**Reference Manual**
00809-0100-4716, Rev JA
May 2008

# Rosemount 3095 MultiVariable™ Mass Flow Transmitter with HART® or FOUNDATION™ Fieldbus Protocol

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# Rosemount 3095 MultiVariable Mass Flow Transmitter

## NOTICE

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

Rosemount Inc. has two toll-free assistance numbers:

**Customer Central**
Technical support, quoting, and order-related questions.

United States - 1-800-999-9307 (7:00 am to 7:00 pm CST)

Asia Pacific- 65 777 8211

Europe/ Middle East/ Africa - 49 (8153) 9390

**North American Response Center**
Equipment service needs.

1-800-654-7768 (24 hours—includes Canada)

Outside of these areas, contact your local Rosemount® representative.

## ⚠CAUTION

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 your local Rosemount Sales Representative.

# Section 1 Introduction

**Using This Manual . . . . . page 1-1**
**Service Support . . . . . page 1-2**

## USING THIS MANUAL

This manual provides installation, configuration, calibration, troubleshooting, and maintenance instructions for the Rosemount® 3095 MultiVariable™ Mass Flow Transmitter and for its operation with the 3095 MultiVariable Engineering Assistant Software.

This manual was developed with the assumption that the user will have a basic understanding of FOUNDATION Fieldbus concepts and wiring practices if needed.

Information is available at www.plantweb.emersonprocess.com/university or check with your system integrator about resources for your specific host system.

The manual consists of the following sections:

**Section 2: Installation**

Explains how to install the 3095. It includes an installation flowchart, installation considerations, and field installation procedure.

**Section 3: HART Commissioning**

Explains how to use the configuration software. This includes installing the software onto a personal computer, establishing communications with the 3095, configuring the transmitter, creating a configuration file, and calibrating the flow transmitter. This section also explains the configuration software menus.

**Section 4: Foundation Fieldbus Configuration**

**Section 5: Troubleshooting**

If a malfunction is suspected, this section describes how to verify that the transmitter hardware and process connections are in good working order.

**Appendix A: Specifications and Reference Data**

Contains specifications, dimensional drawings, and ordering information.

**Appendix B: Product Certifications**

Contains Hazardous Certificates, Factory Mutual (FM) and Canada Standards Association (CSA) certified drawings.

**Appendix C: Critical Alarms for Previous Software Revisions**

**Appendix D: Block Information**

## SERVICE SUPPORT

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

Within the United States, call the Rosemount National 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 name of the process material to which the product was last exposed.

**NOTE**
People who handle products exposed to a hazardous substance can avoid injury if they are informed and understand the hazard. If the product being returned was exposed to a hazardous substance as defined by OSHA, a copy of the required Material Safety Data Sheet (MSDS) for each hazardous substance identified must be included with the returned goods.

The Rosemount National Response Center will detail the additional information and procedures necessary to return goods exposed to hazardous substances.

# Section 2 Installation

**Safety Messages . . . . . page 2-1**
**Installation Flowchart . . . . . page 2-2**
**Receiving and Inspecting . . . . . page 2-2**
**Set the Switches . . . . . page 2-3**
**Considerations . . . . . page 2-4**
**Installation . . . . . page 2-15**

## 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 (⚠). Please refer to the following safety messages before performing an operation preceded by this symbol.

**⚠WARNING**

**Explosions could result in death or serious injury:**

- Do not remove the transmitter cover in explosive atmospheres when the circuit is live.
- Before connecting a 375 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.
- Verify that the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.
- Both transmitter covers must be fully engaged to meet explosion-proof requirements.

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

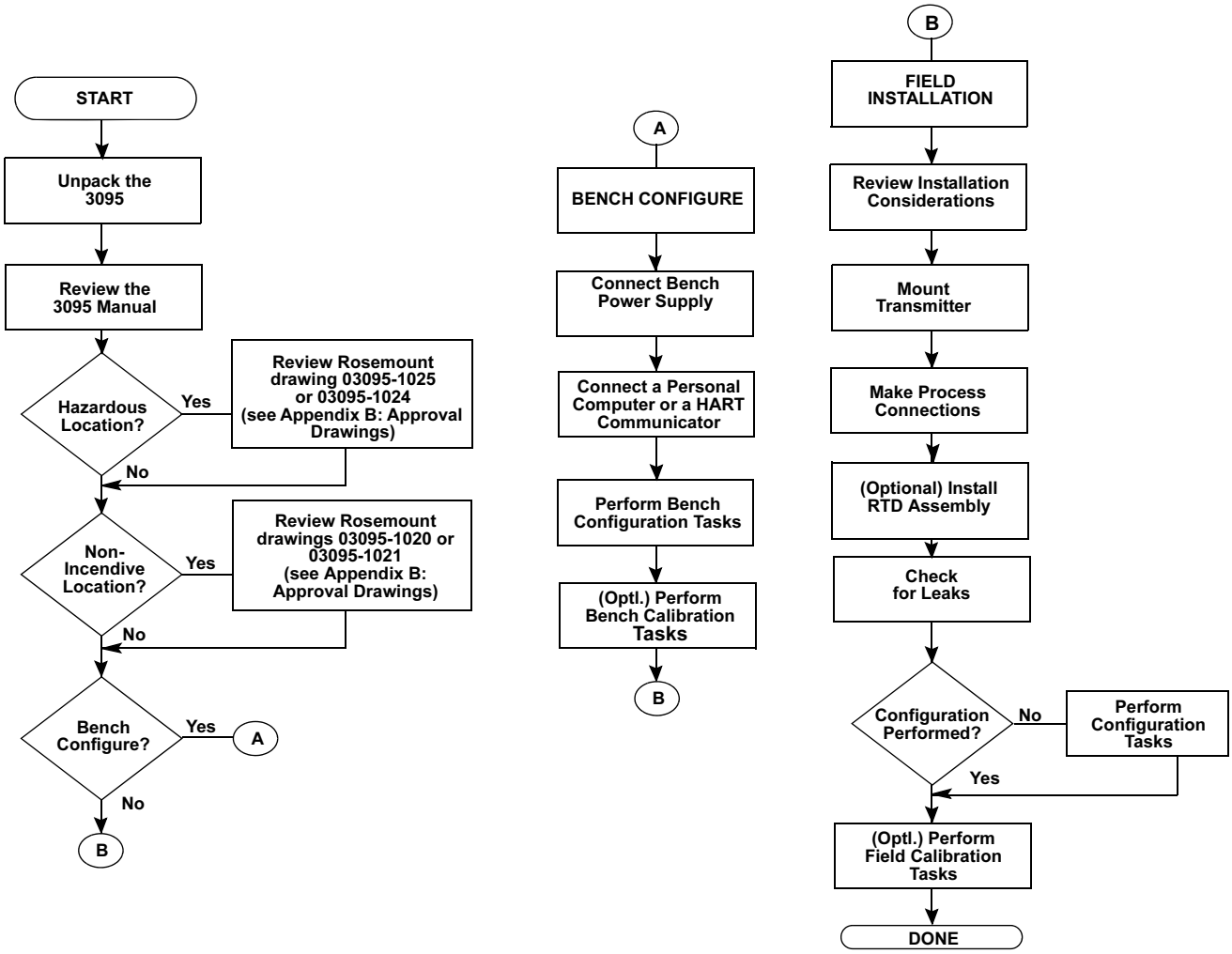
- Make sure only qualified personnel perform the installation.

**Electrical shock could cause death or serious injury. If the sensor is installed in a high-voltage environment and a fault or installation error occurs, high voltage may be present on the transmitter leads and terminals:**

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

**Process leaks can cause death or serious injury**

## INSTALLATION FLOWCHART




## RECEIVING AND INSPECTING

Depending on the system ordered, the 3095 arrives in as many as three different shipping containers:

**3095 MultiVariable Transmitter**
This box contains the 3095 transmitter. If ordered, this package also contains an RTD cable and optional mounting hardware.

**3095 Engineering Assistant Software Package (Accessory)**
The complete Engineering Assistant Software Package includes two installation CD-ROMs and optional HART modem and cables. Engineering Assistant components may also be ordered separately.

**RTD Assembly (Optional)**
This box contains the optional Series 68 or Series 78 RTD Assembly and the Sensor Wiring Instruction Sheet.

Place the shipping containers on a secure bench and open them, taking care not to damage the contents.

- Review the packing list to verify that all equipment was received.
- Inspect the equipment and report any shipping damage to the carrier.
- See “Exploded View of the Rosemount 3095” on page A-9 to verify parts

## SET THE SWITCHES

### Write Protect and Failure Mode Alarm Jumpers (HART)

After the transmitter has been configured, the configuration data can be protected by moving the write protect jumper. When this jumper is installed, the transmitter does not allow any changes to its configuration memory.

As part of its normal operation, the 3095 continuously monitors its own operation. The automatic diagnostic routine is a timed series of checks repeated continuously. If the diagnostic routine detects a failure in a transmitter, the transmitter drives its output either below 3.75 mA or above 21.75 mA depending on the position of the failure mode jumper.

Both of these jumpers are located on the electronics board just inside the electronics housing cover (see Figure 2-1). To avoid exposing the transmitter electronics to the plant environment after installation, set these jumpers during the commissioning stage on the bench.

When shipped from the factory, the write protect jumper is set to “OFF,” and the alarm jumper is set to “High” unless specified differently by ordering the C2 (Custom Configuration) Option Code.

**Failure Mode Alarm vs. Saturation Output Values**

The failure mode alarm output levels differ from the output values that occur when applied pressure is outside the range points. When pressure is outside the range points, the analog output continues to track the input pressure until reaching the saturation value listed below; the output does not exceed the listed saturation value regardless of the applied pressure. For example, for pressures outside the 4–20mA range points, the output saturates at 3.9 mA or 20.8 mA. When the transmitter diagnostics detect a failure, the analog output is set to a specific alarm value that differs from the saturation value to allow for proper troubleshooting.

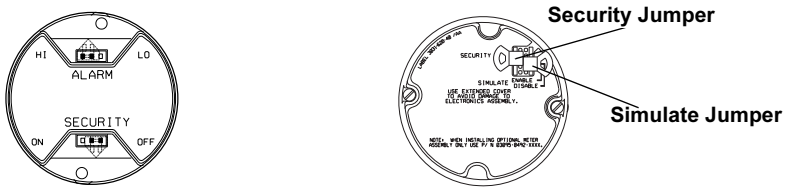
| Level | 4–20 mA Saturation Value | 4–20 mA Alarm Value |
|---|---|---|
| Low | 3.9 mA | 3.75 mA |
| High | 20.8 mA | 21.75 mA |

**NOTE**
The preceding output values can be altered by an analog output trim procedure.

⚠ Use the following steps to change the jumper settings:

1. If the transmitter is installed, secure the loop and remove power.
2. Remove the housing cover opposite the field terminal side.
3. Locate the jumper on the electronics board (see Figure 2-1), then move the jumper to the desired setting.
4. Reattach the transmitter cover. To avoid condensation, metal to metal contact is preferred.
5. If the transmitter is installed, reapply power.

Figure 2-1. Write Protect and Alarm Jumpers (HART) and Security and Simulate Jumpers (FOUNDATION Fieldbus).




**HART Electronics Board** **FOUNDATION fieldbus Electronics Board**

## Security and Simulate Jumpers (FOUNDATION Fieldbus)

### Security

After configuring the transmitter, you may want to protect the configuration data from unwarranted changes. Each transmitter is equipped with a security jumper that can be positioned “ON” to prevent the accidental or deliberate change of configuration data. The jumper is located on the front side of the electronics module and is labeled SECURITY (see Figure 2-1).

### Simulate

The simulate jumper is used in conjunction with the Analog Input (AI) function block. This switch is used to simulate the measurement and is used as a lock-out feature for the AI function block. To enable the simulate feature, insert the jumper across “ENABLE” (see Figure 2-1) while the transmitter is powered.

**NOTE**
When power is cycled to the transmitter, simulate is automatically disabled regardless of the position of the jumper. This prevents the transmitter from being accidentally left in simulate mode. Therefore, to enable the simulate feature, the jumper must be inserted *after* power is applied to the transmitter.

## CONSIDERATIONS

### General

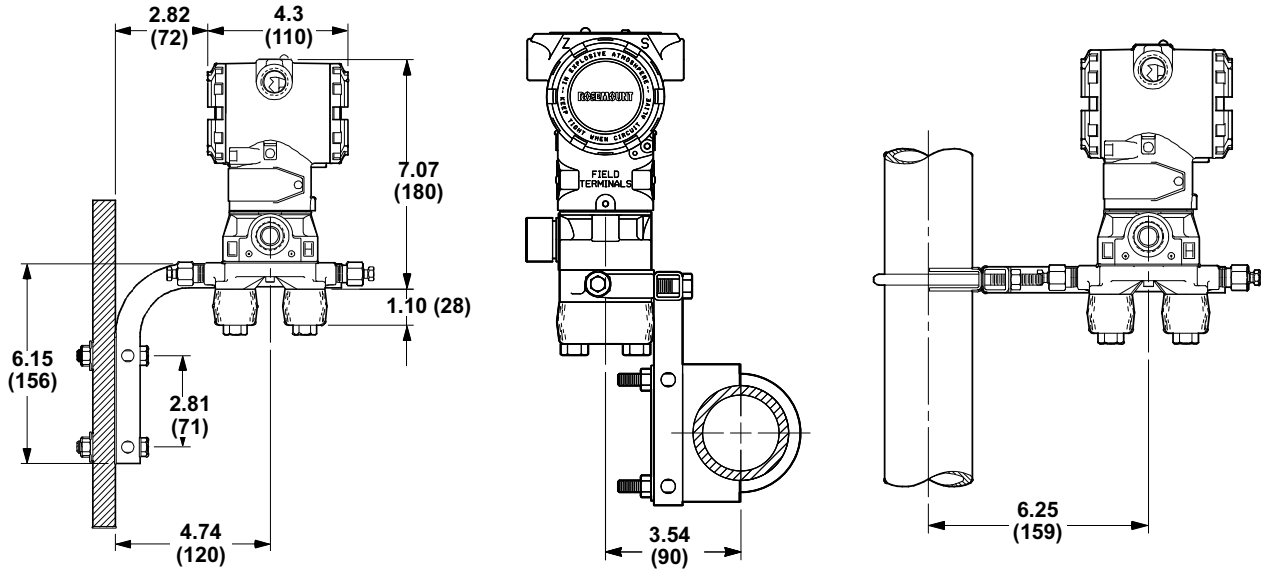
The accuracy of a flow or pressure measurement depends on proper installation of the transmitter and impulse piping. The piping between the process and the transmitter must accurately transfer the pressure in order to obtain accurate measurements. Mount the transmitter close to the process and use minimum impulse piping to achieve best accuracy. Keep in mind the need for easy access, safety of personnel, practical field calibration, and a suitable transmitter environment. In general, install the transmitter to minimize vibration, shock, and temperature fluctuations.

The following paragraphs discuss the factors necessary for a successful transmitter installation.

## Mechanical

The Rosemount 3095 may be panel-mounted, wall-mounted, or attached to a two-inch pipe with an optional mounting bracket. Figure 2-2 illustrates 3095 mounting configurations, “Dimensional Drawings” on page A-9 shows the transmitter dimensions, and Figure 2-3 illustrates example installations.

Figure 2-2. Mounting Configurations.




*Dimensions are in inches (millimeters)*

## Taps

Different measurement conditions require different piping configurations.

### Liquid Flow

For liquid flow measurement, place taps on the side of the line to prevent sediment deposits, and mount the transmitter beside or below these taps so gases can vent into the process line.

### Gas Flow

For gas flow measurement, place taps in the top or side of the line and mount the transmitter beside or above the taps so liquid will drain into the process line.

### Steam Flow

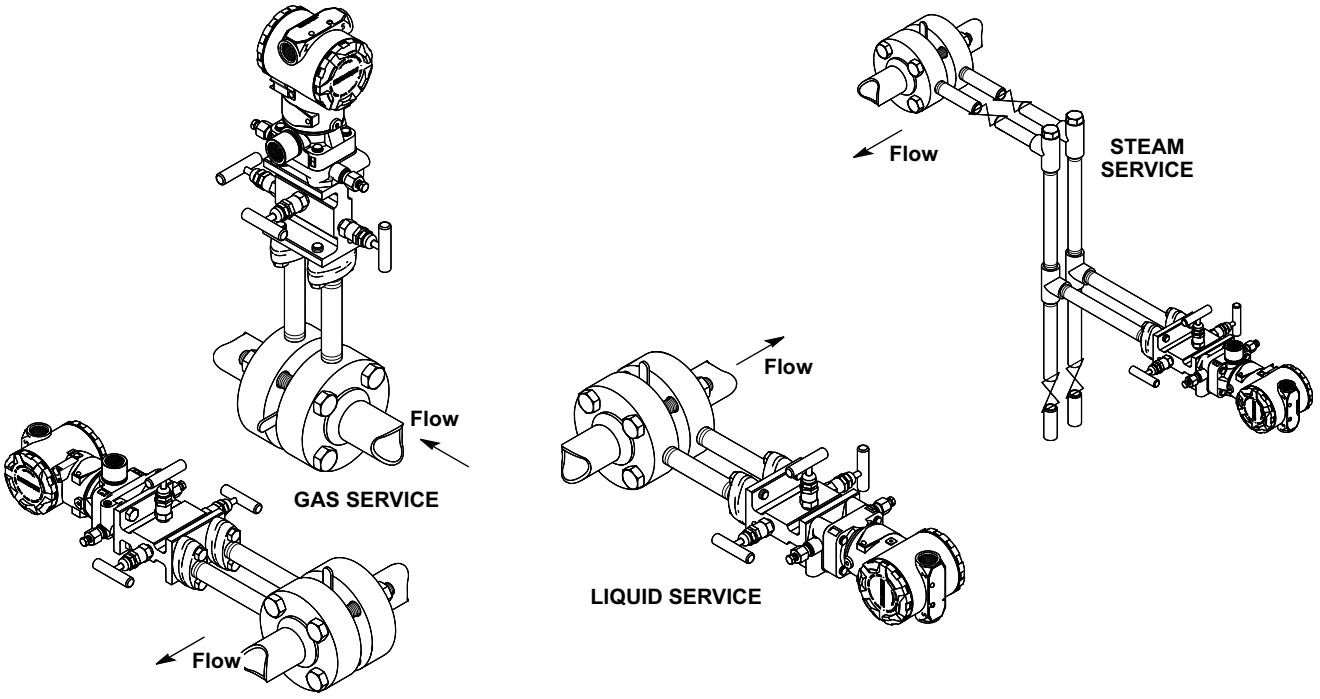
For steam flow measurement, place taps to the side of the line, with the transmitter mounted below the taps to ensure the impulse piping remains filled with condensate.

**NOTE**
When the transmitter is oriented on its side, the Coplanar™ flange may be mounted to ensure proper venting or draining. Mount the flange as shown in Figure 2-3 so that the drain/vent connections are on the bottom half of the flange for gas service, or on the top half of the flange for liquid service.

**⚠CAUTION**

In steam or other elevated temperature services, it is important that temperatures at the coplanar process flanges not exceed 185 °F (85 °C).

Figure 2-3. Example Installations.




**NOTE**
In steam service, lines should be filled with water to prevent contact of the live steam with the transmitter.

## Impulse Piping

Impulse piping, which is the piping between the process and the transmitter, must accurately transfer the pressure in order to obtain accurate measurements. In this pressure transfer, there are five possible sources of error: leaks, friction loss (particularly if purging is used), trapped gas in a liquid line, liquid in a gas line, and temperature-induced or other density variation between the impulse piping.

The best location for the transmitter in relation to the process pipe depends on the process. Consider the following guidelines in determining transmitter location and placement of impulse piping:

- Keep impulse piping as short as possible.
- Slope the impulse piping at least one inch per foot (8 centimeters per meter) upward from the transmitter toward the process connection for liquid.
- Slope the impulse piping at least one inch per foot (8 centimeters per meter) downward from the transmitter toward the process connection for gas.
- Avoid high points in liquid lines and low points in gas lines.
- Make sure both impulse legs are the same temperature.
- Use impulse piping large enough to avoid friction effects and prevent blockage.
- Vent all gas from liquid piping legs.
- When using a sealing fluid, fill both piping legs to the same level.
- When purging is necessary, make the purge connection close to the process taps and purge through equal lengths of the same size pipe.
- Avoid purging through the transmitter.
- Keep corrosive or hot (above 250 °F [121 °C]) process material out of direct contact with the sensor module and flanges.
- Prevent sediment deposits in the impulse piping.
- Keep the liquid head balanced on both legs of the impulse piping.
- Avoid conditions that might allow process fluid to freeze within the process flange.

**NOTE**
For steam service, do not blow down impulse piping through the transmitter. Flush the lines with the blocking valves closed and refill the lines with water before resuming measurement.

## Environmental

Mount the transmitter to minimize ambient temperature changes. “Specifications” on page A-1 lists the transmitter temperature operating limits. Mount the transmitter to avoid vibration and mechanical shock, and to avoid external contact with corrosive materials.

## Access Requirements

When choosing an installation location and position, take into account the need for access to the transmitter.

**Process Flange Orientation**
The process flanges must be oriented so that process connections can be made. In addition, consider the possible need for a testing or calibration input.

**⚠CAUTION**

Drain/vent valves must be oriented so that process fluid is directed away from technicians when the valves are used.

**Housing Rotation**
The electronics housing may be rotated to improve field access to the two compartments. To rotate the housing less than 90 degrees, release the housing rotation set screw and turn the housing not more than 90 degrees from the orientation shown in Figure 2-3 on page 2-6. To rotate the housing greater than 180 degrees, follow the disassembly procedure on page 6-8.

**⚠CAUTION**

Rotating the housing greater than 180 degrees without performing the disassembly procedure may damage the 3095 sensor module.

**Terminal Side of Electronics Housing**

- Wiring connections are made through the conduit openings on the top side of the housing.
- The field terminal side is marked on the electronics housing.
- Mount the transmitter so that the terminal side is accessible. A 0.75-inch (19-mm) clearance is required for cover removal.
- Install a conduit plug in the unused conduit opening.

**Circuit Side of Electronics Housing**
The circuit compartment should not routinely need to be opened when the unit is in service; however, provide 0.75 inches (19 mm) clearance if possible to allow access.

## Process

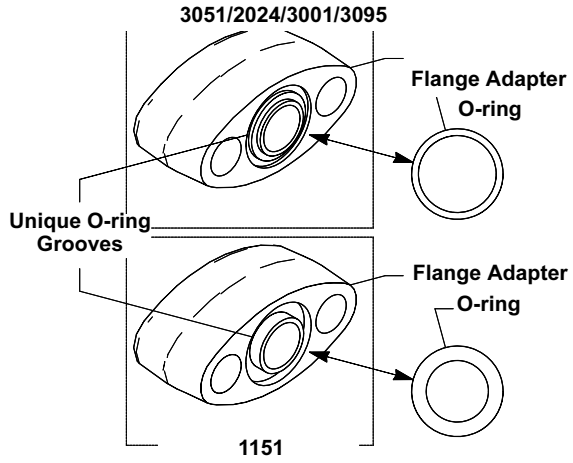
The 3095 process connections on the transmitter flange are $^1/_4$–18 NPT. Flange adapter unions with $^1/_2$–14 NPT connections are available as options. These are Class 2 threads; use your plant-approved lubricant or sealant when making the process connections. The process connections on the transmitter flange are on $2^1/_8$-inch (54-mm) centers to allow direct mounting to a three- or five-valve manifold. By rotating one or both of the flange adapters, connection centers of 2, $2^1/_8$, or $2^1/_4$ inches (51, 54, or 57 mm) may be obtained.

When compressed, Teflon® O-rings tend to cold flow, which aids in their sealing capabilities. Whenever flanges or adapters are removed, visually inspect the Teflon O-rings. Replace them if there are any signs of damage, such as nicks or cuts. If they are undamaged, they can be reused. If the O-rings are replaced, the flange bolts may need to be retorqued after installation to compensate for cold flow.

**⚠WARNING**

Failure to install proper flange adapter O-rings can cause process leaks, which can result in death or serious injury.

There are two styles of Rosemount flange adapters, each requiring a unique O-ring, as shown below. Each flange adapter is distinguished by its unique groove.

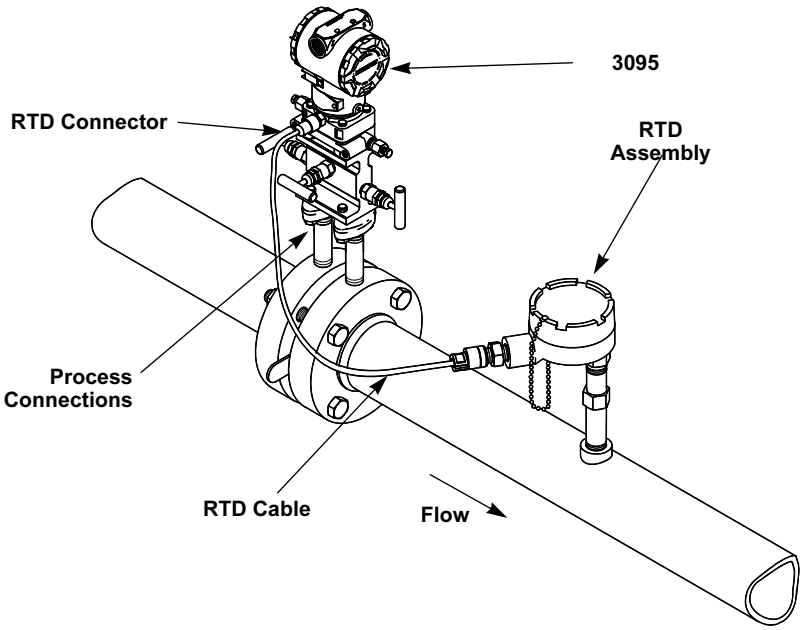



Use only the O-ring designed to seal with the corresponding flange adapter. Refer to the “Spare Parts” on page A-14 for the correct part numbers of the flange adapters and O-rings designed for the 3095 Multivariable Transmitter.

## Mounting

Figure 2-4 illustrates a typical 3095 installation site. Major components of the 3095 System and the 3095 Multivariable Transmitter are identified in these figures.

Figure 2-4. Typical 3095 Installation Site




The 3095 Multivariable Transmitter total weight varies depending on the components ordered (see “Ordering Information” on page A-11). The weight must be securely supported.

Table 2-1. Transmitter Weight

| Component | Weight lb (kg) |
|---|---|
| 3095 Transmitter | 6.0 (2.7) |
| SST Mounting Bracket | 1.0 (0.4) |
| 12 ft (3.66 m) RTD Shielded Cable | 0.5 (0.2) |
| 12 ft (3.66 m) RTD Armored Cable | 1.1 (0.5) |
| 24 ft (7.32 m) RTD Shielded Cable | 1.0 (0.4) |
| 24 ft (7.32 m) RTD Armored Cable | 2.2 (1.0) |
| 75 ft (22.86 m) RTD Shielded Cable | 1.9 (0.9) |
| 75 ft (22.86 m) RTD Armored Cable | 7.2 (3.2) |
| 21 in (53 cm) RTD Armored Cable | 0.5 (0.2) |
| 12 ft (3.66 m) RTD CENELEC Cable | 2.1 (0.9) |
| 24 ft (7.32 m) RTD CENELEC Cable | 3.0 (1.4) |
| 75 ft (22.86 m) RTD CENELEC Cable | 7.1 (3.2) |
| 21 in (53 cm) RTD CENELEC Cable | 1.2 (0.5) |

### Mounting Brackets

Optional mounting brackets available with the 3095 facilitate mounting to a panel, wall, or 2-in. (51-mm) pipe. The bracket option for use with the Coplanar flange is 316 SST with 316 SST bolts.

When installing the transmitter to one of the mounting brackets, torque the bolts to 125 in-lb (14 n-m).

### Mounting Pressure Effect

To correct for mounting position effects, the 3095 should be zero trimmed, using the zero trim procedure described on page 3-13.

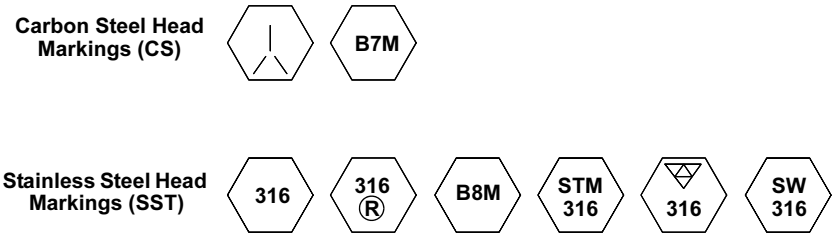
## Bolt Installation Guidelines

The following guidelines have been established to ensure a tight flange, adapter, or manifold seal. Use only bolts supplied with the transmitter or sold by Rosemount Inc. as a spare part to the 3095 transmitter.

The 3095 is shipped with the Coplanar flange installed with four 1.75-inch (44-mm) flange bolts. The following bolts also are supplied to facilitate other mounting configurations:

- Four 2.25-inch (57-mm) manifold/flange bolts for mounting the Coplanar flange on a three-valve manifold. In this configuration, the 1.75-inch (44-mm) bolts may be used to mount the flange adapters to the process connection side of the manifold.
- (Optional) If flange adapters are ordered, four 2.88-inch (73-mm) flange/adapter bolts for mounting the flange adapters to the Coplanar flange.

Stainless steel bolts supplied by Rosemount Inc. are coated with a lubricant to ease installation. Carbon steel bolts do not require lubrication. Do not apply additional lubricant when installing either type of bolt. Bolts supplied by Rosemount Inc. are identified by the following head markings:




## Hazardous Locations

The Rosemount 3095 has an explosion-proof housing and circuitry suitable for intrinsically safe and non-incendive operation. Individual transmitters are clearly marked with a tag indicating the certifications they carry. See Appendix A: Specifications and Reference Data for specific approval categories. See Appendix B: Product Certifications for installation drawings.

## Electrical (HART)

The signal terminals are located in a compartment of the electronics housing separate from the transmitter electronics.

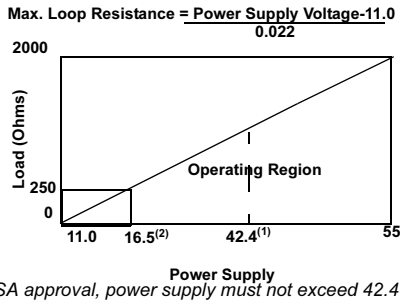
### Power Supply

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. Note that the resistance of intrinsic safety barriers, if used, must be included.

**NOTE**
A loop resistance between 250–1100 ohms inclusive is required to communicate with a personal computer. With 250 ohms of loop resistance, a power supply voltage of at least 16.5 V dc is required. (1)

If a single power supply is used to power more than one 3095 transmitter, the power supply used, and circuitry common to the transmitters, should not have more than 20 ohms of impedance at 1200 Hz.

Figure 2-5. Power Supply Load Limitations.




*(1) For CSA approval, power supply must not exceed 42.4 V dc.*
*(2) HART protocol communication requires a loop resistance value between 250-1100 ohms, inclusive.*

## Electrical (FOUNDATION Fieldbus)

Proper electrical installation is necessary to prevent errors due to improper grounding and electrical noise. Shielded, twisted pair cable should be used for best results in electrically noisy environments. Cable Type A is recommended by FOUNDATION fieldbus.

**NOTE**
After a device labeled with multiple approval types is installed, it should not be reinstalled using any of the other labeled approval types. To ensure this, the approval label should be permanently marked to distinguish the used from the unused approval type(s).

### Field Wiring

⚠ All power to the transmitter is supplied over the signal wiring. For best installation practices, use a fieldbus type A cable. Do not run unshielded signal wiring in conduit or open trays with power wiring or near heavy electrical equipment. Do not remove the transmitter cover in explosive atmospheres when the circuit is alive.

*(1) Quick troubleshooting check: There must be at least 11.0 V dc across the transmitter terminals.*

**NOTE**
Do not apply high voltage (e.g. ac line voltage) to the transmitter terminals. Abnormally high voltage can damage the unit.

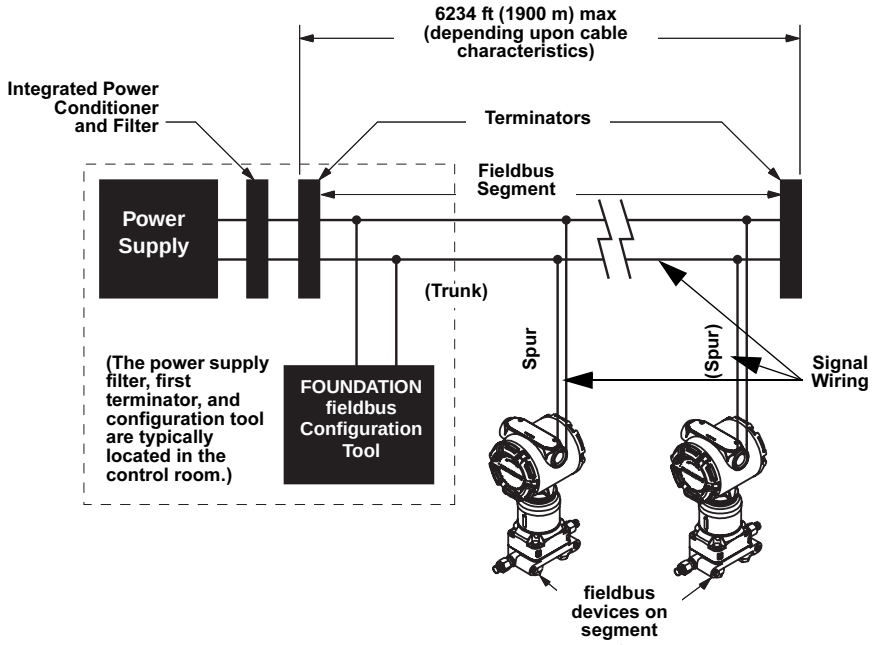
### Grounding

Signal wiring of the fieldbus segment cannot be grounded. Grounding out one of the signal wires will shut down the entire fieldbus segment.

### Shield Wire Ground

To protect the fieldbus segment from noise, grounding techniques for shield wire usually require a single grounding point for shield wire to avoid creating a ground loop. The ground point is typically at the power supply.

Figure 2-6. FOUNDATION Fieldbus Wiring Connections

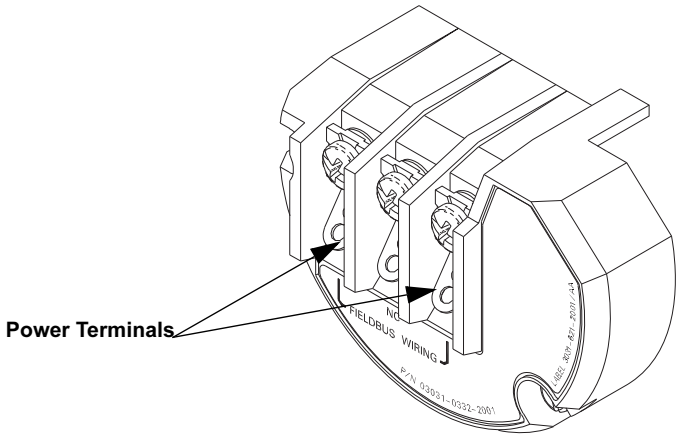



***Intrinsically safe installations may allow fewer devices per I.S. barrier due to current limitations.**

### Power Connections

Use ordinary copper wire of sufficient size to ensure that the voltage across the transmitter power terminals does not go below 9 V dc. To power the transmitter, connect the power leads to the terminals marked “FIELDBUS WIRING” as shown in Figure 2-7. The power terminals are polarity insensitive, which means the electrical polarity of the power leads does not matter when connecting to the power terminals. When wiring to screw terminals, the use of crimped lugs is recommended. Tighten the terminal screws to ensure adequate contact.

Figure 2-7. FOUNDATION Fieldbus Transmitter Terminal Block




**NOTE**
Do not ground out the live signal wiring to the housing when working on a segment. Grounding the communication wires may result in temporary loss of communication with all devices on the segment.

## Grounding the Transmitter Housing

Always ground the transmitter case in accordance with national and local electrical codes. The most effective transmitter case grounding method is a direct connection to earth ground with minimal impedance. Methods for grounding the transmitter case include:

- **Internal Ground Connection:** The Internal Ground Connection screw is inside the FIELD TERMINALS side of the electronics housing. The screw is identified by a ground symbol (⏚), and is standard on all 3095 transmitters.
- **External Ground Assembly:** This assembly is included with the optional transient protection terminal block (Option Code T1), and it is included with CESI/CENELEC Flameproof Certification (Option Code E8), BASEEFA/CENELEC Intrinsic Safety Certification (Option Code I1), and BASEEFA/CENELEC Type N Certification (Option Code N1). The External Ground Assembly can also be ordered with the transmitter (Option Code V5), or as a spare part (03031-0398-0001).

**NOTE**
Grounding the transmitter case using the threaded conduit connection may not provide a sufficient ground. The transient protection terminal block (Option Code T1) does not provide transient protection unless the transmitter case is properly grounded. Use the above guidelines to ground the transmitter case. Do not run transient protection ground wire with signal wiring; the ground wire may carry excessive current if a lightning strike occurs.

## Surges/Transients

The transmitter will withstand electrical transients of the energy level usually encountered in static discharges or induced switching transients. However, high-energy transients, such as those induced in wiring from nearby lightning strikes, can cause damage to the transmitter.

## Optional Transient Protection Terminal Block

The transient terminal block can be ordered as an installed option (Option Code T1 in the transmitter model number) or as a spare part to retrofit existing 3095 transmitters in the field. See “Spare Parts List” on page A-14.

### Installation

When the transient protection terminal block is ordered as a spare part, it must be installed in place of the standard terminal block inside the transmitter housing. See “Removing the Electrical Housing” on page 5-8.

**NOTE**
The transient protection terminal block provides transient protection only if the transmitter housing is properly grounded. See “Grounding the Transmitter Housing” on page 2-14.

### Performance

The transient protection terminal block increases the ability of the 3095 transmitter to withstand electrical transients induced by lightning, welding, or heavy electrical equipment. With the transient protection block installed, the 3095 transmitter meets the standard performance specifications as outlined in this product manual. In addition, the transient protection circuitry meets IEEE Standard 587, Category B and IEEE Standard 472, Surge Withstand Capability.

# INSTALLATION

## Equipment

The following equipment and tools are not provided with the 3095 transmitter. Be sure to review the list prior to field installing the transmitter.

- Installation tools
- Field wire between the power supply and the 3095 transmitter
- Barriers or seals required for hazardous locations
- Conduit
- 2-in. (50.8 mm) mounting pipe or saddles
- Power supply
- 3- or 5-valve manifolds, unless otherwise specified
- Impulse piping
- Tie wraps

Use the following steps to successfully install the 3095 transmitter.

1. Review the installation considerations described on “Considerations” on page 2-4 to determine the location for the 3095 transmitter.

## Mount Transmitter and Install Bolts

2. Mount the 3095 in the desired location, and install flange or flange/adaptor bolts.
   a. Finger-tighten the bolts.
   b. Torque the bolts to the initial torque value using a cross-pattern (see Table 2-2).
   c. Torque the bolts to the final torque value using the same cross-pattern.

Table 2-2. Bolt Installation Torque Values.

| Bolt Material | Initial Torque Value | Final Torque Value |
|---|---|---|
| Carbon Steel (CS) | 300 in-lb (34 n-m) | 650 in-lb (73 n-m) |
| Stainless Steel (SST) | 150 in-lb (17 n-m) | 300 in-lb (34 n-m) |

**NOTE**
Only use bolts supplied with the 3095 or sold by Rosemount Inc. as a spare part to the 3095. Unauthorized parts can affect product performance and may render the instrument dangerous.

When installing the transmitter to one of the mounting brackets, torque the mounting bracket bolts to 125 in-lb (14 n-m).

**NOTE**
All four flange bolts must be installed and tight before applying pressure, or process leakage will result. When properly installed, the flange bolts will protrude through the top of the module housing. Attempting to remove the flange bolts while the transmitter is in service will result in leakage of the process fluid.

## Process Connections

3. Connect the transmitter to the process.

## Install RTD Assembly (optional)

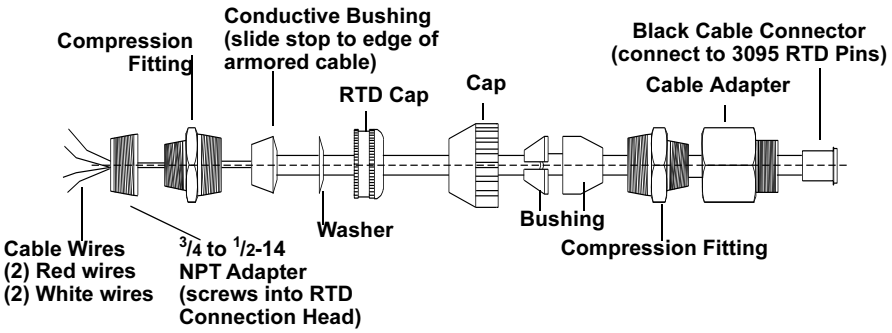
4. (Optional) Install the Series 68 or Series 78 RTD Assembly.

**NOTE**
To meet ISSep/CENELEC Flameproof certification, only European Flameproof Cable Assemblies (Process Temperature Input Codes A, B, or C) may be used for RTD cable installation.

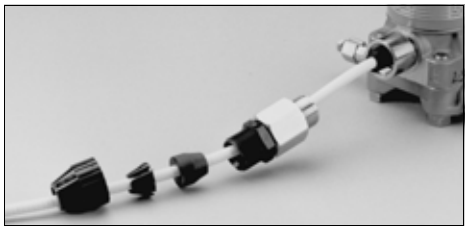
a. Mount the RTD Assembly in the desired location. Refer to the appropriate primary element standard concerning recommended RTD installation location.

b. Connect the RTD cable (optional) to the 3095 RTD connector. All RTD 3095 Cable assemblies use the 3095 RTD cable connector. Identify the cable type being installed and follow the steps below.

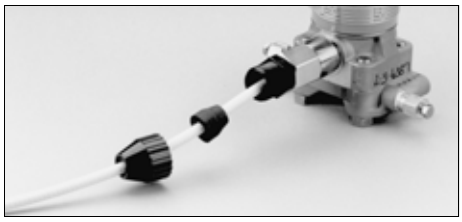
Figure 2-8. Armored Shielded RTD Cable Assembly




First, fully engage the black cable connector to the 3095 RTD connector pins.



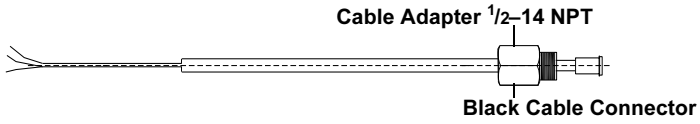
Second, screw in and tighten the cable adapter until metal to metal contact occurs. Install compression fitting.



Third, use pliers to screw in and tighten the strain relief cap onto the compression fitting.

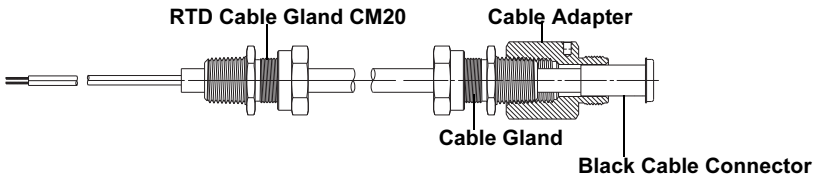
- Installing a Shielded 3095 RTD Cable (intended for use in a conduit)
  a. Fully engage the black cable connector to the 3095 RTD Connector (see Figure 2-9).
  b. Tighten the cable adapter until metal contacts metal (see Figure 2-9).

Figure 2-9. Shielded RTD Cable




- Installing a CENELEC Flameproof 3095 RTD Cable
  a. Fully engage the black cable connector to the 3095 RTD Connector (see Figure 2-10).
  b. Tighten the cable adapter and cable gland until metal contacts metal (see Figure 2-10).

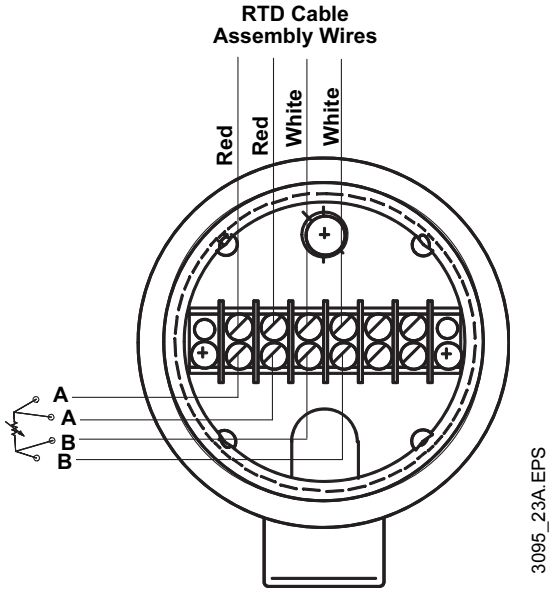
Figure 2-10. CENELEC Flameproof RTD Cable




  c. Make all necessary wiring connections inside the RTD Flat Connection Head as explained in the Sensor Wiring Instructions included with the RTD.

Figure 2-11 illustrates typical wiring configuration of the Rosemount RTC Cable Assembly to a 4-wire RTD.

Figure 2-11. RTD Sensor Wiring Diagram



## Check for Leaks

5. Check all process penetrations for leaks.

## Power and Signal Wiring

6. Make field wiring connections (see Figure 2-6 or Figure 2-12). These connections provide both power and signal wiring.

**⚠WARNING**

For explosion-proof installations, wiring connections must be made in accordance with Rosemount drawing 03095-1025 or 03095-1024.

For instrinsically safe installations, wiring connections must be made in accordance with ANSI/ISA-RP12.6, and Rosemount drawings 03095-1020 or 03095-1031.

For **ALL** installations, wiring connections must be made in accordance with local or national installation codes such as the NEC NFPA 70.

**NOTES**
- Do not run field wiring in conduit or open trays with other power wiring, or near heavy electrical equipment.
- Field wiring need not be shielded, but use twisted pairs for best results.
- To ensure communication, wiring should be 24 AWG or larger and not exceed 5,000 feet (1,500 meters).
- For connections in ambient temperatures above 140 °F (60 °C), use wiring rated for at least 194 °F (90 °C).

a. Remove the cover on the side marked FIELD TERMINALS on the electronics housing.

b. Connect the lead that originates at the positive side of the power supply to the terminal marked “+ SIG” or “+ PWR.” Be sure to include loop resistance.

**NOTE**
Incorrect field wiring connections may damage the 3095. Do not connect field wiring to the “TEST +” terminals.

c. Connect the lead that originates at the negative side of the power supply to the terminal marked “–.”

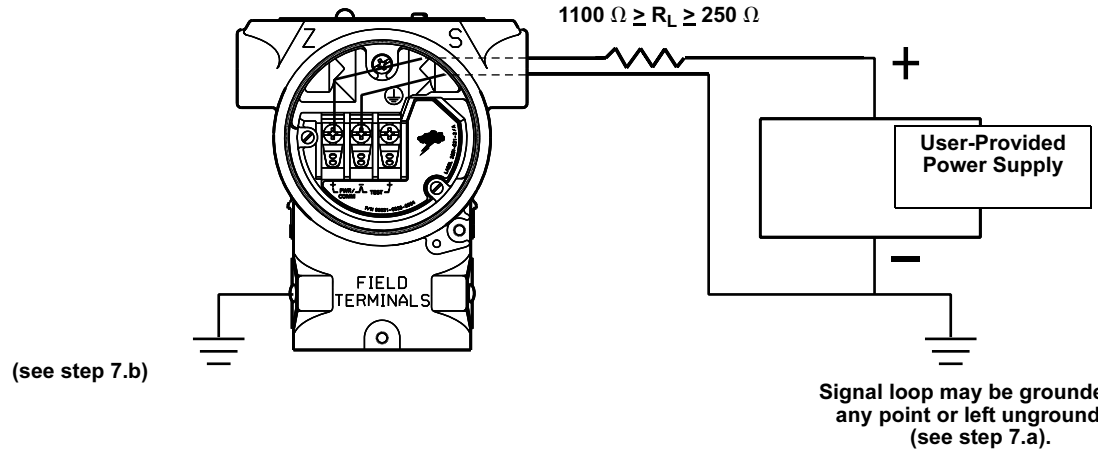
d. Plug and seal unused conduit connections on the transmitter housing to avoid moisture accumulation in the terminal side of the housing.

**NOTE**
If the conduit connections are not sealed, mount the transmitter with the electrical housing positioned downward for drainage. Conduit should be installed with a drip loop, and the bottom of the drip loop should be lower than the conduit connections or the transmitter housing.

## Grounding

7. Install field wiring ground (optional), and ground the transmitter case (required).

Figure 2-12. HART Wiring Connections.




**Field Wiring Ground**

a. Field wiring may be grounded at any one point on the signal loop, or it may be left ungrounded. The negative terminal of the power supply is a recommended grounding point.

**Ground the Transmitter Case**

b. The transmitter case should always be grounded in accordance with national and local electrical codes. The most effective transmitter case grounding method is direct connection to earth ground with minimal impedance. Methods for grounding the transmitter case include:

- External Ground Assembly: This assembly is included with the transient protection terminal block. The External Ground Assembly can also be ordered as a spare part (see “Spare Parts List” on page A-14).
- Internal Ground Connection: Inside the FIELD TERMINALS side of the electronics housing is the Internal Ground Connection screw. This screw is identified by a ground symbol ⏚

**NOTE**
The transient protection terminal block does not provide transient protection unless the transmitter case is properly grounded. Use the above guidelines to ground the transmitter case.

Do not run the transient protection ground wire with field wiring as the ground wire may carry excessive current if a lighting strike occurs.

Grounding the transmitter case using threaded conduit connection may not provide sufficient ground.

8. Replace the cover.

# Section 3 HART Commissioning



**Safety Messages . . . . . page 3-1**
**Engineering Assistant Software . . . . . page 3-2**

## 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 (⚠). Please refer to the following safety messages before performing an operation preceded by this symbol.

**⚠WARNING**

**Explosions could result in death or serious injury:**

- Do not remove the transmitter cover in explosive atmospheres when the circuit is live.
- Before connecting a 375 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.
- Verify that the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.
- Both transmitter covers must be fully engaged to meet explosion-proof requirements.

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

- Make sure only qualified personnel perform the installation.

**Electrical shock could cause death or serious injury. If the sensor is installed in a high-voltage environment and a fault or installation error occurs, high voltage may be present on the transmitter leads and terminals:**

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

**Process leaks can cause death or serious injury**

## ENGINEERING ASSISTANT SOFTWARE

The 3095 Engineering Assistant (EA) Software is a PC-based software package. The EA Software lets you configure the 3095 Multivariable Mass Flow Transmitter and 3095 Multivariable Mass Flowmeters.

The EA Software is available as a Snap-On application to AMS 6.0 and newer, or as Stand-Alone Software powered by AMS. The EA Software performs configuration, maintenance, and diagnostics functions, and serves as the primary communications interface to the 3095 transmitter and 3095 Mass Flowmeters.

### Installation and Initial Setup

The following are the minimum system requirements to install the 3095 Engineering Assistant Software:

- IBM-compatible PC
- Pentium 800 MHz personal computer or above
- Operating System: Microsoft© Windows™ NT, 2000 or XP
- 512 MB RAM
- 350MB of available hard disk space
- CD-ROM
- 800 x 600 256 color display

**NOTE**
The available hard disk space specified above is the amount needed for software installation, not the amount needed for operation (disk space needed will vary from network to network depending on configuration, number of devices, etc.).

#### Installing the 3095 MultiVariable Engineering Assistance Software

The EA Software package is available with or without the HART modem and connecting cables. The complete EA package contains the EA software CD-ROM, and one HART modem with cables for connecting the computer to the 3095. Optional USB HART Modem and cables include separate software to install USB HART modem drivers. Install USB HART Modem drivers following the instructions provided with the modem. Install USB HART Modem drivers prior to beginning the EA software installation.

1. For Stand-Alone users, install the 3095 Engineering Assistant software by clicking on the “setup.exe” file located on the CD-ROM.
2. For Snap-On users, AMS is a two CD-ROM series with the 3095 Engineering Assistant on the second disk. After installing AMS, install the 3095 Engineering Assistant software by clicking on the “setup.exe” file located on the second CD-ROM.
3. A series of screens (called the “Installation Wizard”) will appear and assist in the installation process. Follow the on-screen instructions. It is recommended that the default settings on the PC are used.
4. The system will reboot. Installation will continue until the “Finished” prompt appears.

**NOTE**
For AMS users, AMS must be installed and activated by submitting the proper license codes before EA can be launched as a Snap-On option.

### Installing the HART Modem

After the EA Software has been installed, the HART modem device driver must be installed and configured. The HART modem Installation Wizard automatically appears when the 3095 EA Software is launched. If the wizard does not automatically launch, you can configure the modem by accessing the AMS Network Configuration screen.

If using a HART USB Modem, the modem drivers must be installed prior to configuring the HART Modem. The USB Modem drivers can be installed by following the instructions for the software provided with the HART USB Modem.

**For AMS Snap-On users:**

1. Click on the Windows “Start” button.
2. Click on “All Programs.”
3. Click on the “AMS” folder.
4. Click on the “AMS Configuration” icon.

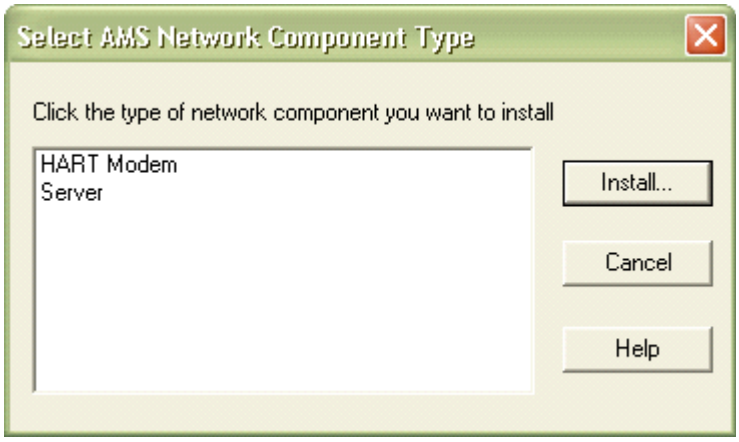
**For EA Stand-Alone users:**

1. Click on the Windows “Start” button.
2. Click on “All Programs.”
3. Click on the “Engineering Assistant” Folder.
4. Click on the “AMS Network” icon.

**Once the Install Wizard is open, the HART modem can be installed.**

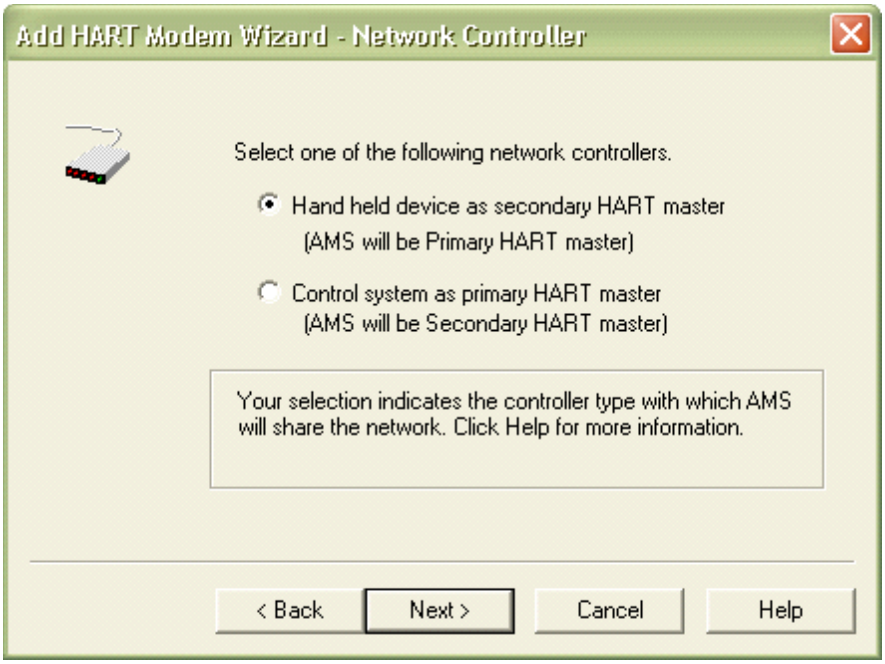
1. Click on the “Add” button.
2. Select “HART Modem” and click the “Install…” button.

Figure 3-1. HART Modem Installation



3. Specify a name for the HART Modem. The default is “HART Modem 1.” Click “Next.”
4. Specify whether AMS will act as a primary or secondary HART master for configuration (See Figure 3-2). If performing a bench configuration, it is recommended to choose “Hand held device as a secondary HART master (AMS will be Primary HART master)”. For field configurations where the instrument is powered by a HART protocol control system, selecting the second choice is recommended in order to prevent HART communication conflicts between AMS and the HART control system. Click “Next.”

Figure 3-2. HART Modem Installation

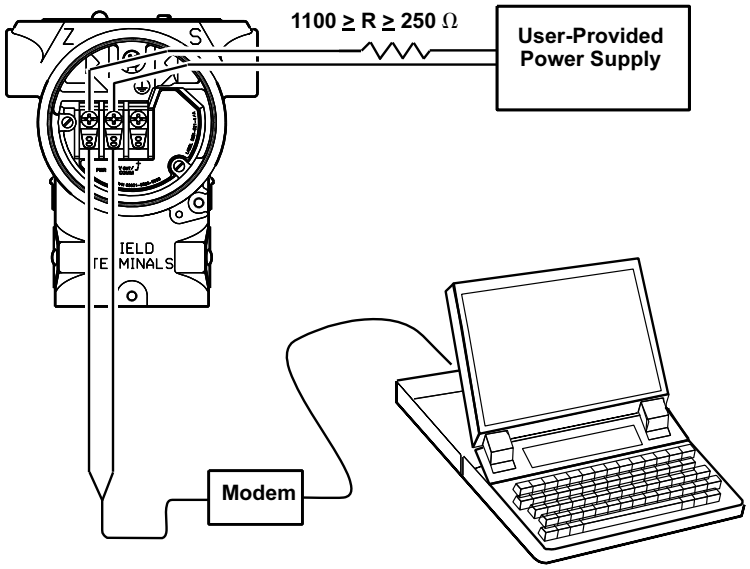



5. Select the PC COM Port for the HART Modem. Click “Next.”
6. If more than one device will be connected to the HART modem at the same time (such as a Rosemount 333 Tri-Loop), select the “Multi Drop” check box and then select a scan address range. (Limiting the address range to 0-2 will improve response time.) Click “Finish” to complete the HART modem configuration.
7. After configuring the HART modem in the AMS network window, access the HART modem properties screen again and select the “Connection” tab. Set the “Retry Count” to a value of 6.

### Connecting to a Personal Computer

Figure 3-3 shows how to connect a computer to a 3095.

Figure 3-3. Connecting a PC to the 3095




1. Power the device as outlined in Section 2.
2. Connect the 9-pin HART modem cable to the 9-pin serial communications port on the PC.

**NOTE**
If your PC does not have a 9-pin serial port, you will need a USB-HART modem, PN 03095-5105-0002.

3. On the side marked “Field Terminals,” connect the modem mini-grabbers to the two terminals marked “Comm.”
4. Launch the 3095 Engineering Assistance Software.

**NOTE**
It may be necessary to access the COM port properties on your PC. In the advanced port settings, adjust the receive buffer to its lowest setting (1) and re-boot the computer to apply the change.

a. For AMS Snap-On users:
   1. Click on the Windows “Start” button.
   2. Click on “All Programs.”
   3. Click on the “AMS” folder.
   4. Click on the “AMS System” icon.

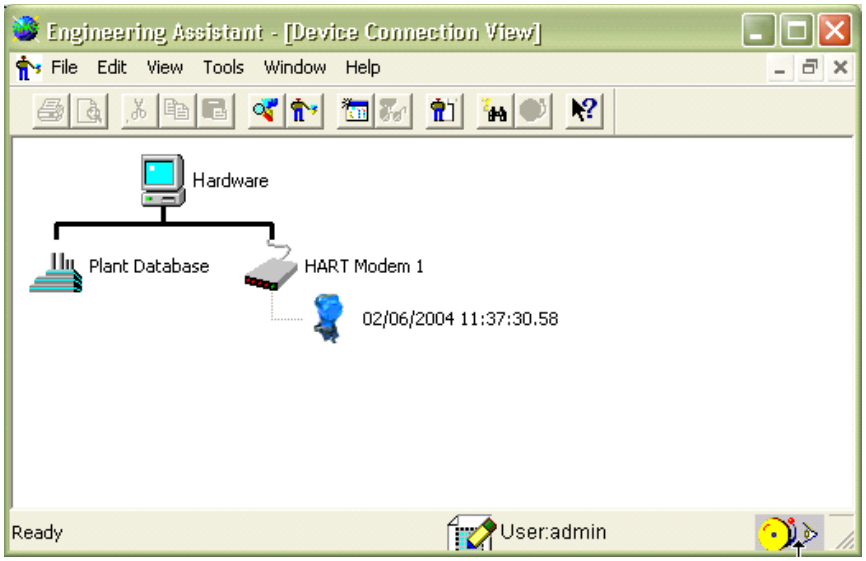
b. For EA Stand-Alone users:
   1. Click on the Windows “Start” button.
   2. Click on “All Programs.”
   3. Click on the “MV Engineering Assistant” folder.
   4. Click on the “MV Engineering Assistant” icon.

5. Enter username and password and click “OK” to log on to the software (see Figure 3-4). Once you are logged on, you will be taken to the default “Device Connection View,” which shows all devices which are currently online (see Figure 3-5).

**NOTE**
The default username is “admin” (lowercase) with a blank password.

Figure 3-4. Software Login.

Figure 3-5. Device Connection View




## Basic Navigation

The 3095 Engineering Assistant lets you navigate through the software in a variety of ways. When first logging onto the system, the default screen is the Device Connection View (Figure 3-5). You will be able to see all devices which are connected to the network.

**NOTE**
If Device Connection View does not appear, go to File_Properties. In the Properties window, select “Device Connection View” as the default browser. Then, click on the Device/AMS Sync tab and de-select the Automatic Sync Function. Click “Apply”.

### Menu Categories

**File**:The File menu contains screens to configure the overall host system, including AMS settings and user login.

**Edit**: The Edit menu contains standard Cut and Paste commands.

**View**: The View menu is used to change the type of graphical interface you are currently working with.

**Tools**: The Tools menu does not contain any applications for the 3095 Engineering Assistant software

**Window**: The Window menu can be used to manage all of the various windows and applications currently open.

**Help**: The Help menu accesses the online assistance guide for the AMS Interface/3095 EA software.

### Tool Bar

Another fast way to navigate through the 3095 Engineering Assistance Software is by using the toolbar (see Figure 3-6).

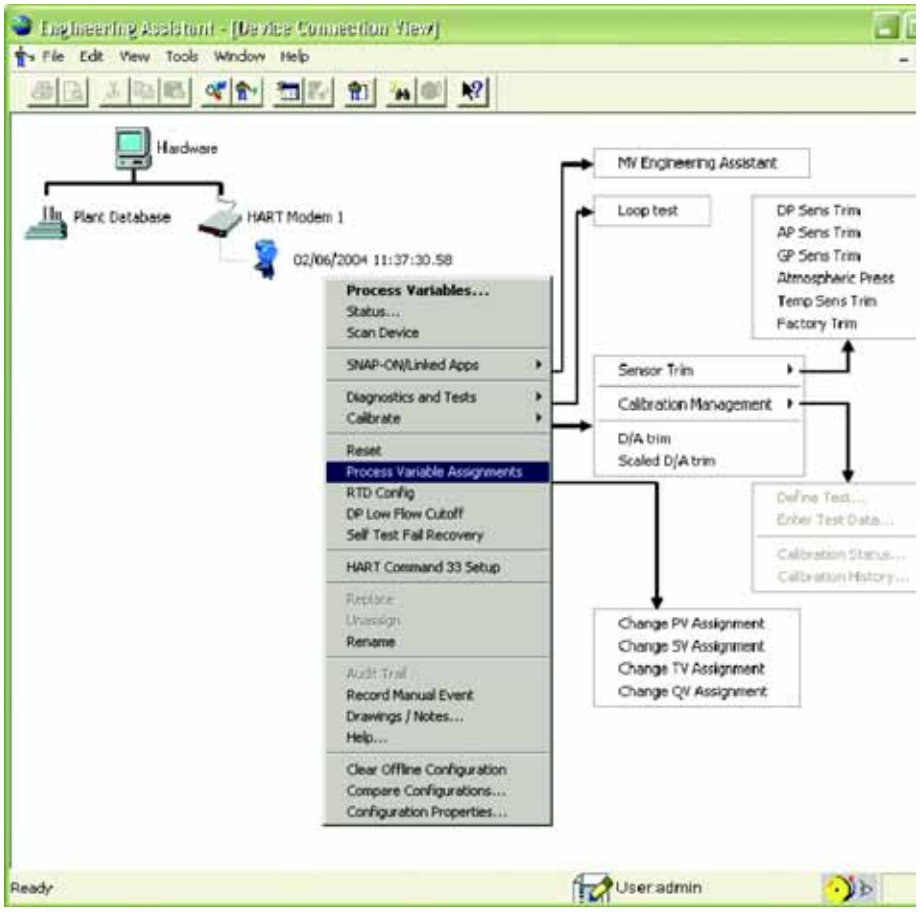
Figure 3-6. Toolbar Icons

## Procedures

In both Snap-On and Stand-Alone versions of the 3095 Engineering Assistant Software, most of the device parameters can be accessed by right-clicking on the transmitter icon (See Figure 3-7 below). To access flow configuration, right-click on the transmitter icon and select 3095 Engineering Assistant or SNAP-ON Linked Apps/3095 Engineering Assistant. More information on completing a flow configuration using the 3095 Engineering Assistant begins on page 3-33.

**NOTE**
Some of the links found when right-clicking on the transmitter icon (see Figure 3-7) may have different titles or may be absent, depending on which version (SNAP-ON or Stand-Alone) of the 3095 Engineering Assistant is running, and depending on the revision level version of the device and the device driver file.

Figure 3-7. Transmitter Links



### Process Variables…

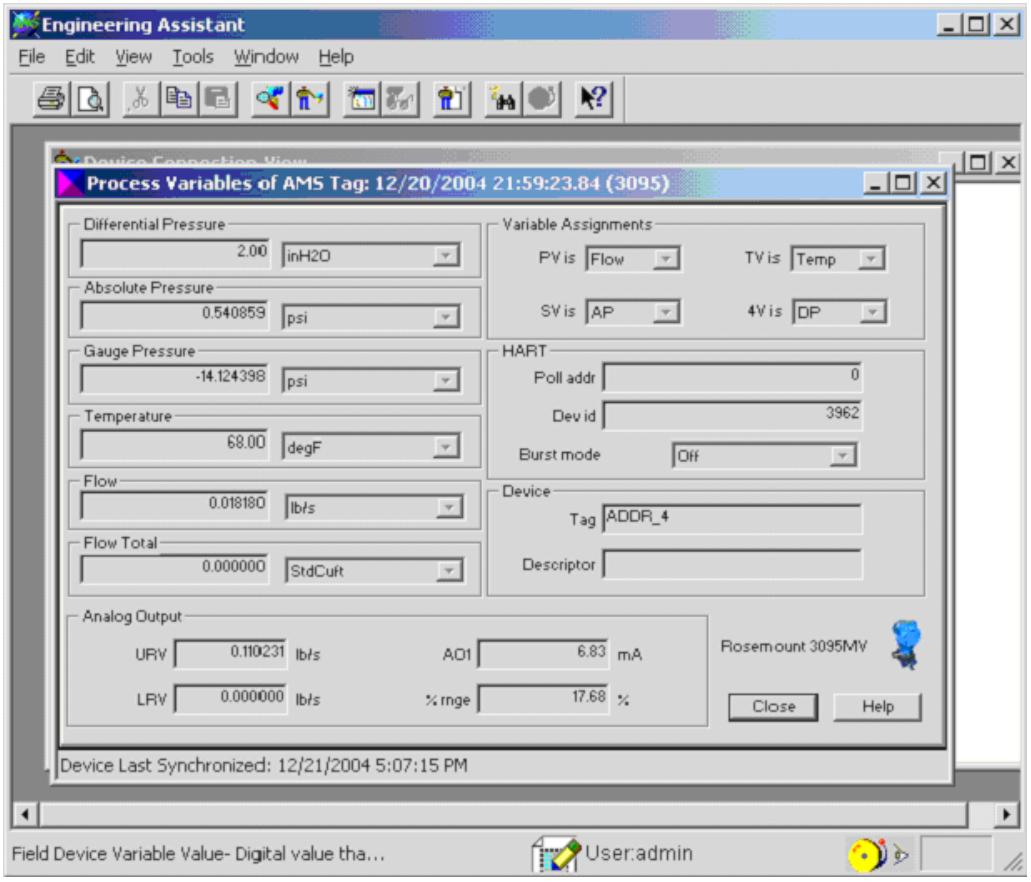
The “Process Variables…” link displays the current reading of the process variables measured by the 3095. In the “Process Variables…” window, variables are automatically updated every 2-3 seconds. All values on the screen are read-only.

1. Right-click on the transmitter icon.
2. Select “Process Variables…” from the pop-up menu.

The following process variables are viewable on the “Process Variables…” window (see Figure 3-8):

- Absolute/Gage Pressure
- Differential Pressure
- Temperature
- Flow Rate
- Flow Total
- Analog Output (4-20mA)

Figure 3-8. Process Variables Window (with 3095 Device Driver File DD2 Rev 3)

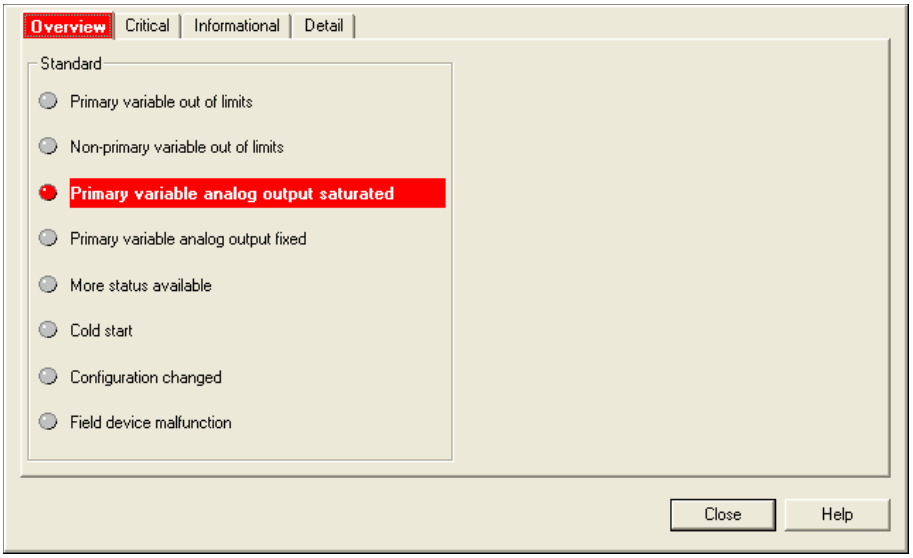


### Status…

The “Status…” link displays a list of the transmitter errors, alarms, and failures. If a status flag is triggered, it is highlighted in red.

1. Right-click on the transmitter icon.
2. Select “Status…” from the pop-up menu.

Figure 3-9. Transmitter Status screen




### Scan Device

The “Scan Device” function synchronizes the transmitter with the host system, updating all parameters, readings, etc.

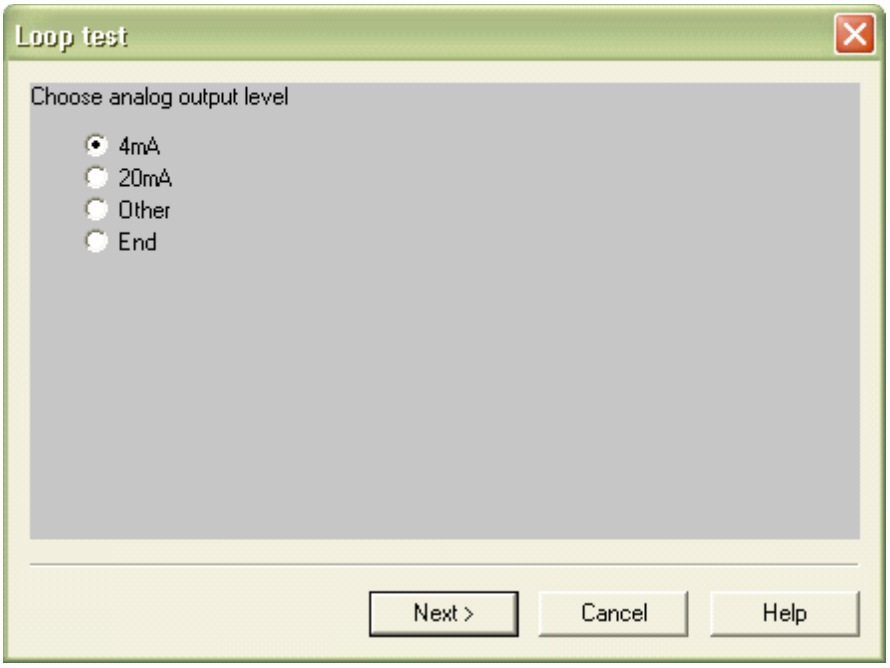
1. Right-click on the transmitter icon.
2. Select “Scan Device” from the menu.

### Diagnostics and Tests

The “Loop Test” application, found under the “Diagnostics and Tests” link, verifies the 4-20mA output of the 3095. The user can manually set the transmitter output current and then verify the actual loop current using an Amp meter.

1. Right-click on the transmitter icon.
2. Highlight “Diagnostics and Tests” from the pop-up menu.
3. Select “Loop Test” from the submenu.
4. Read the warning message and click “Next.”
5. Select the analog output level for the transmitter and click “Next.” If “Other” is chosen, another screen appears allowing you to specify the output current (see Figure 3-10).
6. Measure the output current with an Amp meter and compare with the expected output current. If a correction trim is needed, it will be done as a D/A trim in the calibration functions (see page 3-17).
7. When finished, select “End” and click “Next.”
8. Read the warning message, and click “Next.”
9. Select “Finish.” The analog output returns to its normal reading.

Figure 3-10. Loop test analog output selection.




**Calibrate Menu**

The “Calibrate” menu contains links to three different applications: Sensor Trim, D/A Trim, and Scaled D/A Trim.

From the “Sensor Trim” link, you can access the calibration options for the Differential Pressure, Static Pressure, and Temperature process variables. Additionally, you can change the Atmospheric Pressure value and restore the D/A converter to its factory default setting.

Figure 3-11. Sensor Trim Menu


In addition to the 3095 EA software, the following equipment is required for a sensor trim procedure:

- 3095 transmitter
- Dead-weight tester
- Power supply and load resistor
- Vacuum pump or a barometer that is *at least* 3 times as accurate as the 3095 AP sensor. A barometer is preferred.

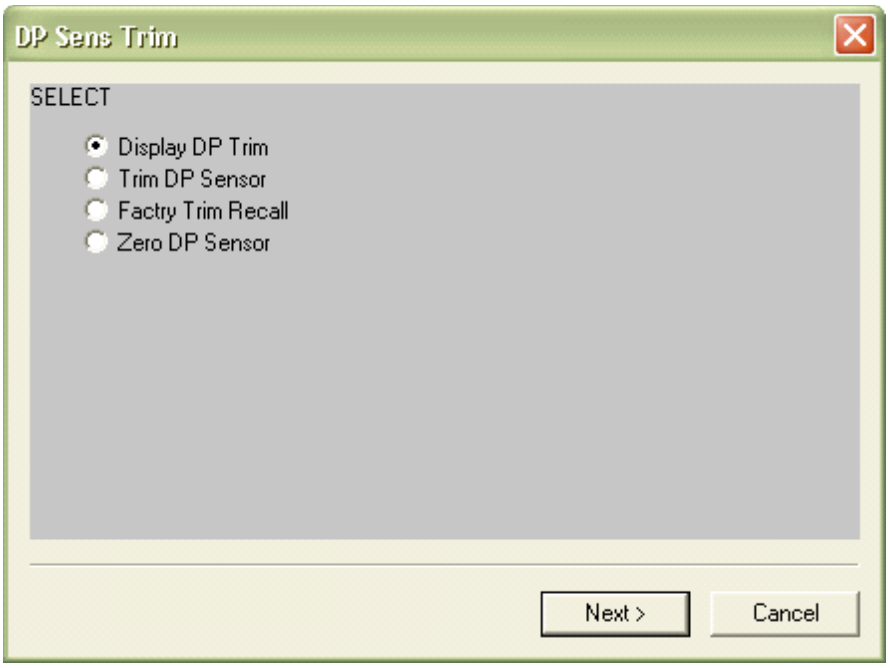
**Sensor Trim Procedure**

1. Right-click on the transmitter icon. Select “Process Variables” to view measured variables and determine if a sensor trim is needed (see Figure 3-8).
2. Right-click on the transmitter icon. Select “Calibrate/Sensor Trim” functions.
3. Click on the process variable requiring modification (DP Sens Trim, AP Sens Trim, GP Sens Trim, or Temp Sens Trim).
4. From the calibration screen (see Figure 3-12), select the type of calibration procedure:
   a. To view the last calibration trim points for the selected process variable, select “Display Trim,” and click “Next.” The offset and slope trim points are displayed.
   b. To fully calibrate the selected process variable, select “Trim Sensor,” and click “Next.”
      1. Read the warning message and click “Next.”
      2. Select the units of measure from the drop-down menu for the variable being calibrated, and click “Next.”
      3. Select whether you want to calibrate the offset or slope (span) point, and click “Next”. The offset trim should be done first; then determine if a slope trim is necessary.
         a. If setting the offset point for the Absolute Pressure sensor, pull vacuum to both the low and high sides of the transmitter, or offset trim the AP sensor using an accurate barometer or reference sensor.
         b. If setting the offset point for the DP Sensor, equalize the high and low ports.
         c. If setting the offset point for the Temperature sensor, insert the RTD probe into an ice bath or use a verified RTD simulator.
         d. If setting the slope trim (span) for the DP sensor, apply the desired pressure to the high side of the transmitter.
         e. If setting the slope trim for the AP or GP sensor, apply the reference pressure to the high and low side ports simultaneously.
         f. If setting the slope trim for the Temperature sensor, insert the RTD probe into a hot oil bath or use a verified RTD simulator.
      4. Enter the new value for the offset or slope point, and click “Next.”
      5. Select “Yes” to implement the new calibration point, and click “Next.”
      6. Read the warning message, and click “Next.”
      7. Click “Finish.”

c. To restore the selected process variable to its factory default calibration, select “Factory Trim Recall” and click “Next.”
   1. Read the warning message and click “Next.”
   2. Select “Yes” to implement the default calibration, and click “Next.”
   3. Read the warning message, and click “Next.”
   4. Click “Finish.”

d. To zero the sensor reading for the selected process variable (not available for Temperature Sensor Calibration), select “Zero Sensor,” and click “Next.”*
   1. Read the warning message and click “Next.”
   2. Select “Yes” to zero the current sensor reading, and click “Next.”
   3. Read the warning message, and click “Next.”
   4. Click “Finish.”

Figure 3-12. Sensor Trim Options Screen



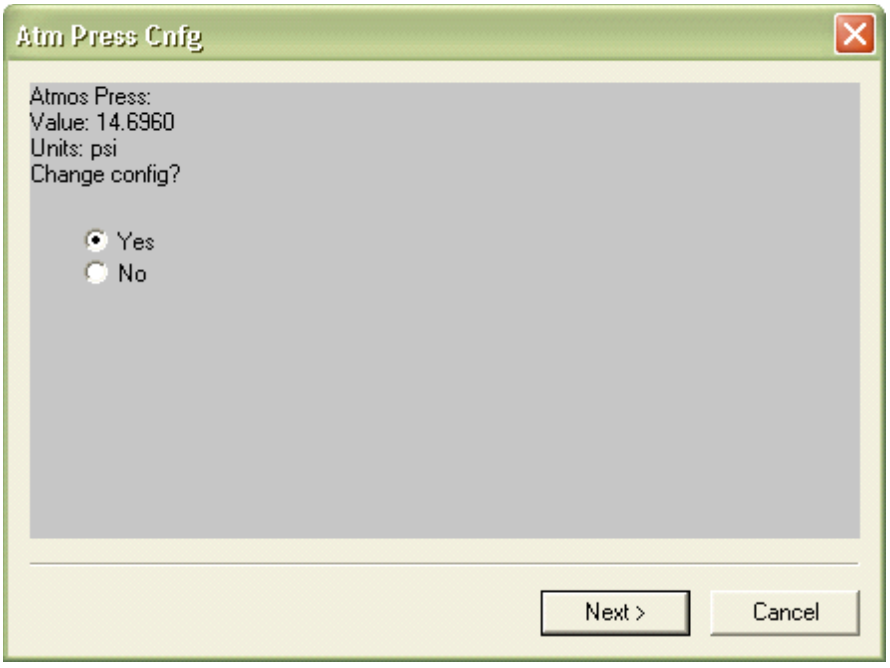

* NOTE: Do not zero an AP sensor unless an absolute 0 pressure (vacuum) source is available.

**Changing the Atmospheric Pressure Value:**

The Gauge Sensor on the 3095 takes measurements with respect to the atmospheric pressure. To change the assumed atmospheric pressure value:

1. Right-click on the transmitter icon.
2. Highlight “Calibrate” from the pop-up menu.
3. Highlight “Sensor Trim” from the submenu.
4. Click on “Atmospheric Press.”
5. A window appears, displaying the current atmospheric pressure value used by the 3095. Select “Yes” to change the value, and click “Next” (see Figure 3-13).
6. Enter the new value for the atmospheric pressure, and click “Next.”
7. Select the unit of measure from the drop-down menu, and click “Next.”
8. Select “Yes” to implement the new assumed Atmospheric Pressure value, and click “Next.”
9. Read the warning message, and click “Next.”
10. Click “Finish.”

Figure 3-13. Atmospheric Pressure Configuration



### D/A Trim

The D/A Trim allows the user to adjust the digital-to-analog converter at the end points of the transmitter output scale to compensate for a discrepancy with a reference milliamp meter.

1. Right-click on the transmitter icon.
2. Highlight “Calibrate” from the pop-up menu.
3. Click “D/A Trim.”
4. Read the warning and click “Next.”
5. Connect the Ammeter, and click “Next.” The 3095M output will go to 4mA.
6. Enter the value (in mA) that is shown on the reference meter, and click “Next.”
7. Compare the meter value to the 4mA reference point, and select “yes” if the two values agree. If “no” is selected, repeat steps 6 and 7. Click “Next.” The 3095M output will go to 20mA.
8. Enter the value shown on the reference meter, and click “Next.”
9. Compare the meter value to the 20mA reference point, and select “yes” if the two values agree. If “no” is selected, repeat steps 8 and 9. Click “Next.”
10. Click “Finish” to end the D/A loop trim.

### Scaled D/A Trim

For the Scaled D/A Trim, the user can adjust the transmitter digital-to-analog converter on an alternate unit of measure, such as voltage (example: using a voltmeter across a 500 ohm resistor produces a low point of 2 volts a high point of 10V).

1. Right-click on the transmitter icon.
2. Highlight “Calibrate” from the pop-up menu.
3. Click “Scaled D/A Trim.”
4. If you expect your measurement to be from 4 – 20 (mA, V, etc.), click “Proceed.” Otherwise, click “Change.”
5. Enter the expected low set point, and click “Next.”
6. Enter the expected high set point, and click “Next.”
7. Follow steps 5-7 on the above D/A Trim procedure, using the low and high values you entered as reference points instead of the normal 4mA and 20mA.

To restore the D/A Conversion to the factory default settings:

1. Right-click on the transmitter icon.
2. Highlight “Calibrate” from the pop-up menu.
3. Highlight “Sensor Trim” from the submenu.
4. Click “Factory Trim.”
5. Select “Yes,” and click “Next” when asked if you want to set the DAC (Digital-to-Analog Converter) Trim to factory defaults.
6. Click “Finish.”

### Reset

The reset command reinitializes the transmitter microprocessor. This is the equivalent of cycling power to the 3095.

**NOTE**
This procedure does not return the transmitter to factory trim settings.

1. Right-click on the transmitter icon.
2. Click “Reset” from the pop-up menu.
3. Read the warning message and click “Next.”
4. The transmitter will reset automatically. Click “Finish” to close the window.

### Process Variable Assignments

The “Assignments” (or Process Variable Assignments) link lets you assign specific variables to individual 4-20mA loops for use with the Rosemount 333 HART Tri-Loop. Table 3-1 illustrates the default variables assigned to each control loop. If a 333 Tri-Loop is used, the Tri-Loop channels can each be configured to any of the PV, SV, TV, or QV variables (see page 3-33).

Table 3-1. 4–20mA Control Loop Defaults Assignments

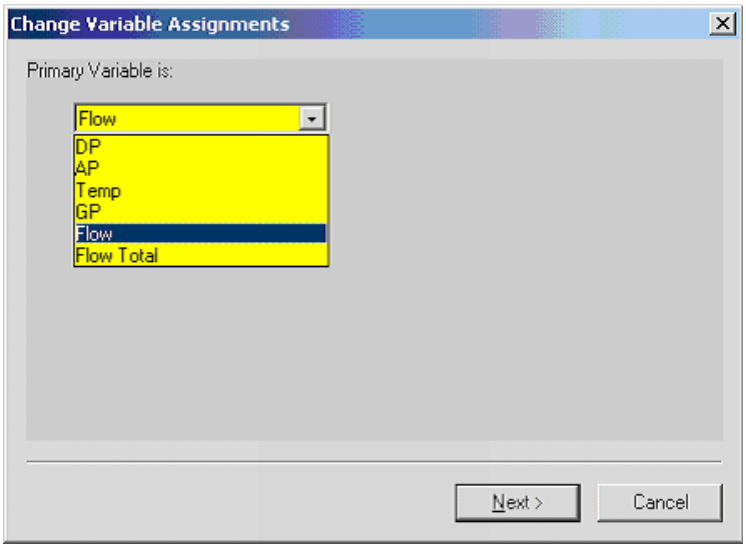
| Loop | EA Label | Label on Tri-Loop | Default Variable | Default Units |
|---|---|---|---|---|
| Primary | PV | N/A | Flow | Std. Cu.ft / hr |
| Secondary | SV | Output 1 | Diff. Pressure | in. H20 |
| Tertiary | TV | Output 2 | Static Pressure | psi |
| Fourth | QV | Output 3 | Temperature | deg. F |

To change the process variable assigned to a particular output variable:

1. Right-click on the transmitter icon.
2. Highlight “Assignments” from the pop-up menu.
3. Click on the control loop you wish to change the variable assignment for. Refer to Table 3-1 for default variable assignments.
4. When the configuration screen appears, select the variable from the pull-down menu to be assigned to the selected 4-20 loop, and click “Next” (see Figure 3-14).
5. Read the warning message, and click “Next.”
6. Click “Finish” to implement the loop assignment change.

**NOTE**
When used with a 333 Tri-Loop, each channel of the Tri-Loop can be configured to any of the variables (PV, SV, TV, or QV). Therefore, it is suggested to leave the 3095M set to its default order of variable assignments.

Figure 3-14. Changing the Primary Loop Variable



### RTD Configuration

The RTD Config link specifies the process temperature (PT) mode. It allows you to enable or disable PT input or to specify automatic backup mode.

When in Normal Mode, the transmitter uses the external RTD for PT measurement. In the event of an RTD failure, the transmitter goes into alarm condition.

When in Fixed Mode the transmitter will stay on a fixed value that is entered by the user.

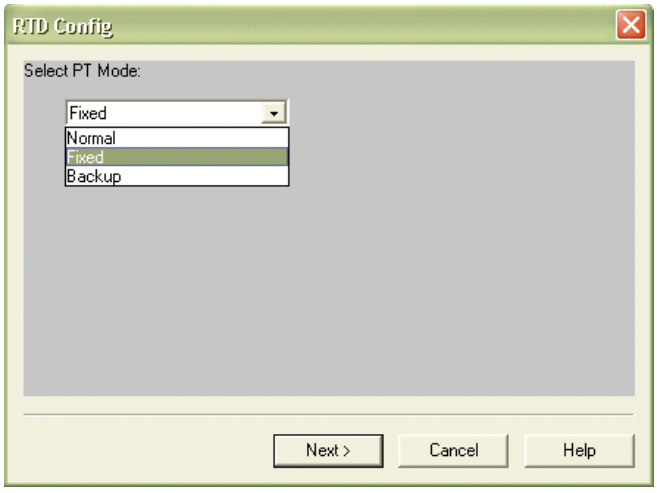
When in Backup Mode, a value is specified that the transmitter will go to in the event the RTD fails or is disconnected. Upon failure, the transmitter will use the backup value and set a HART status bit for PT alarm, but will not go into alarm condition. The transmitter returns to automatic temperature sensor readings when the RTD failure condition no longer exists.

**NOTE**
The fixed and backup process temperature ranges are wider than the actual process temperature range:
Process Temperature Range: -300 to 1500 °F (-185 to 815 °C)
Fixed/Backup Temperature Range: -459 to 3500 °F (-273 to 1927 °C)

To change the RTD configuration:

1. Right-click on the transmitter icon.
2. Click on “RTD Config” from the pop-up menu.
3. Select “Yes” to change the configuration, and click “Next.”
4. From the drop-down menu, select the mode you wish to place the process temperature input in, and click “Next” (see Figure 3-15).
5. Enter a temperature value to be used if the transmitter is in Fixed or Backup Mode, and click “Next.”
6. Select the unit of measure for the temperature input from the drop-down menu, and click “Next.”
7. Click “Finish.”

Figure 3-15. RTD Configuration.



### DP Low Flow Cutoff

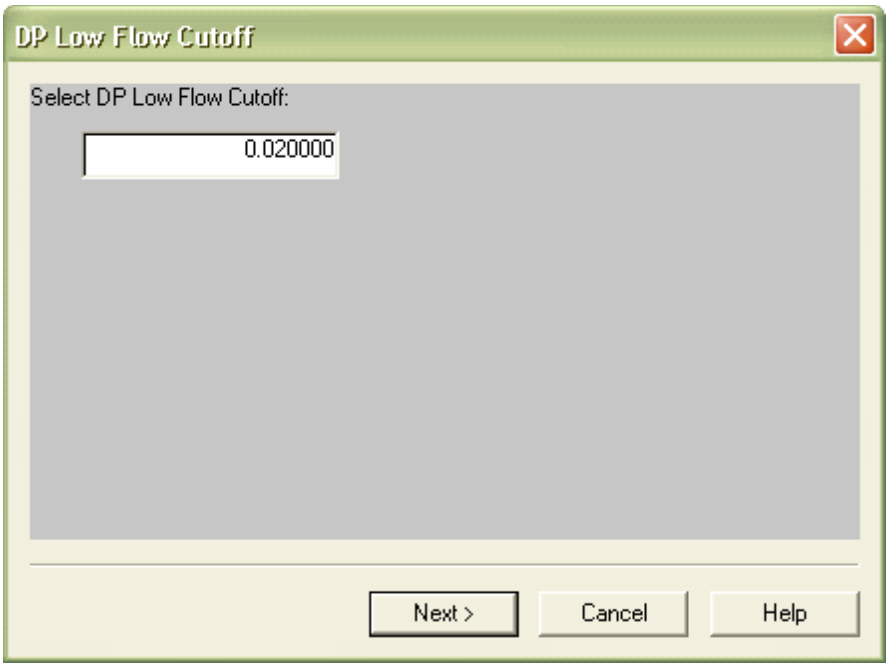
The DP Low Flow Cutoff screen allows the minimum differential pressure (DP) limit for the 3095 to calculate flow to be set. At a DP value less than the low flow cutoff, the flow value will equal zero.

The default value for the DP Low Flow Cutoff is 0.02 inH20 (5 Pa).

To change the DP Low Flow Cutoff point:

1. Right-click on the transmitter icon.
2. Click “DP Low Flow Cutoff” from the pop-up menu.
3. Select “Yes” to change the Low Flow Cutoff point, and click “Next.”
4. Enter the cutoff value, and click “Next” (see Figure 3-16).
5. Select “differential pressure” for the unit of measure, and click “Next.”
6. Select “Yes” to implement the change in the DP Low Flow Cutoff point, and click “Next.”
7. Click “Finish.”

Figure 3-16. DP Low Flow Cutoff.



**Rename**

To change the name that appears next to the transmitter icon on the 3095 Engineering Assistant software:

1. Right-click on the transmitter icon.
2. Click “Rename” from the pop-up menu.
3. Type a new name for the transmitter, and press “Enter” on the keyboard.

**Clear Offline Configuration or Delete**

To remove the offline configuration that is currently saved for the selected 3095. (For more information on Offline Configurations, see page 3-47):

1. Right-click on the transmitter icon.
2. Click “Clear Offline Configuration or Delete” from the pop-up menu.
3. Click “Yes” to delete the offline configuration.

**Compare Configurations…**

“Compare Configurations” lets you compare current, historic, and offline configurations for the selected 3095.

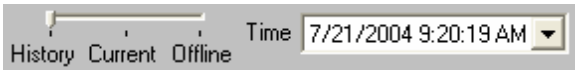
1.Right-click on the transmitter icon.

2.Click “Compare Configurations” from the pop-up menu.

Compare current, offline, and previous configurations for the selected device. From the tabs at the top of the window, you can select the set of parameters to view. A green tab denotes a difference on one or more parameters found on that tab between the two selected configurations.
Compare two different configurations by moving the slide bar to the time setting you want for each of the configurations (see Figure 3-17).

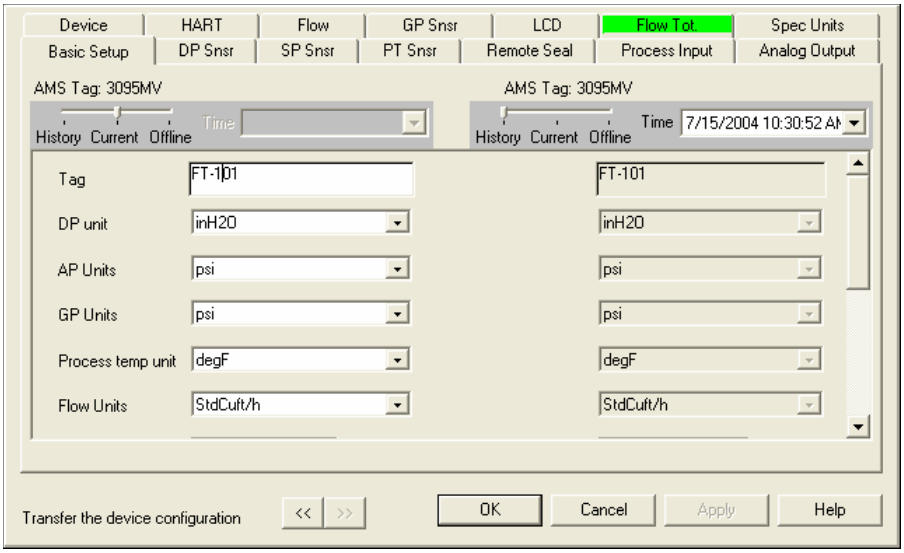
**NOTE**
“Compare Configurations” function compares those configuration settings in the Configurations Properties functions only (see Figure 3-18). The flow configuration file is not included in this comparison.

Figure 3-17. Time Selector




If you are comparing the current configuration for the 3095, you can also change the configuration by modifying the appropriate field and clicking “Apply.”

Figure 3-18. Compare Configurations



### Configuration Properties…

The Configuration Properties screen contains device parameters that are grouped into tabs located at the top of the window. To access the Configuration Properties window:

1. Right-click on the transmitter icon.
2. Click “Configuration Properties…” from the pop-up menu.

When navigating throughout the Configuration Properties screens, the time bar at the bottom of the screen lets you switch your view between previous configurations, the current online configuration, and the saved offline configuration. The history configuration is read-only.

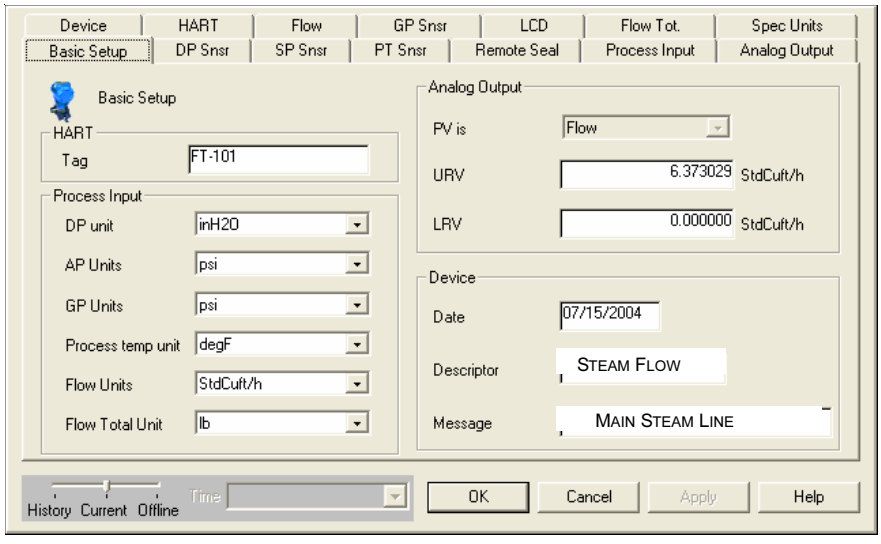
When making changes to the configuration, click “Apply” or “OK” to implement and save the configuration to the device.

### Basic Setup

The basic setup tab provides access to the essential parameters that should be defined upon initial configuration (see Figure 3-19). These include:

- **Tag**: unique name entered by the user (8 characters) to identify the transmitter
- **DP, AP, GP, Temp, Flow, and Flow Total**: units of measure; all selectable
- **URV Upper Range Value** (20mA output): entered by user to range the output
- **LRV Lower Range Value** (4mA output): entered by user to range the output
- **Date, Descriptor, and Message:** used to further help identify the transmitter for the user

Figure 3-19. Basic Setup tab



### Device Tab

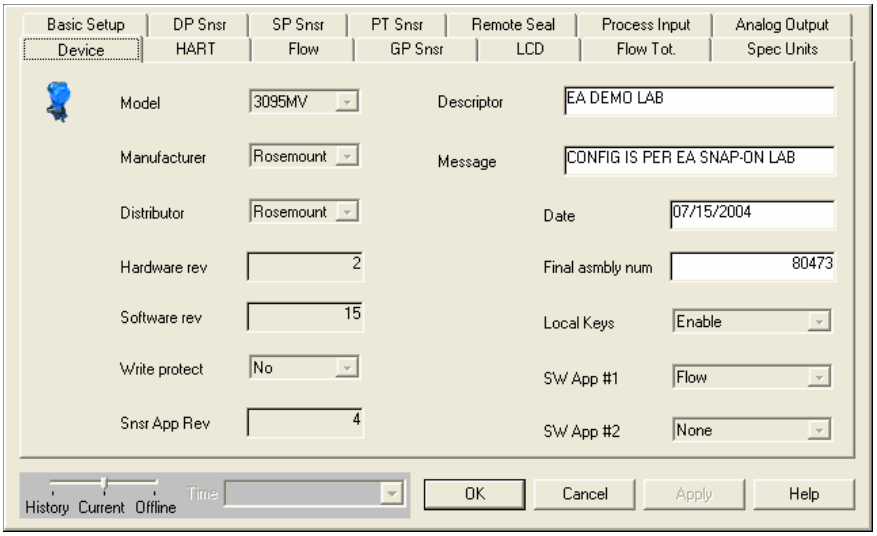
The device tab provides more in-depth information about the 3095 transmitter. Only the Date, Descriptor, and Message fields can be edited. All other fields on the Device tab are read only:

- **Date, Descriptor, and Message**: same parameters as found on the “Basic Setup” tab (See Figure 3-20).

**NOTE**
All other fields on the Device Tab are read only.

- **Model, Manufacturer, and Distributor**: Give the transmitters background information
- **Hardware Rev**: Refers to the hardware revision of the transmitter
- **Software Rev**: Refers to the electronics output board revision of the transmitter
- **Write Protect**: Indicates the position of the security write protect jumper pins on the transmitter output board. This is not selectable from the software (see page 2-3).
- **Final Assembly Number:** assigned by Rosemount at the time of final assembly manufacture

Figure 3-20. Device Tab



### HART Tab

The HART tab is used to set some of the communications parameters that are used by HART protocol.

- **Tag:** same parameter as found on the “Basic Setup” tab.
- **Poll Address**: users can assign a unique HART address to the 3095 to differentiate it from other devices if set up on a multidrop network.
- **Number of Response Preambles**: changes the number of response preambles for the transmitter to EA communication. Typically, this value is set at five. Increase the value only if the transmitter is installed in an electrically noisy environment.
- **Burst Mode**: must be enabled for operation with a Rosemount 333 Tri-Loop. With burst mode ON, the 3095 continuously outputs HART parameters, eliminating the time required for the control system to request information from the transmitter.

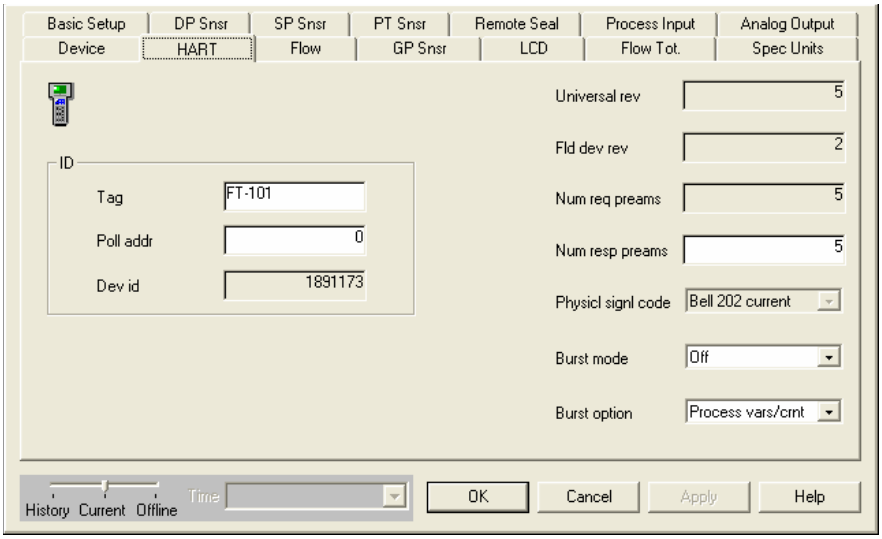
Burst mode is compatible with use of the analog signal. Because HART protocol features simultaneous digital and analog data transmission, the analog value can drive other equipment in the loop while the control system or Tri-Loop receives the digital information.

Access to information other than burst data is obtained through the normal poll/response method of HART communication. The EA or the control system may request any of the information that is normally available while the transmitter is in burst mode. However, the response time to these requests will be longer. Between each burst message sent by the transmitter, a short pause allows the EA or control system to initiate a request. The transmitter receives the request, processes the response message, and then continues bursting the data approximately three times per second. When sending a new flow configuration file from the EA, the burst mode must be OFF.

Burst mode is not compatible with Multi Dropping more than one transmitter because there is no method to discriminate the data communications from multiple field devices.

- **Burst Option**: From the pull down menu select what type of data will be sent when the transmitter is in Burst Mode. For use with the 333 Tri-Loop, the Burst Option must be set to “process vars/crnt” (HART CMD3).

Figure 3-21. HART Tab

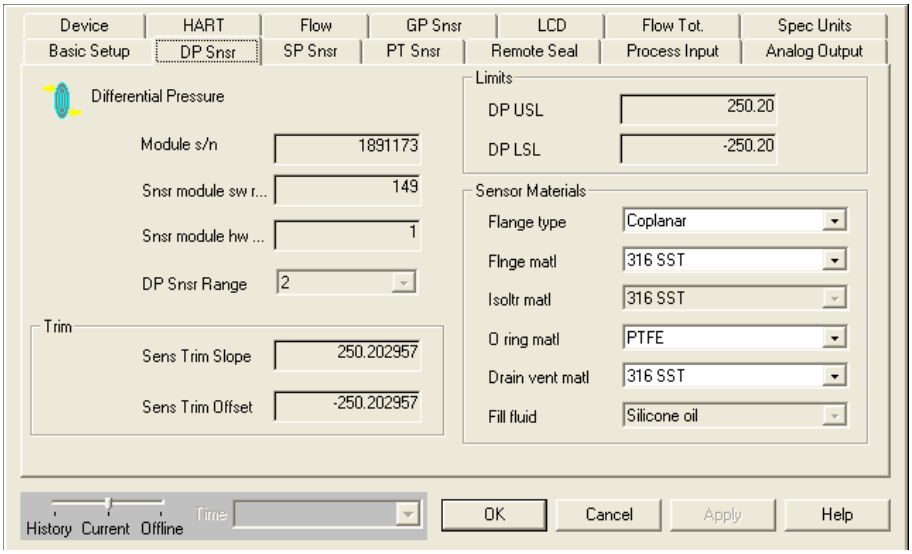



### DP Sensor Tab

The DP Sensor screen provides read only information about the DP sensor module (see Figure 3-22).

- **Flange Type**: From the drop-down menu, select the flange type used in the primary assembly
- **Flange Material**: From the drop-down menu, select the flange material used in the primary assembly
- **O ring Material**: From the drop-down menu, select the O ring material used in the transmitter
- **Drain/Vent Material**: From the drop-down menu, select the drain and vent material used in the transmitter.

Figure 3-22. DP Sensor Tab

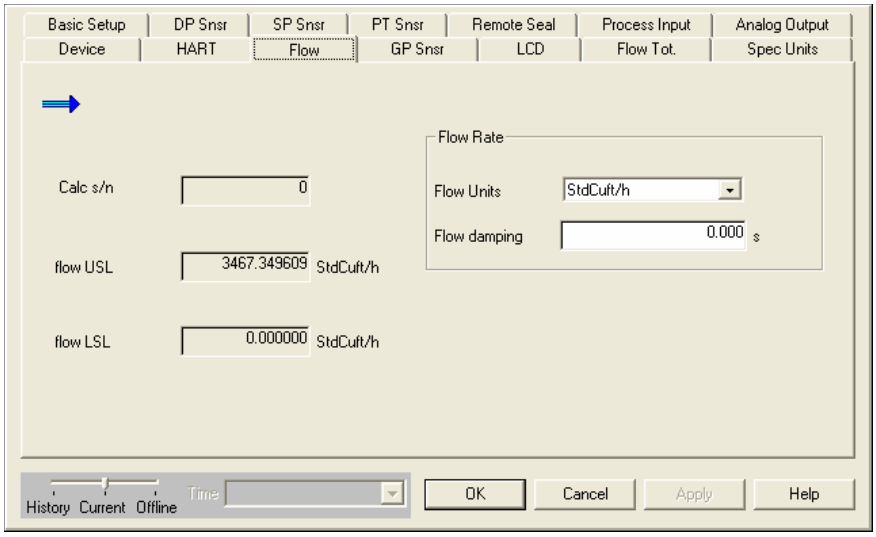


### Flow Tab

The Flow Tab allows for the configuration of flow damping and units of measure (see Figure 3-23).

- **Flow USL and Flow LSL**: This is a value calculated by the transmitter. The calculation is dependent on the DP sensor limit and the flow configuration file.
- **Flow Units**: From the drop-down menu, select the units of measure for the flow rate. This parameter is also on the “Basic Setup” tab.
- **Flow Damping**: Not a selectable parameter in the 3095 transmitter. To dampen the flow measurement, go to the “Process Input” tab and set the DP damping.

Figure 3-23. Flow Tab




### GP, PT, and SP Snsr Tabs

The configuration tabs for the SP, GP, and PT sensors display the high and low sensor limits. There are no writable parameters for these tabs.

### Remote Seal Tab

All parameters found under the Remote Seal tab should show “None,” as the 3095 is not generally used with the Rosemount Diaphragm Seals System.

These fields are selectable by the user in cases where remote diaphragm seals have been assembled to the transmitter.

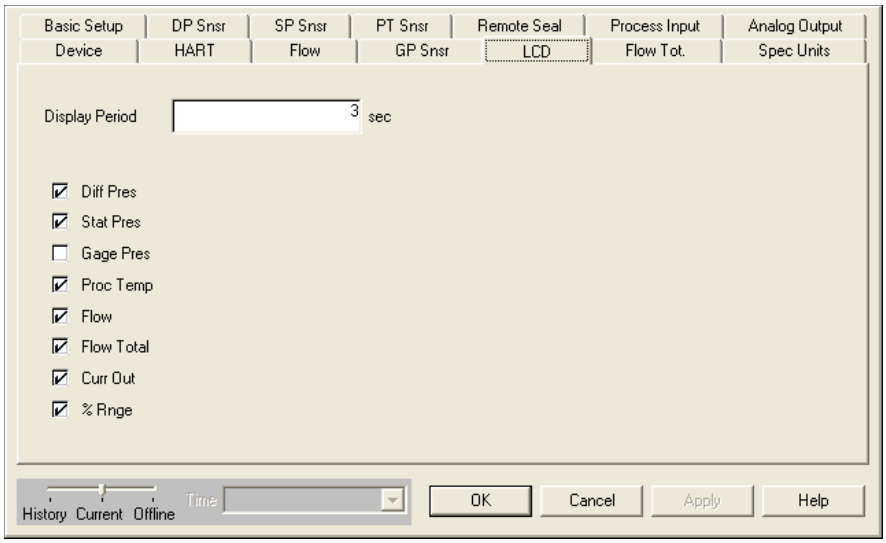
### LCD Configuration Tab

The following parameters can be displayed on the LCD (if LCD is ordered and installed on transmitter). See Figure 3-24.

- **Differential Pressure**
- **Static Pressure (Absolute Pressure)**
- **Gage Pressure**
- **Process Temperature**
- **Flow**
- **Flow Total**
- **Current Output**
- **% Range**

Display Period sets the display time of each parameter selected. Display time is selectable in one-second increments, from two to ten seconds.

Figure 3-24. LCD Configuration Tab

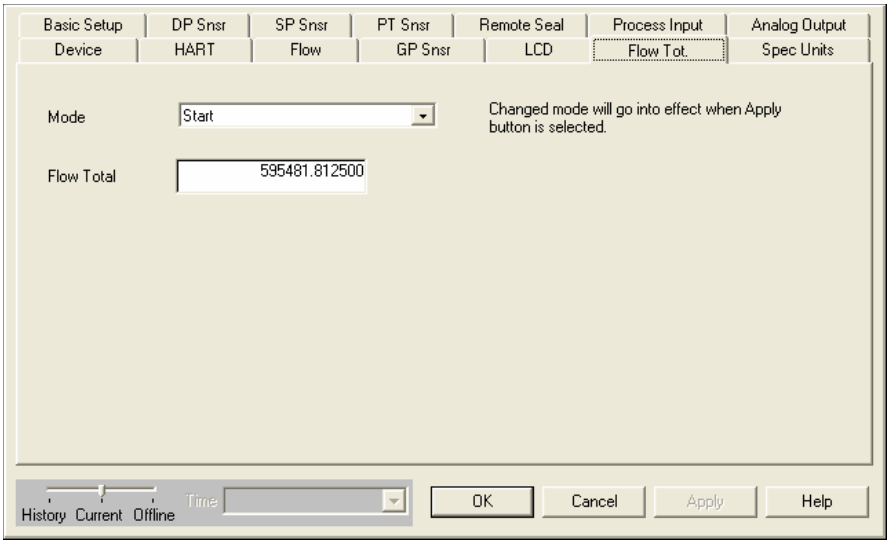



### Flow Total Tab

The Flow Total tab shows the running flow total.

- **Mode**: From the drop-down menu, select “Start” to begin (or continue) flow accumulation. Select “Stop” to stop flow accumulation. Select “Reset” to set to zero. Click “OK” or “Apply” to implement any changes.
- **Flow Total**: Displays the current flow total (updated automatically). The parameter is read-only.

Figure 3-25. Flow Total



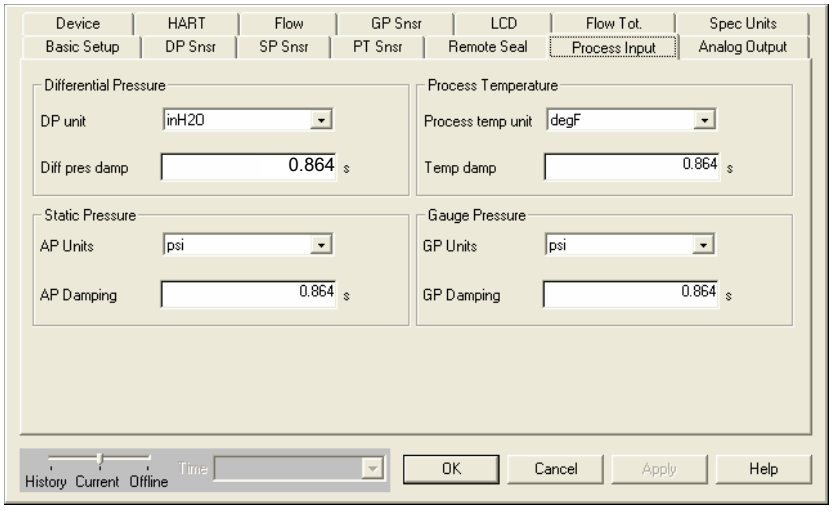

### Process Input Tab

On the Process Input tab, the units of measure and damping can be configured for each of the measured variables (DP, AP/GP, and Temp).

- **Units**: From the drop-down menu, select the units of measure for the chosen process variable. The unit parameters are also selectable on the “Basic Setup” tab.
- **Damping**: Enter in the desired damping value (in seconds).

**NOTE**
The transmitter sets the damping value to the nearest acceptable value. An information message is provided to the operator indicating the new damping values.

Figure 3-26. Process Inputs Tab.



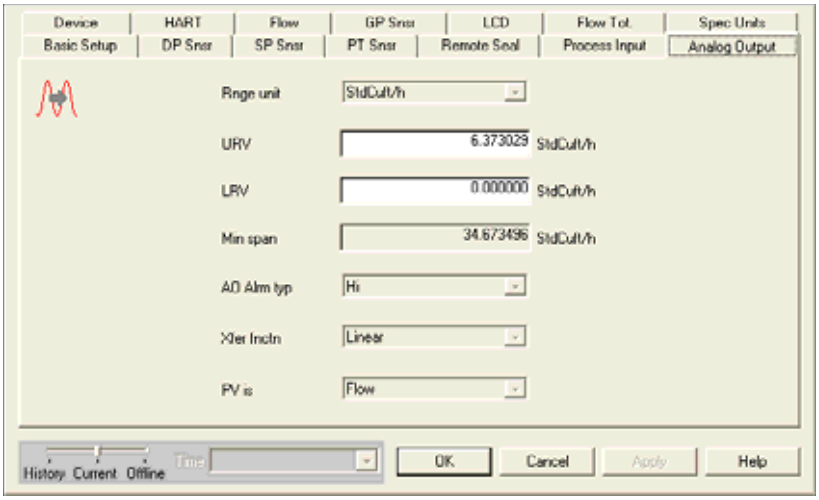
### Analog Output Tab

- **Upper Range Value (URV) and Lower Range Value (LRV)**: Sets the range represented by the 4 to 20mA output. These functions are also selectable on the “Basic Setup” tab.

**NOTE**
All other fields on the Analog Output Tab are read only.

- **Min span**: A value calculated by the transmitter. The calculation is dependent on the DP sensor minimum range and the flow configuration file.
- **AO Alm Typ**: Indicates the position of the alarm jumper pins on the transmitter output board.
- **Xfer Fnctn**: The value is “linear” for the 3095.
- **PV is**: Indicates which variable is set as the primary variable. This is selectable on the “Basic Setup” tab.

Figure 3-27. Analog Output Tab



### Spec Units Tab

The Special Units tab configures flow measurement and flow total to be displayed in units considered nonstandard in the 3095M transmitter.

**NOTE**
After completing a special unit configuration, reset the 4-20mA range (LRV and URV). The range values must be re-entered and applied to the device using either Engineering Assistant or a HART hand-held communicator.

- **Base Unit**: From the drop-down menu, select the desired base unit of measure for flow.
- **Scaling Factor**: Enter a scaling factor. The scaling factor multiplied by the Base Unit will equal the Flow Special Unit.
- **Unit String**: Enter the desired display units. Up to 5 characters can be entered for display of the special units, including all alphanumeric characters and the forward slash (“/”) key. (The field contains 6 spaces but the first space is the space bar.)

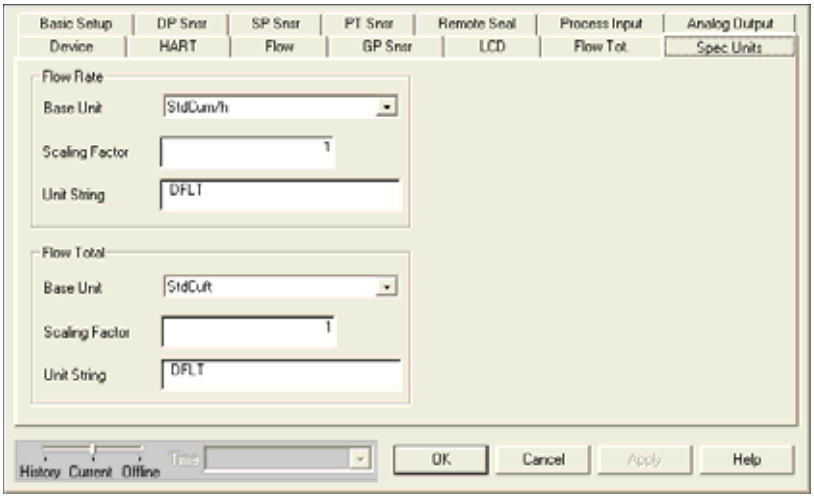
  The following are examples of unit string entries:

  __ M M C F D

  __ __ __ G P M

  After entering each parameter (Base Unit, Scaling Factor, Unit String), click “Apply” to send the parameter to the transmitter. Click “Yes” to the warning messages. The transmitter will accept one field at a time. Click “Apply” again, until all the entered fields (highlighted in yellow) have been sent to the transmitter.

Figure 3-28. Special Units Tab




**NOTE**
After configuring Special Units, remember to set the Flow Units (on the Basic Setup tab to “SPCL” and re-range the LRV-URV for the desired flow range in terms of special units

## Set up Tri-loop Configuration

1. Start AMS.
2. Right-click the on-line 3095 and select **Configuration Properties.**
3. Select the **HART** tab.
4. Select Burst Mode **Off.**
5. Select Burst option to **processvars/crnt**. This is HART command 3. Select Apply and OK.
6. Exit Configuration Properties.
7. Right-click on the Tri-Loop icon and select **Configuration Properties.**
8. In Basic Setup, enter the desired tag name. View device information and channel enable.
9. Select **Channel 1** tab. Select desired Process variable. Input units, upper range value, low Range and Enabled to **Yes**. Select **Apply**.
10. Select **Channel 2** tab. Select desired Process variable. Input units, upper range value, low Range and Enabled to **Yes**. Select **Apply**.
11. Select **Channel 3** tab. Select desired Process variable. Input units, upper range value, low Range and Enabled to **Yes**. Select **Apply**.
12. If necessary, perform an analog output trim on each of the 4-20 loops on the 333 HART Tri-Loop.
13. After all configuration steps have been completed for the 333 Tri-Loop and the 3095 transmitter, AND the flow configuration file has been sent to the 3095 transmitter, return to the Configuration Properties functions of the 3095M and go to the HART tab to set the Burst Mode to **On**.

## Flow Configuration

Flow configuration for the 3095 is achieved by launching the 3095 Snap-On application from the Device Configuration screen. The following steps highlight how to access the flow configuration program for the 3095:

1. Right-click on the transmitter icon.
2. Highlight “SNAP-ON” from the pop-up menu.
3. Click “MultiVariable Engineering Assistant” from the submenu.

Figure 3-29. 3095 Engineering Assistant Menu Structure.


**Basic Navigation File Menu**

“New” starts with a fresh configuration file. This should be selected before import and opening a file.

“Open” lets you open a previously saved configuration file.

“Save” and “Save as” lets you save the current configuration file. You can save a created configuration while in off-line that can be imported to a 3095 when in on-line mode.

“Reports” will print or save the transmitter, primary element, fluid, and natural gas reports. The transmitter report is only available when a 3095 is on-line.

**View Menu**

Select “Toolbar” to show or hide the toolbar.

Select “Status Bar” to show or hide the status bar.

**Configure Menu**

“Configure Flow…” launches the Flow Configuration Wizard.

“Options” enables or disables password usage. The security must be enabled before the password screen can be accessed.

The “Import…” link imports previous versions of 3095 Flow Configuration files. Only EA Mass Flow (*.mfl) files can be imported. The flow configuration wizard automatically opens, and the file is imported to the current file format.

The “Preferences” link is used to switch between US or SI/Metric Units for flow configuration. Default units are applied to all new configurations, not the current configuration. To start a new configuration, Click “File” from the menubar and select “New”.

### Transmitter Menu

Use “Send Configuration…” to fully implement the flow configuration to the transmitter. When finished with the flow configuration wizard, the transmitter does not use the new configuration until the “Send Configuration…” link is used. The function is also accessible within the flow configuration wizard.

To receive the current configuration from the transmitter, select “Receive Configuration.” This will load the currently used configuration from the transmitter’s memory and open the flow configuration wizard.

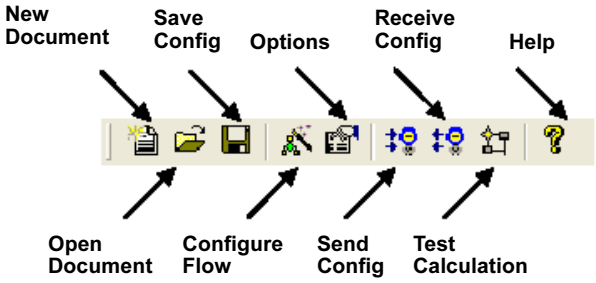
“Test Calculation” lets you verify the accuracy of the 3095’s flow configuration.

1. Enter values for DP, AP, and Temp.
2. Select the units of measure for each process input.
3. Click “Calculate.” The 3095 computes flow based on the values entered.
4. In the Test Calculation window, the “Insert” button inserts the test calculation results into a report. The report can be saved to the PC, or printed.

“Privileges” let you change or set up security and password.

### Toolbar

The toolbar provides another way to access some of the links found under the various headers menubar.



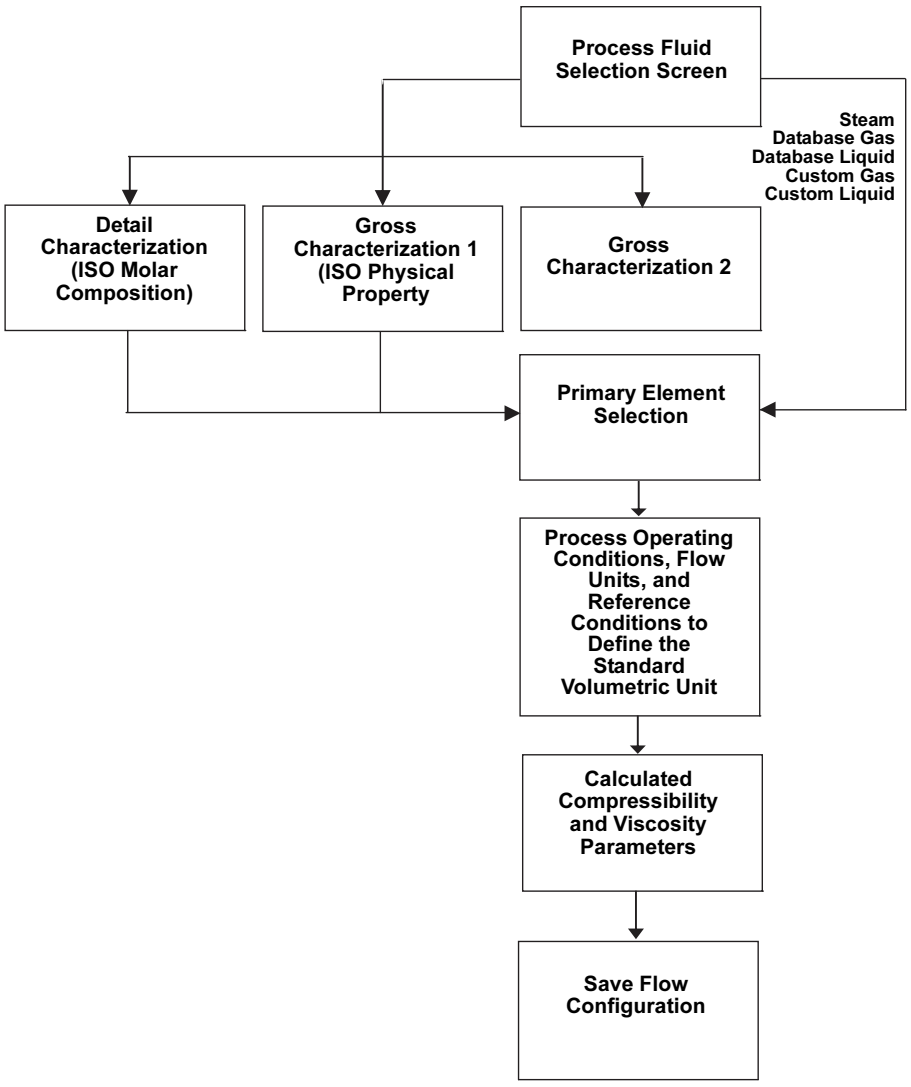
### Flow Configuration Wizard

The flow configuration wizard screens are used to define compensated flow parameters and to create flow configuration files for sending to a transmitter. The flow configuration wizard can be launched by clicking on the “Configure Flow” icon from the toolbar or from the menubar.

1. Click on “Configure” from the menubar.
2. Click “Configure Flow…” from the drop-down menu.

The following flow chart illustrates the screens that will take you through the flow configuration process. If Natural Gas is selected as the process fluid type, there is an extra screen for the configuration of the gas compressibility factor.

Figure 3-30. Flow Configuration Wizard Flowchart

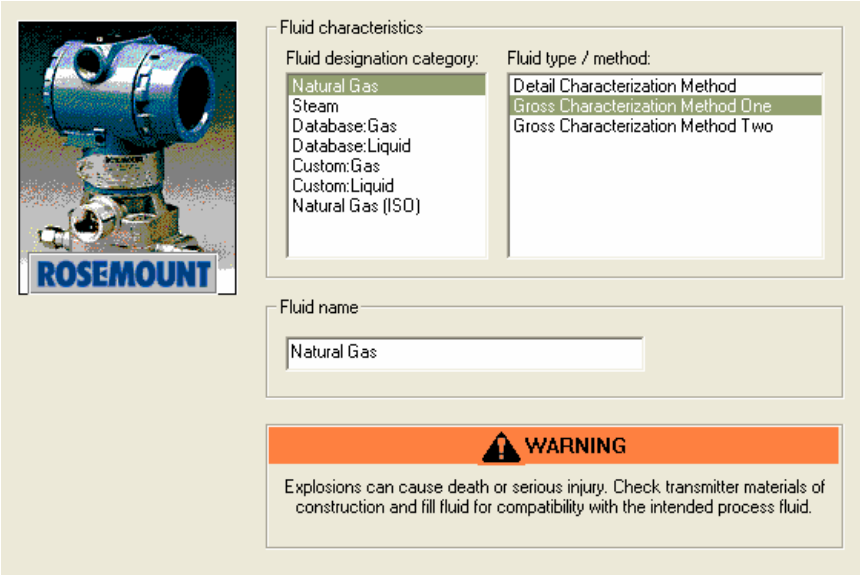


### Process Fluid Selection

The first screen of the flow configuration wizard lets you select the process fluid used in your application. Available fluids include:

- Natural Gas (AGA & ISO)
- Steam
- Gas
- Liquid
- Custom Gas & Liquid

Figure 3-31. Process Fluid Selection




### Natural Gas Flow

1. Select “Natural Gas” or “Natural Gas (ISO)” from the column with the “Fluid Designation Category” header.
2. Select the characterization method for gas compressibility the 3095 Engineering Assistant will use to calculate the natural gas compressibility factor. Gross characterization is a simplified method that is acceptable for a narrow range of pressure, temperature, and gas composition. Detail characterization covers all pressure, temperature, and gas composition ranges for which AGA8 computes compressibility factors. Table 3-2 identifies the acceptable ranges for both of these characterization methods. For ISO Natural Gas, Molar Composition Method is similar to the Detail Characterization Method, and the Physical Property Method is similar to Gross Characterization 1 Method.
3. Click “Next”.

Table 3-2. Gross vs. Detail Characterization Method

| Engineering Assistant Variable | Gross Method | Detail Method |
|---|---|---|
| Pressure | 0–1200 psia (1) | 0–20,000 psia (1) |
| Temperature | 32 to 130 °F (1) | –200 to 400 °F (1) |
| Specific Gravity | 0.554–0.87 | 0.07–1.52 |
| Heating Value | 477–1150 BTU/SCF | 0–1800 BTU/SCF |
| Mole % Nitrogen | 0–50.0 | 0–100 |
| Mole % Carbon Dioxide | 0–30.0 | 0–100 |
| Mole % Hydrogen Sulfide | 0–0.02 | 0–100 |
| Mole % Water | 0–0.05 | 0–Dew Point |
| Mole % Helium | 0–0.2 | 0–3.0 |
| Mole % Methane | 45.0–100 | 0–100 |
| Mole % Ethane | 0–10.0 | 0–100 |
| Mole % Propane | 0–4.0 | 0–12 |
| Mole % i-Butane | 0–1.0 | 0–6 (2) |
| Mole % n-Butane | 0–1.0 | 0–6 (2) |
| Mole % i-Pentane | 0–0.3 | 0–4 (3) |
| Mole % n-Pentane | 0–0.3 | 0–4 (3) |
| Mole % n-Hexane | 0–0.2 | 0–Dew Point |
| Mole % n-Heptane | 0–0.2 | 0–Dew Point |
| Mole % n-Octane | 0–0.2 | 0–Dew Point |
| Mole % n-Nonane | 0–0.2 | 0–Dew Point |
| Mole % n-Decane | 0–0.2 | 0–Dew Point |
| Mole % Oxygen | 0 | 0–21.0 |
| Mole % Carbon Monoxide | 0–3.0 | 0–3.0 |
| Mole % Hydrogen | 0–10.0 | 0–100 |
| Mole % Argon | 0 | 0–1.0 |
| *NOTE: Reference conditions are 14.73 psia and 60 °F for Gross Method.* | | |

*(1) The 3095 MultiVariable sensor operating limits may limit the pressure and temperature range.*
*(2) The summation of i-Butane and n-Butane cannot exceed 6 percent.*
*(3) The summation of i-Pentane and n-Pentane cannot exceed 4 percent.*

### Steam Flow

1. Select “Steam” from the “Fluid Designation Category” header.
2. From the “Fluid Type” header, select either Superheated & Saturated Steam or Saturated Steam.
3. Click “Next”.

**NOTE**
Saturated Steam should be selected ONLY if the steam being measured is always saturated. With this option, the density of the saturated steam is based on the actual static pressure measurement. The Saturated Steam option also requires that the 3095 is set to fixed temperature mode. The fixed temperature value set must be a value within the saturated steam range relative to the operating pressure range entered in the flow configuration wizard.

**Gas & Liquid Flow**

1. Select either Database Gas, Database Fluid, Custom Gas, or Custom Fluid from the “Fluid Designation Category” Header.
2. If using a database gas or fluid, select the fluid used from the “Fluid Type” header. Refer to Table 3-3 for a list of database fluids.
3. If using a custom gas or fluid, enter the name of the fluid under the “Fluid Name” parameter.
4. Click “Next”.

Table 3-3. 3095 Liquids and Gases Database

| | | | | |
|---|---|---|---|---|
| Acetic Acid | Cyclopropane | Isopropanol | n-Heptane | 1–Dodecanol |
| Acetone | Divinyl Ether | Methane | n–Hexane | 1–Heptanol |
| Acetonitrile | Ethane | Methanol | n–Octane | 1–Heptene |
| Acetylene | Ethanol | Methyl Acrylate | n–Pentane | 1–Hexene |
| Acrylonitrile | Ethylamine | Methyl Ethyl Ketone | Oxygen | 1–Hexadecanol |
| Air | Ethylbenzene | Methyl Vinyl Ether | Pentafluorothane | 1–Octanol |
| Allyl Alcohol | Ethylene | m–Chloronitrobenzene | Phenol | 1–Octene |
| Ammonia | Ethylene Glycol | m–Dichlorobenzene | Propane | 1–Nonanal |
| Argon | Ethylene Oxide | Neon | Propadiene | 1–Nonanol |
| Benzene | Fluorene | Neopentane | Pyrene | 1–Pentadecanol |
| Benzaldehyde | Furan | Nitric Acid | Propylene | 1–Pentanol |
| Benzyl Alcohol | Helium–4 | Nitric Oxide | Styrene | 1–Pentene |
| Biphenyl | Hydrazine | Nitrobenzene | Sulfer Dioxide | 1–Undecanol |
| Carbon Dioxide | Hydrogen | Nitroethane | Toluene | 1,2,4–Trichlorobenzene |
| Carbon Monoxide | Hydrogen Chloride | Nitrogen | Trichloroethylene | 1,1,2–Trichloroethane |
| Carbon Tetrachloride | Hydrogen Cyanide | Nitromethane | Vinyl Acetate | 1,1,2,2–Tetrafluoroethane |
| Chlorine | Hydrogen Peroxide | Nitrous Oxide | Vinyl Chloride | 1,2–Butadiene |
| Chlorotrifluoroethylene | Hydrogen Sulfide | n–Butane | Vinyl Cyclohexane | 1,3–Butadiene |
| Chloroprene | Isobutane | n–Butanol | Water | 1,3,5–Trichlorobenzene |
| Cycloheptane | Isobutene | n–Butyraldehyde | 1–Butene | 1,4–Dioxane |
| Cyclohexane | Isobutylbenzene | n–Butyronitrile | 1–Decene | 1,4–Hexadiene |
| Cyclopentane | Isopentane | n–Decane | 1–Decanal | 2–Methyl–1–Pentene |
| Cyclopentene | Isoprene | n–Dodecane | 1–Decanol | 2,2–Dimethylbutane |
| | | n–Heptadecane | 1–Dodecene | |

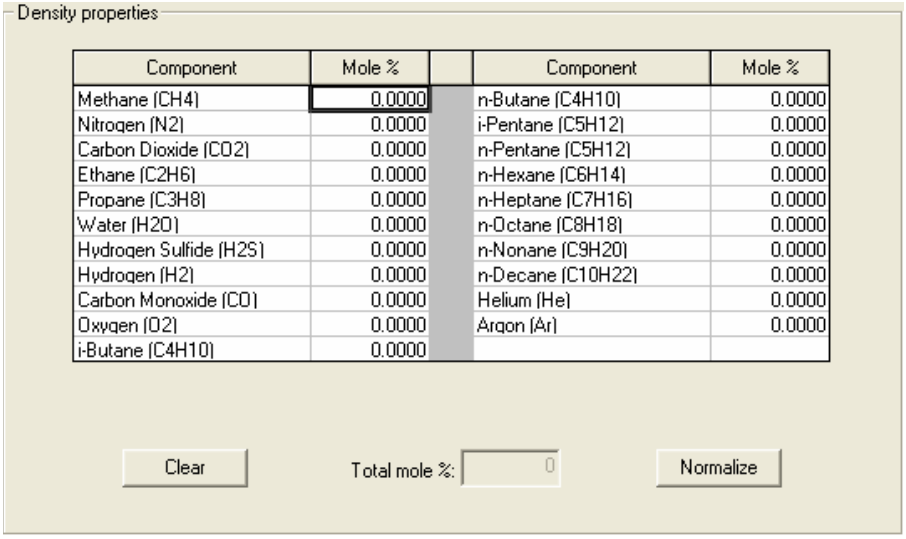
### Composition Mole % (Natural Gas Only)

The next screen will take you to either the gas composition table or the gross characterization screens, depending on what you selected in the previous screen.

**Detail Characterization (AGA) & Molar Composition Method (ISO)**
If either Detail Characterization or Molar Composition Method was selected on the previous screen, the gas composition table will appear.

1. Enter the Mole % for each component in the gas mixture. Refer to Table 3-2 on page 3-38 for valid entries when entering values into the gas composition. The total mole % must add up to 100%.
   - To zero all 21 fields, click “Clear”.
   - The normalize button provides a method to automatically modify all non-zero values to total 100%.
2. Click “Next”.

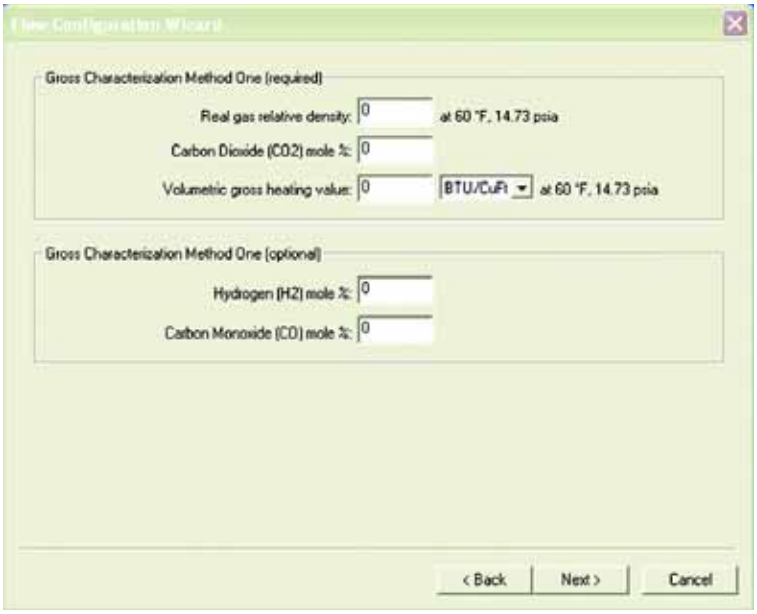
Figure 3-32. Gas Composition



**Gross Characterization Method 1 (AGA) & Physical Property: SGRG-88 (ISO)**
Gross Method 1 uses the density of natural gas, its heating value, and the quantity of non-hydrocarbon components to calculate the gas compressibility factor per AGA8. SGRG-88 is the equivalent gas compressibility factor for ISO applications.

1. Enter values for the following parameters:
   - Real gas relative density (Specific gravity relative to air)
   - Mole % of $CO_2$
   - Volumetric gross heating value
   - Mole % of $H_2$ (optional)
2. Click “Next”.

Figure 3-33. Gross Method I & SGRG-88 Configuration




**Gross Characterization Method 2 (AGA)**
Gross Method 2 uses the density of natural gas and the quantity of non-hydrocarbon components to calculate the gas compressibility factor per AGA8.

1. Enter values for the following parameters:
   - Real gas relative density (Specific gravity relative to air)
   - Mole % of $CO_2$
   - Mole % of $N_2$
   - Mole % of $H_2$ (optional)
   - Mole % of CO (optional)
2. Click “Next”.

**Primary Element Selection**

The Primary Element Selection Screen lets you configure the primary element used with the 3095. The following steps apply to all fluid types (gas, fluid, natural gas, steam).

1. Select the general type of primary used under the “Category “header.
2. Select the specific type of primary used under the “Specific Primary Element” header.

---

**NOTE**
If complying with AGA3 Natural Gas, the primary element should be an orifice plate with AGA flange taps.

If a calibrated primary is selected, you will be prompted to enter values to a table of Flow Coefficients vs. Reynolds Numbers at the next screen.

If a primary is selected with Constant Cd, you will be prompted to enter a single value for the Discharge Coefficient at the next screen.

---

3. Enter the orifice diameter, sensor size, or beta ratio. This parameter will be different depending on the type of primary selected during the previous two steps.

---

**NOTE**
To be in compliance with appropriate national or international standards, beta ratios and differential producer diameters should be within the limits as listed in the standards. The EA software will alert the operator if a primary element value exceeds these limits. However, the EA software will not stop the operator from proceeding with a flow configuration because of this type of exception.

---

4. Enter the primary element material (see Table 3-4 and Figure 3-34 on page 3-43).
5. Enter the meter tube diameter (pipe ID) and units at reference temperature for the measured dimension.
6. Enter the meter tube material.
7. Click “Next”.

Table 3-4. Primary Element Options[1]

| Annubar |
|---|
| Annubar® Diamond II (Discontinued 1999) |
| Annubar® Diamond II+ / Mass ProBar |
| Calibrated Annubar® Diamond II (Discontinued 1999) |
| Calibrated Annubar® Diamond II + / Mass ProBar |
| 485 Annubar® / 3095MFA Mass ProBar |
| 485 Annubar® / 3095MFA Mass ProBar, Constant K |
| Calibrated 485 Annubar® / 3095MFA Mass ProBar |

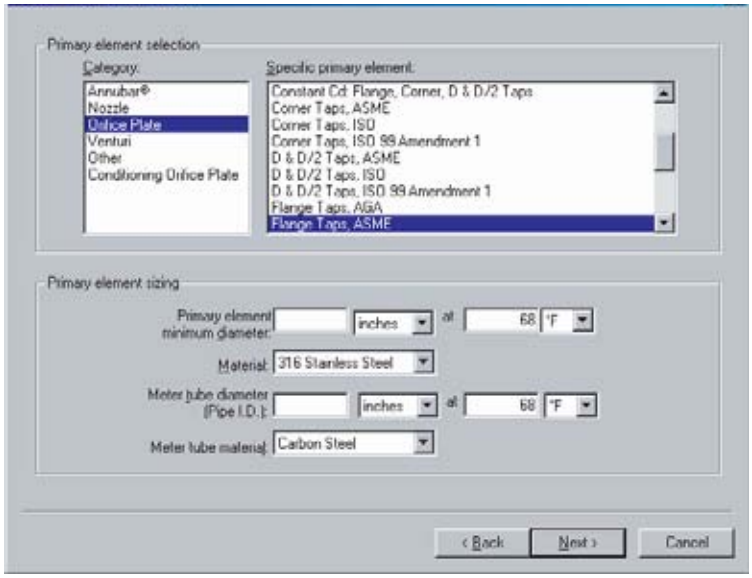
| Nozzle |
|---|
| Long Radius Wall Taps, ASME |
| Long Radius Wall Taps, ISO |
| ISA 1932, ISO |
| Calibrated Cd |
| Constant Cd |

| Venturi |
|---|
| Nozzle, ISO |
| Rough Cast/Fabricated Inlet, ASME |
| Rough Cast Inlet, ASME |
| Machined Inlet, ASME |
| Machined Inlet, ISO |
| Welded Inlet, ISO |
| Calibrated Cd |
| Constant Cd |

| Other |
|---|
| Area Averaging Meter |
| Standard V-Cone® |
| Wafer-Cone® |
| Calibrated Standard V-Cone® |
| Calibrated Wafer-Cone® |
| Wedge Meter® |

| Orifice Plate |
|---|
| 1195 Integral Orifice |
| 1195 Mass ProPlate |
| 1195 Mass ProPlate, Calibrated Cd |
| 1195 Mass ProPlate, Cd with Bias |
| 2½ D & 8D Taps, ASME |
| Calibrated Cd: 2½ D & 8D Taps |
| Calibrated Cd: Flange, Corner, D & D/2 Taps |
| Constant Cd: 2.5D & 8D Taps |
| Constant Cd: Flange, Corner, D & D/2 Taps |
| Corner Taps, ASME |
| Corner Taps, ISO |
| Corner Taps, ISO 99 Amendment 1 |
| D & D/2 Taps, ASME |
| D & D/2 Taps, ISO |
| D & D/2 Taps, ISO 99 Amendment 1 |
| Flange Taps, AGA |
| Flange Taps, ASME |
| Flange Taps, ISO |
| Flange Taps, ISO 99 Amendment 1 |
| Small Bore Orifice, Corner Taps, ASME |
| Small Bore Orifice, Flange Taps, ASME |
| 405P Compact Orifice |
| 405C Compact Conditioning Orifice |
| 1595 Conditioning Orifice Plate, Corner Taps |
| 1595 Conditioning Orifice Plate, D & D/2 Taps |
| 1595 Conditioning Orifice Plate, Flange Taps |
| Calibrated Cd: Flange, Corner, D & D/2 Taps: ISO-5167 (2002) |
| Constant Cd: Flange, Corner, D & D/2 Taps: ISO-5167 (2002) |
| Corner Taps, ISO-5167 (2002) |
| D & D/2 Taps, ISO-5167 (2002) |
| Flange Taps, ISO-5167 (2002) |

Figure 3-34. Primary Element Selection



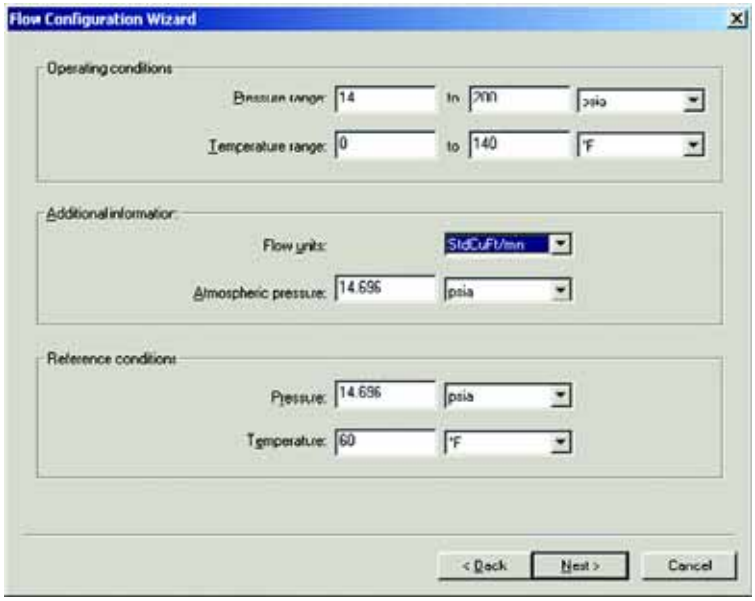

*(1) List of available primaries is subject to change.*

### Operating & Reference Conditions

After supplying information about the primary element, the next screen prompts you to enter values for environmental and operating conditions. This screen applies to all process fluids.

1. Enter the operating pressure range and units.
2. Enter the operating temperature range and units.
3. If desired, modify the atmospheric pressure, flow units, or reference conditions.
4. Click “Next”.

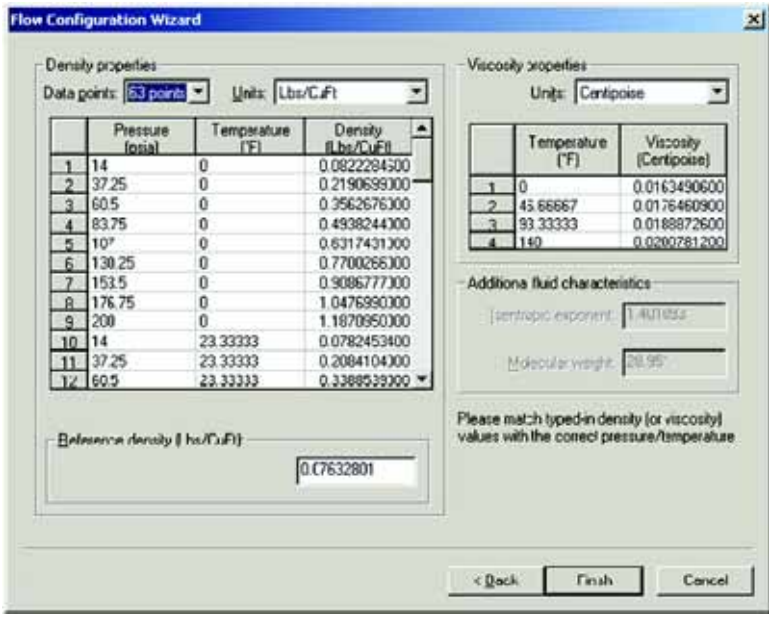
Figure 3-35. Operating and Reference Conditions



### Density, Viscosity, and Compressibility Configuration

The next screen displays the calculated density and viscosity values based on entries made in previous screens in the flow configuration wizard. If a change is made to either a density or viscosity value, the 3095 EA software considers the fluid to be “Custom Fluid.” Click “Finish” to exit the screen.

Figure 3-36. Density, Viscosity, and Compressibility

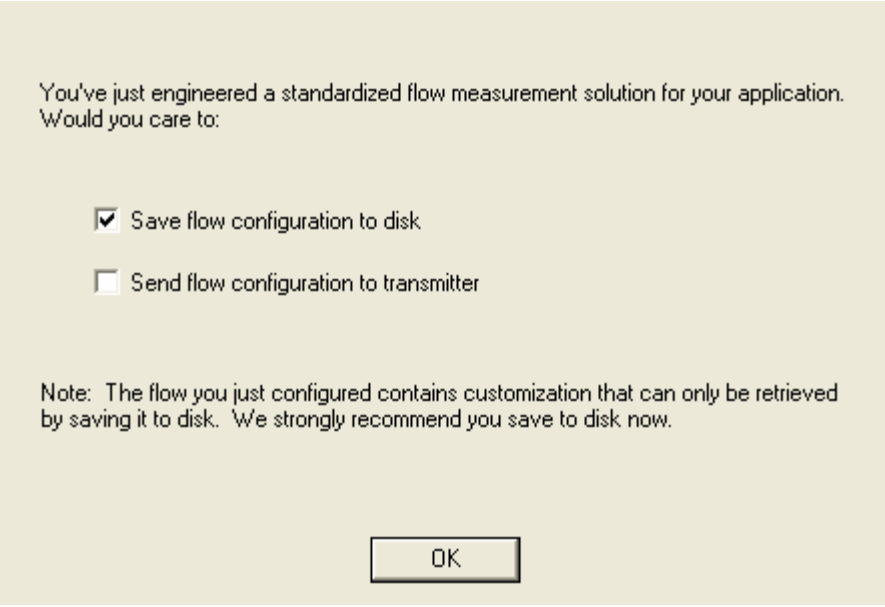


### Saving the Flow Configuration

Once the flow configuration wizard is complete, you will be prompted to save the new flow configuration. You can save it on the computer's hard disk, the 3095's flash memory, or both. Select the box next to the option you wish to perform, and click "OK."

**NOTE**
It is recommended to save the flow configuration to the computer for later use or installation.

Figure 3-37. Saving Options




**CAUTION**
If you selected a custom fluid, or made density or viscosity changes to a database fluid, be sure to save the information to a configuration file so that you can modify the flow configuration information at a later date. Although you can read a flow configuration from a transmitter, it is NOT possible to retrieve custom density, custom viscosity, or custom primary element information. Therefore, be sure to save custom fluid configurations to a unique file.

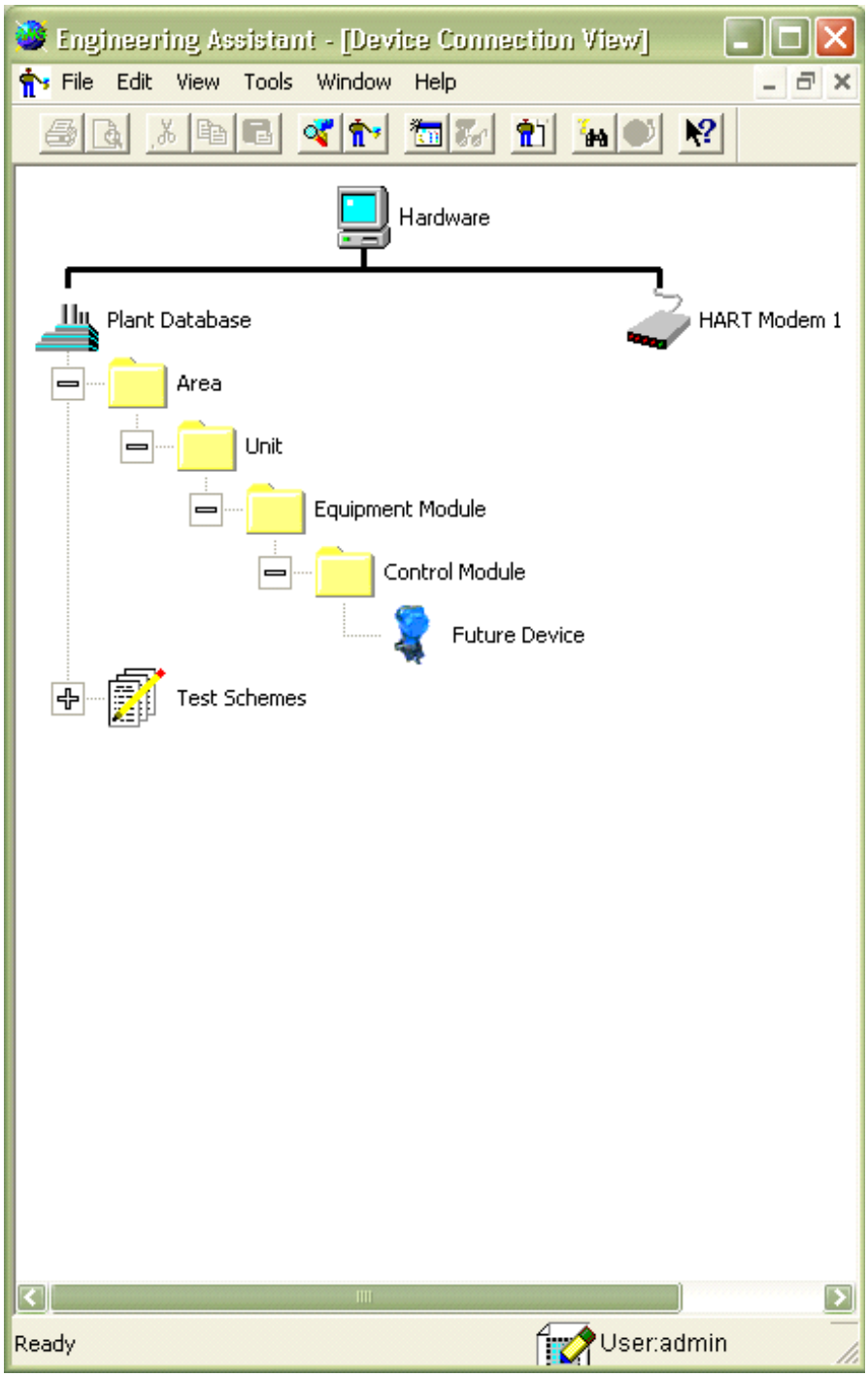
## Off-line Configuration

In off-line mode, the 3095 Engineering Assistant does not communicate directly with the transmitter. Instead, the configuration file is saved to the computer and loaded onto the transmitter at a later time when in on-line mode. To launch the 3095 MultiVariable Engineering Assistant in off-line mode:

1. When at the default Device Connection view, double click on the “Plant Database” icon.
2. Expand the “Area” folder by clicking on the “+” box.
3. Expand the “Unit” folder.
4. Expand the “Equipment Module” folder.
5. Right-click on the “Control Module” folder.
6. Select “Add Future Device” from the pop-up menu.
7. Select “3095 template” from the list of devices and click “OK.”
8. Right-click on the transmitter icon.
9. Launch the MultiVariable Engineering Assistant application (located under the SNAP-ON menu for AMS Snap-on users).

From here you can open up the flow configuration wizard and save a flow configuration file (.mv file). Follow the same procedure for creating a flow configuration as found on page 3-33 or page 3-36.

Figure 3-38. Off-Line Configuration



# Section 4 FOUNDATION Fieldbus Configuration

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**Safety Messages** . . . . . page 4-1
**Engineering Assistant Software** . . . . . page 4-2
**General Information** . . . . . page 4-10
**Function Block Overview** . . . . . page 4-12
**Resource Block** . . . . . page 4-14
**Sensor Transducer Block** . . . . . page 4-19
**Mass Flow Transducer Block** . . . . . page 4-20
**LCD Transducer Block** . . . . . page 4-20
**Analog Input (AI) Block** . . . . . page 4-22
**Operation** . . . . . page 4-26



## OVERVIEW

This section covers basic operation, software functionality, and basic configuration procedures for the 3095 Multivariable™ Transmitter with FOUNDATION Fieldbus. This section is organized by block information. For detailed information about the function blocks used in the 3095, refer to “Block Information” on page D-1 and the FOUNDATION Fieldbus Block manual 00809-0100-4783.

## 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 (⚠). Please 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.**

- Make sure only qualified personnel perform the installation.

**Explosions could result in death or serious injury.**

- Do not remove the connection head cover in explosive atmospheres when the circuit is live.
- Before powering a FOUNDATION fieldbus segment in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with instrinsically safe or non-incendive field wiring practices.
- Verify that the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.
- All connection head covers must be fully engaged to meet explosion-proof requirements.

**Process leaks could result in death or serious injury.**

- Do not remove the thermowell while in operation.
- Install and tighten thermowells and sensors before applying pressure

**Electrical shock could cause death or serious injury.**

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

# ENGINEERING ASSISTANT SOFTWARE

## Installation and Setup

### Installing the 3095 Engineering Assistant for FOUNDATION Fieldbus

Operation of the software requires the installation of both the 3095 Engineering Assistant (EA) for FOUNDATION Fieldbus and FOUNDATION Fieldbus communications card drivers. (The 3095 EA for Ff and the 3095 EA for HART can be loaded onto the same computer.) The following instructions detail the installation of both the National Instruments (NI) PCMCIA interface card and software as well as the 3095 EA for Ff.

**NOTE**
It is necessary to follow the instructions in order. This will simplify the installation process of the National Instruments software and EA. Deviating from these steps may significantly complicate the installation process.

1. Install the NI-FBUS Communications Manager Driver Software from the National Instruments CD.
   a. Insert the NI-FBUS Communications Manager Driver CD.
   b. Windows should detect the presence of a CD and start the installation program. Follow the onscreen prompts to finish the installation. If Windows does not detect the presence of a CD, use Windows Explorer or My Computer to view the contents of the CD-ROM, and then double click the SETUP.EXE program.
   c. Click the Install NI-FBUS Software button.
   d. Follow the Installation wizard to complete the installation process.
   e. The second installation screen asks for a serial number. The serial number is not needed, click Next. A pop-up comes up and says that you have entered an invalid serial number, and asks if you would like to enter a valid serial number, click No.
   f. Continue to follow the installation wizard.
   g. A licensing and activation pop-up will appear. No serial number or activation code is needed.
   h. This wizard will prompt the user to restart the computer once the installation is completed.
   i. When computer reboots, the Add Interface Wizard will appear, continue with the instructions in step 2 before using this screen.
2. Insert the PCMCIA card and install the New Hardware.
   a. Insert the PCMCIA Card into the PCMCIA slot.
   b. The Windows New Hardware Installation wizard will appear. Choose Yes this time only, and continue with the installation wizard.
3. Install the Driver for the National Instruments (NI) PCMCIA-FBus interface card.
   a. Return to the Add Interface Window. Follow the wizard to complete the installation of the PCMCIA card. If the software does not run automatically navigate to Start > All Programs > National Instruments > NI-FBUS > Utilities > Interface Configuration Utility. Click the Add Interface button and choose the PCMCIA Interface type.

4. Download the Rosemount 3095MV Device Descriptor (DD) files from the Fieldbus.org web site.
   a. Go to Fieldbus.org.
   b. Click the End User Resources button.
   c. Click Registered Products.
   d. Choose Emerson Process Management from the Manufacturer drop-down menu.
   e. Choose Flow from the Category drop-down menu.
   f. Click Search.
   g. Click on Rosemount 3095 MultiVariable™ Transmitter.
   h. Click Download DD / CFF File.
   i. Click I Accept to the terms to complete the download.
   j. A dialog box will appear when the DD is ready to download. Click Open.
   k. The files are located in a Zip file, extract all three files into a location on the PC of your choosing. To do this select all of the files and click Extract. Then choose the location that you would like to save them to using your browser.
5. Import the DD into NI-FBUS
   a. Start the NI-FBus Interface Config. Utility. Go to Start > All Programs > National Instruments > NI-FBUS > Utilities > Interface Configuration Utility.
   b. Right click on the “Board” icon to click “Enable”. (If no board appears in this window, the Interface card was not added correctly, please go back to step 3 and follow the instructions.)
   c. Click the Import DD/CFF button.
   d. Click the Browse button,
   e. Navigate to the directory that the DD files were extracted (in step 4K).
   f. Select the correct file in the directory, the click Open to select the directory.
   g. Click OK to install the files.
   h. When the import succeeds, click OK.
   i. Click OK on the Interface Configuration Utility screen to close the Utility.
6. Install the Rosemount Engineering Assistant for Ff software
   a. Insert disc 2 of the EA-5.5.1 CD set. The latest version of EA can also be found online at Rosemount.com.
   b. Windows should automatically open the CD to windows explorer view. Open the EAFF Folder.
   c. Double-click SETUPEAFF.exe.
   d. Follow the instructions in the Installation Wizard to complete the installation.
   e. Instructions will appear to reboot the computer once the installation has finished.

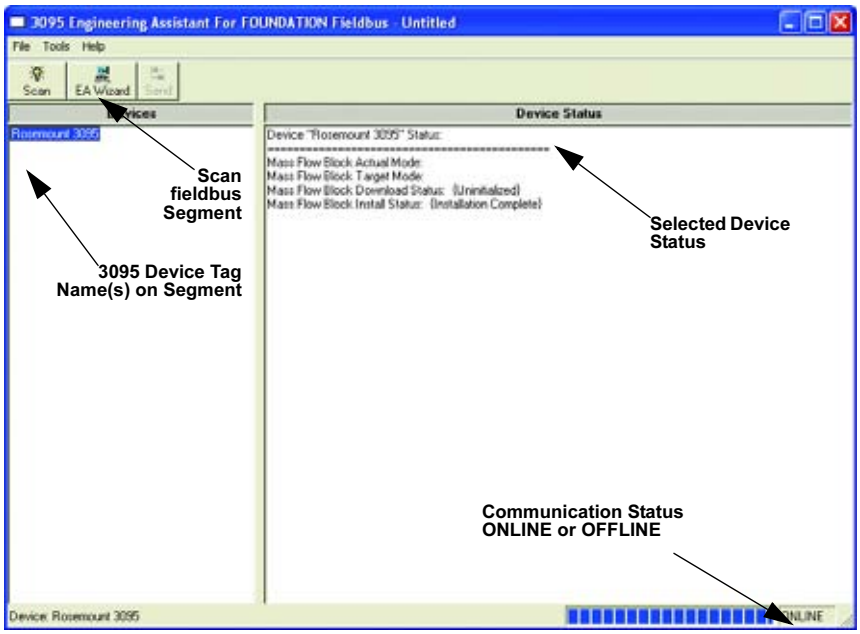
### Establish Communications with the 3095 FOUNDATION Fieldbus Transmitter using 3095 EA for FOUNDATION Fieldbus

1. Connect the 9-pin communications cable into the PCMCIA card port located in the computer.
2. Connect communication wiring to the cable connectors labeled "$D^{+}$" and "$D^{-}$".
3. Open the transmitter cover on the side marked "Field Terminals". Connect the communication wires to the 3095 transmitter terminals labeled "Fieldbus Wiring".
4. Verify device is properly powered to establish communications.
5. Open the 3095 Engineering Assistant for FOUNDATION Fieldbus program. Select the 3095 Engineering Assistant for FOUNDATION Fieldbus from the program menu or use the 3095 EA for FF shortcut icon.
6. Select Scan to scan the FOUNDATION Fieldbus segment. Scanning will locate and present live 3095 FOUNDATION Fieldbus transmitters on the segment. The transmitter device tag name will appear on the screen in the Device view. The Device Status view will publish the status of the transmitter.

**NOTE**
The EA for FOUNDATION fieldbus will not communicate with devices set with a non-commissioned address within the address range 248-251. It may be necessary to change the address of the device before EA will be able to communicate with the 3095 FOUNDATION fieldbus transmitter.

7. FOUNDATION Fieldbus communication status is represented in the lower right corner of the screen. If status is ONLINE, communication has been established. If status is OFFLINE, communication has not been established and/or communication has been disconnected.

Figure 4-1. Device View

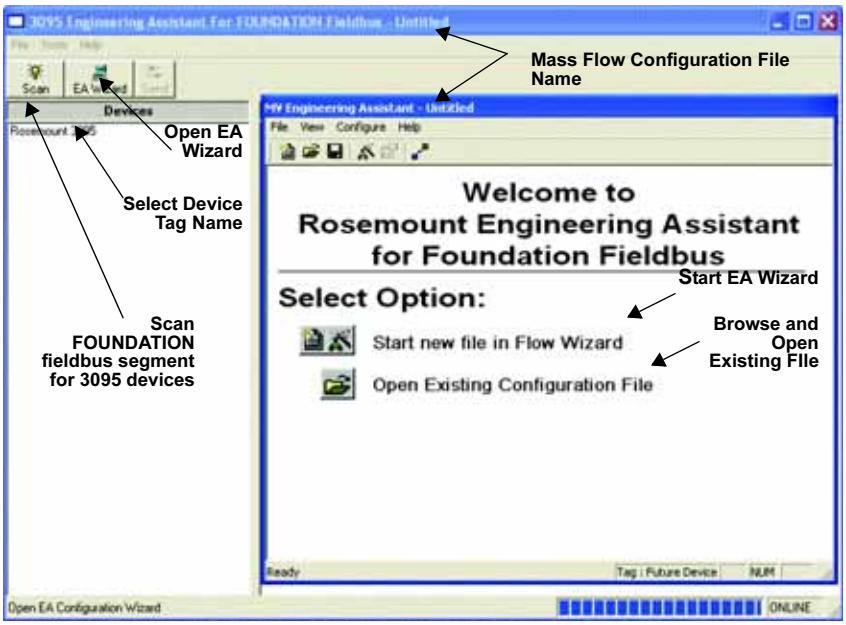


### Create and Send a Mass Flow Configuration using 3095 EA for FOUNDATION Fieldbus

A mass flow configuration file can be created in either OFFLINE or ONLINE mode.

1. Select the device tag name requiring a new or updated mass flow configuration file. The selected device tag will become highlighted. Information about the selected device will appear on the Device Status portion of the screen.
2. Select the EA Wizard. A window stating, “Welcome to Rosemount Engineering Assistant for Foundation Fieldbus” will appear.

Figure 4-2. Open EA Wizard

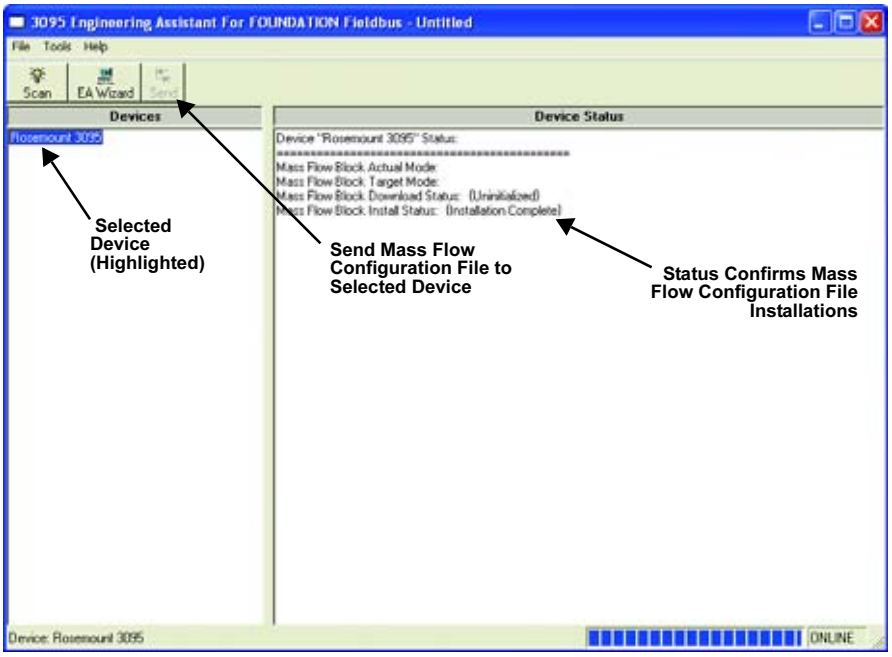



3. Select either “Start new file in Flow Wizard” or “Open existing configuration files” in Flow Wizard. Select either create a new file or open a current (saved) file and edit. Follow the EA Wizard and step through completing a mass flow configuration (see page 3-33 for details).

Figure 4-3. EA Wizard View


4. Upon completing a mass flow configuration using the EA Wizard, the file can be saved to disk. The file must be saved for review or to edit the mass flow configuration file in the future. FOUNDATION Fieldbus mass flow configuration files cannot be uploaded from the Mass Flow Transducer Block. If the file is not saved, it cannot be retrieved.
5. Select the “Send” button to download the mass flow configuration file to the Mass Flow Transducer Block. Sending the mass flow configuration file will overwrite the existing file in the Mass Flow Transducer Block. The transmitter must be out of service to send a mass flow configuration file.
6. A message box will appear confirming the action to send the mass flow configuration file to the Mass Flow Transducer Block. Select “OK” to send the mass flow configuration file.
7. Completing the download of the file to the Mass Flow Transducer Block, a screen that says “Installation Completed Successfully” will appear. Select OK.
8. The installation is now complete and will appear in the Device Status portion of the screen.
9. Bring the transmitter back into service using the host system, for example DeltaV.

Figure 4-4. Download Mass Flow Configuration File



### Verify the Flow Configuration

To view the flow configuration parameters:

1. Open the Mass Flow Block.
2. The following parameters, shown in Table 4-1, contain the flow configuration information that can be viewed in the Mass Flow Block.

Table 4-1. Flow Configuration Parameters

| Parameter Index Number | Parameter Name |
|---|---|
| 21 | FLUID_DENSITY |
| 22 | FLUID_VISCOSITY |
| 23 | GAS_EXPANSION_FACTOR |
| 24 | DISCHARGE_COEFFICIENT |
| 25 | REYNOLDS_NUMBER |
| 32 | FLUID_PHASE |
| 33 | FLUID_NAME |
| 34 | PRIMARY_ELEMENT_CATEGORY |
| 35 | PRIMARY_ELEMENT_TYPE |
| 36 | ORIFICE_BORE_MATERIAL |
| 37 | ORIFICE_BORE_DIAMETER |
| 39 | METER_TUBE_MATERIAL |
| 40 | METER_TUBE_DIAMETER |
| 42 | TEMPERATURE_UPPER_RANGE_VALUE |
| 43 | TEMPERATURE_LOWER_RANGE_VALUE |
| 44 | PRESSURE_UPPER_RANGE_VALUE |
| 45 | PRESSURE_LOWER_RANGE_VALUE |

An important step to verify the correct flow configuration was sent to the transmitter is by running a Test Calculation. This will simulate the differential pressure, static pressure, and process temperature and return the mass flow output from the transmitter. To run a Test Calculation:

1. Open the Mass Flow Transducer Block.
2. Set the Mass Flow Transducer Block into Out Of Service mode.
3. Enter the parameters from the DP Flow Calculation Data Sheet in the parameter indices shown in Table 4-2. These values must be entered in the following units: in$H_2O$, PSIA, and °F, respectively. (The status for these values should be set to Good_Noncascade_Nonspecific_Not Limited).

Table 4-2. Test Calculation Input Parameters

| Parameter Index Number | Parameter Name |
|---|---|
| 14 | DIFFERENTIAL_PRESSURE |
| 16 | PRESSURE |
| 18 | TEMPERATURE |

4. Write/Apply changes (As applicable for the Fieldbus host).
5. Set the block into Manual mode.
6. The Mass Flow Block will calculate the mass flow value (Index Number 13) based on the differential pressure, static pressure, and process temperature values that were entered. This value will be displayed in lb/s and should agree with the calculated mass flow value on the DP Flow Calculation Data Sheet.
7. When complete, set the block into Auto mode.

# GENERAL INFORMATION



## Device Description

Before configuring the device, ensure the host has the appropriate Device Description file revision for this device. The device descriptor can be found on www.rosemount.com. The initial release of the 3095 with FOUNDATION Fieldbus protocol is device revision 1.

## Node Address

The transmitter is shipped at a temporary (248) address. This will enable FOUNDATION Fieldbus host systems to automatically recognize the device and move it to a permanent address.

## Modes

The Resource, Transducer, and all function blocks in the device have modes of operation. These modes govern the operation of the block. Every block supports both automatic (AUTO) and out of service (OOS) modes. Other modes may also be supported.

⚠ **Changing Modes**
To change the operating mode, set the MODE_BLK.TARGET to the desired mode. After a short delay, the parameter MODE_BLOCK.ACTUAL should reflect the mode change if the block is operating properly.

**Permitted Modes**
It is possible to prevent unauthorized changes to the operating mode of a block. To do this, configure MODE_BLOCK.PERMITTED to allow only the desired operating modes. It is recommended to always select OOS as one of the permitted modes.

### Types of Modes

For the procedures described in this manual, it will be helpful to understand the following modes:

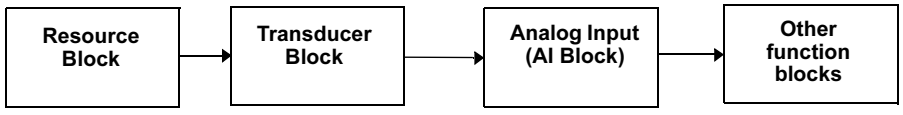
**AUTO**
The functions performed by the block will execute. If the block has any outputs, these will continue to update. This is typically the normal operating mode.

**Out of Service (OOS)**
The functions performed by the block will not execute. If the block has any outputs, these will typically not update and the status of any values passed to downstream blocks will be “BAD”. To make some changes to the configuration of the block, change the mode of the block to OOS. When the changes are complete, change the mode back to AUTO.

**MAN**
In this mode, variables that are passed out of the block can be manually set for testing or override purposes.

**Other Types of Modes**
Other types of modes are Cas, RCas, ROut, IMan and LOW. Some of these may be supported by different function blocks. For more information, see the Function Block manual (document number 00809-0100-4783).

**NOTE**
When an upstream block is set to OOS, this will impact the output status of all downstream blocks. The figure below depicts the hierarchy of blocks:



## Capabilities

**Virtual Communication Relationship (VCRs)**
There are a total of 20 VCRs. One is permanent and 18 are fully configurable by the host system. Twenty five link objects are available.

Table 4-3. Parameters

| Virtual Communication Relationship (VCRs) | Value |
|---|---|
| VCRs | 20 |
| Links | 25 |
| **Host timer recommendations** | **Value** |
| T1 | 96000 |
| T2 | 192000 |
| T3 | 480000 |
| **Network Parameter** | **Value** |
| Slot Time | 8 |
| Maximum Response Delay | 2 |
| Maximum Inactivity to Claim LAS Delay | 32 |
| Minimum Inter DLPDU Delay | 8 |
| Time Sync class | 4 (1 ms) |
| Maximum Scheduling Overhead | 21 |
| Per CLPDU PhL Overhead | 4 |
| Maximum Inter-channel Signal Skew | 0 |
| Required Number of Post-transmission-gab-ext Units | 0 |
| Required Number of Preamble-extension Units | 1 |
| **Block Execution Times** | **Value** |
| Analog Input | 90ms |
| PID | 120 ms |
| Arithmetic | 90 ms |
| Input Selection | 90 ms |
| Signal Characterizer | 90 ms |
| Integrator | 90 ms |
| Output Splitter | 90 ms |
| Control Selector | 90 ms |
| Analog Output | 90 ms |

## FUNCTION BLOCK OVERVIEW

For reference information on the Resource, Mass Flow Transducer, Sensor Transducer, AI, LCD Transducer blocks refer to Appendix D: Block Information. Reference information on the ISEL, INT, ARTH, SGCR, and PID blocks can be found in the Foundation Fieldbus Blocks manual (document number 00809-0100-4783).

**Resource Block (1000)**

The Resource block contains diagnostic, hardware and electronics information. There are no linkable inputs or outputs to the Resource block.

**Sensor Transducer Block (1100)**

The Sensor Transducer Block contains sensor information including the sensor diagnostics and the ability to trim the pressure, temperature and differential pressure sensors or recall factory calibration.

(Contains PT, P, DP, T sensor variables)

**Mass Flow Transducer Block (1200)**

Contains configuration and diagnostic information to perform fully compensated mass flow calculations. Contains the mass flow process variable (PV). Mass flow is calculated using process differential pressure and pressure. Temperature can be based on either process temperature or a fixed temperature value.

**LCD Transducer Block (1300)**

The LCD Transducer Block is used to configure the LCD display.

**Analog Input Block (1400 to 1800)**

Takes the analog input data from the analog input signal and it makes available to other function blocks. It has scaling conversion, filtering, square root, low cut and alarm processing.

**Analog Output Block (1900)**

The AO block provides an analog value to generate an analog output signal. It provides value and rate limiting, scaling conversion, fault state mechanism and other features.

**Input Selector Block (2200)**

Has four analog inputs that may be selected by an input parameter or according to a criterion as first good, maximum, middle and average.

**Integrator Block (2100)**

Integrates a variable in function of the time. There is a second flow input that may be used for the following applications: net flow totalization, volume/mass variation in vessels and precise flow ratio control.

**Arithmetic Block (2300)**

This calculation block provides some pre-defined equations ready for use in applications as flow compensation, HTG, ratio control and others.

**Signal Characterizer Block (2400)**

Has capability for two signal characterization based on the same curve. The second input has an option for swapping “x” to “y”, providing an easy way to use the inverse function, which may be used in signal characterization of read-back variables.

**PID Block (2000)**

Allows the selection of either the standard ISA algorithm or a series algorithm. Additionally the Proportional, Integral and Derivative actions can be based either on the PV or on the error. An additional enhancement provides beta and gamma factors for proportional and derivative multipliers providing a “two degrees of freedom” system.

**Control Selector Block (2500)**

The control selector is used to select the most appropriate control output based on a preconfigured criteria. The outputs of up to three PID blocks are accepted as inputs to the control selector. The control selector selects which control output to pass on to downstream blocks based on user configured criteria such as maximum, minimum, middle, or first good.

**Output Splitter Block (2600)**

The output splitter is used to pass the output of a single PID block to one of two analog output blocks depending on process conditions. Applications such as temperature control may require either heating or cooling depending on process conditions. The output splitter allows the output of the control PID to be sent through two different AO blocks to two different final control elements.

## RESOURCE BLOCK

### FEATURES and FEATURES_SEL

The parameters FEATURES and FEATURE_SEL determine optional behavior of the 3095.

**FEATURES**

The FEATURES parameter is read only and defines which features are supported by the 3095. Below is a list of the FEATURES the 3095 supports.

**UNICODE**

All configurable string variables in the 3095, except tag names, are octet strings. Either ASCII or Unicode may be used. If the configuration device is generating Unicode octet strings, you must set the Unicode option bit.

**REPORTS**

The 3095 supports alert reports. The Reports option bit must be set in the features bit string to use this feature. If it is not set, the host must poll for alerts.

**FAULT STATE**

The fault state condition is set by loss of communication to an output block, when the fault state is promoted to an output block or a physical contact. When fault state is set, then output function bocks will perform their FSTATE actions. The Rosemount 3095 supports fault state action. The fault state option bit must be set in the features bit to use this feature.

**SOFT W LOCK and HARD W LOCK**

Inputs to the security and write lock functions include the hardware security switch, the hardware and software write lock bits of the FEATURE_SEL parameter, the WRITE_LOCK parameter, and the DEFINE_WRITE_LOCK parameter.

The WRITE_LOCK parameter prevents modification of parameters within the device except to clear the WRITE_LOCK parameter. During this time, the block will function normally updating inputs and outputs and executing algorithms. When the WRITE_LOCK condition is cleared, a WRITE_ALM alert is generated with a priority that corresponds to the WRITE_PRI parameter.

The FEATURE_SEL parameter enables the user to select a hardware or software write lock or no write lock capability. To enable the hardware security function, enable the HW_SEL bit in the FEATURE_SEL parameter. When this bit has been enabled the WRITE_LOCK parameter becomes read only and will reflect the state of the hardware switch. In order to enable the software write lock, the SW_SEL bit must be set in the FEATURE_SEL parameter. Once this bit is set, the WRITE_LOCK parameter may be set to “Locked” or “Not Locked.” Once the WRITE_LOCK parameter is set to “Locked” by either the software or the hardware lock, all user requested writes as determined by the DEFINE_WRITE_LOCK parameter shall be rejected.

The DEFINE_WRITE_LOCK parameter allows the user to configure whether the write lock functions (both software and hardware) will control writing to all blocks, or only to the resource and transducer blocks. Internally updated data such as process variables and diagnostics will not be restricted by the security switch.

The following table displays all possible configurations of the WRITE_LOCK parameter.

| FEATURE_SEL HW_SEL bit | FEATURE_SEL SW_SEL bit | SECURITY SWITCH | WRITE_LOCK | WRITE_LOCK Read/Write | DEFINE_WRITE_LOCK | Write access to blocks |
|---|---|---|---|---|---|---|
| 0 (off) | 0 (off) | NA | 1 (unlocked) | Read only | NA | All |
| 0 (off) | 1 (on) | NA | 1 (unlocked) | Read/Write | NA | All |
| 0 (off) | 1 (on) | NA | 2 (locked) | Read/Write | Physical | Function Blocks only |
| 0 (off) | 1 (on) | NA | 2 (locked) | Read/Write | Everything | None |
| 1 (on) | 0 (off)(1) | 0 (unlocked) | 1 (unlocked) | Read only | NA | All |
| 1 (on) | 0 (off) | 1 (locked) | 2 (locked) | Read only | Physical | Function Blocks only |
| 1 (on) | 0 (off) | 1 (locked) | 2 (locked) | Read only | Everything | None |

*(1) The hardware and software write lock select bits are mutually exclusive and the hardware select has the highest priority. When the HW_SEL bit if set to 1 (on), the SW_SEL bit is automatically set to 0 (off) and is read only.*

**FEATURES_SEL**
FEATURES_SEL is used to turn on any of the supported features. The default setting of the 3095 does not select any of these features. Choose one of the supported features if any.

**MAX_NOTIFY**
The MAX_NOTIFY parameter value is the maximum number of alert reports that the resource can have sent without getting a confirmation, corresponding to the amount of buffer space available for alert messages. The number can be set lower, to control alert flooding, by adjusting the LIM_NOTIFY parameter value. If LIM_NOTIFY is set to zero, then no alerts are reported.

## PlantWeb™ Alerts

The Resource Block will act as a coordinator for PlantWeb alerts. There will be three alarm parameters (FAILED_ALARM, MAINT_ALARM, and ADVISE_ALARM) which will contain information regarding some of the device errors which are detected by the transmitter software. There will be a RECOMMENDED_ACTION parameter which will be used to display the recommended action text for the highest priority alarm and a HEALTH_INDEX parameters (0 - 100) indicating the overall health of the transmitter. FAILED_ALARM will have the highest priority followed by MAINT_ALARM and ADVISE_ALARM will be the lowest priority.

**FAILED_ALARMS**
A failure alarm indicates a failure within a device that will make the device or some part of the device non-operational. This implies that the device is in need of repair and must be fixed immediately. There are five parameters associated with FAILED_ALARMS specifically, they are described below.

*FAILED_ENABLED*
This parameter contains a list of failures in the device which makes the device non-operational that will cause an alert to be sent. Below is a list of the failures with the highest priority first.

1. Electronics
2. NV Memory
3. HW / SW Incompatible
4. Primary Value
5. Secondary Value

*FAILED_MASK*
This parameter will mask any of the failed conditions listed in FAILED_ENABLED. A bit on means that the condition is masked out from alarming and will not be reported.

*FAILED_PRI*
Designates the alerting priority of the FAILED_ALM, see “Alarm Priority” on page 4-25. The default is 0 and the recommended value are between 8 and 15.

*FAILED_ACTIVE*
This parameter displays which of the alarms is active. Only the alarm with the highest priority will be displayed. This priority is not the same as the FAILED_PRI parameter described above. This priority is hard coded within the device and is not user configurable.

*FAILED_ALM*
Alarm indicating a failure within a device which makes the device non-operational.

**MAINT_ALARMS**
A maintenance alarm indicates the device or some part of the device needs maintenance soon. If the condition is ignored, the device will eventually fail. There are five parameters associated with MAINT_ALARMS, they are described below.

*MAINT_ENABLED*
The MAINT_ENABLED parameter contains a list of conditions indicating the device or some part of the device needs maintenance soon.

Below is a list of the conditions with the highest priority first.

1. Primary Value Degraded
2. Secondary Value Degraded
3. Configuration Error
4. Calibration Error

*MAINT_MASK*
The MAINT_MASK parameter will mask any of the failed conditions listed in MAINT_ENABLED. A bit on means that the condition is masked out from alarming and will not be reported.

*MAINT_PRI*
MAINT_PRI designates the alarming priority of the MAINT_ALM, “Process Alarms” on page 4-25. The default is 0 and the recommended values is 3 to 7.

*MAINT_ACTIVE*
The MAINT_ACTIVE parameter displays which of the alarms is active. Only the condition with the highest priority will be displayed. This priority is not the same as the MAINT_PRI parameter described above. This priority is hard coded within the device and is not user configurable.

*MAINT_ALM*
An alarm indicating the device needs maintenance soon. If the condition is ignored, the device will eventually fail.

**Advisory Alarms**
An advisory alarm indicates informative conditions that do not have a direct impact on the device's primary functions There are five parameters associated with ADVISE_ALARMS, they are described below.

*ADVISE_ENABLED*
The ADVISE_ENABLED parameter contains a list of informative conditions that do not have a direct impact on the device's primary functions. Below is a list of the advisories with the highest priority first.

1. NV Writes Deferred
2. SPM Process Anomaly detected

*ADVISE_MASK*
The ADVISE_MASK parameter will mask any of the failed conditions listed in ADVISE_ENABLED. A bit on means the condition is masked out from alarming and will not be reported.

*ADVISE_PRI*
ADVISE_PRI designates the alarming priority of the ADVISE_ALM, see “Process Alarms” on page 4-25. The default is 0 and the recommended values are 1 or 2.

*ADVISE_ACTIVE*
The ADVISE_ACTIVE parameter displays which of the advisories is active. Only the advisory with the highest priority will be displayed. This priority is not the same as the ADVISE_PRI parameter described above. This priority is hard coded within the device and is not user configurable.

*ADVISE_ALM*
ADVISE_ALM is an alarm indicating advisory alarms. These conditions do not have a direct impact on the process or device integrity.

## Recommended Actions for PlantWeb Alerts

**RECOMMENDED_ACTION**
The RECOMMENDED_ACTION parameter displays a text string that will give a recommended course of action to take based on which type and which specific event of the PlantWeb alerts are active.

Table 4-4. RECOMMENDED_ACTION

| | Alarm Type | Failed/Maint/Advise Active Event | Recommended Action Text String |
|---|---|---|---|
| PlantWeb Alerts | None | None | No action required |
| | Advisory | Simulation Active | Disable Simulate Switch before returning device to service. |
| | | NV Write Deferred | Limit the number of periodic writes to all static or non-volatile parameters. |
| | | Mass Flow Transducer Block Reverse Flow | Check DP sensor configuration and trim as needed. |
| | | Mass Flow Transducer Block Sensor Out of Range | Check DP sensor configuration and trim as needed. |
| | | Mass Flow Transducer Block SP or PT Clipped | Check that Engineering Assistant (EA) has generated configuration for the proper range of DP values. |
| | Maintenance | Primary Value Degraded | Confirm the operating range of the applied sensor and/or verify the sensor connection and device environment. |
| | Failed | Secondary Value Failure | Verify the ambient temperature is within operating limits. |
| | | Primary Value Failure | Verify the Instrument process is within the Senor range and/or confirm sensor configuration and wiring. |
| | | Output Board Electronics Failure | Replace the Fieldbus Electronic Module Assembly. |
| | | Output Board NV Memory Failure | Reset the Device then download the device configuration. |
| | | Sensor Board NV Memory Failure | Replace Sensor Module. |
| | | HW/SW Incompatible | Verify the Hardware Revision is compatible with the Software Revision. |

## SENSOR TRANSDUCER BLOCK

Before operating the transmitter, perform a Zero Trim and set the Damping.

**NOTE**
When the engineering units of the XD_SCALE in the associated AI Block are selected, the engineering units in the Transducer Block change to the same units. THIS IS THE ONLY WAY TO CHANGE THE ENGINEERING UNITS IN THE SENSOR TRANSDUCER BLOCK.

## Zero Trim

Once the final installation of the transmitter has been completed, perform a Zero Trim before operating the transmitter. The Zero Trim procedure can be found in Section 5: Troubleshooting.

## Damping

⚠ The damping parameter in the Transducer Block may be used to filter measurement noise. By increasing the damping time, the transmitter will have a slower response time, but will decrease the amount of process noise that is translated to the Transducer Block Primary Value. Because both the LCD and AI Block get input from the Transducer Block, adjusting the damping parameter will effect the values passed to both blocks.

**NOTE**
The AI Block has it's own filtering parameter called PV_FTIME. For simplicity, it is better to do filtering in the Transducer Block as damping will be applied to primary value on every sensor update. If filtering is done in AI block, damping will be applied to output every macrocycle. The LCD will display value from Transducer block.

## MASS FLOW TRANSDUCER BLOCK

The Mass Flow Transducer Block is an optional licensed transducer block. The Block is configured using the Rosemount Engineering Assistant for FOUNDATION fieldbus software program. The block may be configured to utilize the process variables measured by the 3095 multivariable transmitter to include: differential pressure, pressure (gage or absolute) and temperature. Process variable measurements may also be used from independent measurement devices on the FOUNDATION fieldbus segment. The Mass Flow Transducer Block can also use a fixed temperature input to calculate mass flow.

## LCD TRANSDUCER BLOCK

The LCD display connects directly to the Rosemount 3095 electronics FOUNDATION fieldbus output board. The display indicates output and abbreviated diagnostic messages.

The display features a two-line display and a 0-100% scaled bar graph. The first line of five characters displays the output description, the second line of seven digits displays the actual value, the third line of six characters displays engineering units and the fourth line displays “Error” when the transmitter is in alarm. The LCD display can also display diagnostic messages.

Each parameter configured for display will appear on the LCD for a brief period before the next parameter is displayed. If the status of the parameter goes bad, the LCD will also cycle diagnostics following the displayed variable:

## Custom Display Configuration

Shipped from the factory, Parameter #1 is configured to display the Primary Variable (pressure) from the LCD Transducer Block. Parameters 2 – 4 are not configured. To change the configuration of Parameter #1 or to configure additional parameters 2 – 4, use the configuration parameters below.

The LCD Transducer Block can be configured to sequence four different process variables as long as the parameters are sourced from a function block that is scheduled to execute within the 3095 MultiVariable transmitter. If a function block is scheduled in the 3095 that links a process variable from another device on the segment, that process variable can be displayed on the LCD.

**DISPLAY_PARAM_SEL**

The DISPLAY_PARAM_SEL parameter specifies how many process variables will be displayed. Select up to four display parameters.

**BLK_TAG_#(1)**

Enter the Block Tag of the function block that contains the parameter to be displayed. The default function block tags from the factory are:

| | |
|---|---|
| TRANSDUCER | CHAR 2400 |
| AI 1400 | AO 1900 |
| PID 2000 | CSEL 2500 |
| INTEG 2100 | OSPL 2600 |
| ISEL 2200 | MASS FLOW 1200 |
| ARITH 2300 | |

**BLK_TYPE_#(1)**

Enter the Block Type of the function block that contains the parameter to be displayed. This parameter is generally selected via a drop-down menu with a list of possible function block types. (e.g. Transducer, PID, AI, etc.)

**PARAM_INDEX_#(1)**

The PARAM_INDEX_# parameter is generally selected via a drop-down menu with a list of possible parameter names based upon what is available in the function block type selected. Choose the parameter to be displayed.

**CUSTOM_TAG_#(1)**

The CUSTOM_TAG_# is an optional user-specified tag identifier that can be configured to be displayed with the parameter in place of the block tag. Enter a tag of up to five characters.

**UNITS_TYPE_#(1)**

The UNITS_TYPE_# parameter is generally selected via a drop-down menu with three options: AUTO, CUSTOM, or NONE. Select AUTO only when the parameter to be displayed is pressure, temperature, or percent. For other parameters, select CUSTOM and be sure to configure the CUSTOM_UNITS_# parameter. Select NONE if the parameter is to be displayed without associated units.

**CUSTOM_UNITS_#(1)**

Specify custom units to be displayed with the parameter. Enter up to six characters. To display Custom Units the UNITS_TYPE_# must be set to CUSTOM.

*(1) _# represents the specified parameter number.*

## ANALOG INPUT (AI) BLOCK

The Analog Input (AI) function block provides the link communicating the process variables in the transducer block to the FOUNDATION fieldbus segment. The Rosemount 3095 provides process variable measurement for static pressure (absolute or gage), differential pressure, process temperature and sensor temperature. Fully compensated Mass Flow is available as a calculated process variable.

## Configure the AI block

⚠ A minimum of four parameters are required to configure the AI Block. The parameters can be changed in the field using any FOUNDATION fieldbus host or configuration tool which supports DD methods.

**CHANNEL**
Channel defines which transducer block measurement is used by the AI Block. Select the channel that corresponds to the desired measurement.

| Channel | Measurement |
|---|---|
| 1 | Differential Pressure |
| 2 | Static Pressure |
| 3 | Process Temperature |
| 4 | Sensor Temperature |
| 5 | Mass Flow |

**L_TYPE**
The L_TYPE parameter defines the relationship of the sensor measurement (pressure or sensor temperature) to the desired output temperature of the AI Block (e.g. pressure, level, flow, etc.). The relationship can be direct, indirect, or indirect square root.

*Direct*
Select direct when the desired output will be the same as the sensor measurement (pressure or sensor temperature).

*Indirect*
Select indirect when the desired output is a calculated measurement based on the sensor measurement (e.g. a pressure measurement is made to determine level in a tank). The relationship between the sensor measurement and the calculated measurement will be linear.

*Indirect Square Root*
Select indirect square root when the desired output is an inferred measurement based on the sensor measurement and the relationship between the sensor measurement and the inferred measurement is square root (e.g. flow).

**XD_SCALE and OUT_SCALE**
The XD_SCALE and OUT_SCALE each include four parameters: 0%, 100%, engineering units, and precision (decimal point). Set these based on the L_TYPE:

*L_TYPE is Direct*
When the desired output is the measured variable, set the XD_SCALE to represent the operating range of the process. Set OUT_SCALE to match XD_SCALE.

*L_TYPE is Indirect*
When an inferred measurement is made based on the sensor measurement, set the XD_SCALE to represent the operating range that the sensor will see in the process. Determine the inferred measurement values that correspond to the XD_SCALE 0 and 100% points and set these for the OUT_SCALE.

*L_TYPE is Indirect Square Root*
When an inferred measurement is made based on the sensor measurement and the relationship between the inferred measurement and sensor measurement is square root, set the XD_SCALE to represent the operating range that the sensor will see in the process. Determine the inferred measurement values that correspond to the XD_SCALE 0 and 100% points and set these for the OUT_SCALE.

**NOTE**
To avoid configuration errors, only select Engineering Units for XD_SCALE and OUT_SCALE that are supported by the device. The supported units are:

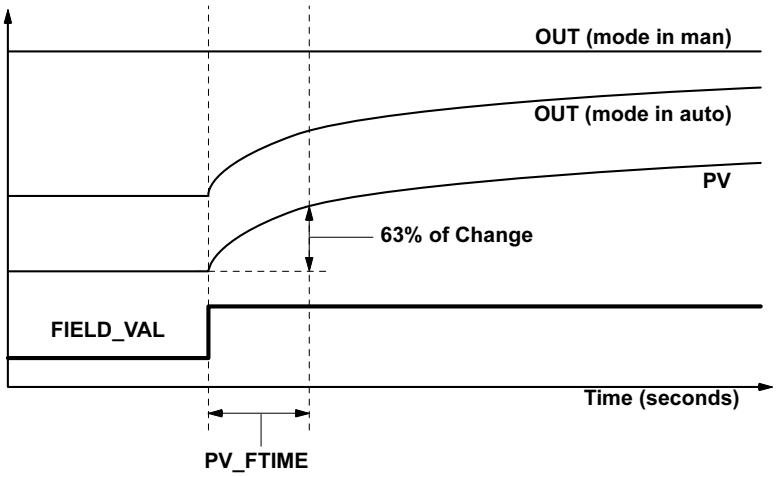
| Pressure (Channels 1 and 2) | Temperature (Channels 3 and 4) | Mass Flow (Channel 5) |
|---|---|---|
| Pa | °C | $lb_m$/sec |
| kPa | °F | $lb_m$/min |
| bar | K | $lb_m$/hour |
| mPa | | $lb_m$/day |
| mbar | | kg/sec |
| torr | | kg/min |
| atm | | kg/hour |
| psi | | grams/sec |
| $g/cm^2$ | | grams/min |
| $kg/cm^2$ | | grams/hour |
| in$H_2O$ at 68 °F | | StdCuFt/sec |
| mm$H_2O$ at 68 °F | | StdCuFt/min |
| in.$H_2O$ at 4 °F | | StdCuFt/hour |
| mm$H_2O$ at 4 °F | | StdCuFt/day |
| ft$H_2O$ at 68 °F | | StdCuM/hour |
| inHg at 0 °C | | StdCuM/day |
| mmHg at 0 °C | | NmlCuM/hour |
| | | NmlCuM/day |

When the engineering units of the XD_SCALE are selected, this causes the engineering units of the PRIMARY_VALUE_RANGE in the Transducer Block to change to the same units. THIS IS THE ONLY WAY TO CHANGE THE ENGINEERING UNITS IN THE SENSOR TRANSDUCER BLOCK, PRIMARY_VALUE_RANGE parameter.

## Filtering

⚠ The filtering feature changes the response time of the device to smooth variations in output readings caused by rapid changes in input. Adjust the filter time constant (in seconds) using the PV_FTIME parameter. Set the filter time constant to zero to disable the filter feature.

Figure 4-5. Analog Input PV_FTIME filtering Diagram.




## Low Cut

⚠ When the converted input value is below the limit specified by the LOW_CUT parameter, and the Low Cutoff I/O option (IO_OPTS) is enabled (True), a value of zero is used for the converted value (PV). This option is useful to eliminate false readings when the differential pressure measurement is close to zero, and it may also be useful with zero-based measurement devices such as flowmeters.

**NOTE**
**Low Cutoff** is the only I/O option supported by the AI block. Set the I/O option in **Manual** or **Out of Service** mode only.

## Process Alarms

Process Alarm detection is based on the OUT value. Configure the alarm limits of the following standard alarms:

- High (HI_LIM)
- High high (HI_HI_LIM)
- Low (LO_LIM)
- Low low (LO_LO_LIM)

In order to avoid alarm chattering when the variable is oscillating around the alarm limit, an alarm hysteresis in percent of the PV span can be set using the ALARM_HYS parameter. The priority of each alarm is set in the following parameters:

- HI_PRI
- HI_HI_PRI
- LO_PRI
- LO_LO_PRI

## Alarm Priority

Alarms are grouped into five levels of priority:

| Priority Number | Priority Description |
|---|---|
| 0 | The alarm condition is not used. |
| 1 | An alarm condition with a priority of 1 is recognized by the system, but is not reported to the operator. |
| 2 | An alarm condition with a priority of 2 is reported to the operator. |
| 3-7 | Alarm conditions of priority 3 to 7 are advisory alarms of increasing priority. |
| 8-15 | Alarm conditions of priority 8 to 15 are critical alarms of increasing priority. |

## Status Options

Status Options (STATUS_OPTS) supported by the AI block are shown below:

**Propagate Fault Forward**

If the status from the sensor is Bad, Device failure or Bad, Sensor failure, propagate it to OUT without generating an alarm. The use of these sub-status in OUT is determined by this option. Through this option, the user may determine whether alarming (sending of an alert) will be done by the block or propagated downstream for alarming.

**Uncertain if Limited**

Set the output status of the Analog Input block to uncertain if the measured or calculated value is limited.

**BAD if Limited**

Set the output status to Bad if the sensor is violating a high or low limit.

**Uncertain if Man Mode**

Set the output status of the Analog Input block to uncertain if the actual mode of the block is Man.

**NOTES**
The instrument must be in **Out of Service** mode to set the status option.

## OPERATION

Each FOUNDATION fieldbus host or configuration tool has different ways of displaying and performing operations. Some hosts will use Device Descriptions (DD) and DD Methods to complete device configuration and will display data consistently across platforms. The DD can found on www.rosemount.com. There is no requirement that a host or configuration tool support these features.

The information in this section will describe how to use methods in a general fashion. In addition, if your host or configuration tool does not support methods this section will cover manually configuring the parameters involved with each method operation. For more detailed information on the use of methods, see your host or configuration tool manual.

### Master Reset Method

To perform a master reset, run the Master Reset Method. If your system does not support methods, manually configure the Resource Block parameters listed below:

1. Set the RESTART to one of the options below:
   a. Set Run to nominal state when not restarting (default)
   b. Resource is not used by device
   c. Defaults set all device parameters to FOUNDATION Fieldbus default values
   d. The Processor does a software reset of the CPU

### Sensor Transducer Block

Sensor Calibration, Upper and Lower Trim methods.

In order to calibrate the transmitter, run the Upper and Lower Trim Methods. If your system does not support methods, manually configure the Transducer Block parameters listed below.

1. Set MODE_BLK.TARGET to OOS.
2. Set CAL_UNIT to supported engineering units in the Transducer Block.
3. Apply physical pressure that corresponds to the lower calibration point and allow the pressure to stabilize. The pressure must be between the range limits defined in PRIMARY_VALUE_RANGE.
4. Set values of CAL_POINT _LO to correspond to the pressure applied to the sensor.
5. Apply pressure, upper cal point.
6. Set CAL_POINT_HI.

**NOTE**
CAL_POINT_HI must be within PRIMARY_VALUE_RANGE and greater than CAL_POINT_LO + CAL_MIN_SPAN

7. Set SENSOR_CAL_DATE to the current date
8. Set SENSOR_CAL_WHO to the person responsible for the calibration
9. Set SENSOR_CAL_LOC to the calibration location
10. Set SENSOR_CAL_METHOD to User Trim
11. Set MODE_BLK.TARGET to AUTO

## Sensor Calibration, Zero Trim Method:

In order to zero the transmitter, run the Zero Trim Method. If your system does not support methods, manually configure the Transducer Block parameters listed below.

1. Set MODE_BLK.TARGET to OOS
2. Apply zero pressure to the sensor and allow the reading to stabilize
3. Set values CAL_POINT_LO to 0
4. Set SENSOR_CAL_DATE to the current date
5. Set SENSOR_CAL_WHO to the person responsible for the calibration
6. Set SENSOR_CAL_LOC to the calibration location
7. Set SENSOR_CAL_METHOD to User Trim
8. Set MODE_BLK.TARGET to AUTO

## Factory Trim Recall Method:

To perform a factory trim on the transmitter, run the Factory Trim Method. If your system does not support methods, manually configure the Transducer Block parameters listed below.

1. Set MODE_BLK.TARGET to OOS
2. Set FACTORY_CAL_RECALL to Recall
3. Set SENSOR_CAL_DATE to the current date
4. Set SENSOR_CAL_WHO to the person responsible for the calibration
5. Set SENSOR_CAL_LOC to the calibration location
6. Set SENSOR_CAL_METHOD to Factory Trim
7. Set MODE_BLK.TARGET to AUTO

## Mass Flow Transducer Block

Use the Rosemount Engineering Assistant (EA) for FOUNDATION Fieldbus application to create and download the mass flow configuration.

## Analog Input (AI) Function Block

### Status

Along with the measured or calculated PV value, every FOUNDATION Fieldbus block passes an additional parameter called STATUS. The PV and STATUS are passed from the Transducer Block to the Analog Input Block. The STATUS can be one of the following: GOOD, BAD, or UNCERTAIN. When there are no problems detected by the self-diagnosis of the block, the STATUS will be GOOD. If a problem occurs with the hardware in the device, or, the quality of the process variable is compromised for some reason, the STATUS will become either BAD or UNCERTAIN depending upon the nature of the problem. It is important that the Control Strategy that makes use of the Analog Input Block is configured to monitor the STATUS and take action where appropriate when the STATUS is no longer GOOD.

### Simulation

Simulate replaces the channel value coming from the Sensor Transducer Block. For testing purposes, it is possible to manually drive the output of the Analog Input Block to a desired value. There are two ways to do this:

Manual Mode: To change only the OUT_VALUE and not the OUT_STATUS of the AI Block, place the TARGET MODE of the block to MANUAL. Then, change the OUT_VALUE to the desired value.

**Simulate**

1. If the SIMULATE switch is in the OFF position, move it to the ON position. If the SIMULATE jumper is already in the ON position, you must move it to off and place it back in the ON position.

**NOTE**
As a safety measure, the switch must be reset every time power is interrupted to the device in order to enable SIMULATE. This prevents a device that is tested on the bench from getting installed in the process with SIMULATE still active.

2. To change both the OUT_VALUE and OUT_STATUS of the AI Block, set the TARGET MODE to AUTO.
3. Set SIMULATE_ENABLE_DISABLE to ‘Active.’
4. Enter the desired SIMULATE_VALUE to change the OUT_VALUE and SIMULATE_STATUS_QUALITY to change the OUT_STATUS.

If errors occur when performing the above steps, be sure that the SIMULATE jumper has been reset after powering up the device.

# Section 5 Troubleshooting

**Safety Messages . . . . . page 5-1**
**EA Communication Troubleshooting . . . . . page 5-2**
**Disassembly Procedures . . . . . page 5-8**
**Reassembly Procedures . . . . . page 5-10**
**EA Error Message Summary . . . . . page 5-12**
**Foundation fieldbus Troubleshooting Guides . . . . . page 5-16**
**Resource Block . . . . . page 5-19**
**Sensor Transducer Block . . . . . page 5-20**
**Analog Input (AI) Function Block . . . . . page 5-22**
**LCD Transducer Block . . . . . page 5-23**

## 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 (⚠). Please refer to the following safety messages before performing an operation preceded by this symbol.

**⚠WARNING**

Use only the procedures and new parts specifically referenced in this manual. Unauthorized procedures or parts can affect product performance and the output signal used to control a process, and may render the instrument dangerous. Direct any questions concerning these procedures or parts to Rosemount Inc.Do not remove the transmitter cover in explosive atmospheres when the circuit is live.

To prevent damage which may lead to inaccurate measurements, do not scratch, puncture, or depress the isolating diaphragms. Verify that the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.

To prevent damage which may lead to inaccurate measurements, do not use any chlorine or acid solutions to clean the diaphragms.

Process leaks can cause death or serious injury

# EA COMMUNICATION TROUBLESHOOTING

## Alarm Abbreviations

Table 5-1 shows standard alarm abbreviations used in Appendix C: Critical Alarms for Previous Software Revisions.

Table 5-1. Alarm Abbreviations

| Abbreviation | Definition |
|---|---|
| LOL | Lower Operating Limits (customer specified using the EA) |
| UOL | Upper Operating Limits (customer specified using the EA) |
| LRL | Lower Range Limits |
| URL | Upper Range Limits |
| LRV | Lower Range Value |
| URV | Upper Range Value |
| URL+ | URL + (10%URL) (For example, URL+ = 250 + (0.10 × 250) = 275 |
| LRL– | LRL – (10%LRL) (For example, LRL– = –250 –[0.10 × (250)] = –275 |

## Corrective Action

Table 5-2 identifies the most likely causes for communication problems between the Engineering Assistant (EA) software and the Rosemount 3095.

Table 5-2. Corrective Action for EA Communication Problems

| Symptom | Corrective Action |
|---|---|
| No Communication between the EA Software and the Rosemount 3095 | **Loop Wiring (HART)**<br>• HART protocol communication requires a loop resistance value between 250–1100 ohms, inclusive.<br>• Check for adequate voltage to the transmitter. (If the computer is connected and 250 ohms resistance is properly in the loop, a power supply voltage of at least 16.5 V dc is required.)<br>• Check for intermittent shorts, open circuits, and multiple grounds.<br>• Check for capacitance across the load resistor. Capacitance should be less than 0.1 microfarad. |
| | **EA for HART Installation**<br>• Verify that the install program modified the CONFIG.SYS file.<br>• Verify computer reboot followed EA-HART installation.<br>• Verify correct COMM port selected.<br>• Verify laptop computer is not in low energy mode (certain laptops disable all COMM ports in low energy mode).<br>• Check if HART driver is loaded and installed. If using a HART USB port modem, install drivers from CD-ROM provided with USB modem.<br>• EA for HART cannot be open simultaneously with EA for FOUNDATION fieldbus. Proper communications require closing the EA for FOUNDATION fieldbus program.<br>Verify the receive buffer computer setting is set to the lowest setting (1) in the advanced COM port settings and re-boot the computer. |
| | **Loop Wiring (FOUNDATION Fieldbus)**<br>• Fieldbus protocol communications requires a conditioned supply with two terminators on the bus.<br>• Check for adequate voltage to the tranmsitter. It must have at least 9 volts across the terminals.<br>• Check for intermittent shorts and open circuits.<br>Verify neither terminal is grounded. Fieldbus protocol does not allow either side of the bus segment to be grounded |
| | **EA for FOUNDATION Fieldbus Installation**<br>• Verify computer reboot followed by the EA-Fieldbus installation.<br>• Verify PCMCIA card drivers are properly installed.<br>• EA for HART connot be open simultaneously with EA for FOUNDATION fieldbus. Proper communications require closing the EA for HART program. |

## Overrange Conditions

Overrange conditions typically indicate an error that the sensor or flow measurements have reached an overrange condition where substitute values are being used.

Table 5-3 identifies actions to the analog output and digital output during these conditions. Blank table cells indicate no action for that condition. Table 5-4 shows recommended corrective action, and also identifies effects on the flow calculation during these conditions.

Table 5-3. Overrange Conditions.

| EA Display (Diagnostics, Error Info) | Analog Output | | | | | Digital Output | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Flow | DP | AP/GP | PT | Flow Total | Flow | DP | AP/GP | PT | Flow Total |
| DP above URL+ | Saturate in direction of alarm jumper | Saturate High (1) | | | Saturate in direction of alarm jumper | | URL+ | | | |
| DP below LRL– | Saturate Low(2) | Saturate Low(2) | | | Saturate Low(2) | zero | URL– | | | zero |
| AP/GP above URL+ | Saturate in direction of alarm jumper | Saturate in direction of alarm jumper | Saturate High(1) | | Saturate in direction of alarm jumper | | URL+ | URL+ | | |
| AP/GP below LRL– | Saturate in direction of alarm jumper | Saturate in direction of alarm jumper | Saturate Low (2) | | Saturate in direction of alarm jumper | | URL– | URL– | | |
| PT above URL+ | Saturate in direction of alarm jumper | | | Saturate High(1) | Saturate in direction of alarm jumper | | | | URL+ | |
| PT below LRL– | Saturate in direction of alarm jumper | | | Saturate Low(2) | Saturate in direction of alarm jumper | | | | URL– | |
| ST above URL+ | Saturate in direction of alarm jumper | | | | | NAN(3) | NAN(3) | NAN(3) | NAN(3) | NAN(3) |
| ST below LRL– | Saturate in direction of alarm jumper | | | | | NAN(3)) | NAN(3) | NAN(3) | NAN(3) | NAN(3) |

*(1) Saturate high if direct acting (URV>LRV), Saturate low if reverse acting (URV<LRV).*
*(2) Saturate low if direct acting (URV>LRV), Saturate high if reverse acting (URV<LRV).*
*(3) NAN indicates "Not a Number." Distributed Control Systems and HART masters will read "7F A0 00 00h."*

Table 5-4. Corrective Action: Overrange Conditions

| EA Display (Diagnostics, Error Info) | LCD Display | Flow Calculation Affects (1) | | Corrective Action |
|---|---|---|---|---|
| | | C' | ( ) 0.5 | |
| "DP above URL+" | "DP_OL" | URL+ | URL+ | These displays indicate that the transmitter differential pressure reading exceeds its sensor limits by more than 10%. There are two possible causes. Either the transmitter is overpressured (underpressured), or it has a sensor malfunction. Check the pressure input to the transmitter. If an overpressure (underpressure) condition exists, correct it. If not, replace the sensor module as described on page 5-9. |
| "DP below LRL–" | "DP_OL" | Unreliable flow output | Unreliable flow output | |
| "AP/GP above URL+ " | "SP_OL" | UOL | URL+ | These displays indicate that the transmitter absolute pressure reading exceeds its sensor limits by more than 10%. There are two possible causes. Either the transmitter is overpressured (underpressured), or it has a sensor malfunction. Check the pressure input to the transmitter. If an overpressure (underpressure) condition exists, correct it. If not, replace the sensor module as described on page 5-10page 5-9 |
| "AP/GP below LRL–" | "SP_OL" | LOL | LRL– | |
| "PT above URL+" | "PT_OL" | UOL | URL+ | Check the transmitter RTD connector and RTD screw terminals to ensure the RTD cable is properly connected. Verify that the process temperature is between -300F and 1500 °F. Check output board revision level to verify this is correct process temperature range. |
| "PT below LRL– " | "PT_OL" | LOL | LRL– | |
| "ST above URL+" | no display | Unreliable flow output | Unreliable flow output | These displays indicate that the ambient temperature limit of the transmitter is being exceeded. Verify that the transmitter ambient temperature is between -40F and 185F. If transmitter temperature exceeds these limits, correct the temperature. If transmitter temperature is within these limits, replace the sensor module as described on page 5-9. |
| "ST below LRL–" | no display | Unreliable flow output | Unreliable flow output | |

*(1) Only the parameter causing the exception is clipped at the operating or sensor limits. The other calculation inputs are not affected.*

Table 5-5. Rosemount 3095 Flow Exceptions.

| LCD Display | EA Display (Diagnostics, Error Info) | Flow Calculation Affects (1) | | Flow Analog Output | Flow Digital Output |
|---|---|---|---|---|---|
| | | C' | $( )^{0.5}$ | | |
| no display(2) | "AP/GP is above UOL" | UOL | | | |
| no display(2) | "AP/GP is below LOL" | LOL | | | |
| no display(2) | "PT is above UOL" | UOL | | | |
| no display(2) | "PT is below LOL" | LOL | | | |
| no display(2) | "Flow math error" | Math Error | Math Error | Saturate in direction of alarm jumper | NAN (3) |
| no display(2) | "–2 in$H_20$ < DP ≤ low-flow cutoff"(4) | Unreliable flow output | Unreliable flow output | | 0 |
| no display(2) | "DP ≤ –2 in$H_20$" | Unreliable flow output | Unreliable flow output | Saturate Low(5) | zero |

*(1) Only the parameter causing the exception is clipped at the operating or sensor limits. The other calculation inputs are not affected.*
(2) The LCD has no display for this error. It continues with normal unit display during this error condition.
(3) NAN indicates "Not a Number." Distributed Control Systems and HART masters will read "7F A0 00 00h."
(4) Default and minimum low-flow cutoff value = 0.02 in$H_2O$.
(5) Saturate low if direct acting (URV>LRV), Saturate high if reverse acting (URV<LRV).

## Sensor Limits

Table A-3 on page A-21 identifies sensor limits for Rosemount 3095 transmitters with serial numbers less than 40,000.

## Unexpected Process Variable (PV) Readings

The EA software provides a means to display the current process variables and flow calculations.

**WARNING**
The following performance limitations may inhibit efficient or safe operation. Critical applications should have appropriate diagnostic and backup systems in place.

Pressure transmitters contain an internal fill fluid. It is used to transmit the process pressure through the isolating diaphragms to the pressure sensing element. In rare cases, oil loss paths in oil-filled pressure transmitters can be created. Possible causes include: physical damage to the isolator diaphragms, process fluid freezing, isolator corrosion due to an incompatible process fluid, etc.

A transmitter with oil fill fluid loss may continue to perform normally for a period of time. Sustained oil loss will eventually cause one or more of the operating parameters to exceed published specifications while a small drift in operating point output continues. Symptoms of advanced oil loss and other unrelated problems include:

- Sustained drift rate in true zero and span or operating point output or both
- Sluggish response to increasing or decreasing pressure or both
- Limited output rate or very nonlinear output or both
- Change in output process noise
- Noticeable drift in operating point output
- Abrupt increase in drift rate of true zero or span or both
- Unstable output
- Output saturated high or low.

Table 5-6. Unexpected Process Variable (PV) Readings

| Symptom | Corrective Action |
|---|---|
| **High PV Reading** | **DIFFERENTIAL PRODUCER**<br>• Check for restrictions at the differential producer.<br>• Check the installation and condition of the differential producer.<br>• Note any changes in process fluid properties that may affect output.<br>**IMPULSE PIPING**<br>• Check to ensure that the pressure connection is correct.<br>• Check for leaks or blockage.<br>• Check to ensure that blocking valves are fully open.<br>• Check for entrapped gas in liquid lines and for liquid in gas lines.<br>• Check to ensure that the density of fluid in impulse lines is unchanged.<br>• Check for sediment in the transmitter process flange.<br>• Make sure that process fluid has not frozen within the process flange.<br>**POWER SUPPLY**<br>• Check the output voltage of the power supply at the transmitter. It should be 11 to 55 V dc for HART (9 to 32 V dc for fieldbus) with no load at the transmitter terminals.<br>***Note: do not use higher than the specified voltage to check the loop, or damage to the transmitter may result.***<br>**TRANSMITTER ELECTRONICS**<br>• Connect a personal computer and use the EA Software to check the sensor limits to ensure calibration adjustments are within the sensor range and that calibration is correct for the pressure being applied.<br>• Connect a personal computer and using the EA Software, select Diagnostics, Error Info to detect any electronic failures.<br>• Make sure the post connectors are clean.<br>• Confirm that the electronics housing is properly sealed against moisture.<br>• If the electronics are still suspect, substitute new electronics.<br>**SENSING ELEMENT**<br>• The sensing element is not field repairable and must be replaced if found to be defective. Check for obvious defects, such as a punctured isolating diaphragm or fill fluid loss, and contact your nearest Rosemount Service Center. |

Table 5-6. Unexpected Process Variable (PV) Readings

| | |
|---|---|
| **Erratic PV Reading** | DIFFERENTIAL PRODUCER<br>• Check the installation and condition of the differential producer.<br>**LOOP WIRING**<br>• Check for adequate voltage to the transmitter. It should be 11 to 55 V dc for HART (9 to 32 V dc for fieldbus) with no load at the transmitter terminals.<br>• Check for intermittent shorts, open circuits, and multiple grounds.<br>*Note: Do not use higher than the specified voltage to check the loop, or damage to the transmitter electronics may result.*<br>PROCESS PULSATION<br>• Adjust the electronic damping (see page 4-17).<br>**TRANSMITTER ELECTRONICS**<br>• Connect a personal computer and use the EA Software to check the sensor limits to ensure calibration adjustments are within the sensor range and that calibration is correct for the pressure being applied.<br>• Connect a personal computer and using the EA Software, select Diagnostics, Error Info to detect any electronic failures.<br>• Make sure the post connectors are clean.<br>• Confirm that the electronics housing is properly sealed against moisture.<br>• If the electronics are still suspect, substitute new electronics.<br>**IMPULSE PIPING**<br>• Check for entrapped gas in liquid lines and for liquid in gas lines.<br>• Make sure that process fluid has not frozen within the process flange.<br>**SENSING ELEMENT**<br>• The sensing element is not field repairable and must be replaced if found to be defective. Check for obvious defects, such as a punctured isolating diaphragm or fill fluid loss, and contact your nearest Rosemount Service Center. |
| Low PV Reading or No PV Reading | **DIFFERENTIAL PRODUCER**<br>• Check the installation and condition of the differential producer.<br>• Note any changes in process fluid properties that may affect output.<br>**LOOP WIRING**<br>• Check for adequate voltage to the transmitter. It should be 11 to 55 V dc for HART (9 to 32 V dc for fieldbus) with no load at the transmitter terminals.<br>• Check the milliamp rating of the power supply against the total current being drawn for all transmitters being powered.<br>• Check for shorts and multiple grounds.<br>• Check for proper polarity at the signal terminal.<br>• Check loop impedance.<br>• Check the wire insulation to detect possible shorts to ground.<br>*Note: Do not use higher than the specified voltage to check the loop, or damage to the transmitter electronics may result.*<br>**IMPULSE PIPING**<br>• Check to ensure that the pressure connection is correct.<br>• Check for leaks or blockage.<br>• Check to ensure that blocking valves are fully open and that bypass valves are tightly closed.<br>• Check for entrapped gas in liquid lines and for liquid in gas lines.<br>• Check for sediment in the transmitter process flange.<br>• Make sure that process fluid has not frozen within the process flange.<br>**TRANSMITTER ELECTRONICS**<br>• Connect a personal computer and use the EA Software to check the sensor limits to ensure calibration adjustments are within the sensor range and that calibration is correct for the pressure being applied.<br>• Connect a personal computer and using the EA Software, select Diagnostics, Error Info to detect any electronic failures.<br>• Make sure the post connectors are clean.<br>• Confirm that the electronics housing is properly sealed against moisture.<br>• If the electronics are still suspect, substitute new electronics.<br>**SENSING ELEMENT**<br>• The sensing element is not field repairable and must be replaced if found to be defective. Check for obvious defects, such as a punctured isolating diaphragm or fill fluid loss, and contact your nearest Rosemount Service Center. |

Table 5-6. Unexpected Process Variable (PV) Readings

| | |
|---|---|
| **Sluggish Output Response/Drift** | **DIFFERENTIAL PRODUCER**<br>• Check for restrictions at the differential producer.<br>**IMPULSE PIPING**<br>• Check for leaks or blockage.<br>• Ensure that blocking valves are fully open<br>• Check for sediment in the transmitter process flange.<br>• Check for entrapped gas in liquid lines and for liquid in gas lines.<br>• Ensure that the density of fluid in impulse lines is unchanged.<br>• Make sure that process fluid has not frozen within the process flange.<br>**TRANSMITTER ELECTRONICS**<br>• Connect a personal computer and using the EA Software, select Diagnostics, Error Info to detect any electronic failures.<br>• Confirm that damping is correctly set.<br>• Confirm that the electronics housing is properly sealed against moisture.<br>**SENSING ELEMENT**<br>• The sensing element is not field repairable and must be replaced if found to be defective. Check for obvious defects, such as a punctured isolating diaphragm or fill fluid loss, and contact your nearest Rosemount Service Center.<br>• Confirm that the electronics housing is properly sealed against moisture. |

## DISASSEMBLY PROCEDURES

Read the following information carefully before disassembling a transmitter. General information concerning the process sensor body and electrical housing follow. Figure 2-3 on page 2-6 shows an exploded view of the transmitter.

### Removing the Process Sensor Body

**NOTE**
Do not leave inoperable transmitters in service.

Be aware of the following:

- The process flange can be detached by removing the four flange bolts and the two alignment screws that secure it.
- Isolating diaphragms can be cleaned with a soft rag, mild cleaning solution, and clear water rinse.
- The flange adapters and process flange can be rotated or reversed for mounting convenience.
- When removing the process flange or flange adapters, visually inspect the Teflon O-rings. Replace the O-rings if they show any signs of damage, such as nicks or cuts. If they are undamaged, they can be reused.
- If the teflon sensor module O-rings have been replaced, re-torque the flange bolts after installation to compensate for cold flow.

### Removing the Electrical Housing

Electrical connections are located in a compartment identified as FIELD TERMINALS on the electronics housing. Unscrew the cover on the Field Terminal side to access the signal terminal block.

Remove the signal terminal block by loosening the two small screws located at the 9 o'clock and 4 o'clock positions, then pulling the terminal block straight out to disconnect the block from the post connectors.

## Removing the Electronics Board

The transmitter electronics are located behind the cover opposite the terminal side.

**NOTE**
To prevent damage to the circuit board, remove power from the transmitter before removing the electronics cover.

To remove the electronics board:

1. Remove the housing cover opposite the field terminal side.
2. Loosen the two captive screws that anchor the board.

**NOTE**
The circuit board is electrostatically sensitive. To prevent damage to the circuit board, be sure to observe handling precautions for static-sensitive components.

3. Slowly pull the electronics board out of the housing. With the two captive screws free of the transmitter housing, only the sensor module ribbon cable holds the module to the housing.
4. Disconnect the sensor module ribbon cable to release the electronics board from the transmitter.
5. Carefully tuck the cable connector completely inside the internal shroud. The shroud protects the cable from damage that might occur when the housing is rotated.

## Removing the Sensor Module

**NOTE**
Do not remove the housing until after you tuck the cable connector completely inside of the internal shroud. The shroud protects the cable from damage that can occur when you rotate the housing.

6. Loosen the housing rotation set screw with a 5/64-inch hex wrench and back off one full turn.

**NOTE**
Before removing the sensor module from the electrical housing, disconnect the electronics board power cable from the sensor module. This will prevent damage to the sensor module ribbon cable.

7. Unscrew the housing from the module, making sure the shroud and sensor cable do not catch on the housing. Damage can occur to the cable if the internal shroud and sensor cable rotate with the housing. Carefully pull the shroud and sensor ribbon cable assembly through the housing opening.

**NOTE**
If the Coplanar flange has been removed, take care not to damage the isolating diaphragm after disassembly. Damage to the isolating diaphragm may lead to inaccurate measurements.

The sensing module is a complete assembly and cannot be further disassembled.

## REASSEMBLY PROCEDURES

Follow these procedures carefully to ensure proper reassembly:

### Attaching the Sensor Module to the Electronics Housing

1. Inspect all cover and housing (non-process-wetted) O-rings and replace if necessary. Lightly lubricate with silicone to ensure a good seal.
2. Carefully tuck the cable connector completely inside the internal shroud. To do this, turn the shroud and cable counterclockwise one rotation to tighten the cable.
3. Lower the electronics housing onto the module, and guide the internal shroud and cable through the housing and into the external shroud.
4. Fasten the housing to the module by turning clockwise.

**NOTE**
To prevent damage to the cable connector, watch the cable and shroud as you attach the housing to the module. Make sure the cable connector does not slip out of the internal shroud and begin to rotate with the housing. Reinsert the cable connector into the shroud if it escapes before the housing is fully fastened.

5. Inspect the threaded connections.

**NOTE**
The bottom of the electronic housing must be within $^{1}/_{16}$-in. of the sensor module to maintain explosion-proof requirements.

6. Tighten the housing rotation set screw.

### Attaching the Electronics Board

1. Remove the cable connector from its position inside the internal shroud, and attach the cable to the electronics board.
2. Align the post-receptacle connectors with the posts inside the electronics housing.

**NOTE**
If the post-receptacle connectors have a black rubber sleeve over them, the sleeve must be removed before installing a new electronics board. Gently grasp the sleeve between thumb and forefinger and slide it off the connector. Discard sleeve.

3. Insert the electronics board into the housing and tighten the captive mounting screws.
4. Replace the electronics housing cover. Metal to metal contact is preferred.

## Reassembling the Process Sensor Body

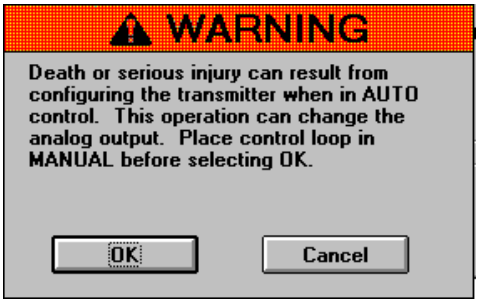
1. Inspect the Teflon sensor module O-rings. If the O-rings are undamaged, they can be re-used. If the O-rings show signs of damage, such as nicks or cuts, or if there is any doubt about their sealing ability, replace them with new O-rings. Use the following steps:
   a. Remove the damaged O-rings by carefully prying them from the O-ring grooves. Take care not to damage the surface of the isolating diaphragm during this process.
   b. Replace the damaged O-rings by fitting new O-rings into the O-ring grooves.
2. Install the process flange on the sensor module. To hold the process flange in place, install the two hex head alignment screws. These screws are not pressure retaining and need only be finger tight. Do not overtighten; this will affect the module/flange alignment.
3. Install the appropriate flange bolts using Figure 2-9 on page 2-18 as a reference:
   - For installations requiring a $^1/_4$–18 NPT mounting, install the four 1.75-inch process flange bolts. First finger-tighten the bolts. Then tighten the bolts incrementally in a cross pattern until they are securely tightened to 650 in-lb (300 in-lb for stainless steel bolts). After tightening, the bolts should protrude through the top of the module housing.
   - For installations requiring a $^1/_2$–14 NPT mounting, hold the optional flange adapters and flange adapter O-rings in place while finger-tightening the four 2.88-inch process flange/adapter bolts. Tighten the bolts in a cross pattern following the procedure outlined above. (Use two 2.88- inch bolts and two 1.75-inch bolts for gage pressure configurations.) After tightening, the bolts should protrude through the top of the module housing. If the bolts do not extend all the way through the module housing, you have used a bolt of incorrect length. Replace the bolt with one of the correct length, and repeat the procedure.
   - For installations with a three-valve manifold, align the process flange with the three-valve manifold. Install the four 2.25-inch manifold flange bolts following the procedure outlined above. After tightening, the bolts should protrude through the top of the module housing. If the bolts do not extend all the way through the module housing, you have used a bolt of incorrect length. Replace the bolt with one of the correct length, and repeat the procedure. Optional flange adapters can be installed on the process end of the three-valve manifold using the 1.75-inch flange bolts supplied with the transmitter.
4. If the Teflon sensor module O-rings have been replaced, the flange bolts should be re-torqued after installation to compensate for cold flow.

5. Follow these steps to install the drain/vent valve:
   a. Apply sealing tape to the threads on the seat. Starting at the base of the valve with the threaded end pointing toward the installer, apply two clockwise turns of the sealing tape.
   b. Take care to orient the opening on the valve so that process fluid will drain toward the ground and away from personnel when the valve is opened.
   c. Tighten the drain/vent valve to 250 in-lb.

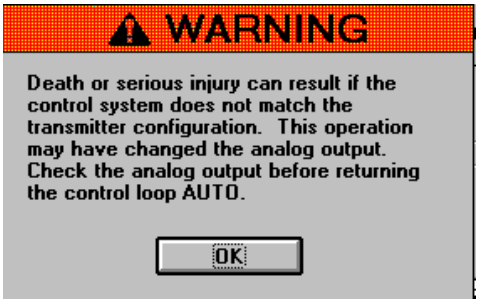
## EA ERROR MESSAGE SUMMARY

### Warning Messages

The EA warns the operator whenever an action could change the analog output:




The EA also warns the operator at the conclusion of an action that may have changed the analog output:



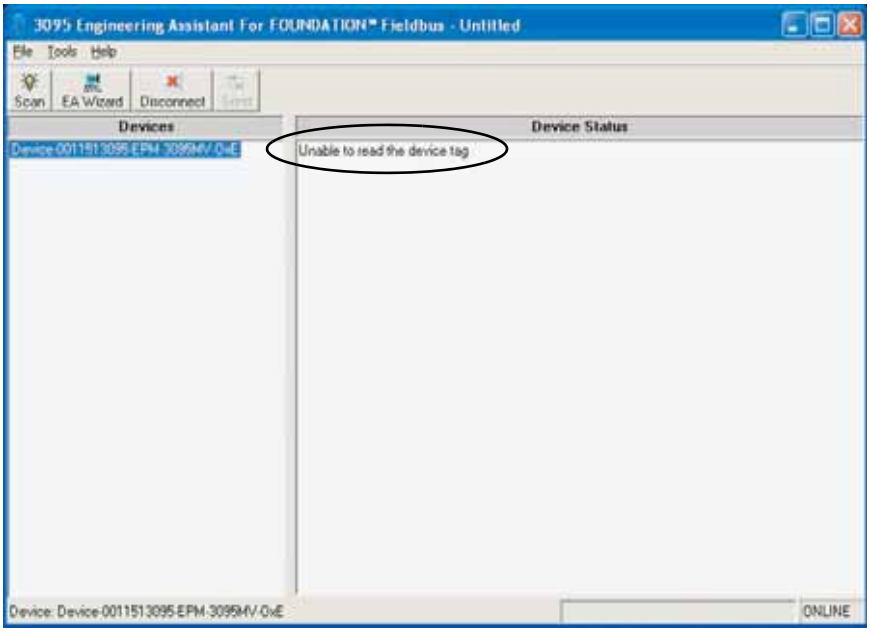
## Error messages

Table 5-7. EA Error Message Summary.

| Alarm text as displayed in Diagnostics, Error Info | Additional Corrective Action (If Needed) |
|---|---|
| The transmitter and Engineering Assistant are not in communication. | 1. Verify that all cables correctly attached.<br>2. See Table 5-3. |
| Communications Error: Device is in write protect mode | Move the write protect (security) jumper on the output board (see Figure 2-4). |
| Communications Error: Entered analog current value is too low | These messages occur when entering invalid values. Enter a different value, and retry the operation. |
| Communications Error: Number of preambles requested is too high | |
| Communications Error: Number of preambles requested is too low | |
| Communications Error: Requested burst command is invalid | |
| Communications Error: Requested burst mode is invalid | |
| Communications Error: Requested local keys control code is invalid | |
| Communications Error: Sensor slope trim point value is too high | |
| Communications Error: Sensor slope trim point value is too low | |
| Communications Error: Sensor offset trim point value too high | |
| Communications Error: Sensor offset trim point value too low | |
| Communications Error: Excess trim correction was attempted | |
| Communications Error: Trim span from offset to slope values too small | |
| DP (Differential Press) is below Lower Internal Limit | See Table 5-4 |
| DP (Differential Press) is above Upper Internal Limit | |
| SP (Static Press) is below Lower Internal Limit | |
| SP (Static Press) is above Upper Internal Limit | |
| PT (Process Temp) is below Lower Internal Limit | |
| PT (Process Temp) is above Upper Internal Limit | |
| ST (Sensor Temp) is below Lower Internal Limit | |
| ST (Sensor Temp) is above Upper Internal Limit | |
| Static Pressure Sensor is Open | See Table 5-3. |
| Static Pressure Sensor is Shorted | |
| Process Temp Sensor is Disconnected | |
| Sensor Module is Not Updating | |
| Sensor Module Microprocessor is Not Responding | |
| Sensor Hardware is Incompatible | |
| Sensor Board EEPROM Not Initialized | |
| Sensor Board EEPROM Burn Failure | |
| RAM Failure | |
| Transmitter Self Test Failed | |
| Output Board EEPROM Not Initialized | |
| Output Board EEPROM Burn Failure | |
| Flow Application - AP is above Upper Operating Limit | See Table 5-3. |
| Flow Application - AP is below Lower Operating Limit | |
| Flow Application - PT is above the Upper Operating Limit | |
| Flow Application - PT is below Lower Operating Limit | |

## Installing a Device Driver (DD) for the3095 Engineering Assistant for Fieldbus

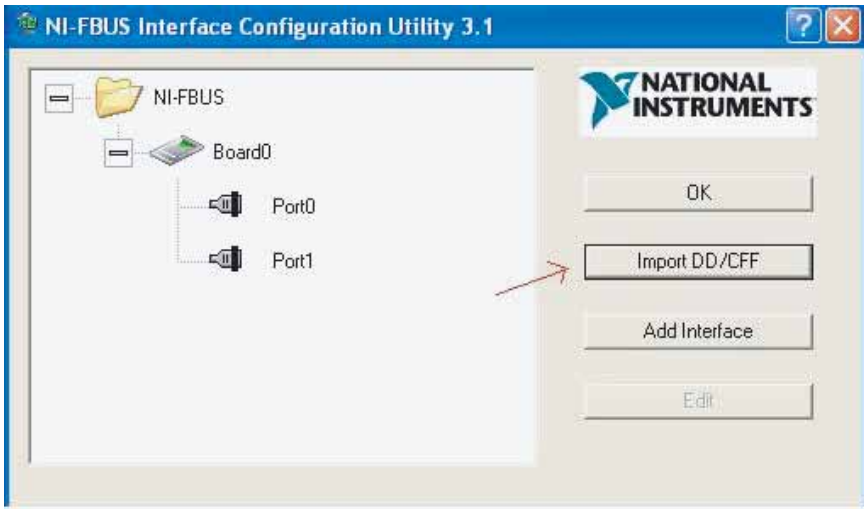
If, after you scan the Fieldbus segment, an “Unable to read the device tag” message appears on the screen, make sure the necessary device driver (DD) is installed.



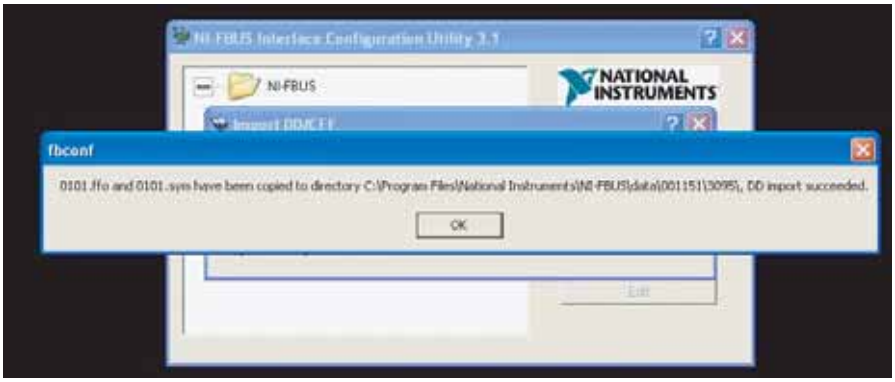

To install a Fieldbus DD for National Instruments:

1. Save DD (.ffo, .sym files) to local computer, if necessary.
2. Close the Engineering Assistant application and NI-FBUS.
3. Start the NI Interface Configuration Utility.

4. Click on “Import DD/CFF”.




5. Browse to the location of the DD files and select the .ffo file. Click “Open”.
6. Click “OK”. (A pop-up message appears to indicate the import was successful.)




7. Run the Engineering Assistant application for Fieldbus.

## FOUNDATION FIELDBUS TROUBLESHOOTING GUIDES

Figure 5-1. Troubleshooting Flowchart

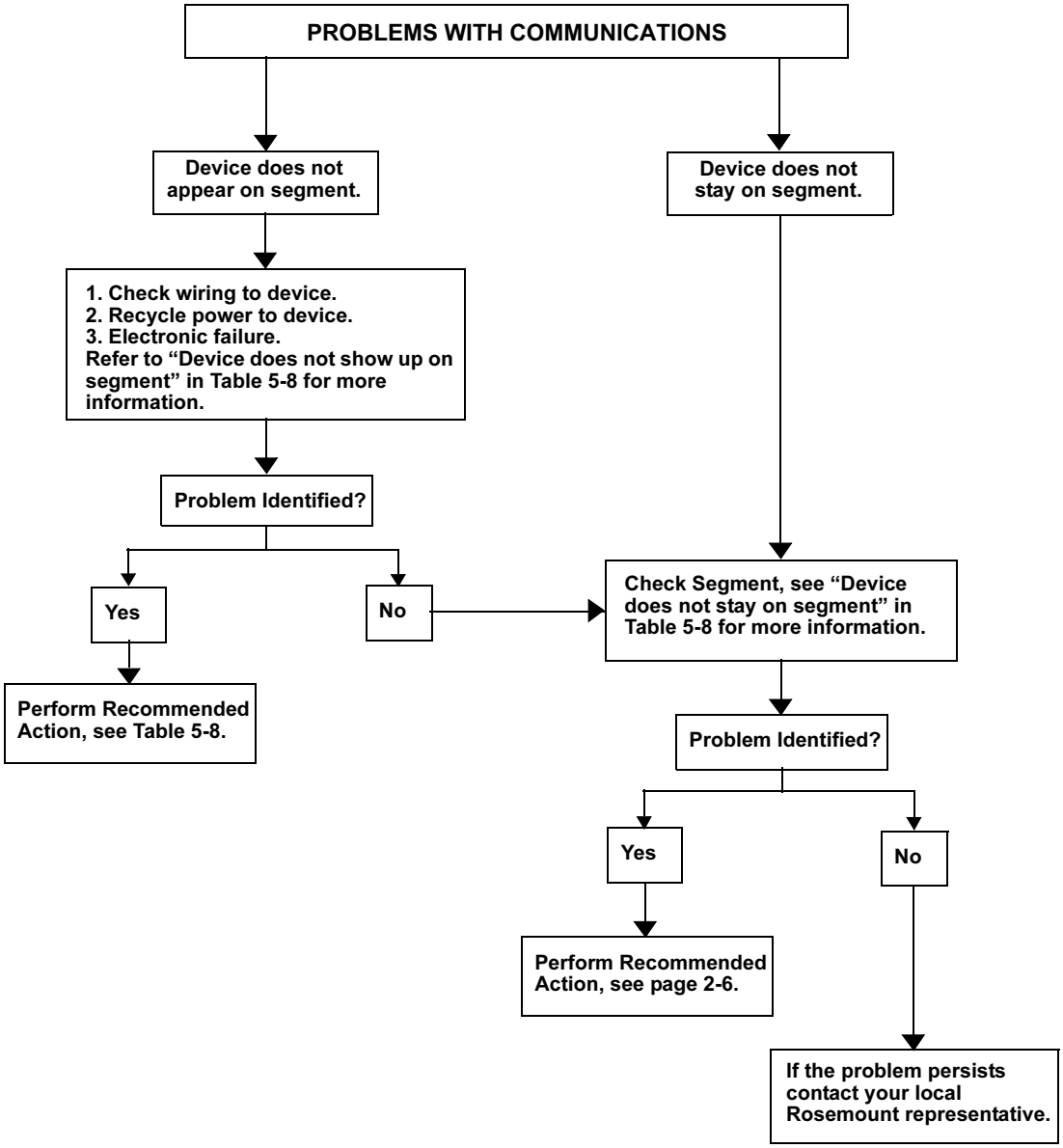


Figure 5-2. Problems with communications flowchart

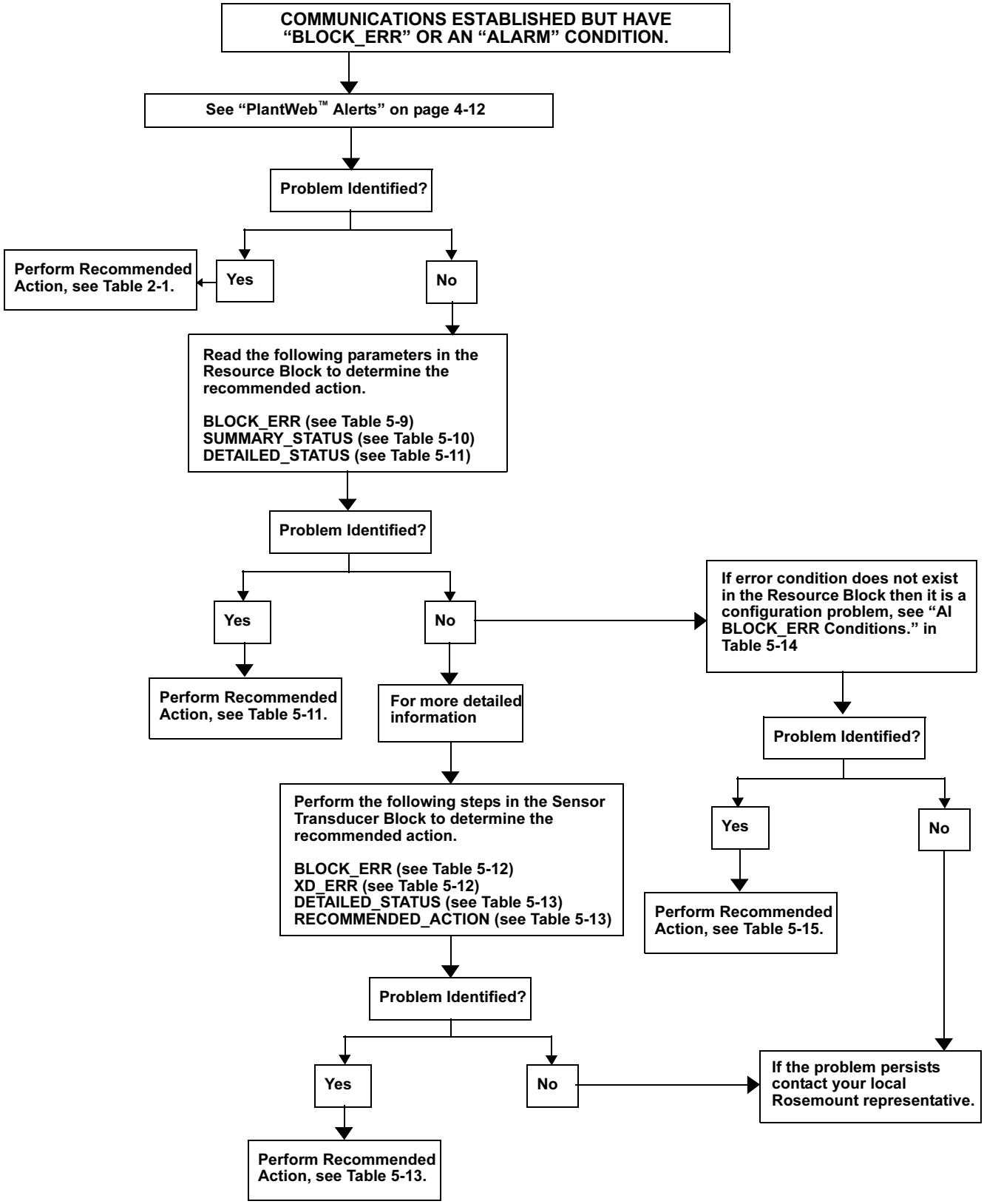


Table 5-8. Troubleshooting guide.

| Symptom[1] | Cause | Recommended Actions |
|---|---|---|
| Device does not show up on segment | Unknown | Recycle power to device |
| | No power to device | 1. Ensure the device is connected to the segment.<br>2. Check voltage at terminals. There should be 9–32Vdc.<br>3. Check to ensure the device is drawing current. There should be approximately 17 mA. |
| | Segment problems | |
| | Electronics failing | 1. Electronics board loose in housing.<br>2. Replace electronics. |
| | Incompatible network settings | Change host network parameters.<br>Refer to host documentation for procedure. |
| Device does not stay on segment[2] | Incorrect signal levels.<br>Refer to host documentation for procedure. | 1. Check for two terminators.<br>2. Excess cable length.<br>3. Bad Power supply or conditioner |
| | Excess noise on segment.<br>Refer to host documentation for procedure. | 1. Check for incorrect grounding.<br>2. Check for correct shielded wire.<br>3. Tighten wire connections.<br>4. Check for corrosion or moisture on terminals.<br>5. Check for Bad power supply. |
| | Electronics failing | 1. Tighten electronics board.<br>2. Replace electronics. |
| | Other | 1. Check for water in the terminal housing. |

*(1) The corrective actions should be done with consultation of your system integrator.*
*(2) Wiring and installation 31.25 kbit/s, voltage mode, wire medium application guide AG-140 available from the fieldbus Foundation.*

## RESOURCE BLOCK

This section describes error conditions found in the Resource block. Read Table 5-9 through Table 5-11 to determine the appropriate corrective action.

### Block Errors

Table 5-9. Resource Block BLOCK_ERR messages

Table 5-9 lists conditions reported in the BLOCK_ERR parameter.

| Condition Name and Description |
|---|
| **Other** |
| **Simulate Active:** This indicates that the simulation switch is in place. This is not an indication that the I/O blocks are using simulated data. |
| Device Fault State Set |
| Device Needs Maintenance Soon |
| **Memory Failure**: A memory failure has occurred in FLASH, RAM, or EEPROM memory |
| **Lost Static Data**: Static data that is stored in non-volatile memory has been lost. |
| **Lost NV Data**: Non-volatile data that is stored in non-volatile memory has been lost. |
| Device Needs Maintenance Now |
| **Out of Service**: The actual mode is out of service. |

Table 5-10. Resource Block SUMMARY_STATUS messages

| Condition Name |
|---|
| Uninitilized |
| No repair needed |
| Repairable |
| Call Service Center |

Table 5-11. Resource Block DETAILED_STATUS with recommended action messages

| Condition Name | Recommended Action |
|---|---|
| LOI Transducer block error | 1. Restart processor<br>2. Check display connection<br>3. Call service center |
| Sensor Transducer block error. | 1. Restart processor<br>2. Check SuperModule™ cable<br>3. Call service center |
| Mfg. Block integrity error | 1. Restart processor<br>2. Call service center |
| Non-Volatile memory integrity error | 1. Restart processor<br>2.Call service center |
| ROM integrity error | 1. Restart processor<br>2. Call service center |
| ADB transducer block error | 1. Check impulse lines<br>2. Check anomaly detected (SPM)<br>3. Call service center |

## SENSOR TRANSDUCER BLOCK

The following conditions are reported in the BLOCK_ERR and XD_ERROR parameters. Conditions in **bold** type are available. Conditions in *italic* are inactive for the Transducer block and are given here only for reference.

Table 5-12. BLOCK_ERR and XD_ERR Conditions

| Condition Number | Condition Name and Description |
|---|---|
| 0 | *Other* |
| 1 | *Block Configuration Error* |
| 2 | *Link Configuration Error* |
| 3 | *Simulate Active* |
| 4 | *Local Override* |
| 5 | *Device Fault State Set* |
| 6 | *Device Needs Maintenance Soon* |
| 7 | *Input failure/process variable has bad status* |
| 8 | *Output Failure* |
| 9 | *Memory Failure* |
| 10 | *Lost Static Data* |
| 11 | *Lost NV Data* |
| 12 | *Readback Check Failed* |
| 13 | *Device Needs Maintenance Now* |
| 14 | **Power Up**: The device was just powered-up. |
| 15 | **Out of Service**: The actual mode is out of service. |
| 17 | **General Error**: A general error that cannot be specified below occurred |
| 20 | **Electronics Failure**: An electrical component failed. |
| 22 | **I/O Failure**: An I/O failure occurred. |
| 23 | **Data Integrity Error**: Data stored in the device is no longer valid due to a non-volatile memory checksum failure, a data verify after write failure, etc. |
| 25 | **Algorithm Error:** The algorithm used in the transducer block produced an error due to overflow, data reasonableness failure, etc. |

### Diagnostics

In addition to the BLOCK_ERR and XD_ERROR parameters, more detailed information on the measurement status can be obtained via TB_DETAILED_STATUS. Table 5-13 lists the potential errors and the possible corrective actions for the given values. The corrective actions are in order of increasing system level compromises. The first step should always be to reset the transmitter and then if the error persists, try the steps in Table 5-13. Start with the first corrective action and then try the second.

Table 5-13. TB_DETAILED_ STATUS Descriptions and Corrective Actions

| Value | Description | Corrective Actions |
|---|---|---|
| 0x00002000 | ST Sensor Failure | 1. Check module connections.<br>2. Restart Processor.<br>3. Send to Service Center. |
| 0x00001000 | PT Sensor Failure | 1. Check module connections.<br>2. Restart Processor.<br>3. Send to Service Center. |
| 0x00000800 | SP Sensor Failure | 1. Check module connections.<br>2. Restart Processor.<br>3. Send to Service Center. |
| 0x00000400 | DP Sensor Failure | 1. Check module connections.<br>2. Restart Processor.<br>3. Send to Service Center. |
| 0x00000200 | ST Out of Range | 1. Check Ambient Temperature.<br>2. Restart Processor. |
| 0x00000100 | PT Out of Range | 1. Check Process Temperature.<br>2. Restart Processor. |
| 0x00000080 | SP Out of Range | 1. Check Process Pressure.<br>2. Restart Processor. |
| 0x00000040 | DP Out of Range | 1. Check Process Pressure.<br>2. Restart Processor. |
| 0x00000020 | Sensor HW Failure | 1. Check module connections.<br>2. Restart Processor.<br>3. Send to Service Center. |
| 0x00000010 | Sensor Module not Responding | 1. Check module connections.<br>2. Restart Processor.<br>3. Send to Service Center. |
| 0x00000008 | Sensor Module not Updating | 1. Check module connections.<br>2. Restart Processor.<br>3. Send to Service Center. |
| 0x00000004 | HW/SW Incompatible | 1. Restart Processor.<br>2. Send to Service Center. |
| 0x00000002 | Sensor Factory EEPROM Corrupt | 1. Restart Processor.<br>2. Send to Service Center. |
| 0x00000001 | Sensor User EEPROM Corrupt | 1. Restart Processor.<br>2. Send to Service Center. |

## ANALOG INPUT (AI) FUNCTION BLOCK

This section describes error conditions that are supported by the AI Block. Read Table 5-15 to determine the appropriate corrective action.

Table 5-14. AI BLOCK_ERR Conditions.

| Condition Number | Condition Name and Description |
|---|---|
| 0 | Other |
| 1 | **Block Configuration Error:** the selected channel carries a measurement that is incompatible with the engineering units selected in XD_SCALE, the L_TYPE parameter is not configured, or CHANNEL = zero. |
| 3 | **Simulate Active:** Simulation is enabled and the block is using a simulated value in its execution. |
| 7 | **Input Failure/Process Variable has Bad Status:** The hardware is bad, or a bad status is being simulated. |
| 14 | **Power Up** |
| 15 | **Out of Service:** The actual mode is out of service. |

Table 5-15. Troubleshooting the AI block

| Symptom | Possible Causes | Recommended Actions |
|---|---|---|
| Bad or no pressure readings (Read the AI “BLOCK_ERR” parameter) | BLOCK_ERR reads OUT OF SERVICE (OOS) | 1. AI Block target mode target mode set to OOS.<br>2. Resource Block OUT OF SERVICE. |
| | BLOCK_ERR reads CONFIGURATION ERROR | 1. Check CHANEL parameter (see “CHANNEL” on page 4-18)<br>2. Check L_TYPE parameter (see “L_TYPE” on page 4-18)<br>3. Check XD_SCALE engineering units. (see “XD_SCALE and OUT_SCALE” on page 4-19) |
| | BLOCK_ERR reads POWERUP | Download Schedule into block. Refer to host for downloading procedure. |
| | BLOCK_ERR reads BAD INPUT | 1. Sensor Transducer Block Out Of Service (OOS)<br>2. Resource Block Out of Service (OOS) |
| | No BLOCK_ERR but readings are not correct. If using Indirect mode, scaling could be wrong. | 1. Check XD_SCALE parameter.<br>2. Check OUT_SCALE parameter.<br>(see “XD_SCALE and OUT_SCALE” on page 4-19) |
| | No BLOCK_ERR. Sensor needs to be calibrated or Zero trimmed. | See Section 3: Operation and Maintenance to determine the appropriate trimming or calibration procedure. |
| OUT parameter status reads UNCERTAIN and substatus reads EngUnitRangViolation. | Out_ScaleEU_0 and EU_100 settings are incorrect. | See “XD_SCALE and OUT_SCALE” on page 4-19. |

## LCD TRANSDUCER BLOCK

This section describes error conditions found in the LCD Transducer Block. Read Table 5-16 and to determine the appropriate corrective action.

**Self Test Procedure for the LCD**

The SELF_TEST parameter in the Resource block will test LCD segments. When running, the segments of the display should light up for about five seconds.

If your host system supports methods refer to your host documentation on how to run the “Self Test” method. If your host system does not support methods than you can run this test manually be following the steps below.

1. Put Resource block into “OOS” (Out of Service).
2. Go to the parameter called “SELF_TEST” and write the value Self test (0x2).
3. Observe the LCD screen when you are doing this. All of the segments should light up.
4. Put the Resource block back into “AUTO”.

Table 5-16. LCD Transducer Block BLOCK_ERR messages

| Condition Name and Description |
|---|
| Other |
| **Out of Service**: The actual mode is out of service. |

| Symptom | Possible Causes | Recommended Action |
|---|---|---|
| The LCD displays “DSPLY#INVLID.” Read the BLOCK_ERR and if it says “BLOCK CONFIGURATION” perform the Recommended Action | One or more of the display parameters are not configured properly. | See “LCD Transducer Block” on page 4-16. |
| “3095” is being displayed or not all of the values are being displayed. | The LCD block parameter “DISPLAY_PARAMETER_SELECT is not properly configured. | See “LCD Transducer Block” on page 4-16. |
| The display reads OOS | The resource and or the LCD Transducer block are OOS. | Verify that both blocks are in “AUTO,” |
| The display is hard to read. | Some of the LCD segments may have gone bad. | See XXXX (Self Test). If some of the segment is bad, replace the LCD. |
| | Device is out o the temperature limit for the LCD. (-20 to 80 °C) | Check ambient temperature of the device. |

# Appendix A Specifications and Reference Data

**Specifications** . . . . . **page A-1**
**Dimensional Drawings** . . . . . **page A-9**
**Ordering Information** . . . . . **page A-11**
**Spare Parts** . . . . . **page A-14**
**Options** . . . . . **page A-16**
**Accessories** . . . . . **page A-18**
**Product Compatibility** . . . . . **page A-20**

## SPECIFICATIONS

### Functional

**Service**
Gas, liquid, or steam

**Differential Sensor**
Limits
- Code 1: –25 to 25 inH2O (–0,062 to 0,062 bar)
- Code 2: –250 to 250 inH2O (–0,622 to 0,622 bar)
- Code 3: –1000 to 1000 inH2O (–2,49 to 2,49 bar)

**Absolute Sensor**
Limits
- Code 3: 0.5 to 800 psia (0,0344 to 55,2 bar)
- Code 4: 0.5 to 3,626 psia (0,0344 to 250 bar)

**Gage Sensor**
Limits
- Code C: 0–800 psig (0–55,2 bar)
- Code D: 0–3,626 psig (0–250 bar)

**Temperature Sensor**
Process Temperature Range
- –300 to 1500 °F (–184 to 816 °C)

Fixed Temperature Range
- –459 to 3500 °F (–273 to 1927 °C)

**Overpressure Limit**
0 psia to two times the pressure sensor range with a maximum of 3,626 psia (250 bar).

### Static Pressure Limit

Operates within specifications between static line pressures of 0.5 psia and the URL of the absolute pressure sensor.

### 4–20 mA (output option code A)

#### Zero and Span Adjustment

Zero and span values can be set anywhere within the range. Span must be greater than or equal to the minimum span.

#### Output

Two-wire 4–20 mA, user-selectable for DP, AP, GP, PT, mass flow, or totalized flow. Digital *HART* protocol superimposed on 4–20 mA signal, available to any host that conforms to the *HART* protocol.

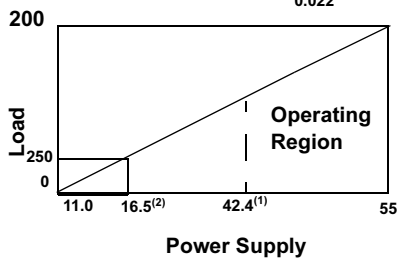
#### Power Supply

External power supply required. Transmitter operates on terminal voltage of 11–55 V dc.

#### Load Limitations

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

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




*(1) For CSA approval, power supply must not exceed 42.4 V dc.*
*(2) HART protocol communication requires a loop resistance value between 250-1100 ohms, inclusive.*

### FOUNDATION fieldbus (output option code V)

#### Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 V dc transmitter terminal voltage.

#### Current Draw

17.5 mA for all configurations (including LCD display option)

### Humidity Limits

0–100% relative humidity

### Turn-on Time

Digital and analog measured variables will be within specifications 7–10 seconds after power is applied to transmitter.

Digital and analog flow output will be within specifications 10–14 seconds after power is applied to transmitter.

### Failure Mode Alarm

#### Output Code A

If self-diagnostics detect a non-recoverable transmitter failure, the analog signal will be driven either below 3.75 mA or above 21.75 mA to alert the user. High or low alarm signal is user-selectable by internal jumper pins.

#### Output Code V

If self-diagnostics detect a gross transmitter failure, that information gets passed as a status along with the process variable(s).

### Configuration

HART Hand-held Communicator (Model 275 or 375)

- Performs traditional transmitter maintenance functions

3095 Multivariable Engineering Assistant (EA) software package

- Contains built-in physical property database
- Enables mass flow configuration, maintenance, and diagnostic functions via HART modem (output option code A)
- Enables mass flow configuration via PCMIA Interface for FOUNDATION fieldbus (output option code V)

### Primary Elements

Supports over 25 different primary elements including:

- *Annubar* Averaging Pitot Tube
- Rosemount 1195 Integral Orifice Plate
- Rosemount 405 Compact and Conditioning Orifice
- ISO/ASME Orifice Flange Taps
- Calibrated and Custom Primary Elements
- ISO/ASME Corner Taps
- AGA Flange Taps
- ISO/ASME Venturi
- ISO/ASME Venturi Nozzle
- Area Averaging Meter
- V-Cone

### Physical Properties Database

- Maintained in Engineering Assistant Software Configurator
- Physical properties for over 110 fluids
- Natural gas per AGA
- Steam and water per ASME
- Other database fluids per American Institute of Chemical Engineers (AIChE)
- Optional custom entry

**FOUNDATION fieldbus Function Blocks (Output Option Code V)**

Supports the following function blocks:

- Analog Input
- Analog Output
- PID
- Input Selector
- Signal Characterizer
- Arithmetic
- Integrator
- Control Selector
- Output Splitter

**Temperature Limits**

Process (at transmitter isolator flange for atmospheric pressures and above)

- Silicone fill: –40 to 250 °F (–40 to 121 °C)
- Inert fill: 0 to 185 °F (–18 to 85 °C) (Process temperature above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio.)

Ambient:

- -40 to 185 °F (-40 to 85 °C)
- with integral meter: -4 to 175 °F (-20 to 80 °C)

Storage:

- -50 to 230 °F (-46 to 110 °C)
- with integral meter: -40 to 185 °F (-40 to 85 °C)

**Damping**

Analog output response to step input change can be user-selectable from 0 to 29 seconds for one time constant.

**Steam Flow Calculations:**

Steam densities calculated per ASME steam tables.

Saturated steam configurable using static pressure based density calculations.

**Natural Gas Flow Calculations**

Flow calculations per 1992 AGA (American Gas Association) Report No 3 or ISO-5167 (2003).

Compressibility Calculations per AGA Report No 8 or ISO-12213.

## Performance

(Zero-based spans, reference conditions, silicone oil fill, 316 SST isolating diaphragms, 4–20 mA analog output.)

**Specification Conformance**

The Rosemount 3095 maintains a specification conformance of measured variables to at least $3\sigma$.

**Mass Flow**

Fully compensated for pressure, temperature, density, viscosity gas expansion, discharge coefficient, and thermal correction variances over operating range.

$$Qm=NC_dEY_1d^2\{DP(p)\}^{1/2}.$$

Ultra for Flow: Mass Flow Reference Accuracy (option U3)(1)

- ±1.0% of Mass Flow Rate over a 10:1 flow range (100:1 DP range for liquids and gases)

Mass Flow Reference Accuracy

- ±1.0% of Mass Flow Rate over 8:1 flow range (64:1 DP range for liquids and gases)

Totalized Mass Flow

- ±1.0% of Total Mass Flow

(Uncalibrated differential producer (Orifice) installed per ASME MFC3M or ISO 5167-1. Uncertainties for discharge coefficient, producer bore, tube diameter, and gas expansion factor defined in ASME MFC3M or ISO 5167-1. Density uncertainty of 0.1%. Differential pressure calibrated at up to 1/10th full scale for optimum flow accuracy/rangeability.)

## Differential Pressure (DP)

Range 1

- 0–0.5 to 0–25 inH2O (0–0,0344 to 0–0,0623 bar) (50:1 rangeability is allowed)

Range 2

- 0–2.5 to 0–250 inH2O (0–6,22 to 0–622,7 mbar) (100:1 rangeability is allowed)

Range 3

- 0–10 to 0–1000 inH2O (0–24,9 to 0–2490,9 mbar) (100:1 rangeability is allowed)

*(1) Ultra for Flow (option U3) applicable for HART protocol, DP ranges 2 and 3 with SST isolator material and silicone fill fluid only.*

**Reference Accuracy (including Linearity, Hysteresis, Repeatability)(1)**
Range 2-3 Ultra for Flow (Option U3)(2)

- ±0.05% DP reading for rangedown from 1:1 to 3:1 of URL
- For rangedown greater than 3:1 of URL,

Accuracy = $\pm\left[0.05 + 0.0145\left(\frac{URL}{Reading}\right)\right]$ % Reading

Range 2-3

- ±0.075% of span for spans from 1:1 to 10:1 of URL
- For rangedowns greater than 10:1 of URL,

Accuracy = $\pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right]$ % of Span

Range 1

- ±0.10% of span for spans from 1:1 to 15:1 of URL
- For rangedowns greater than 15:1 of URL,

Accuracy = $\pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right]$ % of Span

**Ambient Temperature Effect per 50 °F (28 °C) (2)**
Range 2-3 Ultra for Flow (Option U3)(2)

- ±0.130% reading for rangedown from 1:1 to 3:1 of URL
- ±[0.05 + 0.0345 (URL/Reading)]% Reading > 3:1 to 100:1 of URL

Range 2-3

- ±(0.025% of URL + 0.125% of span) for spans from 1:1 to 30:1
- ±(0.035% of URL – 0.175% of span) for spans from 30:1 to 100:1

Range 1

- ±(0.20% of URL + 0.25% of span) for spans from 1:1 to 30:1
- ±(0.24% of URL +0.15% of span) for spans from 30:1 to 50:1

**Static Pressure Effects**
Range 2-3

- Zero error = ±0.05% of URL per 1,000 psi (68,9 bar)
- Span error = ±0.20% of reading per 1,000 psi (68,9 bar)

Range 1

- Zero error = ±0.05% of URL per 800 psi (55,1 bar)
- Span error = ±0.40% of reading per 800 psi (55,1 bar)

**DP Stability**
Range 2-3 Ultra for Flow (Option U3)(2)

- ±0.25% of URL for 10 years for ±50 °F (28 °C) temperature changes, up to 1000 psi (68,9 bar) line pressure

Ranges 2-3

- ±0.125% URL for 5 years for ±50 °F (28 °C) ambient temperature changes, and up to 1000 psi (68,9 bar) line pressure.

Range 1

- ±0.2% of URL for 1 year

*(1) For FOUNDATION fieldbus transmitters, use calibrated range in place of span.*
*(2) Ultra for Flow (option U3) applicable for DP ranges 2 and 3 with SST isolator material and silicone fill fluid only.*

## Absolute/Gage Pressure

Range 3 (absolute)/Range C (gage)

- 0–8 to 0–800 psia (0–0,55 to 0–55,1 bar) (100:1 rangeability is allowed)

Range 4 (absolute) /Range D (gage)

- 0–36.26 to 0–3,626 psia (0–2,5 to 0–250 bar) (100:1 rangeability is allowed)

**Reference Accuracy**
**(including Linearity, Hysteresis, Repeatability)**
±0.075% of span for spans from 1:1 to 10 of URL
For rangedowns greater than 6:1 of URL,

$$\text{Accuracy} = \pm\left[0.03 + 0.0075\left(\frac{\text{URL}}{\text{Span}}\right)\right] \text{ \% of Span}$$

**Ambient Temperature Effect per 50 °F (28 °C)**
±(0.050% of URL + 0.125% of span) spans from 1:1 to 30:1
±(0.060% of URL – 0.175% of span) spans from 30:1 to 100:1

**Stability**
±0.125% URL for 5 years for ±50°F (28 °C) ambient temperature changes, and up to 1000 psi (6,9MPa) line pressure.

## Process Temperature (PT)

Specification for process temperature is for the transmitter portion only. Sensor errors caused by the RTD are not included. The transmitter is compatible with any PT100 RTD conforming to IEC 751 Class B, which has a nominal resistance of 100 ohms at 0 °C and $\propto$ = 0.00385. Examples of compatible RTDs include the Rosemount Series 68 and 78 RTD Temperature Sensors.

**RTD Range**
–300 to 1500°F (–184 to 816 °C)

**PT Accuracy**
**(including Linearity, Hysteresis, Repeatability)**
For 12 and 24 ft. Cables

- ±1.0 °F (0.56 °C) for process temperatures from –150 to 1200 °F (–101to 649 °C)
- For process temperatures above 1200 °F (649 °C), add ±1.0 °F (0.56 °C) per 100 °F (38 °C)

For 75 ft. cables:

- ±2.0 °F (1.12 °C) for process temperatures from –150 to 1200 °F (–101 to 649 °C)
- For process temperatures above 1200 °F (649 °C), add ±1.0 °F (0.56 °C) per 100 °F (38 °C)

**PT Stability**
±1.0 °F (0.56 °C) for 12 months

## Physical

**Security**
Transmitter security jumper mounted on electronics board, when enabled prevents changes to transmitter configuration.
User Engineering Assistant provides two levels of optional password security

### Electrical Connections

½–14 NPT, M20 × 1.5 (CM20), PG-13.5. *HART* interface connections fixed to terminal block for output code A.

### RTD Process Temperature Input

100-ohm platinum RTD per IEC-751 Class B

### Process Connections

Transmitter: ¼–18 NPT on 2 1/8-in. centers 1/2–14 NPT on 2-, 2 1/8-, or 2 1/4-in. centers with optional flange adapters
RTD: RTD dependent.

### Process Wetted Parts

Isolating Diaphragms

- 316L SST or *Hastelloy* C-276®. CF-8M (last version of 316 SST, material per ASTM-A743)

Drain/Vent Valves

- 316 SST or *Hastelloy* C®

Flanges

- Plated carbon steel, 316 SST, or *Hastelloy* C

Wetted O-rings

- Glass-Filled TFE

### Non-Wetted Parts

Electronics Housing

- Low copper aluminum. NEMA 4X, CSA, Enclosure Type 4X, IP 65, IP 66, IP 68

Bolts

- Plated carbon steel per ASTM A449, Grade 5 or austenitic 316 SST

Fill Fluid

- Silicone or halocarbon inert oil (Inert oil only available for gage sensor modules.)

Paint (Aluminum Housing only)

- Polyurethane

O-rings

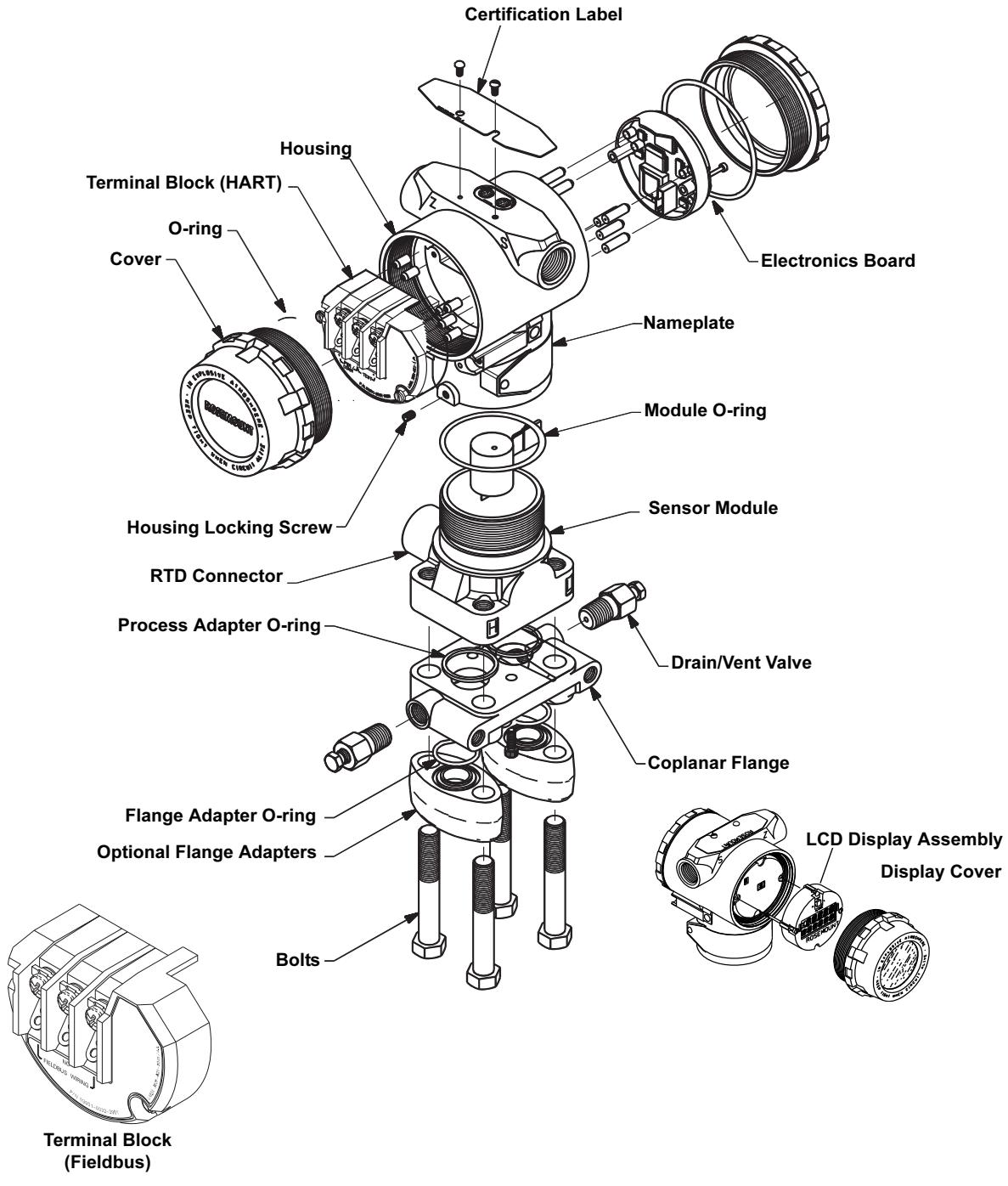
- Buna-N

### Weight

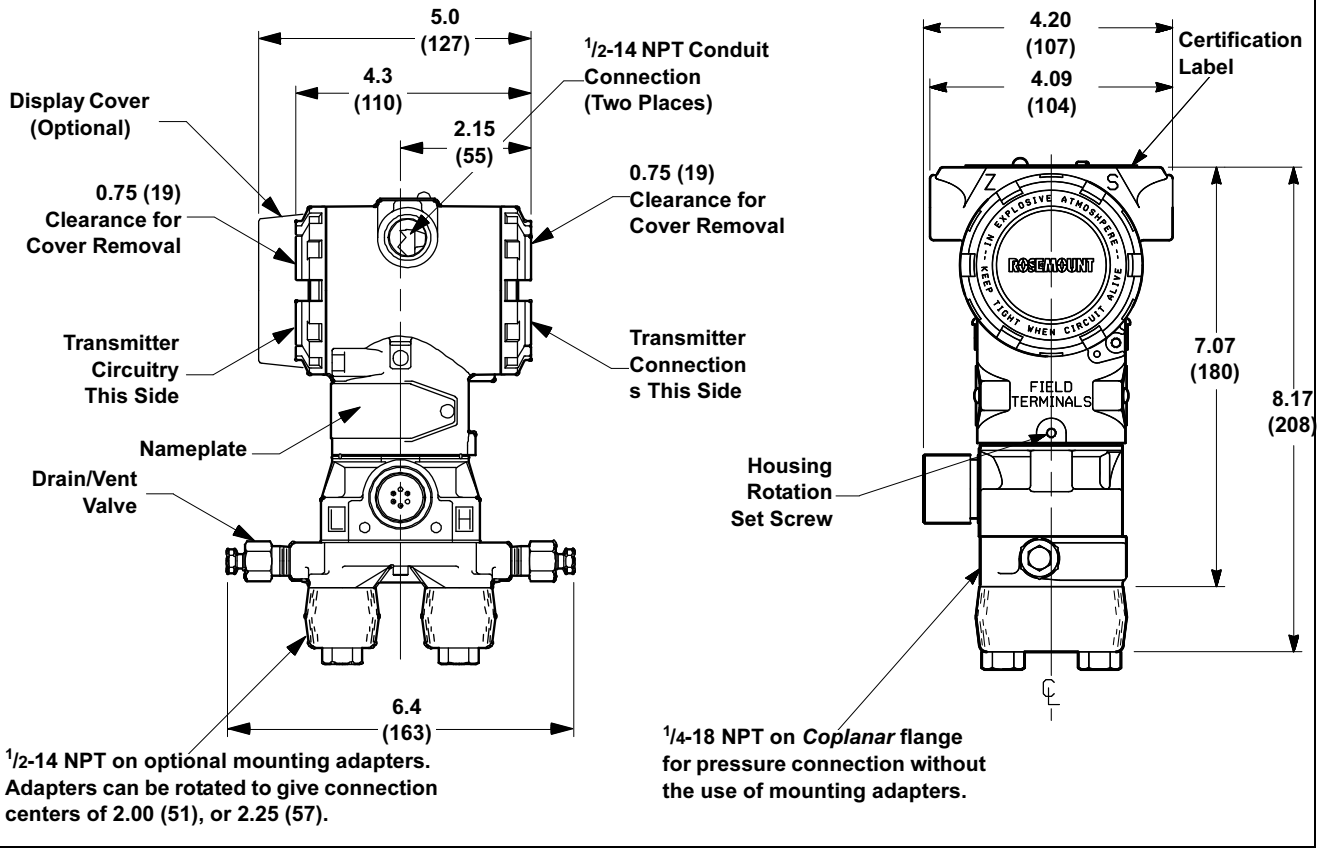
| Component | Weight in lb (kg) |
|---|---|
| Rosemount 3095 Transmitter | 6.0 (2.7) |
| SST Mounting Bracket | 1.0 (0.4) |
| 12 ft (3.66 m) RTD Shielded Cable | 0.5 (0.2) |
| 12 ft (3.66 m) RTD Armored Cable | 1.1 (0.5) |
| 24 ft (7.32 m) RTD Shielded Cable | 1.0 (0.4 |
| 24 ft (7.32 m) RTD Armored Cable | 2.2 (1.0) |
| 75 ft (22.86 m) RTD Shielded Cable | 1.9 (0.9) |
| 75 ft (22.86 m) RTD Armored Cable | 7.2 (3.2) |
| 21 in (53 cm) RTD Armored Cable | 0.5 (0.2) |
| 12 ft (3.66 m) RTD CENELEC Cable | 2.1 (0.9) |
| 24 ft (7.32 m) RTD CENELEC Cable | 3.0 (1.4) |
| 75 ft (22.86 m) RTD CENELEC Cable | 7.1 (3.2) |
| 21 in (53 cm) RTD CENELEC Cable | 1.2 (0.5) |

## DIMENSIONAL DRAWINGS

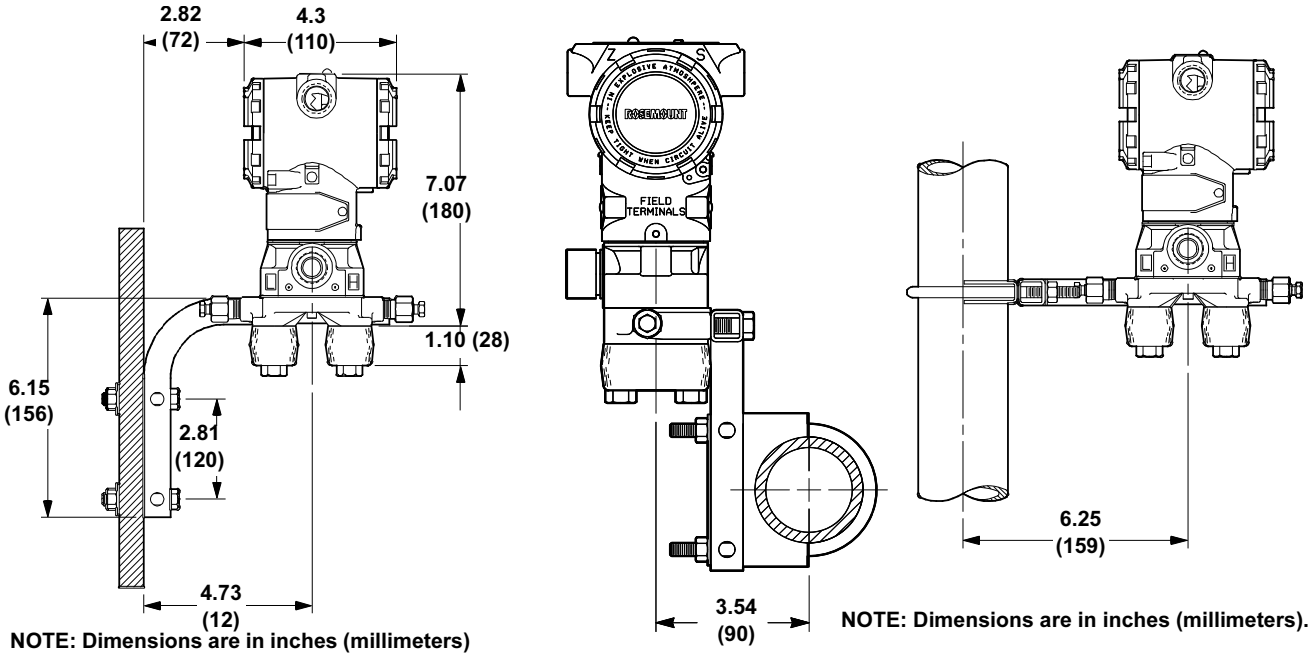
### Exploded View of the Rosemount 3095



## Rosemount 3095




## Mounting Configurations



## ORDERING INFORMATION

| Model | Product Description | | |
|---|---|---|---|
| 3095 | *MultiVariable* Mass Flow Transmitter | | |
| **Code** | **Output** | | |
| A | 4–20 mA with digital signal based on *HART* protocol | | |
| V | FOUNDATION™ fieldbus protocol: | | |
| **Code** | **Differential Pressure Range** | | |
| 1[1] | 0–0.5 to 0–25 in$H_2O$ (0–1,25 to 0–62,3 mbar) | | |
| 2 | 0–2.5 to 0–250 in$H_2O$ (0–6,22 to 0–622,7 mbar) | | |
| 3 | 0–10 to 0–1000 in$H_2O$ (0–0,0249 to 0–2,49 bar) | | |
| **Code** | **Static Pressure Ranges** | | |
| 3 | 0–8 to 0–800 psia (0–0,55 to 0–55,2 bar) | | |
| 4 | 0–36.26 to 0–3,626 psia (0–2,5 to 0–250 bar) | | |
| C | 0–8 to 0–800 psig (0–0,55 to 0–55,2 bar) | | |
| D | 0–36.26 to 0–3,626 psig (0–2,5 to 0–250 bar) | | |
| **Code** | **Isolator Material** | **Fill Fluid** | |
| A | 316L SST | silicone | |
| B[2] | *Hastelloy C-276* | silicone | |
| J[3] | 316L SST | inert | |
| K[2][3] | *Hastelloy C-276* | inert | |
| **Code** | **Flange Style** | | **Material** |
| A | *Coplanar* | | CS |
| B | *Coplanar* | | SST |
| C | *Coplanar* | | *Hastelloy C* |
| F[4] | *Coplanar* | | SST, non-vented |
| J | DIN compliant traditional flange, SST 10 mm adapter/manifold bolting | | SST, $^{7}/_{16}$ — 20 Bolting |
| 0 | None (required for option code S3 or S5) | | |
| **Code** | **Drain/Vent Material** | | |
| A | SST | | |
| C[2] | *Hastelloy* C | | |
| 0 | None (required for option code S3 or S5) | | |
| **Code** | **O-ring** | | |
| 1 | Glass-filled TFE | | |
| **Code** | **Process Temperature Input (RTD ordered separately)** | | |
| 0 | Fixed process temperature (no cable) | | |
| 1 | RTD Input with 12 ft. (3,66 m) of Shielded cable (intended for use with conduit) | | |
| 2 | RTD Input with 24 ft. (7,32 m) of Shielded cable (intended for use with conduit) | | |
| 7 | RTD Input with 75 ft. (22,86 m) of Shielded cable (intended for use with conduit) | | |
| 3 | RTD Input with 12 ft. (3,66 m) of Armored, Shielded cable | | |
| 4 | RTD Input with 24 ft. (7,32 m) of Armored, Shielded cable | | |
| 5[5] | RTD Input with 21 in. (53 cm) of Armored, Shielded cable | | |
| 8 | RTD Input with 75 ft. (22,86 m) of Armored, Shielded cable | | |
| A | RTD Input with 12 ft. (3,66 m) of ATEX Flameproof cable | | |
| B | RTD Input with 24 ft. (7,32 m) of ATEX Flameproof cable | | |
| C | RTD Input with 75 ft. (22,86 m) of ATEX Flameproof cable | | |
| D[5] | RTD Input with 21 in. (53 cm) of ATEX Flameproof cable (typically ordered with Approval Code H) | | |
| **Code** | **Transmitter Housing Material** | **Conduit Entry Size** | |
| A | Polyurethane-covered aluminum | ½–14 NPT | |
| B | Polyurethane-covered aluminum | M20 × 1.5 (CM20) | |
| C | Polyurethane-covered aluminum | PG 13.5 | |
| J | SST | ½–14 NPT | |
| K | SST | M20 × 1.5 (CM20) | |
| L | SST | PG 13.5 | |
| **Code** | **Terminal Block** | | |
| A | Standard | | |
| B | With integral transient protection | | |

| Code | Display |
|---|---|
| 0 | None |
| 1 | LCD display |
| **Code** | **Bracket** |
| 0 | None |
| 1 | *Coplanar* SST flange bracket for 2-in. pipe or panel mount, SST bolts |
| 2 | Traditional Flange Bracket for 2” Pipe Mounting, CS Bolts |
| 3 | Traditional Flange Bracket for panel Mounting, CS Bolts |
| 4 | Traditional Flange Flat Bracket for 2” Pipe Mounting, CS Bolts |
| 5 | Traditional Flange Bracket for 2” Pipe Mounting, 300-Series, SST Bolts |
| 6 | Traditional Flange Bracket for panel Mounting, 300-Series, SST Bolts |
| 7 | Traditional Flange Flat Bracket for 2” Pipe Mounting, 300-Series, SST Bolts |
| 8 | SST Traditional Flange Bracket for 2” Pipe Mounting, 300-Series, SST Bolts |
| 9 | SST Traditional Flange Flat Bracket for 2” Pipe Mounting, 300-Series, SST Bolts |
| **Code** | **Bolts** |
| 0 | CS bolts |
| 1 | Austenitic 316 SST bolts |
| N | None (Required for Option Code S3 or S5) |
| **Code** | **Product Certifications** |
| 0 | None |
| A | FM Approvals Explosion-Proof |
| B | FM Approvals Explosion-Proof, Intrinsic Safety, and Non-Incendive (combination of A and J) |
| C | CSA Explosion-Proof |
| D | CSA Explosion-Proof, Intrinsic Safety, and Non-Incendive (combination of C and K) |
| F | ATEX Intrinsic Safety |
| G | ATEX Type N |
| H | ATEX Flame-Proof |
| J | FM Approvals Intrinsic Safety |
| K | CSA Intrinsic Safety |
| L | ATEX Flame-Proof, Intrinsic Safety, Type N, and Dust (combination of F, G, H, and P) |
| P | ATEX Dust |
| T | ATEX FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only |
| V | FM FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only |
| W | CSA FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only |
| Y | IECEx FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only. |
| 4 | IECEx Intrinsic Safety; for FOUNDATION fieldbus protocol only. |
| 5 | IECEx Type n; for FOUNDATION fieldbus protocol only. |
| **Code** | **Engineered Measurement Solution (EMS)** |
| B | Mass Flow and Measured Variables (DP, P, and T) with HART or FOUNDATION fieldbus. |
| V | Process Variable Measurement with FOUNDATION fieldbus protocol only |

| Code | Options |
|---|---|
| | **Performance Class** |
| U3[6] | Ultra for Flow: ±0.05% DP reading accuracy, up to 100:1 rangedown, 10 year stability, limited 12 year warranty |
| | **PlantWeb Control Functionality** |
| A01 | Regulatory control suite: PID, arith, signal char, integ, etc.; requires Foundation fieldbus |
| | **Custom Configuration** |
| C2[7] | Custom Flow Configuration (Requires completed Configuration Data Sheet 00806-0100-4716.) |
| | **Flange Adapter** |
| DF[8] | Flange Adapters — Adapter Type Determined by Selected Flange Material: Plated CS, SST, *Hastelloy C* |
| | **Integral Manifold** |
| S5 | Assembly with Rosemount 305 Integral Manifold (Requires integral manifold model number – see 00813-0100-4733) |
| S6 | Assembly with Rosemount 309 Hookups (Required traditional Flange Style Options J, K, or L) |
| | **Cleaning** |
| P2 | Cleaning for Special Services |
| | **Material Traceability Certification** |
| Q8[9] | Material Inspection Certificate per EN 10204 3.1B |
| | **Calibration Data Sheet** |
| Q4 | Inspection Certificate for Calibration Data |
| | **Hydrostatic Testing** |
| P1 | Hydrostatic Testing |
| | **Primary Elements** |
| S3 | Assembly with Rosemount 405 Compact Orifice (requires compact orifice model number, see 00813-0100-4810) |
| S4[10] | Assembly with Rosemount *Annubar* Averaging Pitot Tubes or Rosemount 1195 Integral Orifice Plates (requires corresponding model number, see 00813-0100-4809, 00813-0100-4760, or 00813-0100-4686) |
| | **Surface Finish Certification** |
| Q16 | Surface Finish Certification |
| **Typical Model Number** | **3095 A 2 3 A A A 1 3 A B 0 1 1 0 B** |

*(1) Available only with 3 or C sensor modules and A 316L SST/silicone, Isolator/Fill Fluid option.*
*(2) Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.*
*(3) Only available with C or D Gage Sensor Modules.*
*(4) Requires that Drain/Vent Material Code 0 (none).*
*(5) For use with Annubars with integral RTDs.*
*(6) Ultra for Flow applicable for HART protocol, DP ranges 2 and 3 with SST isolator material and silicone fill fluid only.*
*(7) Not available with Output code V.*
*(8) Not available with assembly to Rosemount 1195 Integral Orifice Option Code S4.*
*(9) This option is available for the sensor module housing, Coplanar and Coplanar flange adapters.*
*(10) With a primary element installed, the maximum operating pressure will be the lesser of either the transmitter or the primary element.*

## SPARE PARTS

### Spare Parts List

| Spares Category[1] | Part Description | | Part Number |
|---|---|---|---|
| | **Silicone Fill Sensor Module** | | |
| | Differential: 0–0.5/25 in$H_2O$, Range 1/Absolute: 0–8/800 psia, Range 3 | | |
| | | 316L SST | 03095-0345-1312 |
| | Differential: 0–0.5/25 in$H_2O$, Range 1/Gage: 0–8/800 psia, Range C | | |
| | | 316L SST | 03095-0345-1812 |
| | Differential: 0–2.5/250 in$H_2O$, Range 2/Absolute: 0–8/800 psia, Range 3 | | |
| | | 316L SST | 03095-0345-2312 |
| | | Hastelloy® C-276 | 03095-0345-2313 |
| | Differential: 0–2.5/250 in$H_2O$, Range 2/Absolute: 0–36.26/3,626 psia, Range 4 | | |
| | | 316L SST | 03095-0345-2412 |
| | | Hastelloy C-276 | 03095-0345-2413 |
| | Differential: 0–10/1,000 in$H_2O$, Range 3/Absolute: 0–8/800 psia, Range 3 | | |
| | | 316L SST | 03095-0345-3312 |
| | | Hastelloy C-276 | 03095-0345-3313 |
| B | Differential: 0–10/1,000 in$H_2O$, Range 3/Absolute: 0–36.26/3,626 psia, Range 4 | | |
| | | 316L SST | 03095-0345-3412 |
| | | Hastelloy C-276 | 03095-0345-3413 |
| | Differential: 0–2.5/250 in$H_2O$, Range 2/Gage: 0–8/800 psig, Range C | | |
| | | 316L SST | 03095-0345-2812 |
| | | Hastelloy C-276 | 03095-0345-2813 |
| | Differential: 0–2.5/250 in$H_2O$, Range 2/Gage: 0–36.26/3,626 psig, Range D | | |
| | | 316L SST | 03095-0345-2912 |
| | | Hastelloy C-276 | 03095-0345-2913 |
| | Differential: 0–10/1,000 in$H_2O$, Range 3/Gage: 0–8/800 psig, Range C | | |
| | | 316L SST | 03095-0345-3812 |
| | | Hastelloy C-276 | 03095-0345-3813 |
| | Differential: 0–10/1,000 in$H_2O$, Range 3/Gage: 0–36.26/3,626 psig, Range D | | |
| | | 316L SST | 03095-0345-3912 |
| | | Hastelloy C-276 | 03095-0345-3913 |
| | **Halocarbon Inert Fill Sensor Module** | | |
| | Differential: 0–2.5/250 in$H_2O$, Range 2/Gage: 0–8/800 psig, Range C | | |
| | | 316L SST | 03095-0345-282203 |
| | | Hastelloy C-276 | 095-0345-2823 |
| | Differential: 0–2.5/250 in$H_2O$, Range 2/Gage: 0–36.26/3,626 psig, Range D | | |
| | | 316L SST | 03095-0345-292203 |
| | | Hastelloy C-276 | 095-0345-2923 |
| | Differential: 0–10/1,000 in$H_2O$, Range 3/Gage: 0–8/800 psig, Range C | | |
| | | 316L SST | 03095-0345-382203 |
| | | Hastelloy C-276 | 095-0345-3823 |
| | Differential: 0–10/1,000 in$H_2O$, Range 3/Gage: 0–36.26/3,626 psig, Range D | | |
| | | 316L SST | 03095-0345-392203 |
| | | Hastelloy C-276 | 095-0345-3923 |
| | **Electronics Board Assembly Hardware** | | |
| A | HART Output Electronics Board, Mass Flow | | 03095-0303-1005 |
| | FOUNDATION fieldbus Electronics Board, Mass Flow | | 03095-0303-0050 |
| | **LCD Display - HART** | | |
| | LCD Display Kit for Standard Aluminum Housing[2] | | 03095-0492-0001 |
| A | LCD Display Kit for 316 SST Housing[2] | | 03095-0492-0002 |
| | LCD Display (includes display and mounting hardware) | | 03095-0492-0101 |
| | LCD Display Cover Kit for Aluminum Housing | | 03031-0193-0002 |
| | LCD Display Cover Kit for 316 SST Housing | | 03031-0193-0002 |
| | **LCD Display - FOUNDATION Fieldbus** | | |
| A | LCD Display Cover Kit for Standard Aluminum Housing | | 03095-0292-0003 |
| | LCD Display Cover Kit for 316 SST Housing | | 03095-0292-0004 |

| Spares Category[1] | Part Description | | Part Number |
|---|---|---|---|
| | **Standard Aluminum Housing (HART)** | | |
| | Electronics Housing without Terminal Block ($^1/_2$-14 NPT conduit with RFI filters) | | 03031-0635-0201 |
| B | Electronics Cover | | 03031-0292-0001 |
| A | Standard Terminal Block Assembly | | 03031-0332-0009 |
| B | Transient Protection Terminal Block Assembly | | 03031-0332-0010 |
| A | External Ground Assembly | | 03031-0398-0001 |
| | **316 SST Housing** | | |
| | Electronics Housing without Terminal Block ($^1/_2$-14 NPT conduit with RFI filters) | | 03031-0635-0241 |
| B | Cover Assembly Kit | | 03031-0292-0202 |
| A | **Process Flanges** | | |
| | Differential Coplanar™ Flange | | |
| | | Nickel-plated Carbon Steel | 03031-0388-0025 |
| | | 316 SST | 03031-0388-0022 |
| | | Hastelloy C | 03031-0388-0023 |
| | Coplanar Flange Alignment Screw (package of 12 screws) | | 03031-0309-0001 |
| | Differential Traditional Flange | | |
| | DIN Compliant Traditional Flange, SST, $^7/_{16}$ in. Adaptor/Manifold Bolting | | 03031-1350-0012 |
| B | **Flange Adaptor Union** | | |
| | | Nickel-plated Carbon Steel | 02024-0069-0005 |
| | | 316 SST | 02024-0069-0002 |
| | | Hastelloy C | 02024-0069-0003 |
| A | **Vent Valve Kits** | | |
| | 316 SST Valve Stem and Seat Kit | | 01151-0028-0022 |
| | Hastelloy C Valve Stem and Seat Kit | | 01151-0028-0023 |
| | (Each kit contains Part for one transmitter.) | | |
| | **O-Ring Packages** | | |
| B | Electronic Housing, Cover (Standard and Display) | | 03031-0232-000103 |
| B | Electronics Housing, Module | | 031-0233-00010303 |
| B | Process Flange, Glass-filled Teflon | | 1-0234-000103031- |
| B | Flange Adapter, Glass-filled Teflon | | 0242-0001 |
| | (Each package contains 12 O-rings.) | | |
| | **Mounting Brackets Kits** | | |
| | Coplanar Flange Bracket Kit (Figure 2) | | |
| B | SST Bracket, 2-in. Pipe or Panel Mount, SST Bolts | | 03031-0189-0003 |
| | Traditional Flange Bracket Kit for 2-in. Pipe Mounting, CS Bolts | | 03031-0313-0001 |
| | **Terminal Block Assembly (FOUNDATION Fieldbus)** | | |
| A | Standard Terminal Block Assembly | | 03031-0332-2001 |
| B | Transient Protection Terminal Block Assembly | | 03031-0332-2002 |

| Spares Category[1] | Part Description | | Part Number |
|---|---|---|---|
| | **Bolt Kits** | | |
| B | **Coplanar Flange** | | |
| | Flange Bolt Kit | | |
| | | Carbon Steel (set of 4) | 03031-0312-0001 |
| | | 316 SST (Set of 4) | 03031-0312-0002 |
| | Flange/Adapter Bolt Kit | | |
| | | Carbon Steel (set of 4) | 03031-0306-0001 |
| | | 316 SST (Set of 4) | 03031-0306-0002 |
| | Manifold/Flange Kit | | |
| | | Carbon Steel (set of 4) | 03031-0311-0001 |
| | | 316 SST (Set of 4) | 03031-0311-0002 |
| | (Each kit contains bolts for one transmitter) | | |
| | Manifold | | |
| | Carbon Steel | | Use Bolts Supplied with Manifold |
| | 316 SST | | |
| | **RTD Cables, Adapters and Plugs** | | |
| B | RTD Input with 12 ft (3.66 m) of Shielded Cable (Intended for use with conduit.) | | 03095-0320-0011 |
| | RTD Input with 24 ft (7.32 m) of Shielded Cable (Intended for use with conduit.) | | 03095-0320-0012 |
| | RTD Input with 12 ft (3.66 m) of Armored, Shielded Cable | | 03095-0320-0001 |
| | RTD Input with 24 ft (7.32 m) of Armored, Shielded Cable | | 03095-0320-0002 |
| | RTD Input with 21 in. (53 cm) of Armored, Shielded Cable | | 03095-0320-0003 |
| | RTD Input with 75 ft (22.86 m) of Shielded Cable (Intended for use with conduit.) | | 03095-0320-0013 |
| | RTD Input with 75 ft (22.86 m) of Armored, Shielded Cable | | 03095-0320-0007 |
| | RTD Input with 12 ft (3.66 m) of CENELEC Flameproof Cable | | 03095-0320-0021 |
| | RTD Input with 24 ft (7.32 m) of CENELEC Flameproof Cable | | 03095-0320-0022 |
| | RTD Input with 75 ft (22.86 m) of CENELEC Flameproof Cable | | 03095-0320-0023 |
| | RTD Input with 21 in. (53 cm) of CENELEC Flameproof Cable | | 03095-0320-0024 |
| | $^3/_4$-14 to $^1/_2$-14 NPT Adapter (conduit adapter for Rosemount RTD Connection Head) | | 03095-0308-0001 |
| | Armored Cable Compression Seal | | 03095-0325-0001 |
| | $^1/_2$ in. male to CM20 female Brass Cable Adapter | | 00444-0282-0001 |
| | NOTE: The following connect to the Model 3095MV RTD Connector: | | |
| | RTD Connector Plug (for transmitters without an RTD) | | 03095-0323-0001 |
| | $^1/_2$-14 NPT RTD Cable Adapter | | 03095-0322-0001 |
| | **3095 Engineering Assistant Software** | | |
| | Serial Port HART® Modem and Cables | | 03095-5105-0001 |
| | USB Port HART Modem and Cables | | 03095-5105-0002 |
| | FOUNDATION fieldbus PCMCIA Card and Cables | | 03095-5108-0001 |
| | Cable Only | | 03095-5109-0001 |

*(1) Spares Category: A=One spare for every 25 transmitters. B=One spare for every 50 transmitters.*
*(2) Includes LCD display, mounting hardware, and cover kit.*

## OPTIONS

### Standard Configuration

Unless otherwise specified, transmitter is shipped as follows:

**Engineering units:**

| | |
|---|---|
| Differential | in$H_2O$ (Range 2) |
| Absolute/gage | psi (all ranges) |
| Output: | Specified model code option |
| Flange type: | Specified model code option |
| Flange material: | Specified model code option |
| O-ring material: | Specified model code option |
| Drain/vent: | Specified model code option |
| Flow Configuration Parameters: | Factory default |
| Software tag: | (Blank) |

In addition, transmitter is shipped as follows:

- The three process variables are digitally trimmed to the specified upper and lower range values.
- For Mass Flow and Measured Variables (EMS Code B), process variable output order is set to Flow, DP, AP/GP, PT.
- Flow is configured to measure air via ASME Orifice: Flange Tap, with a primary element minimum diameter of 0.5 in. (SST material), meter tube diameter of 2 in. (carbon steel material), flow range configured from 0–8,262 SCFH, 10–100 psia operating pressure range, and 50–100 °F operating temperature range.

**Custom Configuration (Option Code C2)**

If Option Code C2 is ordered, the custom flow configuration parameters are specified in addition to the standard configuration parameters.

**Fixed Process Temperature (Option Code 0)**

If Process Temperature Input (option code 0) is ordered, the fixed process temperature is set to 68 °F unless specified during order entry (HART protocol only).

**Tagging**

Three customer tagging options are available:

- Standard SST tag is wired to the transmitter. Tag character height is 0.125 in. (3.18 mm), 85 characters maximum.
- Tag may be permanently stamped on transmitter nameplate upon request. Tag character height is 0.0625 in. (1.59 mm), 65 characters maximum.
- Tag may be stored in transmitter memory.
- Software tag (8 characters maximum HART protocol; 32 characters maximum FOUNDATION fieldbus protocol) is left blank unless specified.

**Additional Information**

Rosemount transmitters are available as fully assembled and factory calibrated flowmeters. Flowmeter Product Data Sheets are listed below:

- *Annubar* Flowmeter Series:00813-0100-4809
  Rosemount 3051SFA *ProBar*
  Rosemount 3095MFA Mass *ProBar*
  Rosemount 485 *Annubar* Primary Element
- *Proplate* Flowmeter Series: 00813-0100-4686
  Rosemount 3051SFP *Proplate*
  Rosemount 3095MFP Mass *Proplate*
  Rosemount 1195 Integral Orifice Primary Element
- Compact Orifice Flowmeter Series: 00813-0100-4810
  Rosemount 3051SFC Flowmeter
  Rosemount 3095MFC Mass Flowmeter
  Rosemount 405 Compact Orifice Primary
- Orifice Plate Primary Element Systems: 00813-0100-4792
  Rosemount 1495 Orifice Plate
  Rosemount 1496 Flange Union
  Rosemount 1497 Meter Section

### Optional Rosemount 305 Integral Manifolds

Rosemount 3095 Transmitter and 305AC (305BC) Integral Manifold are fully assembled, calibrated, and seal tested by the factory. Refer to PDS 00813-0100-4733 for additional information.

### Temperature Sensors and Assemblies

Rosemount offers many types of temperature sensors and assemblies.

## ACCESSORIES

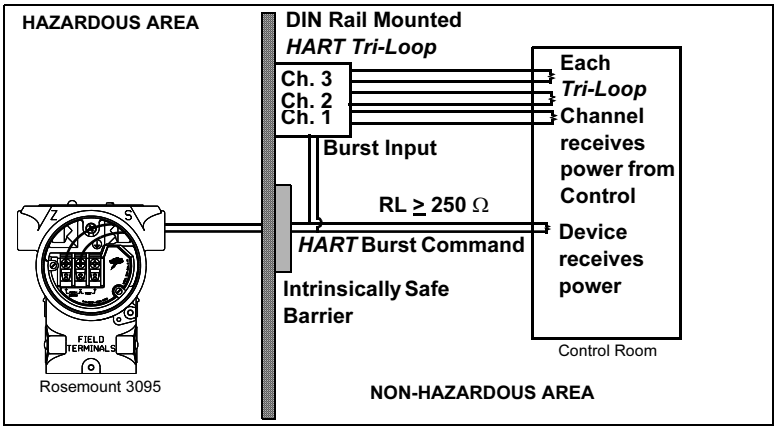
### Rosemount 333 *HART Tri-Loop*™ *HART*-to-Analog Signal Converter

The Rosemount 333 *HART Tri-Loop* can be installed with the 3095 without disrupting existing device wiring. The 333 *HART Tri-Loop* provides up to three additional analog outputs for process monitoring or control without additional pipe penetrations.

The *HART Tri-Loop* accepts the 3095 digital signal and converts it to three independent isolated 4–20 mA analog signals. Any of the 3095 process variables (DP, AP, GP, PT, or flow) can be provided via the 333 *HART Tri-Loop*.

### Rosemount 333 *HART Tri-Loop*

| Model | Product Description |
|---|---|
| 333 | *HART Tri-Loop* (standard configuration) |
| **Code** | **Alarm Option** |
| U | High Alarm |
| D | Low Alarm |
| **Code** | **Configuration Option** |
| (no code) | Standard Configuration |
| C2 | Custom Configuration. Requires a completed Configuration Data Sheet (00806-0100-4754) |
| **Typical Model Number: 333 U** | |




### Accessories

| Item Description | Part Number |
|---|---|
| Serial Port *HART* Modem and Cables Only | 03095-5105-0001 |
| USB Port *HART* Modem and Cables Only | 03095-5105-0002 |
| FOUNDATION fieldbus PCMCIA Interface Card and Cables Only | 03095-5108-0001 |

### Rosemount 3095 Engineering Assistant Software Packages

The Rosemount 3095 Engineering Assistant software supports mass flow configuration for both *HART* and FOUNDATION fieldbus protocols. The package is available with or without protocol-specific modem and connecting cables. All configurations are packaged separately.

For best performance of the EA Software, the following computer hardware and software is recommended:

- Pentium, 800MHz personal computer or above
- 512 MB RAM
- 350 MB of available hard disk space
- Mouse or other pointing device
- Color computer display
- *Microsoft* ® *Windows*™ NT, 2000 or XP

### Engineering Assistant Software Packages

| Code | Product Description |
|---|---|
| EA | Engineering Assistant Software program |
| **Code** | **Diskette Type** |
| 2(1) | EA Software Rev. 5, CD-ROM (includes *HART Tri-Loop* Configurator Software) |
| **Code** | **Language** |
| E | English |
| **Code** | **Modem and Connecting Cables** |
| O | None |
| H | Serial Port *HART* Modem and Cables |
| B | USB Port *HART* Modem and Cables |
| C | FOUNDATION fieldbus PMCIA Interface Card and Cables |
| **Code** | **Operating Software** |
| N | EA Rev. 5 |
| **Code** | **License** |
| 1 | Single PC license |
| 2 | Site license |
| **Typical Model Number:** | **EA 2 E O N 1** |

*(1) EA-HART: Revision 5.3, 5.4, and 5.5 supports Windows NT, 2000, or XP and upgrades only on Windows 98.*
*EA-FOUNDATION fieldbus supports windows 2000 and XP.*

## PRODUCT COMPATIBILITY

It is important to understand the following compatibility issues involved when retrofitting parts to the Rosemount 3095:

- Electronics (output) board revisions
- Sensor module software revisions
- LCD Display
- Hardware compatibility issues

Please read this section carefully if you plan to retrofit existing Rosemount 3095 transmitters with new components.

### Revision Level Indicators

Determine the revision level of the Rosemount 3095 transmitter electronics board and sensor module using the Engineering Assistant (EA) software or the HART Communicator.

**EA Software**

From the AMS context menu, select *Configuration Properties* < *Device Tab* < *Software Rev*.

**HART Communicator**

Select *1 Device Setup*, *3 Basic Setup*, *4 Device Info*, and *9 Revisions*.

### Electronics Board

Use Table A-1 to assist in determining the electronics board revision level of the Rosemount 3095 transmitter.

Table A-1. Electronics Software Board Revisions

| Electronics Board [1] | Transmitter Serial Number | Shipment Start Date |
|---|---|---|
| Revision 13 | 32,400 and above | 3/99 |
| Revision 15 | 55,660 and above | 12/00 |
| Revision 12 | 28,600 and above | 11/98 |
| Revision 10 | 20,000 and above | 12/97 |
| Revision 9 | 15,600 and above | 5/97 |
| Revision 8 | 10,000 and above | 8/96 |
| Revision 5 | 3,675 and above | 1/96 |
| Revision 4 | 2,822 and above | 10/95 |

*(1) Fieldbus MultiVariable electronics are compatible with model serial number 2527425 and above. The module serial number is located on the sensor module label and electronically stored in the device retrievable via fieldbus communications.*

### Sensor Module

Table A-2 lists the sensor module revision, the transmitter serial number, the shipment start date, and the process temperature range.

Table A-2. Sensor Module Software Revisions

| Sensor Module Revision [1] | Transmitter Serial Number | Shipment Start Date | Process Temperature Range |
|---|---|---|---|
| 149 | >28,600 | 11/98 | –150 to 1500 °F (–101 to 815 °C)[2] |
| 142(b) | 10,000–40,000 | 8/96 | –40 to 1200 °F (–40 to 649 °C) |
| 142(a) | 0–9,999 | 10/95 | –40 to 400 °F (–40 to 204 °C) |

*(1) Fieldbus MultiVariable electronics are compatible with model serial number 2527425 and above. The module serial number is located on the sensor module label and electronically stored in the device retrievable via fieldbus communications.*
*(2) Electronic Board Revision 12 and 13 supported Process Temperature Range –300 to 1500 °F (–184 to 815 °C)*

## Sensor Limits

Tables A-3, A-4, and A-5 identify the Rosemount 3095 sensor limits.

Table A-3. Sensor Limits for Sensor Module Revision 149.

| Sensor Range | LRL– [1] | LRL | URL | URL+[2] |
|---|---|---|---|---|
| Flow | No limit | 0 | op-limits calc[3] | no limit |
| DP Range 1 | –27.5 inH2O @ 68 °F | –25 inH2O @ 68 °F | 25 inH2O @ 68 °F | 27.5 inH2O @ 68 °F |
| DP Range 2 | –275 in$H_20$ at 68 °F | –250 in$H_20$ at 68 °F | 250 in$H_20$ at 68 °F | 275 in$H_20$ at 68 °F |
| DP Range 3 | –1100 in$H_20$ at 68 °F | –1000 in$H_20$ at 68 °F | 1000 in$H_20$ at 68 °F | 1100 in$H_20$ at 68 °F |
| AP Range 3 | 0 psia[4] | 0.5 psia | 800 psia | 880 psia |
| AP Range 4 | 0 psia[4] | 0.5 psia | 3,626 psia | 3,988 psia |
| GP Range C | –15 psig | 0 psig | 800 psig | 880 psig |
| GP Range D | –15 psig | 0 psig | 3,626 psig | 3,988 psig |
| PT [5] | – 165 °F (–109 °C)[6] | –150 °F (–101 °C)[7] | 1500 °F (815 °C) | 1550 °F (843 °C) |
| Sensor Temperature | –47 °F (–44 °C) | –40 ° F (–40 ° C) | 185 °F (85 °C) | 200 °F (93.5 °C) |

*(1) LRL– is equal to LRV and lower sensor trim limits.*
*(2) URL+ is equal to URV and upper sensor trim limits.*
*(3) The flow rate when DP=URL+, AP=UOL, and PT=LOL. This value is calculated by the EA.*
*(4) For output board versions below 10, LRL– is 0.45 psia.*
*(5) In the fixed temperature mode, PT range is –459 to 3500 °F (–273 to 1927 °C).*
*(6) Electronic Board Revision 12 and 13 supported –330 °F (–201 °C).*
*(7) Electronic Board Revision 12 and 13 supported –300 °F (–185 °C).*

Table A-4. Sensor Limits for Sensor Module Revision 142B

| Sensor Range | LRL– (1) | LRL | URL | URL+(2) |
|---|---|---|---|---|
| Flow | No limit | 0 | op-limits calc(3) | no limit |
| DP Range 2 | –275 in$H_20$ at 68 °F | –250 in$H_20$ at 68 °F | 250 in$H_20$ at 68 °F | 275 in$H_20$ at 68 °F |
| DP Range 3 | –913 in$H_20$ at 68 °F | –830 in$H_20$ at 68 °F | 830 in$H_20$ at 68 °F | 913 in$H_20$ at 68 °F |
| AP Range 3 | 0 psia(4) | 0.5 psia | 800 psia | 880 psia |
| AP Range 4 | 0 psia(4) | 0.5 psia | 3,626 psia | 3,988 psia |
| GP Range C | –15 psig | 0 psig | 800 psig | 880 psig |
| GP Range D | –15 psig | 0 psig | 3,626 psig | 3,988 psig |
| PT (5) | – 44 °F (–42 °C) | –40 °F (–40 °C) | 1200 °F (649 °C) | 1220 °F (660 °C) |
| Sensor Temperature | –47 °F (–44 °C) | –40 ° F (–40 ° C) | 185 °F (85 °C) | 200 °F (93.5 °C) |

*(1) LRL– is equal to LRV and lower sensor trim limits.*
*(2) URL+ is equal to URV and upper sensor trim limits.*
*(3) The flow rate when DP=URL+, AP=UOL, and PT=LOL. This value is calculated by the EA.*
*(4) For output board versions below 10, LRL– is 0.45 psia.*
*(5) In the fixed temperature mode, PT range is –459 to 3500 °F (–273 to 1927 °C).*

Table A-5. Sensor Limits for Sensor Module Revision 142A

| Sensor Range | | LRL | URL | URL+(2) |
|---|---|---|---|---|
| Flow | No limit | 0 | op-limits calc(3) | no limit |
| DP Range 2 | –275 in$H_20$ at 68 °F | –250 in$H_20$ at 68 °F | 250 in$H_20$ at 68 °F | 275 in$H_20$ at 68 °F |
| DP Range 3 | –913 in$H_20$ at 68 °F | –830 in$H_20$ at 68 °F | 830 in$H_20$ at 68 °F | 913 in$H_20$ at 68 °F |
| AP Range 3 | 0.45 psia(4) | 0.5 psia | 800 psia | 880 psia |
| AP Range 4 | 0.45 psia(4) | 0.5 psia | 3,626 psia | 3,988 psia |
| PT (5) | – 44 °F (–42 °C) | –40 °F (–40 °C) | 400 °F (205 °C) | 440 °F (224.4 °C) |
| Sensor Temperature | –47 °F (–44 °C) | –40 ° F (–40 ° C) | 185 °F (85 °C) | 200 °F (93.5 °C) |

*(1) LRL– is equal to LRV and lower sensor trim limits.*
*(2) URL+ is equal to URV and upper sensor trim limits.*
*(3) The flow rate when DP=URL+, AP=UOL, and PT=LOL. This value is calculated by the EA.*
*(4) For output board versions below 10, LRL– is 0.45 psia.*
*(5) In the fixed temperature mode, PT range is –459 to 3500 °F (–273 to 1927 °C).*

## Electronics Compatibility

Table A-6 lists electronics compatibility issues between the electronics board, the sensor module, and the LCD Display.

Table A-6. Electronics Compatibility Table

| Electronics Software Board (1) | Sensor Software Module | | | LCD Display |
|---|---|---|---|---|
| | Revision 142(a) | Revision 142(b) | Revision 149 | LCD Display |
| Revision 4 and 5 | Compatible | Compatible | Not Compatible | Not Compatible |
| Revision 8, 9, and 10 | Compatible | Compatible | Not Compatible | Not Compatible |
| Revision 12, 13, and 15 | Compatible | Compatible | Compatible | Compatible |

*(1) Fieldbus MultiVariable electronics are compatible with model serial number 2527425 and above. The module serial number is located on the sensor module label and electronically stored in the device retrievable via fieldbus communications.*

## Hardware Compatibility

Table A-7 lists hardware compatibility issues between new and old housings and the internal components.

Table A-7. Hardware Compatibility Issues

| Housing | Terminal Block | | Electronics Board | | Sensor Module | | LCD Display |
|---|---|---|---|---|---|---|---|
| | New | Old | New(1) | Old(2) | New | Old | LCD Display |
| New | Compatible | Not Compatible | Compatible | Compatible | Compatible | Compatible | Compatible |
| Old | Compatible | Compatible | Compatible | Compatible | Compatible | Compatible | Compatible |

*(1) Revision 12 and 13, and 15.*
*(2) Revision 10 and below.*

## Communication Compatibility

| | Electronic Software 8 and older | Electronic Software 9 and newer | Sensor Module Software Revision 149 and 142 |
|---|---|---|---|
| EA 4.0 and older | Compatible | Compatible | Compatible |
| EA 5.0 and newer | Not Compatible | Compatible | Compatible |

### EA Software Revisions

| EA Revision | Date Effective | Features |
|---|---|---|
| 3.5 | 11/97 | • Lowest recommended revision of EA software. Contact a Rosemount Sales Representative to upgrade older revisions of the EA software.<br>• Verifies Range Values so range values are not overwritten if new flow configuration is sent to the transmitter. |
| 4.0 | 11/98 | • Required for LCD display and Totalizer setup.<br>• Special Units setup for Flow and Flow Total<br>• Supports configurable DP Low Flow Cutoff<br>• Supports Extended Process Temperature and Range 1 DP<br>• Supports Annubar® Diamond II+ / Mass ProBar®<br>• Includes On-Line manual |
| 5.0<br>5.1 | 11/00<br>6/01 | • 32 bit OS platform for Microsoft® Windows® 95, 98, and NT 4.0, uses a limited version of AMS to interface with the 3095 and Rosemount 333.<br>• Supports ISO5167 Amd. 1, Flange, Corner, and D&D/2 Tap Orifice |
| 5.2 | 10/02 | • Supports OS platforms for Microsoft Windows 98, NT, and 2000<br>• Supports ISO 12213 Natural Gas<br>• Supports Rosemount 405P Compact Orifice ($^1/_2$ - 4-in.)<br>• Supports Rosemount 485 Annubar / Mass ProBar<br>• Includes Print Functionality |
| 5.3 | 5/03 | • Supports OS platforms for Microsoft Windows NT, 2000, and XP |
| 5.4 | 5/04 | • Available as an upgrade only. May be used to upgrade from EA-5.0 and later.<br>• Supports OS platforms for Microsoft Windows NT, 2000, and XP.<br>• Supports Rosemount 405C and 1595 Conditioning Orifice Plates. |
| 5.5 | 4/05 | • Supported for installation to Microsoft Windows 2000 and XP.<br>• Supports Rosemount 405P (6 - 8-in.). |

### HART Communicator Revisions

| Field Device Revision | Date Effective | Features |
|---|---|---|
| 1, DD Rev. 5 | 10/95 | • Initial Rosemount 3095 DD release |
| 1, DD Rev. 7 | 9/97 | • Recognizes Gauge Pressure as a Field Device Variable<br>• Compatible with Back-up Process Temperature Mode<br>• Will not communicate with new Rev. 12 electronics board (11/98) if “Flow Total” is selected as a process variable |
| 2, DD Rev. 1 | 12/98 | • Required for LCD display and Totalizer setup<br>• Special Units setup for Flow and Flow Total<br>• Supports configurable DP Low Flow Cutoff<br>• Supports Extended Process Temperature and Range 1 DP<br>• Supports Annubar® Diamond II+/ Mass Probar® |
| 2, DD Rev 2 | 3/00 | • Remove PV damping<br>• Add loop warning message |
| 2, DD Rev 3 | 6/04 | • Add flow rate units for metric ton per minute, hour, and day.<br>• Add message if flow rate upper limit exceeds EA calculated flow range. |

# Appendix B Product Certifications

**Approved Manufacturing Locations . . . . . page B-1**
**European Directive Information . . . . . page B-1**
**ATEX Type N . . . . . page B-2**
**ATEX Intrinsic Safety . . . . . page B-3**
**3095 HART Hazardous Locations Certifications . . . . . page B-4**
**3095 FIELDBUS Hazardous Locations Certifications . . . page B-6**
**IECEx Certifications . . . . . page B-9**
**Approval Drawings . . . . . page B-10**

## APPROVED MANUFACTURING LOCATIONS

Rosemount Inc. — Chanhassen, Minnesota USA

Emerson Process Management GmbH & Co. — Wessling, Germany

Emerson Process Management Asia Pacific
Private Limited — Singapore

Beijing Rosemount Far East Instrument Co., Limited – Beijing, China

## EUROPEAN DIRECTIVE INFORMATION

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

**ATEX Directive (94/9/EC)**

Emerson Process Management complies with the ATEX Directive.

**European Pressure Equipment Directive (PED) (97/23/EC)**

3095F_2/3,4/D and 3095M_2/3,4/D Flow Transmitters
— QS Certificate of Assessment - EC No. PED-H-20 Module H
Conformity Assessment

All other 3095_ Transmitters/Level Controller
— Sound Engineering Practice

Transmitter Attachments: Process Flange - Manifold
— Sound Engineering Practice

**Electro Magnetic Compatibility (EMC) (89/336/EEC)**

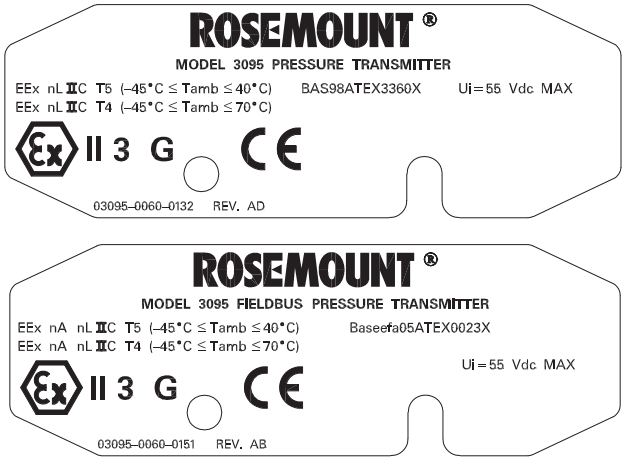
3095 Flow Transmitters
— EN 50081-1: 1992; EN 50082-2:1995; EN 61326-1:1997 – Industrial

**Ordinary Location Certification for Factory Mutual**

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

## ATEX TYPE N

Rosemount 3095 Multivariable Mass Flow Transmitters that have the following labels attached, have been certified to comply with Directive 94/9/EC of the European Parliament and the Council as published in the Official Journal of the European Communities No. L 100/1 on 19 April 1994.




The following information is provided as part of the labeling of the transmitter:

- Name and address of the manufacturer (may be any of the following):
  - Rosemount USA
  - Rosemount Germany
  - Rosemount Singapore

CE

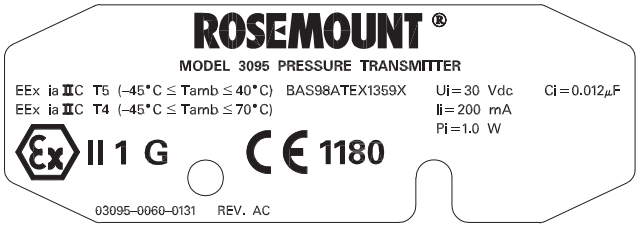
- Complete model number (see Appendix A: Specifications and Reference Data).
- The serial number of the device
- Year of construction
- Marking for explosion protection: **II 3 G**
  - EEx nL IIC T5 (–45 °C ≤ $T_{amb}$ ≤ 40 °C)
  - EEx nL IIC T4 (–45 °C ≤ $T_{amb}$ ≤ 70 °C)
  - Ui = 55 Vdc Max
  - BASEEFA ATEX certificate number: BAS 98 ATEX 3360X
  - EEx nA nL IIC T5 (-45°C ≤ Tamb ≤ 40°C) (FIELDBUS)
  - EEx nA nL IIC T4 (-45°C ≤ Tamb ≤ 70°C) (FIELDBUS)
  - BASEEFA ATEX certificate number: Baseefa05ATEX0022X (FIELDBUS)

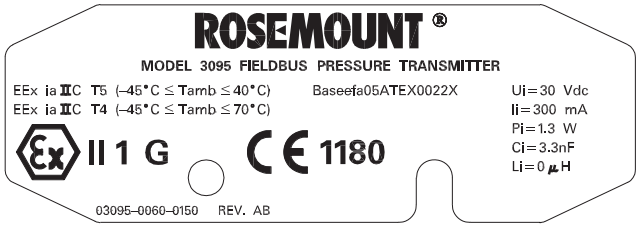
**Special conditions for safe use (X):**

Rosemount 3095 transmitters fitted with the transient protection terminal block are not capable of withstanding the 500 V insulation test required by Clause 9.1 of EN 50 021 (1998), and this must be taken into account when installing the apparatus.

## ATEX INTRINSIC SAFETY

Rosemount 3095 Multivariable Mass Flow Transmitters that have the following labels attached, have been certified to comply with Directive 94/9/EC of the European Parliament and the Council as published in the Official Journal of the European Communities No. L 100/1 on 19 April 1994.




The following information is provided as part of the labeling of the transmitters:

- Name and address of the manufacturer (may be any of the following):
  - Rosemount USA
  - Rosemount Germany
  - Rosemount Singapore

CE 1180

- Complete model number (see Appendix A Specifications and Reference Data)
- The serial number of the device
- Year of construction
- Marking for explosion protection: II 1 G
  - EEx ia IIC T5 (–45 °C ≤ $T_{amb}$ ≤ 40 °C)
  - EEx ia IIC T4 (–45 °C ≤ $T_{amb}$ ≤ 70 °C)
  - $U_i$ = 30 Vdc $I_i$ = 200 mA $P_i$ = 1.0 W $C_i$ = 0.012 µF
  - BASEEFA ATEX certificate number: BAS 98 ATEX 1359X
  - Ui = 30 Vdc Ii = 300 mA Pi = 1.3 W Ci = 3.3 nF Li = 0 uH (FIELDBUS)
  - BASEEFA ATEX certificate number: Baseefa05ATEX0022X (FIELDBUS)

**Special conditions for safe use (X):**

Rosemount 3095 transmitters fitted with the transient protection terminal block are not capable of withstanding the 500 V insulation test required by Clause 6.4.12 of EN 50 020 (1994), and this must be taken into account when installing the apparatus.

## 3095 *HART* HAZARDOUS LOCATIONS CERTIFICATIONS

### North American Certifications

**FM Approvals**

A Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. Enclosure type NEMA 4X. Factory Sealed. Provides nonincendive RTD connections for Class I, Division 2, Groups A, B, C, and D.

J Intrinsically Safe for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations. Non-incendive for Class I, Division 2, Groups A, B, C, and D. Temperature Code T4. Factory Sealed.

For input parameters and installation see control drawing 03095-1020.

**Canadian Standards Association (CSA)**

C Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. CSA enclosure Type 4X suitable for indoor and outdoor hazardous locations. Provides nonincendive RTD connection for Class I, Division 2, Groups A, B, C, and D.Factory Sealed. Install in accordance with Rosemount Drawing 03095-1024. Approved for Class I, Division 2, Groups A, B, C, and D.

K Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D. when installed in accordance with Rosemount drawing 03095-1021. Temperature Code T3C.

For input parameters and installation see control drawing 03095-1021.

### European Certifications

F ATEX Intrinsic Safety
Certificate Number: BAS98ATEX1359X ⟨Ex⟩ II 1 G
EEx ia IIC T5 ($T_{amb}$ = –45 °C to 40 °C)
EEx ia IIC T4 ($T_{amb}$ = –45 °C to 70 °C)
CE 1180

Table B-1. Connection Parameters (Power/Signal Terminals)

| |
|---|
| $U_i$ = 30V |
| $I_i$ = 200 mA |
| $P_i$ = 1.0 W |
| $C_i$ = 0.012 µF |
| $L_i$ = 0 |

Table B-2. Temperature Sensor Connection Parameters

| |
|---|
| $U_o$ = 30V |
| $I_o$ = 19 mA |

Table B-2. Temperature Sensor Connection Parameters

| |
|---|
| $P_o$ = 140 mW |
| $C_i$ = 0.002 µF |
| $L_i$ = 0 |

Table B-3. Connection Parameters for Temperature Sensor Terminals

| | |
|---|---|
| $C_o$ = 0.066 µF | Gas Group IIC |
| $C_o$ = 0.560 µF | Gas Group IIB |
| $C_o$ = 1.82 µF | Gas Group IIA |
| $L_o$ = 96 mH | Gas Group IIC |
| $L_o$ = 365 mH | Gas Group IIB |
| $L_o$ = 696 mH | Gas Group IIA |
| $L_o/R_o$ = 247 µH/ohm | Gas Group IIC |
| $L_o/R_o$ = 633 µH/ohm | Gas Group IIB |
| $L_o/R_o$= 633 µH/ohm | Gas Group IIA |

**Special Conditions for Safe Use**

The 3095, when fitted with the transient terminal block (order code B), are not capable of withstanding the 500 volts insulation test required by EN50 020, Clause 6.4.12 (1994). This condition must be accounted for during installation.

G ATEX Type N
Certificate Number: BAS98ATEX3360X ⟨Ex⟩ II 3 G
EEx nL IIC T5 ($T_{amb}$ = –45 °C to 40 °C)
EEx nL IIC T4 ($T_{amb}$ = –45 °C to 70 °C)
$U_i$ = 55V
CE
The apparatus is designed for connection to a remote temperature sensor such as a resistance temperature detection (RTD)

**Special Conditions for Safe Use**

The 3095, when fitted with the transient terminal block (order code B), are not capable of withstanding the 500 volts insulation test required by EN50 021, Clause 9.1 (1995). This condition must be accounted for during installation.

H ATEX Flameproof
Certificate Number: KEMA02ATEX2320X ⟨Ex⟩ II 1/2 G
EEx d IIC T5 (-50°C ≤ $T_{amb}$ ≤ 80°C)
T6 (-50°C ≤ $T_{amb}$ ≤ 65°C)
CE 1180

**Special Conditions for Safe Use (x):**

The device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. the manufacturer’s instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

P ATEX Dust
Certificate Number: KEMA02ATEX2321 ⟨Ex⟩ II 1 D
V = 55 Vdc MAX
I = 23 mA MAX
IP66
CE 1180

**Combinations of Certifications**

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

B A and J combination

D C and K combination

L F, G, H, and P combination

## 3095 *FIELDBUS* HAZARDOUS LOCATIONS CERTIFICATIONS

### North American Certifications

**FM Approvals**

A Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. Enclosure type NEMA 4X. Factory Sealed. Provides nonincendive RTD connections for Class I, Division 2, Groups A, B, C, and D.

J Intrinsically Safe for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations. Non-incendive for Class I, Division 2, Groups A, B, C, and D. Temperature Code T4. Factory Sealed.

For input parameters and installation see control drawing 03095-1020.

V FISCO for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations. Temperature Code T4. Factory Sealed.

For input parameters and installation see control drawing 03095-1020.

**Canadian Standards Association (CSA)**

C Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. CSA enclosure Type 4X suitable for indoor and outdoor hazardous locations. Provides nonincendive RTD connection for Class I, Division 2, Groups A,B, C, and D.Factory Sealed. Install in accordance with Rosemount Drawing 03095-1024. Approved for Class I, Division 2, Groups A, B, C, and D.

K Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D. when installed in accordance with Rosemount drawing 03095-1021. Temperature Code T3C. For input parameters and installation see control drawing 03095-1021.

W FISCO for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations.
Temperature Code T4.
For input parameters and installation see control drawing 03095-1021.

## European Certifications

F ATEX Intrinsic Safety
Certificate Number: Baseefa05ATEX0022X ⟨Ex⟩ II 1 G
EEx ia IIC T5 (Tamb = -45°C to 40°C)
EEx ia IIC T4 (Tamb = -45 °C to 70 °C)
CE 1180

Table B-4. Connection Parameters (Power/Signal Terminals)

| |
|---|
| $U_i$ = 30V |
| $I_i$ = 300 mA |
| $P_i$ = 1.3 W |
| $C_i$ = 3.3 nF |
| $L_i$ = 0 |

Table B-5. Temperature Sensor Connection Parameters

| |
|---|
| $U_o$ = 30V |
| $I_o$ = 19 mA |
| $P_o$ = 140 mW |
| $C_i$ = 0.002 µF |

Table B-6. Connection Parameters for Temperature Sensor Terminals

| | |
|---|---|
| $C_o$ = 0.066 µF | Gas Group IIC |
| $C_o$ = 0.560 µF | Gas Group IIB |
| $C_o$ = 1.82 µF | Gas Group IIA |
| $L_o$ = 96 mH | Gas Group IIC |
| $L_o$ = 365 mH | Gas Group IIB |
| $L_o$ = 696 mH | Gas Group IIA |
| $L_o/R_o$ = 247 µH/ohm | Gas Group IIC |
| $L_o/R_o$ = 633 µH/ohm | Gas Group IIB |
| $L_o/R_o$= 633 µH/ohm | Gas Group IIA |

**Special Conditions for Safe Use (x):**

Versions of the apparatus fitted with the transient protected terminals are not capable of withstanding the 500V insulation test required by Clause 6.4.12 of EN 50020:2002. This must be taken into account when installing the apparatus.

G ATEX Type N
Certificate Number: Baseefa05ATEX0023X ⟨Ex⟩ II 3 G
EEx nA nL IIC T5 (Tamb = -45°C to 40°C)
EEx nA nL IIC T4 (Tamb = -45°C to 70°C)
$U_i$ = 55V
CE

The apparatus is designed for connection to a remote temperature sensor such as a resistance temperature detection (RTD)

**Special Conditions for Safe Use (x):**

Versions of the apparatus fitted with the transient protected terminals are not capable of withstanding the 500V insulation test required by Clause 8.1 of EN 60079-15:2003. This must be taken into account when installing the appratus.

H ATEX Flameproof
Certificate Number: KEMA02ATEX2320X ⟨Ex⟩ II 1/2 G
EEx d IIC T5 (-50°C = Tamb = 80°C)
T6 (-50°C = Tamb = 65°C)
CE 1180

**Special Conditions for Safe Use (x):**

The device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. the manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

P ATEX Dust Certificate Number: KEMA02ATEX2321 (⟨Ex⟩) II 1 D
V = 55 Vdc MAX
I = 23 mA MAX
IP66
CE 1180

Y ATEX FISCO Intrinsically Safety
Certificate Number: Baseefa05ATEX0022X (⟨Ex⟩) II 1 G
EEx ia IIC T4 (Tamb = -45°C to 70°C)
CE 1180

Table B-7. Connection Parameters (Power/Signal Terminals)

| |
|---|
| $U_i$ = 17.5V |
| $I_i$ = 380 mA |
| $P_i$ = 5.32 W |
| $C_i$ = 3.3 nF |
| $L_i$ = 0 |

Table B-8. Temperature Sensor Connection Parameters

| |
|---|
| $U_o$ = 30V |
| $I_o$ = 19 mA |
| $P_o$ = 140 mW |
| $C_i$ = 0.002 µF |

Table B-9. Connection Parameters for Temperature Sensor Terminals

| | |
|---|---|
| $C_o$ = 0.066 μF | Gas Group IIC |
| $C_o$ = 0.560 μF | Gas Group IIB |
| $C_o$ = 1.82 μF | Gas Group IIA |
| $L_o$ = 96 mH | Gas Group IIC |
| $L_o$ = 365 mH | Gas Group IIB |
| $L_o$ = 696 mH | Gas Group IIA |
| $L_o/R_o$ = 247 μH/ohm | Gas Group IIC |
| $L_o/R_o$ = 633 μH/ohm | Gas Group IIB |
| $L_o/R_o$= 633 μH/ohm | Gas Group IIA |

**Special Conditions for Safe Use (x):**

Versions of the apparatus fitted with the transient protected terminals are not capable of withstanding the 500V insulation test required by Clause 6.4.12 of EN 50020:2002. This must be taken into account when installing the apparatus.

## IECEX CERTIFICATIONS

Y IECEx FISCO Intrinsically Safety
Certificate Number: IECEx BAS 05.0023X
Ex ia IIC T4 (Tamb = -45°C to 70°C)

Table B-10. Connection Parameters (Power/Signal Terminals)

| |
|---|
| $U_i$ = 17.5V |
| $I_i$ = 380 mA |
| $P_i$ = 5.32 W |
| $C_i$ = 3.3 nF |
| $L_i$ = 0 |

4 IECEx Intrinsic Safety
Certificate Number: IECEx BAS 05.0023X
Ex ia IIC T5 (Tamb = -45°C to 40°C)
Ex ia IIC T4 (Tamb = -45°C to 70°C)

Table B-11. Connection Parameters (Power/Signal Terminals)

| |
|---|
| $U_i$ = 30V |
| $I_i$ = 300 mA |
| $P_i$ = 1.3 W |
| $C_i$ = 3.3 nF |
| $L_i$ = 0 |

5 IECEx Type N
Certificate Number: IECEx BAS 05.0024X
Ex nC IIC T5 (Tamb = -45°C to 40°C)
Ex nC IIC T4 (Tamb = -45°C to 70°C)
Ui = 55V

**Combinations of Certifications**

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

B A and J combination

D C and K combination

L F, G, H, and P combination

## APPROVAL DRAWINGS

Index of I.S. F.M. for 3095 (Drawing Numbers 03095-1020, Rev AD)

Rosemount 3095 Explosion-Proof Installation Drawing,

Canadian Standards Association (Drawing Number 03095-1024, Rev AA)

Index of I.S. CSA for 3095 (Drawing Number 03095-1021, Rev AC)

Rosemount 3095 Explosion-Proof Installation Drawing,

Factory Mutual (Drawing Number 03095-1025, Rev AA)

CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY

REVISIONS

| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
|---|---|---|---|---|
| AA | ADD 3095C | RTC1003705 | G.H. | 4/17/98 |
| AB | ADD 2055 | RTC1004254 | L.M.E. | 6/9/98 |
| AC | ADD FIELDBUS TRANSMITTER | RTC1018395 | C.J.B. | 10/7/04 |
| AD | ADD PAGES 11 & 12 FOR FISCO; ADD PAGE 10 FOR NOTES | RTC1018800 | C.J.B. | 12/10/04 |

# ENTITY APPROVALS FOR 3095/2055

THE ROSEMOUNT TRANSMITTERS LISTED ABOVE ARE FM APPROVED AS INTRINSICALLY SAFE WHEN USED IN CIRCUIT WITH FM APPROVED BARRIERS WHICH MEET THE ENTITY PARAMETERS LISTED IN THE CLASS I, II, AND III, DIVISION 1 GROUPS INDICATED, TEMP CODE T4. ADDITIONALLY, THE ROSEMOUNT 751 FIELD SIGNAL INDICATOR IS FM APPROVED AS INTRINSICALLY SAFE WHEN CONNECTED IN CIRCUIT WITH ROSEMOUNT TRANSMITTERS (FROM ABOVE) AND FM APPROVED BARRIERS WHICH MEET THE ENTITY PARAMETERS LISTED FOR CLASS I, II, AND III, DIVISION 1, GROUPS INDICATED, TEMP CODE T4.

TO ASSURE AN INTRINSICALLY SAFE SYSTEM, THE TRANSMITTER AND BARRIER MUST BE WIRED IN ACCORDANCE WITH THE BARRIER MANUFACTURER'S FIELD WIRING INSTRUCTIONS AND THE APPLICABLE CIRCUIT DIAGRAM INDICATED ON SHEET 2, 4, OR 6.

CAD MAINTAINED (MicroStation)

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125

-TOLERANCE-
.X ± .1 [2,5]
.XX ± .02 [0,5]
.XXX ± .010 [0,25]
FRACTIONS ± 1/32
ANGLES ± 2°

DO NOT SCALE PRINT

CONTRACT NO.

DR. Myles Lee Miller 3/19/93
CHK'D
APP'D. Kevin Voegele 4/8/93
APP'D. GOVT.

EMERSON. Process Management

ROSEMOUNT®
8200 Market Boulevard • Chanhassen, MN 55317 USA

TITLE INDEX OF I.S. FM FOR 3095

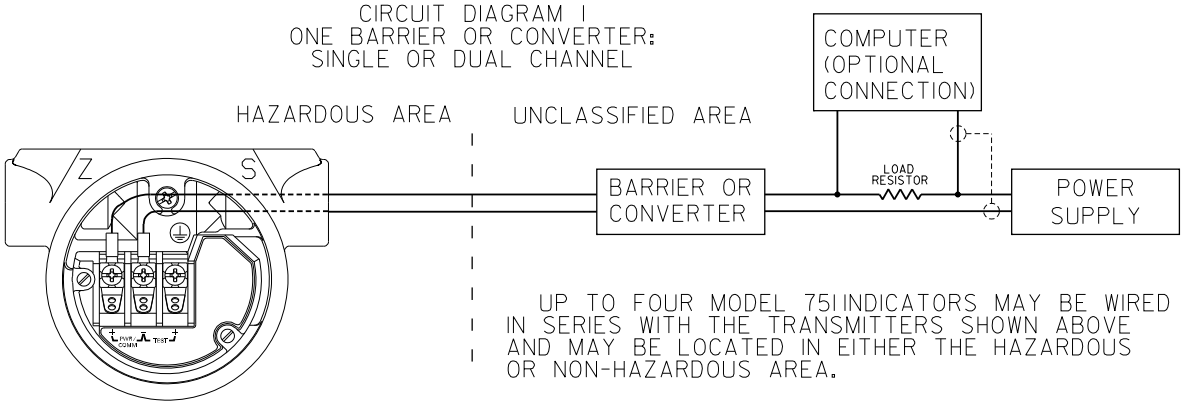
SIZE A | FSCM NO | DWG NO. 03095-1020

SCALE N/A | WT. | SHEET 1 OF 12

Form Rev AC

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AD | | | | |

CIRCUIT DIAGRAM 1
ONE BARRIER OR CONVERTER:
SINGLE OR DUAL CHANNEL

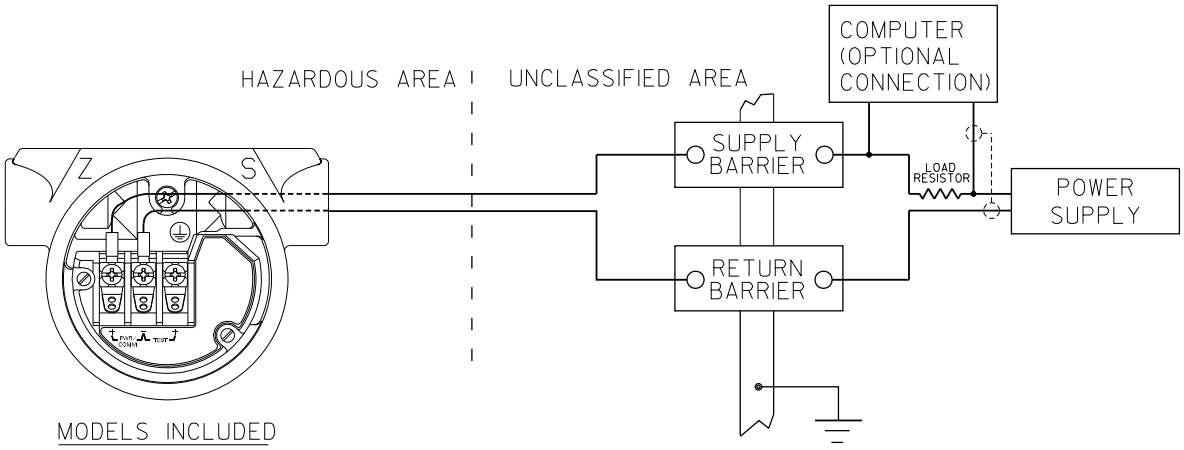



UP TO FOUR MODEL 751 INDICATORS MAY BE WIRED IN SERIES WITH THE TRANSMITTERS SHOWN ABOVE AND MAY BE LOCATED IN EITHER THE HAZARDOUS OR NON-HAZARDOUS AREA.

MODELS INCLUDED

3095M

CIRCUIT DIAGRAM 2
SUPPLY AND RETURN BARRIERS
(FOR USE IN THIS CONFIGURATION, THE MULTIPLE BARRIER COMBINATIONS MUST BE FM APPROVED)




MODELS INCLUDED

3095M

UP TO FOUR MODEL 751 INDICATORS MAY BE WIRED IN SERIES WITH THE TRANSMITTERS SHOWN ABOVE AND MAY BE LOCATED IN EITHER THE HAZARDOUS OR NON-HAZARDOUS AREA.

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03095-1020 | |
|---|---|---|---|---|
| ISSUED | SCALE N/A | WT. ——— | SHEET 2 OF 12 | |

Form Rev AC

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AD | | | | |

ENTITY CONCEPT APPROVALS

THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM. THE APPROVED VALUES OF MAX. OPEN CIRCUIT VOLTAGE (Voc OR Vt) AND MAX. SHORT CIRCUIT CURRENT (Isc OR It) AND MAX. POWER (Voc X Isc/4) OR (Vt X It/4), FOR THE ASSOCIATED APPARATUS MUST BE LESS THAN OR EQUAL TO THE MAXIMUM SAFE INPUT VOLTAGE (Vmax), MAXIMUM SAFE INPUT CURRENT (Imax), AND MAXIMUM SAFE INPUT POWER (Pmax) OF THE INTRINSICALLY SAFE APPARATUS. IN ADDITION, THE APPROVED MAX. ALLOWABLE CONNECTED CAPACITANCE ($C_a$) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE CAPACITANCE AND THE UNPROTECTED INTERNAL CAPACITANCE ($C_i$) OF THE INTRINSICALLY SAFE APPARATUS, AND THE APPROVED MAX. ALLOWABLE CONNECTED INDUCTANCE ($L_a$) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE INDUCTANCE AND THE UNPROTECTED INTERNAL INDUCTANCE ($L_i$) OF THE INTRINSICALLY SAFE APPARATUS.

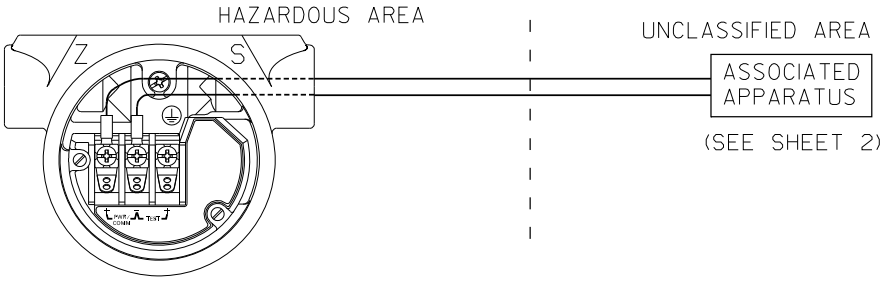
NOTE: ENTITY PARAMETERS LISTED APPLY ONLY TO ASSOCIATED APPARATUS WITH LINEAR OUTPUT.

CLASS I, DIV. 1, GROUPS A AND B

| | |
|---|---|
| $V_{MAX}$ = 40V | $V_T$ OR $V_{OC}$ IS LESS THAN OR EQUAL TO 40V |
| $I_{MAX}$ = 165mA | $I_T$ OR $I_{SC}$ IS LESS THAN OR EQUAL TO 165mA |
| $P_{MAX}$ = 1 WATT | $(\frac{V_T \times I_T}{4})$ OR $(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1 WATT |
| $C_i$ = .012µf | $C_A$ IS GREATER THAN .012µf |
| $L_i$ =20µH | $L_A$ IS GREATER THAN 20µH |

CLASS I, DIV. 1, GROUPS C AND D

| | |
|---|---|
| $V_{MAX}$ = 40V | $V_T$ OR $V_{OC}$ IS LESS THAN OR EQUAL TO 40V |
| $I_{MAX}$ = 225mA | $I_T$ OR $I_{SC}$ IS LESS THAN OR EQUAL TO 225mA |
| $P_{MAX}$ = 1 WATT | $(\frac{V_T \times I_T}{4})$ OR $(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1 WATT |
| $C_i$ = .012µf | $C_A$ IS GREATER THAN .012µf |
| $L_i$ =20µH | $L_A$ IS GREATER THAN 20µH |




MODELS INCLUDED

3095M

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

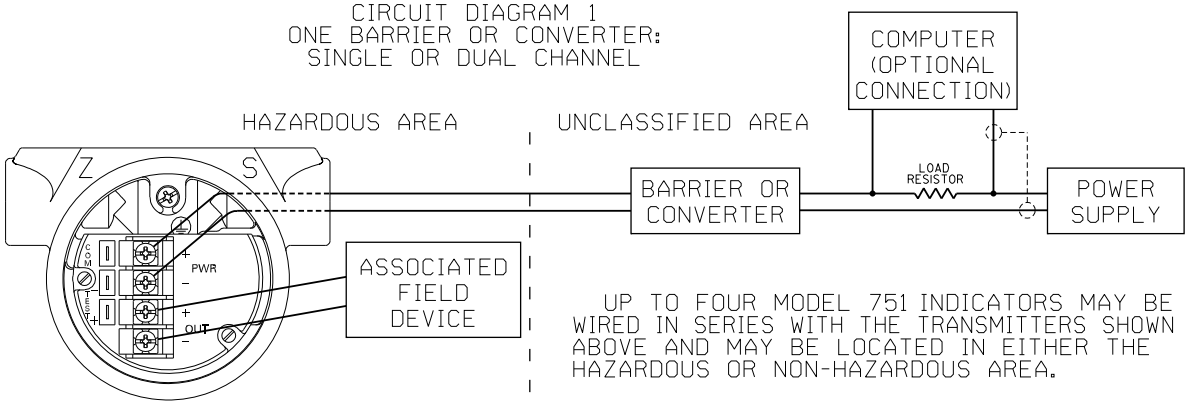
CAD MAINTAINED (MicroStation)

| | | | |
|---|---|---|---|
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03095-1020 |
| ISSUED | SCALE N/A | WT. ——— | SHEET 3 OF 12 |

Form Rev AC

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AD | | | | |

CIRCUIT DIAGRAM 1
ONE BARRIER OR CONVERTER:
SINGLE OR DUAL CHANNEL

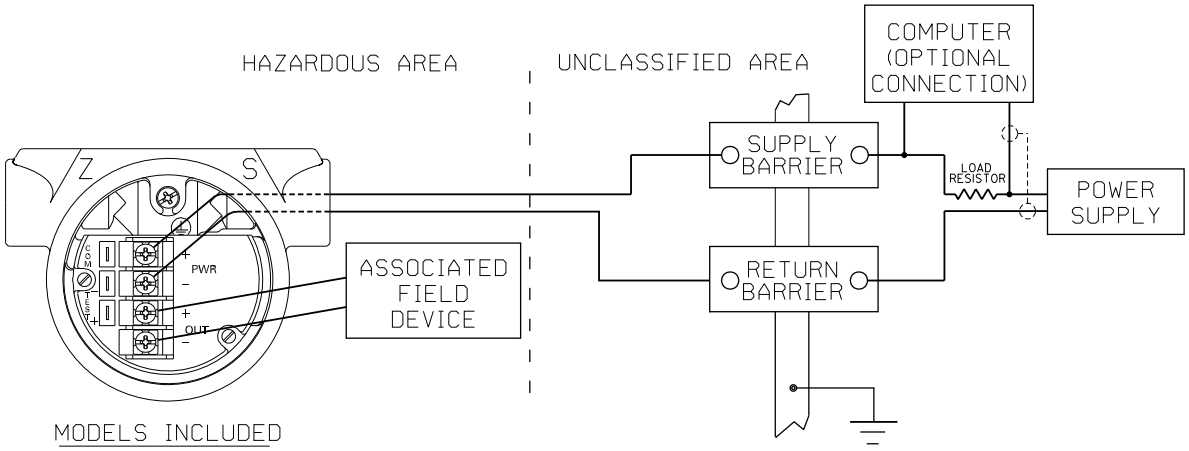



UP TO FOUR MODEL 751 INDICATORS MAY BE WIRED IN SERIES WITH THE TRANSMITTERS SHOWN ABOVE AND MAY BE LOCATED IN EITHER THE HAZARDOUS OR NON-HAZARDOUS AREA.

MODELS INCLUDED

3095C

CIRCUIT DIAGRAM 2
SUPPLY AND RETURN BARRIERS
(FOR USE IN THIS CONFIGURATION, THE MULTIPLE BARRIER COMBINATIONS MUST BE FM APPROVED)




MODELS INCLUDED

3095C

UP TO FOUR MODEL 751 INDICATORS MAY BE WIRED IN SERIES WITH THE TRANSMITTERS SHOWN ABOVE AND MAY BE LOCATED IN EITHER THE HAZARDOUS OR NON-HAZARDOUS AREA.

| | | | |
|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03095-1020 |
| ISSUED | SCALE N/A | WT. ——— | SHEET 4 OF 12 |

Form Rev AC

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AD | | | | |

ENTITY CONCEPT APPROVALS

TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM, THE APPROVED VALUES OF MAX. OPEN CIRCUIT VOLTAGE (Voc OR Vt) AND MAX. SHORT CIRCUIT CURRENT (Isc OR It) AND MAX. POWER (Voc X Isc/4) OR (Vt X It/4), FOR THE ASSOCIATED APPARATUS MUST BE LESS THAN OR EQUAL TO THE MAXIMUM SAFE INPUT VOLTAGE (Vmax), MAXIMUM SAFE INPUT CURRENT (Imax), AND MAXIMUM SAFE INPUT POWER (Pmax) OF THE INTRINSICALLY SAFE APPARATUS. IN ADDITION, THE APPROVED MAX. ALLOWABLE CONNECTED CAPACITANCE (Ca) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE CAPACITANCE AND THE UNPROTECTED INTERNAL CAPACITANCE ($C_i$) OF THE INTRINSICALLY SAFE APPARATUS, AND THE APPROVED MAX. ALLOWABLE CONNECTED INDUCTANCE (La) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE INDUCTANCE AND THE UNPROTECTED INTERNAL INDUCTANCE ($L_i$) OF THE INTRINSICALLY SAFE APPARATUS.

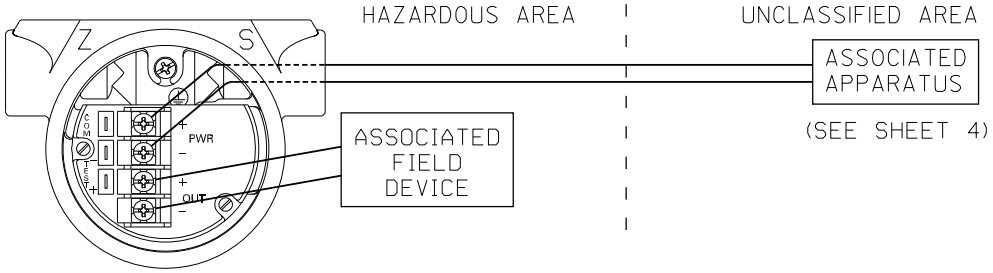
NOTE: ENTITY PARAMETERS ARE FOR 3095C ONLY. USER MUST TAKE ENTITY PARAMETERS OF THE ASSOCIATED FIELD DEVICE INTO CONSIDERATION FOR INSTALLATION.

CLASS I, DIV. 1, GROUPS A AND B

| | |
|---|---|
| $V_{MAX}$ = 40V | $V_T$ OR $V_{OC}$ IS LESS THAN OR EQUAL TO 40V |
| $I_{MAX}$ = 165mA | $I_T$ OR $I_{SC}$ IS LESS THAN OR EQUAL TO 165mA |
| $P_{MAX}$ = 1 WATT | $(\frac{V_T \times I_T}{4})$ OR $(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1 WATT |
| $C_i$ = .012µf | $C_A$ IS GREATER THAN .012µf |
| $L_i$ =20µH | $L_A$ IS GREATER THAN 20µH |

CLASS I, DIV. 1, GROUPS C AND D

| | |
|---|---|
| $V_{MAX}$ = 40V | $V_T$ OR $V_{OC}$ IS LESS THAN OR EQUAL TO 40V |
| $I_{MAX}$ = 225mA | $I_T$ OR $I_{SC}$ IS LESS THAN OR EQUAL TO 225mA |
| $P_{MAX}$ = 1 WATT | $(\frac{V_T \times I_T}{4})$ OR $(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1 WATT |
| $C_i$ = .012µf | $C_A$ IS GREATER THAN .012µf |
| $L_i$ =20µH | $L_A$ IS GREATER THAN 20µH |




MODELS INCLUDED

3095C

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

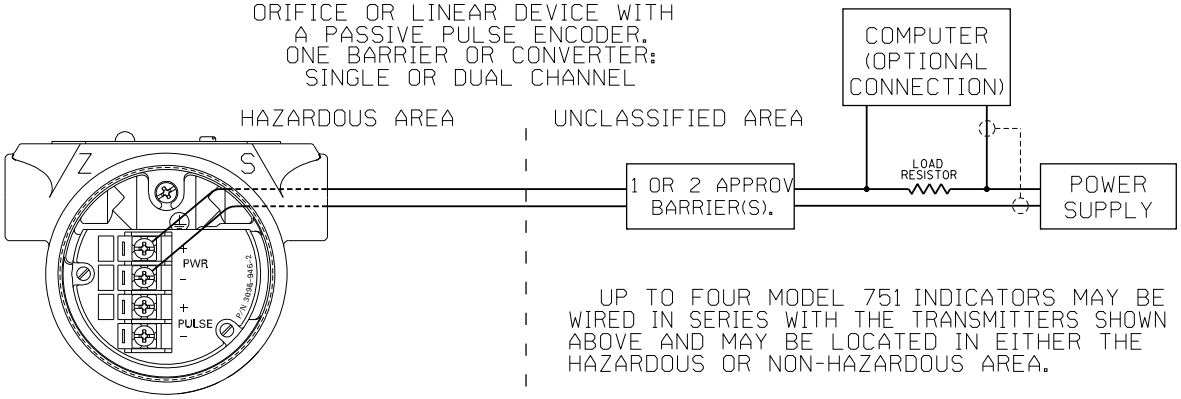
CAD MAINTAINED (MicroStation)

| | | | | |
|---|---|---|---|---|
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03095-1020 | |
| ISSUED | SCALE N/A | WT. ——— | SHEET 5 OF 12 | |

Form, Rev. AC

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AD | | | | |

CIRCUIT DIAGRAM 1
ORIFICE OR LINEAR DEVICE WITH
A PASSIVE PULSE ENCODER.
ONE BARRIER OR CONVERTER:
SINGLE OR DUAL CHANNEL

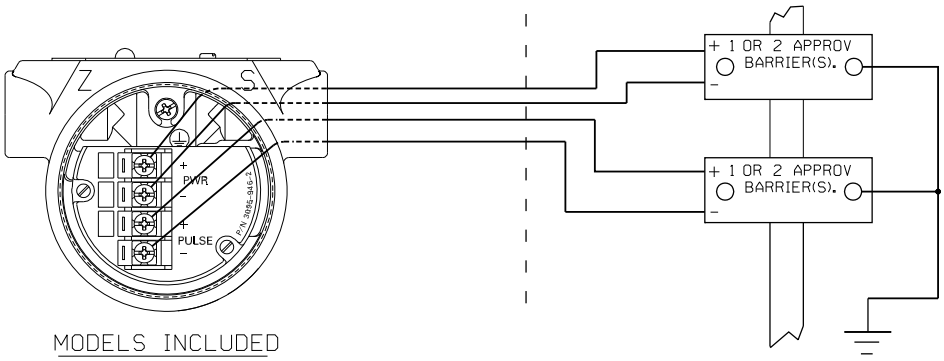



UP TO FOUR MODEL 751 INDICATORS MAY BE WIRED IN SERIES WITH THE TRANSMITTERS SHOWN ABOVE AND MAY BE LOCATED IN EITHER THE HAZARDOUS OR NON-HAZARDOUS AREA.

MODELS INCLUDED

2055/3095FT

CIRCUIT DIAGRAM 2
LINEAR DEVICE WITH AN ACTIVE PULSE SIGNAL
REQUIRING EXTERNAL POWER.
(FOR USE IN THIS CONFIGURATION, THE MULTIPLE BARRIER
COMBINATIONS MUST BE FM APPROVED)




MODELS INCLUDED

2055/3095FT

UP TO FOUR MODEL 751 INDICATORS MAY BE WIRED IN SERIES WITH THE TRANSMITTERS SHOWN ABOVE AND MAY BE LOCATED IN EITHER THE HAZARDOUS OR NON-HAZARDOUS AREA.

| | | | |
|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03095-1020 |
| ISSUED | SCALE N/A | WT. ——— | SHEET 6 OF 12 |

Form Rev AC

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AD | | | | |

ENTITY CONCEPT APPROVALS

THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM. THE APPROVED VALUES OF MAX. OPEN CIRCUIT VOLTAGE (Voc OR Vt) AND MAX. SHORT CIRCUIT CURRENT (Isc OR It) AND MAX.POWER (Voc X Isc/4) OR (Vt X It/4), FOR THE ASSOCIATED APPARATUS MUST BE LESS THAN OR EQUAL TO THE MAXIMUM SAFE INPUT VOLTAGE (Vmax), MAXIMUM SAFE INPUT CURRENT (Imax), AND MAXIMUM SAFE INPUT POWER (Pmax) OF THE INTRINSICALLY SAFE APPARATUS. IN ADDITION, THE APPROVED MAX. ALLOWABLE CONNECTED CAPACITANCE (Ca) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE CAPACITANCE AND THE UNPROTECTED INTERNAL CAPACITANCE ($C_i$) OF THE INTRINSICALLY SAFE APPARATUS, AND THE APPROVED MAX. ALLOWABLE CONNECTED INDUCTANCE (La) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE INDUCTANCE AND THE UNPROTECTED INTERNAL INDUCTANCE ($L_i$) OF THE INTRINSICALLY SAFE APPARATUS.

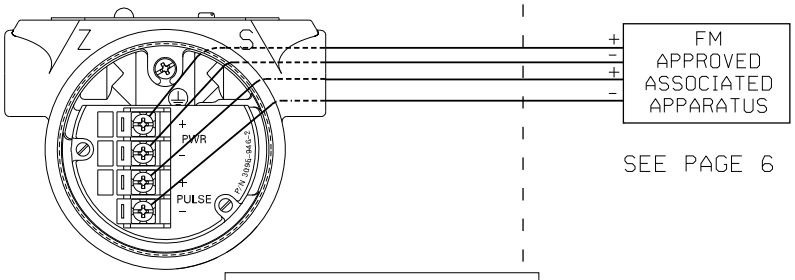
NOTE: ENTITY PARAMETERS LISTED APPLY ONLY TO ASSOCIATED APPARATUS WITH LINEAR OUTPUT.

CLASS I, DIV. 1, GROUPS A AND B

| | |
|---|---|
| $V_{MAX}$ = 40V | $V_T$ OR $V_{OC}$ IS LESS THAN OR EQUAL TO 40V |
| $I_{MAX}$ = 165mA | $I_T$ OR $I_{SC}$ IS LESS THAN OR EQUAL TO 165mA |
| $P_{MAX}$ = 1 WATT | $(\frac{V_T X I_T}{4})$ OR $(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1 WATT |
| $C_i$ = .012µf | $C_A$ IS GREATER THAN .012µf |
| $L_i$ =20µH | $L_A$ IS GREATER THAN 20µH |

CLASS I, DIV. 1, GROUPS C AND D

| | |
|---|---|
| $V_{MAX}$ = 40V | $V_T$ OR $V_{OC}$ IS LESS THAN OR EQUAL TO 40V |
| $I_{MAX}$ = 225mA | $I_T$ OR $I_{SC}$ IS LESS THAN OR EQUAL TO 225mA |
| $P_{MAX}$ = 1 WATT | $(\frac{V_T X I_T}{4})$ OR $(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1 WATT |
| $C_i$ = .012µf | $C_A$ IS GREATER THAN .012µf |
| $L_i$ =20µH | $L_A$ IS GREATER THAN 20µH |




MODELS INCLUDED

2055/3095FT

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

DR. Myles Lee Miller

ISSUED

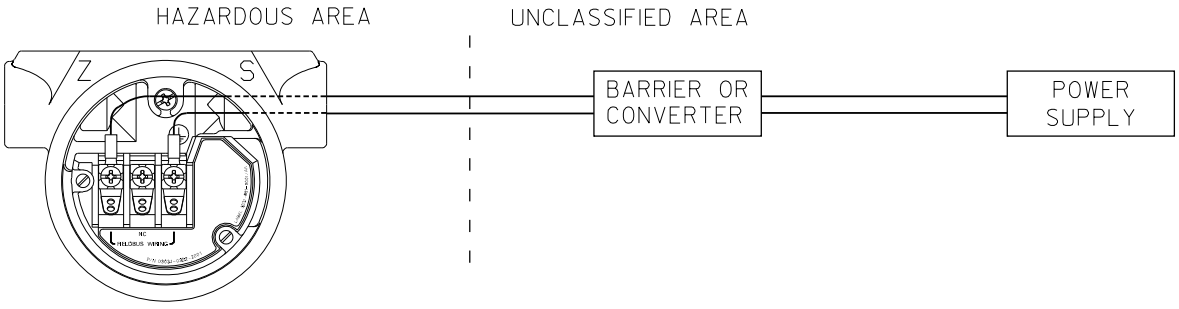
CAD MAINTAINED (MicroStation)

| SIZE | FSCM NO | DWG NO. | |
|---|---|---|---|
| A | | 03095-1020 | |
| SCALE N/A | WT. | SHEET 7 OF 12 | |

Form Rev AC

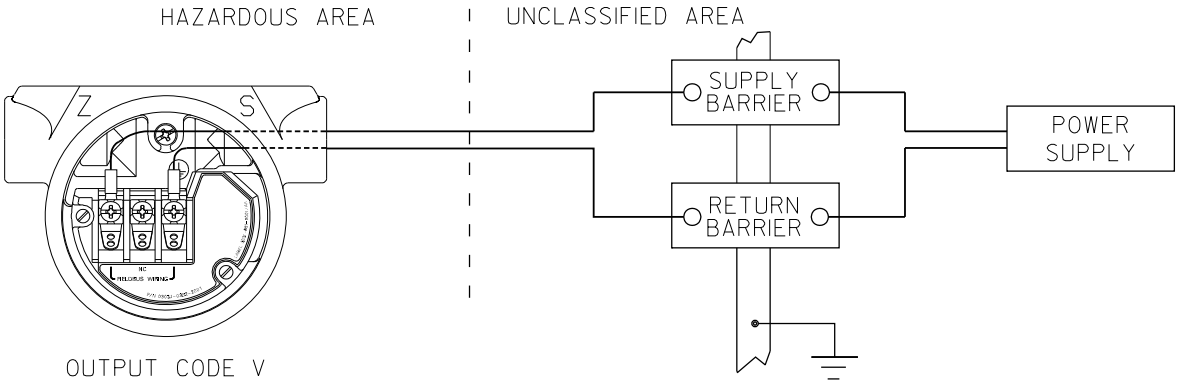
| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AD | | | | |

CIRCUIT DIAGRAM 1
ONE BARRIER OR CONVERTER:
SINGLE OR DUAL CHANNEL




OUTPUT CODE V
MODELS INCLUDED
3095

CIRCUIT DIAGRAM 2
SUPPLY AND RETURN BARRIERS
(FOR USE IN THIS CONFIGURATION, THE MULTIPLE BARRIER COMBINATIONS MUST BE FM APPROVED)




OUTPUT CODE V
MODELS INCLUDED
3095

| | | | |
|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03095-1020 |
| ISSUED | SCALE N/A | WT. ——— | SHEET 8 OF 12 |

Form Rev AC

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AD | | | | |

## ENTITY CONCEPT APPROVALS

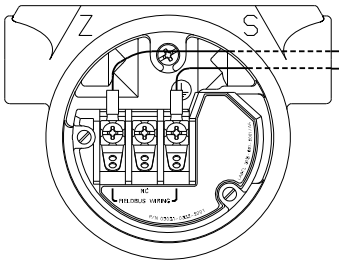
THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM. THE APPROVED VALUES OF MAX. OPEN CIRCUIT VOLTAGE (Voc OR Vt) AND MAX. SHORT CIRCUIT CURRENT (Isc OR It) AND MAX. POWER (Voc X Isc/4) OR (Vt X It/4), FOR THE ASSOCIATED APPARATUS MUST BE LESS THAN OR EQUAL TO THE MAXIMUM SAFE INPUT VOLTAGE (Vmax), MAXIMUM SAFE INPUT CURRENT (Imax), AND MAXIMUM SAFE INPUT POWER (Pmax) OF THE INTRINSICALLY SAFE APPARATUS. IN ADDITION, THE APPROVED MAX. ALLOWABLE CONNECTED CAPACITANCE (Ca) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE CAPACITANCE AND THE UNPROTECTED INTERNAL CAPACITANCE ($C_i$) OF THE INTRINSICALLY SAFE APPARATUS, AND THE APPROVED MAX. ALLOWABLE CONNECTED INDUCTANCE (La) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE INDUCTANCE AND THE UNPROTECTED INTERNAL INDUCTANCE ($L_i$) OF THE INTRINSICALLY SAFE APPARATUS.

NOTE: ENTITY PARAMETERS LISTED APPLY ONLY TO ASSOCIATED APPARATUS WITH LINEAR OUTPUT.

FOR OUTPUT CODE V

CLASS I, DIV. 1, GROUPS A, B, C AND D

| | |
|---|---|
| $V_{MAX}$ = 30V | $V_T$ OR $V_{OC}$ IS LESS THAN OR EQUAL TO 30V |
| $I_{MAX}$ = 300mA | $I_T$ OR $I_{SC}$ IS LESS THAN OR EQUAL TO 300mA |
| $P_{MAX}$ = 1.3 WATT | $(\frac{V_T \times I_T}{4})$ OR $(\frac{V_{OC} \times I_{SC}}{4})$ IS LESS THAN OR EQUAL TO 1.3 WATT |
| $C_i$ = 0 µf | $C_A$ IS GREATER THAN 0 µf |
| $L_i$ = 0 µH | $L_A$ IS GREATER THAN 0 µH |




HAZARDOUS AREA

UNCLASSIFIED AREA

ASSOCIATED APPARATUS

(SEE SHEET 8)

OUTPUT CODE V
MODELS INCLUDED
3095

| | | | |
|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03095-1020 |
| ISSUED | SCALE N/A | WT. ——— | SHEET 9 OF 12 |

Form Rev AC

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AD | | | | |

ENTITY NOTES:

1. NO REVISION TO THIS DRAWING WITHOUT PRIOR FM APPROVAL.
2. THE ASSOCIATED APPARATUS MUST BE FM APPROVED.
3. THE FM APPROVED ASSOCIATED APPARATUS MUST BE A LINEAR OUTPUT DEVICE.
4. CONTROL EQUIPMENT CONNECTED TO ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms or Vdc.
5. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.
6. THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS WITH ASSOCIATED APPARATUS WHEN THE FOLLOWING IS TRUE:
   $V_{max}$ or $U_i \geq V_{oc}$, $V_t$ or $U_o$;
   $I_{max}$ or $I_i \geq I_{sc}$, $I_t$ or $I_o$;
   $P_{max}$ or $P_i \geq P_o$;
   $C_a \geq C_i + C_{cable}$;
   $L_a \geq L_i + L_{cable}$.
7. RESISTANCE BETWEEN INTRINSICALLY SAFE GROUND AND EARTH GROUND MUST BE LESS THAN 1Ω.
8. INSTALLATION SHOULD BE IN ACCORDANCE WITH ANSI/ISA-RP12.06.01 "INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS (CLASSIFIED) LOCATIONS" AND THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70).
9. THE ASSOCIATED APPARATUS MUST BE A RESISTIVELY LIMITED SINGLE OR MULTIPLE CHANNEL FM APPROVED BARRIER HAVING PARAMETERS LESS THAN THOSE QUOTED, AND FOR WHICH THE OUTPUT AND THE COMBINATIONS OF OUTPUTS IS NON-IGNITION CAPABLE FOR THE CLASS, DIVISION AND GROUP OF USE.
10. WARNING - SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY AND SUITABILITY FOR DIVISION 2.
11. WARNING - TO PREVENT IGNITION OF FLAMMABLE OR COMBUSTIBLE ATMOSPHERES, DISCONNECT POWER BEFORE SERVICING.

| | | | | |
|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) | |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03095-1020 | |
| ISSUED | SCALE N/A | WT. ——— | SHEET 10 OF 12 | |

Form Rev AC

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AD | | | | |

## FISCO CONCEPT

THE FISCO CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIALLY EXAMINED IN SUCH COMBINATION. THE CRITERIA FOR SUCH INTERCONNECTION IS THAT THE VOLTAGE (Vmax), THE CURRENT (Imax), AND THE POWER ($P_i$), WHICH INTRINSICALLY SAFE APPARATUS CAN RECEIVE AND REMAIN INTRINSICALLY SAFE, CONSIDERING FAULTS, MUST BE EQUAL OR GREATER THAN THE VOLTAGE (Uo, Voc, Vt), THE CURRENT (Io, Isc, It) AND THE POWER (Po) WHICH CAN BE PROVIDED BY THE ASSOCIATED APPARATUS (SUPPLY UNIT). IN ADDITION, THE MAXIMUM UNPROTECTED RESIDUAL CAPACITANCE ($C_i$) AND THE INDUCTANCE ($L_i$) OF EACH APPARATUS (OTHER THAN THE TERMINATORS) CONNECTED TO THE FIELDBUS MUST BE LESS THAN OR EQUAL TO 5 nF AND 10µH RESPECTIVELY.

IN EACH I.S. FIELDBUS SEGMENT ONLY ONE ACTIVE SOURCE, NORMALLY THE ASSOCIATED APPARATUS, IS ALLOWED TO PROVIDE THE NECESSARY POWER FOR THE FIELDBUS SYSTEM. THE ALLOWED VOLTAGE (Uo, Voc, Vt) OF THE ASSOCIATED APPARATUS USED TO SUPPLY THE BUS MUST BE LIMITED TO THE RANGE OF 14Vd.c. TO 24Vd.c. ALL OTHER EQUIPMENT CONNECTED TO THE BUS CABLE HAS TO BE PASSIVE, MEANING THAT THE APPARATUS IS NOT ALLOWED TO PROVIDE ENERGY TO THE SYSTEM, EXCEPT TO A LEAKAGE CURRENT OF 50uA FOR EACH CONNECTED DEVICE. SEPARATELY POWERED EQUIPMENT NEEDS A GALVANIC ISOLATION TO INSURE THAT THE INTRINSICALLY SAFE FIELDBUS CIRCUIT REMAINS PASSIVE.

THE CABLE USED TO INTERCONNECT THE DEVICES NEEDS TO COMPLY WITH THE FOLLOWING PARAMETERS:

| | |
|---|---|
| Loop Resistance R': | 15.....150Ω/km |
| Inductance per unit length L': | 0.4.....1 mH/km |
| Capacitance per unit length C': | 80.....200 nF/km |

C' = C' line/line + 0.5C' line/screen, if both lines are floating, or
C' = C' line/line + C' line/screen, if the screen is connected to one line

| | |
|---|---|
| Length of spur cable: | max 30m |
| Length of trunk cable: | max 1Km |
| Length of spur splice: | max 1m |

TERMINATORS
AT EACH END OF THE TRUNK CABLE A FM APPROVED LINE TERMINATOR WITH THE FOLLOWING PARAMETERS IS SUITABLE:
R = 90.....100Ω
C = 0.....2.2uF

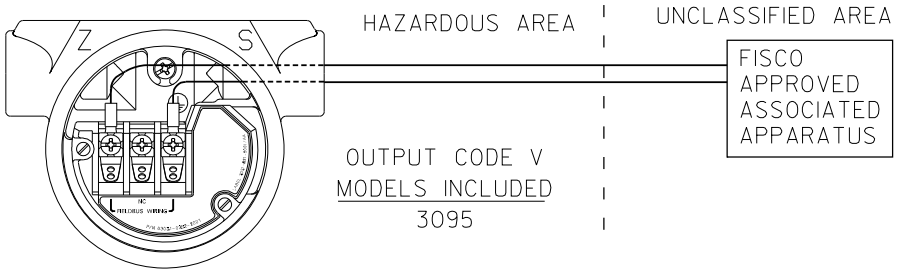
| | | | |
|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03095-1020 |
| ISSUED | SCALE N/A | WT. | SHEET 11 OF 12 |

Form Rev AC

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AD | | | | |

FOR OUTPUT CODE V (FISCO)
CLASS I, DIV. 1, GROUPS A, B, C AND D

| | |
|---|---|
| $V_{MAX}$ = 17.5V | $V_T$ OR $V_{OC}$ IS LESS THAN OR EQUAL TO 17.5V |
| $I_{MAX}$ = 380mA | $I_T$ OR $I_{SC}$ IS LESS THAN OR EQUAL TO 380mA |
| $P_{MAX}$ = 5.32 WATT | (Vt*It) OR (Vos*Isc) IS LESS THAN OR EQUAL TO 5.32 WATT |
| $C_1$ = 0 $\mu$f | |
| $L_1$ = 0 $\mu$H | |




FISCO NOTES:

1. NO REVISION TO THIS DRAWING WITHOUT PRIOR FM APPROVAL.
2. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.
3. THE FISCO ASSOCIATED APPARATUS MUST BE FM APPROVED.
4. CONTROL EQUIPMENT CONNECTED TO FISCO BARRIER MUST NOT USE OR GENERATE MORE THAN 250 Vrms or Vdc.
5. RESISTANCE BETWEEN FISCO INTRINSICALLY SAFE GROUND AND EARTH GROUND MUST BE LESS THAN 1Ω.
6. INSTALLATION SHOULD BE IN ACCORDANCE WITH ANSI/ISA-RP12.06.01 "INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS (CLASSIFIED) LOCATIONS" AND THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70).
7. THE FISCO CONCEPT ALLOWS INTERCONNECTION OF FIELDBUS INTRINSICALLY SAFE APPARATUS WITH FISCO ASSOCIATED APPARATUS WHEN THE FOLLOWING IS TRUE:
   Vmax or $U_1 \geq$ Voc, Vt or Uo;
   Imax or $I_1 \geq$ Isc, It or Io;
   Pmax or $P_1 \geq$ Po.
8. WARNING - SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
9. WARNING - TO PREVENT IGNITION OF FLAMMABLE OR COMBUSTIBLE ATMOSPHERES, DISCONNECT POWER BEFORE SERVICING.

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

| | | | |
|---|---|---|---|
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03095-1020 |
| ISSUED | SCALE N/A | WT. | SHEET 12 OF 12 |

Form Rev AC

CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY

REVISIONS

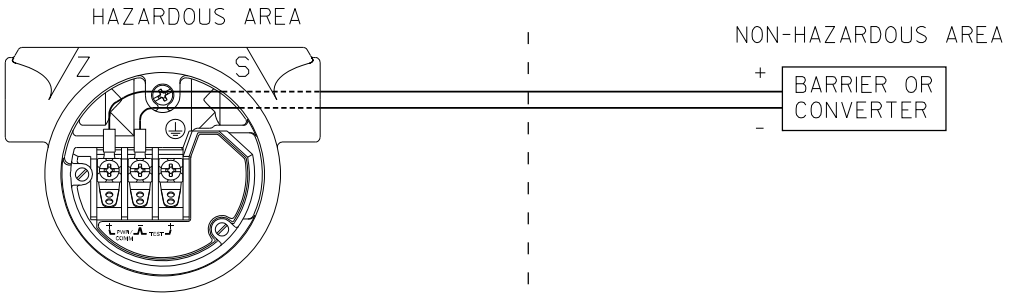
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
|---|---|---|---|---|
| AA | ADD 3095C | RTC1003705 | G.H. | 4/17/98 |
| AB | ADD 2055 | RTC1004254 | L.M.E. | 6/9/98 |
| AC | ADD FIELDBUS | RTC1018529 | C.J.B. | 10.18.04 |

# CSA INTRINSIC SAFETY APPROVALS

CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE




ROSEMOUNT
MODELS INCLUDED
[WITH OR WITHOUT TI
(TRANSIENT PROTECTION) OPTION]

3095M

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2.

CAD MAINTAINED (MicroStation)

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125

-TOLERANCE-
.X ± .1 [2,5]
.XX ± .02 [0,5]
.XXX ± .010 [0,25]
FRACTIONS ± 1/32
ANGLES ± 2°

DO NOT SCALE PRINT

CONTRACT NO.

DR. Myles Lee Miller 3/19/93

CHK'D

APP'D. Kevin Voegele 4/8/93

APP'D. GOVT.

EMERSON. Process Management

ROSEMOUNT®
8200 Market Boulevard • Chanhassen, MN 55317 USA

TITLE INDEX OF I.S. CSA FOR 3095/2055

SIZE A | FSCM NO | DWG NO. 03095-1021

SCALE N/A | WT. | SHEET 1 OF 5

Form Rev AC

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AC | | | | |

| DEVICE | PARAMETERS | APPROVED FOR CLASS I, DIV.I |
|---|---|---|
| CSA APPROVED SAFETY BARRIER | 30 V OR LESS<br>330 OHMS OR MORE<br>28 V OR LESS<br>300 OHMS OR MORE<br>25 V OR LESS<br>200 OHMS OR MORE<br>22 V OR LESS<br>180 OHMS OR MORE | GROUPS A, B, C, D |
| FOXBORO CONVERTER<br>2AI-I2V-CGB, 2AI-I3V-CGB,<br>2AS-I3I-CGB, 3A2-I2D-CGB,<br>3A2-I3D-CGB, 3AD-I3I-CGB,<br>3A4-I2D-CGB, 2AS-I2I-CGB,<br>3F4-I2DA | | GROUPS B, C, D |
| CSA APPROVED SAFETY BARRIER | 30 V OR LESS<br>150 OHMS OR MORE | GROUPS C, D |
| ROSEMOUNT<br>03095-5000-1012<br>03095-5000-2002 | 19 V OR LESS<br>200 OHMS OR MORE | GROUPS A, B, C, D |

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8200 Market Boulevard
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| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03095-1021 | |
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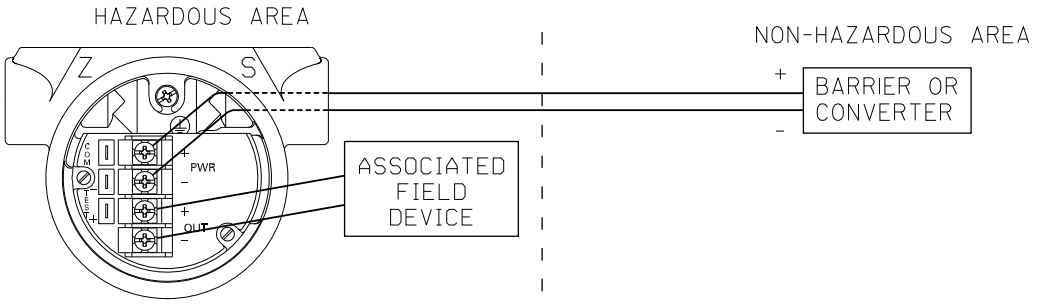
| AC | | | | |

# CSA INTRINSIC SAFETY APPROVALS

CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE




ROSEMOUNT
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3095C

NOTE: SEE I.S. INSTALLATION DRAWING OF ASSOCIATED APPARATUS TO INSURE PROPER INSTALLATATION.

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2.

| | | | | |
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| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AC | | | | |

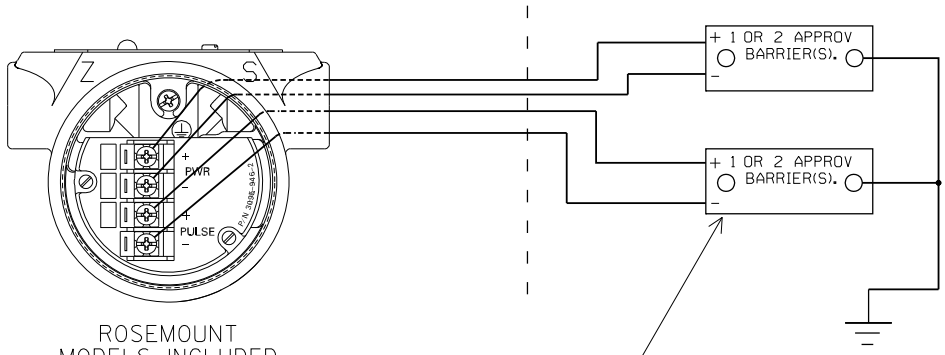
# CSA INTRINSIC SAFETY APPROVALS

CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE

*INTRINSICALLY SAFE OUTPUT PARAMETERS (SEE PAGE 2)

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(TRANSIENT PROTECTION) OPTION]

3095F / 2055

SECOND BARRIER REQUIRED FOR 2055 PULSE WITH ACTIVE SIGNAL REQUIRING AN EXTERNAL POWER SUPPLY

NOTE: SEE I.S. INSTALLATION DRAWING OF ASSOCIATED APPARATUS TO INSURE PROPER INSTALLATATION.

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2.

* WHEN USING MORE THAN ONE CHANNEL OF A CSA APPROVED BARRIER, THE EFFECTIVE VOLTAGE AND RESISTANCE OF THE COMBINED LINES MUST COMPLY WITH THE LISTED INTRINSICALLY SAFE OUTPUT PARAMETERS. THE EFFECTIVE VOLTAGE AND RESISTANCE ARE TO BE CALCULATED AS FOLLOWED:

VOLTAGE: EFFECTIVE VOLTAGE= HIGHEST BARRIER VOLTAGE (NOTE: BOTH LINES MUST BE REFERERCED TO A COMMON GROUND)

RESISTANCE: EFFECTIVE RESISTANCE= PARRELLEL COMBINATION OF EACH LINE (NOTE: DIODE RETURNS DO NOT NEED TO BE INCLUDED FOR THIS CALCULATION).

| | | | |
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Form Rev AC

| REVISIONS | | | | |
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| AC | | | | |

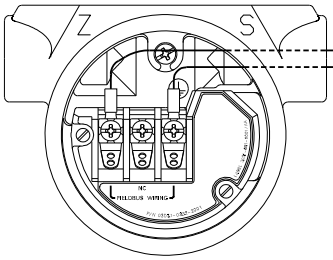
# CSA INTRINSIC SAFETY APPROVALS

CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE

HAZARDOUS AREA
CLASS I, DIVISION 1, GROUPS A,B,C,D




NON-HAZARDOUS AREA

\+ BARRIER OR CONVERTER -

ROSEMOUNT
MODELS INCLUDED
[WITH OR WITHOUT TI
(TRANSIENT PROTECTION) OPTION]
3095M with OUTPUT OPTION V

ENTITY PARAMETERS:

INTRINSICALLY SAFE
$U_1$ (Vmax) = 30V
$I_1$ (Imax) = 300mA
$P_1$ (Pmax) = 1.3W
$C_1$ = 0μF
$L_1$ = 0μH

FISCO:
$U_1$ (Vmax) = 17.5V
$I_1$ (Imax) = 380 mA
$P_1$ (Pmax) = 5.32W
$C_1$ = 0μF
$L_1$ = 0μH

NOTE: SEE I.S. INSTALLATION DRAWING OF ASSOCIATED APPARATUS TO INSURE PROPER INSTALLATATION.

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2.

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Form Rev AC

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REVISIONS

| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
|---|---|---|---|---|
| D | ADD DIV 1,2 | 662265 | M.J.Z. | 9/6/94 |
| AA | ADD 2055 | RTC1004254 | L.M.E. | 6/9/98 |

12. INSTALLATION TO BE IN ACCORDANCE WITH CANADIAN ELECTRICAL CODE.

△9. NON-INCENDIVE FIELD WIRING METHODS MAY BE USED FOR CONNECTING THE TEMPERATURE SENSING ASSEMBLY. WHEN USING NON-INCENDIVE FIELD WIRING, THE CONNECTION HEAD AND TEMPERATURE SENSOR ASSEMBLY NEED NOT BE EXPLOSION PROOF, BUT ALL COMPONENTS CONNECTED TO THE TEMP SENSOR CONNECTOR MUST BE CLASSIFIED "SIMPLE APPARATUS". SIMPLE APPARATUS ARE DEVICES WHICH ARE INCAPABLE OF GENERATING OR STORING MORE THAN 1.2V, Ø.1A, 25MW, OR 20$\mu$J (RTD'S QUALIFY AS SIMPLE APPARATUS).

△8. DIVISION 2 WIRING METHOD.

6. CLASS II INSTALLATIONS MUST USE A CSA APPROVED DUST-IGNITIONPROOF SENSOR.

5. IN AMBIENTS GREATER THAN 40°C, SPRING LOADED TEMPERATURE SENSORS USED WITHOUT AN EXPLOSIONPROOF THERMOWELL MUST BE RATED FOR AT LEAST 85°C.

4. COMPONENTS REQUIRED TO BE APPROVED MUST BE APPROVED FOR GAS GROUP APPROPRIATE TO AREA CLASSIFICATION.

3. ALL CONDUIT THREADS TO BE ASSEMBLED WITH FIVE FULL THREADS MINIMUM.

△2. TRANSMITTER MUST NOT BE CONNECTED TO EQUIPMENT GENERATING MORE THAN 250VAC.

△1. WIRING METHOD SUITABLE FOR CLASS I, DIV 1, ANY LENGTH.

NOTES:

CAD Maintained, (MICROSTATION).

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125

-TOLERANCE-
.X ± .1 [2.5]
.XX ± .02 [0.5]
.XXX ± .010[0.25]
FRACTIONS ± 1/32
ANGLES ± 2°

DO NOT SCALE PRINT

CONTRACT NO.

DR. Myles Lee Miller 10/27/93

CHK'D

APP'D. BEN LOUWAGIE 10/28/93

APP'D. GOVT.

ROSEMOUNT° MEASUREMENT
FISHER-ROSEMOUNT

ROSEMOUNT INC.
12001 TECHNOLOGY DRIVE
EDEN PRAIRIE, MN 55344 USA

TITLE MODEL 3095/2055
EXPLOSIONPROOF INSTALLATION
DRAWING, CSA

SIZE A | FSCM NO | DWG NO. Ø3095-1024

SCALE | WT. | SHEET 1 OF 3

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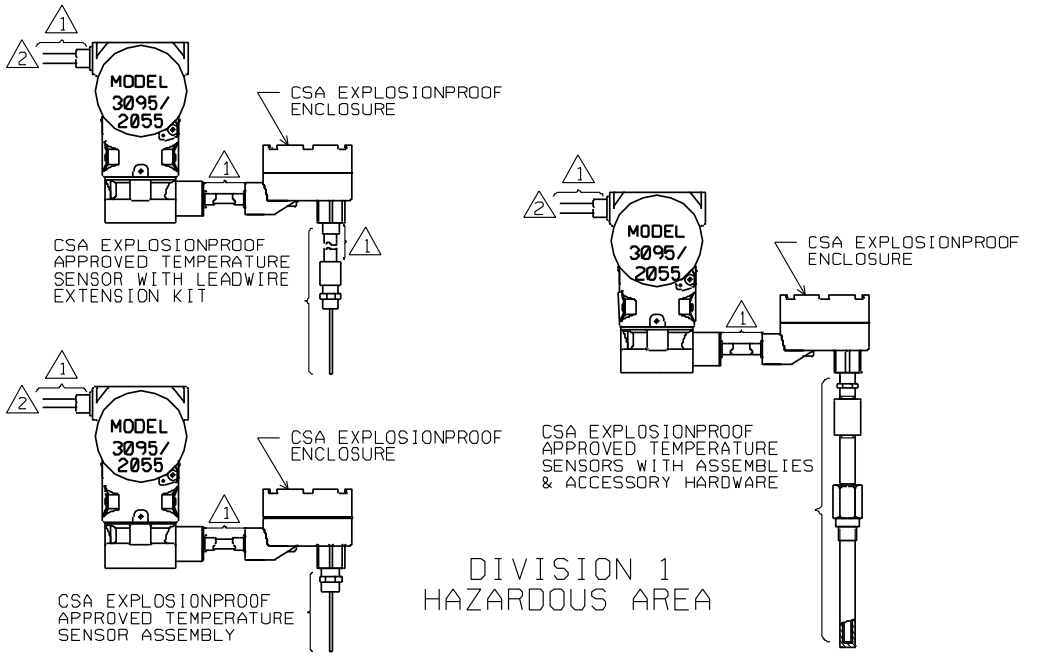
| AA | | RTC1004254 | | |

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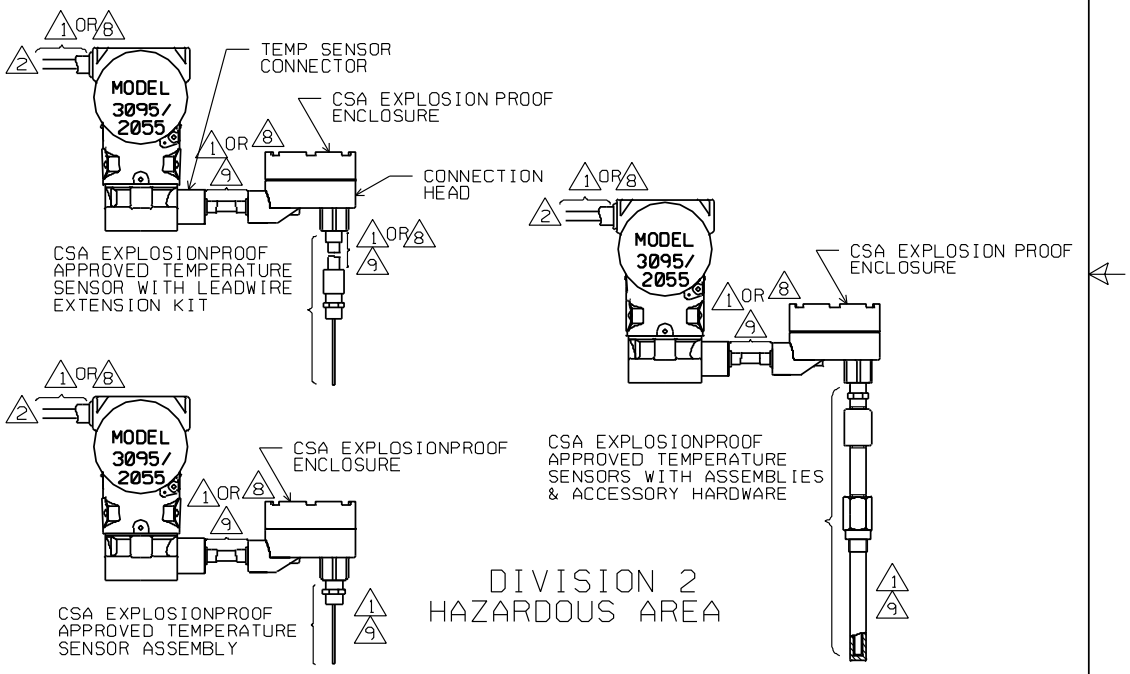
|---|---|---|---|
| ROSEMOUNT INC.<br>12001 TECHNOLOGY DRIVE<br>EDEN PRAIRIE, MN 55344 USA | | | CAD Maintained, (MICROSTATION). |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03095-1024 |
| ISSUED | SCALE N/A | WT. ——— | SHEET 2 OF 3 |

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AA | | RTC1004254 | | |

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|---|---|---|---|
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|---|---|---|---|---|---|
| | REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| | AA | ADD 2055 | RTC1004207 | L.M.E. | 5/13/98 |

12. INSTALLATION TO BE IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE.

9. NON-INCENDIVE FIELD WIRING METHODS MAY BE USED FOR CONNECTING THE TEMPERATURE SENSING ASSEMBLY. WHEN USING NON-INCENDIVE FIELD WIRING, THE CONNECTION HEAD AND TEMPERATURE SENSOR ASSEMBLY NEED NOT BE EXPLOSION PROOF, BUT ALL COMPONENTS CONNECTED TO THE TEMP SENSOR CONNECTOR MUST BE CLASSIFIED "SIMPLE APPARATUS". SIMPLE APPARATUS ARE DEVICES WHICH ARE INCAPABLE OF GENERATING OR STORING MORE THAN 1.2V, 0.1A, 25mW, OR 20 $\mu$J (RTD's QUALIFY AS SIMPLE APPARATUS).

8. DIVISION 2 WIRING METHOD.

6. CLASS II INSTALLATIONS MUST USE A CSA APPROVED DUST-IGNITIONPROOF SENSOR.

5. IN AMBIENTS GREATER THAN 40°C, SPRING LOADED TEMPERATURE SENSORS USED WITHOUT AN EXPLOSIONPROOF THERMOWELL MUST BE RATED FOR AT LEAST 85°C.

4. COMPONENTS REQUIRED TO BE APPROVED MUST BE APPROVED FOR GAS GROUP APPROPRIATE TO AREA CLASSIFICATION.

3. ALL CONDUIT THREADS TO BE ASSEMBLED WITH FIVE FULL THREADS MINIMUM.

2. TRANSMITTER MUST NOT BE CONNECTED TO EQUIPMENT GENERATING MORE THAN 250VAC.

1. WIRING METHOD SUITABLE FOR CLASS I, DIV 1, ANY LENGTH.

NOTES:

CAD MAINTAINED (MicroStation)

| | | | |
|---|---|---|---|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125<br>-TOLERANCE-<br>.X ± .1 [2,5]<br>.XX ± .02 [0,5]<br>.XXX ± .010 [0,25]<br>FRACTIONS ± 1/32 ANGLES ± 2°<br>DO NOT SCALE PRINT | CONTRACT NO.<br>DR. Myles Lee Miller 7/21/93<br>CHK'D BLL<br>APP'D. BEN LOUWAGIE 8/17/93<br>APP'D. GOVT. | EMERSON. Process Management<br>ROSEMOUNT®<br>8200 Market Boulevard • Chanhassen, MN 55317 USA<br>TITLE: MODEL 3095/2055 EXPLOSIONPROOF INSTALLATION DRAWING, FACTORY MUTUAL<br>SIZE A · FSCM NO · DWG NO. 03095-1025<br>SCALE · WT. · SHEET 1 OF 3 | |

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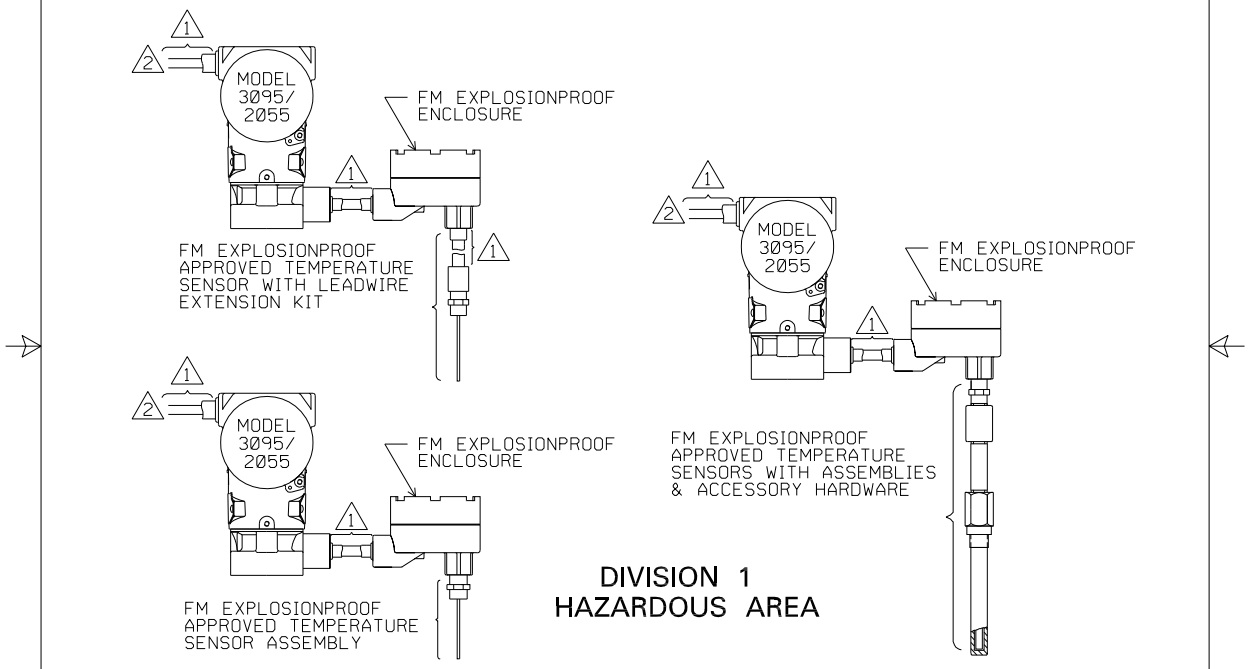


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Form Rev AC

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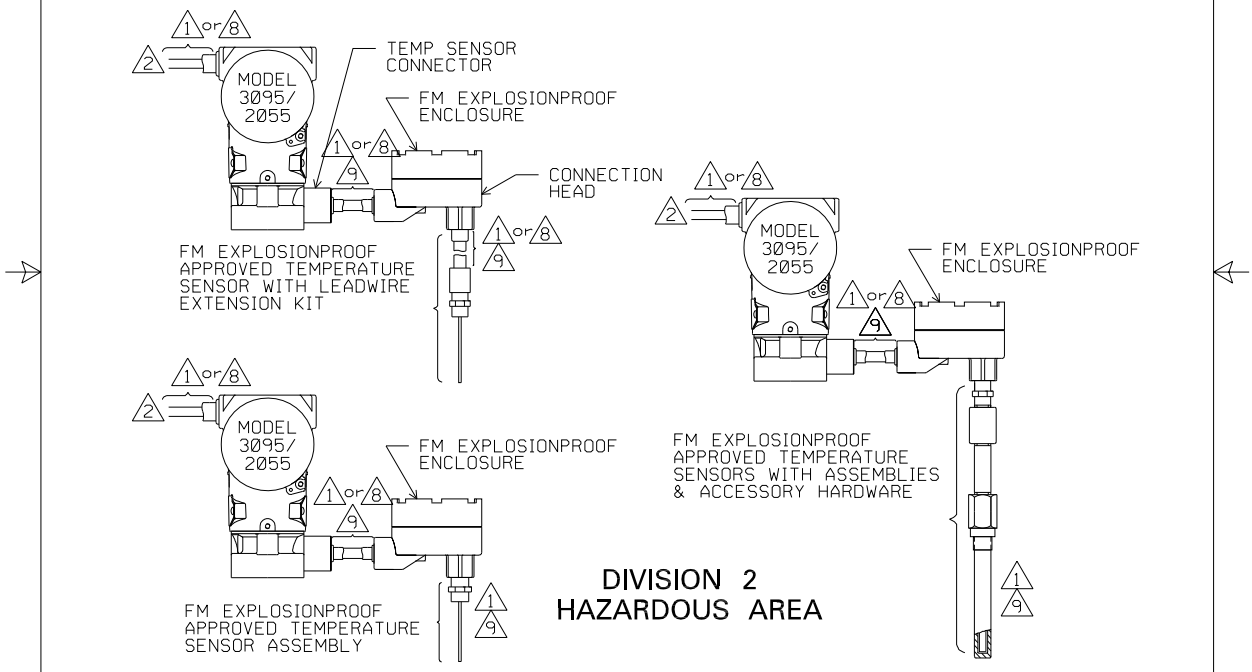
| AA | | RTC1004207 | | |

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| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03095-1025 |
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# Appendix C Critical Alarms for Previous Software Revisions

**Alarm Abbreviations . . . . . page C-1**
**Alarms and Error Conditions for Revision 12 and 13 . . . page C-1**
**Alarms and Error Conditions for Revisions 8, 9, and 10 page C-2**
**Alarms and Error Conditions for Revisions 4 and 5 . . . . page C-5**

## ALARM ABBREVIATIONS

Standard alarm abbreviations used in this appendix are:

- LOL: Lower Operating Limits (customer specified using the EA)
- UOL: Upper Operating Limits (customer specified using the EA)
- LRL: Lower Range Limits
- URL: Upper Range Limits
- LRV: Lower Range Value
- URV: Upper Range Value
- URL+ (10%URL)
  (For example, URL+ = 250 + (0.10 × 250) = 275
- LRL– (10%LRL)
  (For example, LRL– = –250 –[0.10 × (250)] = –275

## ALARMS AND ERROR CONDITIONS FOR REVISION 12 AND 13

The Rosemount 3095 has both analog and digital alarms. If an alarm or error condition exists, it will be displayed during communication with the EA, the HART Communicator, or on the LCD meter display. Some non-flow error conditions may take up to 2 seconds to display, while some flow error conditions may take up to 10 seconds to display. View specific alarm conditions using the EA software.

**NOTE**
Alarms are not logged or archived. The alarms and error conditions displayed on the Diagnostics, Error Info screen indicate the current error status for the Rosemount 3095 transmitter.

**NOTE**
For a discussion of critical alarms for previous electronics board and sensor module revisions, see Appendix D. For previous version compatibility issues, see Appendix A: Specifications and Reference Data.

## LCD Display

Critical alarms and overrange conditions are displayed as one of the selected variables on the LCD display. During a critical alarm or overrange condition, the display scrolls through all selected variables and the error message, displaying each for a fixed amount of time, as set by the user. See Table C-1 on page C-2 for more information.

## Critical Alarms

Critical alarms are the highest priority Rosemount 3095 alarms, and indicate an error that prevents accurate sensor or flow measurements. Table C-1 shows the LCD Display, the EA display, analog output, digital output, and the recommended corrective for critical alarms.

Table C-1. Critical Alarms

| LCD Display | EA Display (Diagnostics, Error Info) | Analog Output | Digital Output | Corrective Action |
|---|---|---|---|---|
| Error "OB_FT" | **Output Board EEPROM Not Initialized**<br>**Output Board EEPROM Burn Failure** | Alarm in the direction of the alarm jumper | NAN (1) | The output electronics have not been properly initialized at the factory. Replace the output electronics board as described on page 5-8. Contact your Field Service Center. |
| Error "SM_FT" | SB EEProm Burn Failure<br>SB EEProm Not Initialized | | | The sensor module has not been properly initialized at the factory. Replace the sensor module as described on page 5-8. Contact your Field Service Center. |
| Error (no display)(2) | Sensor Hardware is incompatible | | | The transmitter electronics has undergone a component or software failure. Replace the sensor module as described on page 5-8. Contact your Field Service Center. |
| Error "SM_FT" | Sensor Module is Not Updating | | | The 10-pin ribbon cable may be disconnected, or the transmitter electronics may have undergone a component or software failure. Contact your Field Service Center. |
| Error (no display)(2) | RAM Failure | | | Issue a master reset to the transmitter. |
| Error "OB_FT" | Transmitter Self Test Failed | | | The electronics sensor has undergone a component or software failure. If connected to a transmitter with EA software, institute a "self-test recovery" in EA Error Info. If connected to a transmitter with a HART Communicator, institute a "self-test recovery" as follows: 4 Detailed Setup–1 Output Conditioning–2 HART Output. After a self-test recovery, transmitter trim values need to be verified. |
| Error (no display)(2) | Static Pressure Sensor is Open | | | This display means that the transmitter absolute pressure reading exceeds its sensor limits. There are two possible causes. Either the transmitter is overpressured, or it has a sensor malfunction. Check the pressure input to the transmitter. If an overpressure condition exists, correct it. If not, replace the sensor module as described on page 5-8. |
| Error (no display)(2) | Process Temp Sensor is Disconnected | | | Check the transmitter RTD connector and RTD screw terminals to ensure the RTD cable is properly connected. This alarm can not occur if a transmitter is set to fixed PT mode in EA Error Info. If the transmitter is set to backup PT mode, the transmitter will not go into alarm condition, but "PT is disconnected" is displayed in EA Error Info. |

*(1) NAN indicates "Not a Number." Distributed Control Systems and HART masters will read "7F A0 00 00h."*
*(2) The LCD has no display for this error. It continues with normal unit display during this error condition.*

## ALARMS AND ERROR CONDITIONS FOR REVISIONS 8, 9, AND 10

The Rosemount 3095 provides both analog and digital alarms. If an alarm or error condition exists in the 3095, it will be displayed during the EA communication with the transmitter and on the LCD display. Some non-flow error conditions may take up to 2 seconds to display, while some flow error conditions may take up to 10 seconds to display. View specific alarm conditions using the EA software.

**NOTE**
Alarms are not logged or archived. The alarms and error conditions displayed on the Diagnostics, Error Info screen indicate the alarms present at the time of command invocation.

### Critical Alarms

Critical alarms are the highest priority 3095 alarms, and indicate an error that prevents accurate sensor or flow measurements. The analog output and the digital output respond as indicated in Table C-2.

### Overrange Conditions

Overrange conditions typically indicate an error which indicates that the sensor or flow measurements have reached an overrange condition where substitute values are being used.

Table C-3 identifies actions to the analog output and digital output during these conditions. Blank table cells indicate no action for that condition. Table C-4 identifies recommended corrective action, and also identifies affects on the flow calculation during these conditions.

Table C-2. Critical Alarms

| Alarm text as displayed in Diagnostics, Error Info | Analog Output | Digital Output | Corrective Action |
|---|---|---|---|
| **Output Board EEPROM Not Initialized** (1)<br><br>**Output Board EEPROM Burn Failure** (2) | Alarm in the direction of the alarm jumper | NAN (3) | The output electronics has not been properly initialized at the factory. Replace the output electronics board as described on page 5-8. Contact your Field Service Center. |
| Sensor Hardware is incompatible (4) | | | The transmitter electronics has undergone a component or software failure. Replace the sensor module as described on page 5-9. Contact your Field Service Center. |
| Sensor Module is Not Updating (4) | | | The 10-pin ribbon cable may be disconnected, or the transmitter electronics may have undergone a component or software failure. Contact your Field Service Center. |
| Static Pressure Sensor is Shorted | | | The sensor module has undergone a component or software failure. Replace the sensor module as described on page 5-9. Contact your Field Service Center. |
| RAM Failure | | | Issue a master reset to the transmitter. |
| Transmitter Self Test Failed | | | The transmitter electronics have undergone a component or software failure. Sensor hardware is incompatible. Replace the sensor module board as described on page 5-9. |
| Static Pressure Sensor is Open | | | This display means that the transmitter absolute pressure reading exceeds its sensor limits. There are two possible causes. Either the transmitter is overpressured, or it has a sensor malfunction. Check the pressure input to the transmitter. If an overpressure condition exists, correct it. If not, replace the sensor module as described on page 5-9. |
| Process Temp Sensor is Disconnected (5) | | | Check the transmitter RTD connector and RTD screw terminals to ensure the RTD cable is properly connected. |
| **Configuration incomplete** (1) | | | Connect a computer containing the EA software, and resend the configuration to the transmitter. |

*(1) For Version 8 software, the analog output does not alarm and the digital output is not set to NAN. Error info does report this error.*
*(2) For Version 8 software, the analog output does not alarm, but the digital output is set to NAN.*
*(3) NAN indicates "Not a Number." Distributed Control Systems and HART masters will read "7F A0 00 00h."*
*(4) For Version 8 software, this message is followed by 5 additional non-related errors. The analog output and digital output alarm as designed.*
*(5) This alarm cannot occur if a transmitter is set to fixed PT mode. If the transmitter is set to backup PT mode, an additional status bit is set indicating PT disconnect, but the transmitter will not go into alarm condition.*

Table C-3. Overrange Conditions

| EA Display | Analog Output | | | | Digital Output | | | |
|---|---|---|---|---|---|---|---|---|
| | Flow | DP | AP/GP | PT | Flow | DP | AP/GP | PT |
| DP above URL+ | Saturate in direction of alarm jumper | Saturate High (1) | | | | URL+ | | |
| DP below LRL– | Saturate Low(2) | Saturate Low(2) | | | zero | URL– | | |
| AP/GP above URL+ | Saturate in direction of alarm jumper | Saturate in direction of alarm jumper | Saturate High(1) | | | URL+ | URL+ | |
| AP/GP below LRL– | Saturate in direction of alarm jumper | Saturate in direction of alarm jumper | Saturate Low (2) | | | URL– | URL– | |
| PT above URL+ | Saturate in direction of alarm jumper | | | Saturate High(1) | | | | URL+ |
| PT below LRL– | Saturate in direction of alarm jumper | | | Saturate Low(2) | | | | URL– |
| ST above URL+ | Saturate in direction of alarm jumper | | | | NAN(3) | NAN(3) | NAN(3) | NAN(3) |
| ST below LRL– | Saturate in direction of alarm jumper | | | | NAN(3) | NAN(3) | NAN(3) | NAN(3) |

*(1) Saturate high if direct acting (URV>LRV), Saturate low if reverse acting (URV<LRV).*
*(2) Saturate low if direct acting (URV>LRV), Saturate high if reverse acting (URV<LRV).*
*(3) NAN indicates "Not a Number." Distributed Control Systems and HART masters will read "7F A0 00 00h."*

Table C-4. Corrective Action: Overrange Conditions

| EA Display | Flow Calculation Affects (1) | | Corrective Action |
|---|---|---|---|
| | C' | ( ) 0.5 | |
| DP above URL+ | URL+ | URL+ | These displays indicate that the transmitter differential pressure reading exceeds its sensor limits by more than 10%. There are two possible causes. Either the transmitter is overpressured (underpressured), or it has a sensor malfunction. Check the pressure input to the transmitter. If an overpressure (underpressure) condition exists, correct it. If not, replace the sensor module as described on page 5-9. |
| DP below LRL– | Unreliable flow output | Unreliable flow output | |
| AP/GP above URL+ | UOL | URL+ | These displays indicate that the transmitter absolute pressure reading exceeds its sensor limits by more than 10%. There are two possible causes. Either the transmitter is overpressured (underpressured), or it has a sensor malfunction. Check the pressure input to the transmitter. If an overpressure (underpressure) condition exists, correct it. If not, replace the sensor module as described on page 5-9. |
| AP/GP below LRL– | LOL | LRL– | |
| PT above URL+ | UOL | URL+ | Check the transmitter RTD connector and RTD screw terminals to ensure the RTD cable is properly connected. Verify that the process temperature is between sensor limits. See the Sensor Limits Tables on page A-21 for more information. |
| PT below LRL– | LOL | LRL– | |
| ST above URL+ | Unreliable flow output | Unreliable flow output | These displays indicate that the ambient temperature limit of the transmitter is being exceeded. Verify that the transmitter ambient temperature is between -40F and 185F. If transmitter temperature exceeds these limits, correct the temperature. If transmitter temperature is within these limits, replace the sensor module as described on page 5-9. |
| ST below LRL– | Unreliable flow output | Unreliable flow output | |

*(1) Only the parameter causing the exception is clipped at the operating or sensor limits. The other calculation inputs are not affected.*

Table C-5. 3095 Flow Exceptions

| EA Display | Flow Calculation Affects (1) | | Flow Analog Output | Flow Digital Output |
|---|---|---|---|---|
| | C' | $( )^{0.5}$ | | |
| AP/GP is above UOL | UOL | | | |
| AP/GP is below LOL | LOL | | | |
| PT is above UOL | UOL | | | |
| PT is below LOL | LOL | | | |
| Flow math error - all errors | Math Error | Math Error | Saturate in direction of alarm jumper | NAN (2) |
| –2 in$H_20$ < DP ≤ low-flow cutoff(3) | Unreliable flow output | Unreliable flow output | | 0 |
| DP ≤ –2 in$H_20$ | Unreliable flow output | Unreliable flow output | Saturate Low(4) | zero |

*(1) Only the parameter causing the exception is clipped at the operating or sensor limits. The other calculation inputs are not affected.*
*(2) NAN indicates "Not a Number." Distributed Control Systems and HART masters will read "7F A0 00 00h."*
*(3) Low-flow cutoff is adjustable, from minimum DP limit of 0.02 in$H_20$, to a maximum DP limit which is user selectable.*
*(4) Saturate low if direct acting (URV>LRV), Saturate high if reverse acting (URV<LRV).*

## ALARMS AND ERROR CONDITIONS FOR REVISIONS 4 AND 5

The following are for Versions 4 and 5 of the 3095 electronics board.

Critical alarms are the highest priority 3095 alarms, and typically indicate an error that prevents accurate sensor or flow measurements. Regardless of which of these alarms occur, the analog output and the digital output respond as indicated in Table C-6.

Table C-6. Critical Alarms

| Alarm text as displayed in Diagnostics, Error Info | Analog Output | Digital Output | Corrective Action |
|---|---|---|---|
| **Output Board EEPROM Not Initialized** (1) | Alarm in the direction of the alarm jumper | NAN (3) | The output electronics has not been properly initialized at the factory. Replace the output electronics board as described on page 5-10. Contact your Field Service Center. |
| **Output Board EEPROM Burn Failure** (2) | | | |
| Sensor Hardware is incompatible (4) | | | The transmitter electronics has undergone a component or software failure. Replace the sensor module as described on page 5-10. Contact your Field Service Center. |
| Sensor Module is Not Updating (4) | | | The 10-pin ribbon cable may be disconnected, or the transmitter electronics may have undergone a component or software failure. Contact your Field Service Center. |
| Static Pressure Sensor is Shorted | | | The sensor module has undergone a component or software failure. Replace the sensor module as described on page 5-10. Contact your Field Service Center. |
| Static Pressure Sensor is Open | | | This display means that the transmitter absolute pressure reading exceeds its sensor limits. There are two possible causes. Either the transmitter is overpressured, or it has a sensor malfunction. Check the pressure input to the transmitter. If an overpressure condition exists, correct it. If not, replace the sensor module as described on page 5-10. |
| Process Temp Sensor is Disconnected | | | Check the transmitter RTD connector and RTD screw terminals to ensure the RTD cable is properly connected. This alarm cannot occur if a transmitter is set to fixed RTD mode. |
| **Configuration incomplete** (1) | | | Connect a computer containing the EA software, and resend the configuration to the transmitter. |

*(1) For Version 4 software, the analog output does not alarm and the digital output is not set to NAN. Error info does report this error.*
*(2) For Version 4 software, the analog output does not alarm, but the digital output is set to NAN.*
*(3) NAN indicates "Not a Number." Distributed Control Systems and HART masters will read "7F A0 00 00h."*
*(4) For Version 4 software, this message is followed by 5 additional non-related errors. The analog output and digital output alarm as designed.*

### Overrange Conditions

Overrange conditions typically indicate an error which indicates that the sensor or flow measurements have reached an overrange condition where substitute values are being used.

Table C-7 identifies actions to the analog output and digital output during these conditions. Blank table cells indicate no action for that condition. Table C-8 identifies recommended corrective action, and also identifies affects on the flow calculation during these conditions.

Table C-7. Overrange Conditions

| Alarm text as displayed in Diagnostics, Error Info | Analog Output | | | | Digital Output | | | |
|---|---|---|---|---|---|---|---|---|
| | Flow | DP | AP | PT | Flow | DP | AP | PT |
| DP above URL+ | Saturate in direction of alarm jumper | Saturate High (1) | | | | URL+ | | |
| DP below LRL– | Saturate Low(2) | Saturate Low(2) | | | NAN (3) | URL– | | |
| AP above URL+ | Saturate in direction of alarm jumper | Saturate in direction of alarm jumper | Saturate High(1) | | | URL+ | URL+ | |
| AP below LRL– | Saturate in direction of alarm jumper | Saturate in direction of alarm jumper | Saturate Low (2) | | | URL– | URL– | |
| PT above URL+ | Saturate in direction of alarm jumper | | | Saturate High(1) | | | | URL+ |
| PT below LRL– | Saturate in direction of alarm jumper | | | Saturate Low(2) | | | | URL– |
| ST above URL+ | Saturate in direction of alarm jumper | | | | NAN(3) | NAN(3) | NAN(3) | NAN(3) |
| ST below LRL– | Saturate in direction of alarm jumper | | | | NAN(3) | NAN(3) | NAN(3) | NAN(3) |

*(1) Saturate high if direct acting (URV>LRV), Saturate low if reverse acting (URV<LRV).*
*(2) Saturate low if direct acting (URV>LRV), Saturate high if reverse acting (URV<LRV).*
*(3) NAN indicates "Not a Number." Distributed Control Systems and HART masters will read "7F A0 00 00h."*

Table C-8. Corrective Action: Overrange Conditions

| Alarm text as displayed in Diagnostics, Error Info | Flow Calculation Affects (1) | | Corrective Action |
|---|---|---|---|
| | C' | $( )^{0.5}$ | |
| DP above URL+ | URL+ | URL+ | These displays indicate that the transmitter differential pressure reading exceeds its sensor limits by more than 10%. There are two possible causes. Either the transmitter is overpressured (underpressured), or it has a sensor malfunction. Check the pressure input to the transmitter. If an overpressure (underpressure) condition exists, correct it. If not, replace the sensor module as described on page 5-9. |
| DP below LRL– | Unreliable flow output | Unreliable flow output | |
| AP above URL+ | UOL | URL+ | These displays indicate that the transmitter absolute pressure reading exceeds its sensor limits by more than 10%. There are two possible causes. Either the transmitter is overpressured (underpressured), or it has a sensor malfunction. Check the pressure input to the transmitter. If an overpressure (underpressure) condition exists, correct it. If not, replace the sensor module as described on page 5-9. |
| AP below LRL– | LOL | LRL– | |
| PT above URL+ | UOL | URL+ | Check the transmitter RTD connector and RTD screw terminals to ensure the RTD cable is properly connected. Verify that the process temperature is between -40F and 400F. |
| PT below LRL– | LOL | LRL– | |
| ST above URL+ | Unreliable flow output | Unreliable flow output | These displays indicate that the ambient temperature limit of the transmitter is being exceeded. Verify that the transmitter ambient temperature is between -40F and 185F. If transmitter temperature exceeds these limits, correct the temperature. If transmitter temperature is within these limits, replace the sensor module as described on page 5-9. |
| ST below LRL– | Unreliable flow output | Unreliable flow output | |

*(1) Only the parameter causing the exception is clipped at the operating or sensor limits. The other calculation inputs are not affected.*

Table C-9. Flow Exceptions

| Alarm text as displayed in Diagnostics, Error Info | Flow Calculation Affects (1) | | Flow Analog Output | Flow Digital Output |
|---|---|---|---|---|
| | C' | $( )^{0.5}$ | | |
| AP is above UOL | UOL | | | |
| AP is below LOL | LOL | | | |
| PT is above UOL | UOL | | | |
| PT is below LOL | LOL | | | |
| Flow math error - all errors | Math Error | Math Error | Saturate in direction of alarm jumper | NAN (2) |
| –2 $inH_20$ < DP ≤ 1 $inH_20$ | Unreliable flow output | Unreliable flow output | | 0 |
| DP ≤ –2 $inH_20$ | Unreliable flow output | Unreliable flow output | Saturate Low(3) | NAN(2) |

*(1) Only the parameter causing the exception is clipped at the operating or sensor limits. The other calculation inputs are not affected.*
*(2) NAN indicates "Not a Number." Distributed Control Systems and HART masters will read "7F A0 00 00h."*
*(3) Saturate low if direct acting (URV>LRV), Saturate high if reverse acting (URV<LRV).*

# Appendix D Block Information

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**Analog Input (AI) Function Block** . . . . . **page D-1**
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## OVERVIEW

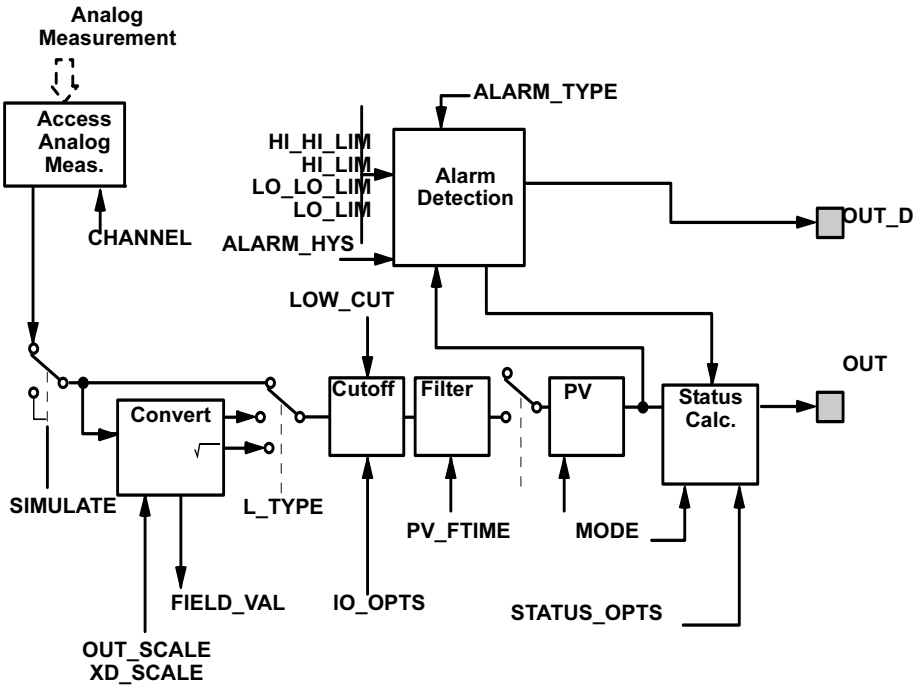
This section contains information about the function blocks used in the 3095 Multivariable™ Transmitter with FOUNDATION Fieldbus. Included are descriptions of transducer block parameters and descriptions, errors, and diagnostics.

## ANALOG INPUT (AI) FUNCTION BLOCK

The Analog Input (AI) function block processes field device measurements and makes them available to other function blocks. The output value from the AI block is in engineering units and contains a status indicating the quality of the measurement. The measuring device may have several measurements or derived values available in different channels. Use the channel number to define the variable that the AI block processes.

The AI block supports alarming, signal scaling, signal filtering, signal status calculation, mode control, and simulation. In Automatic mode, the block's output parameter (OUT) reflects the process variable (PV) value and status. In Manual mode, OUT may be set manually. The Manual mode is reflected on the output status. A discrete output (OUT_D) is provided to indicate whether a selected alarm condition is active. Alarm detection is based on the OUT value and user specified alarm limits. Figure D-1 illustrates the internal components of the AI function block, and Table D-1 lists the AI block parameters and their units of measure, descriptions, and index numbers.

Figure D-1. AI Function Block Internal Components




**NOTES:**
**OUT = block output value and status.**
**OUT_D = discrete output that signals a selected alarm condition.**

## AI Parameter Table

Table D-1. Definitions of Analog Input Function Block System Parameters.

| Parameter | Index No. | Available Values | Units | Default | Read/Write | Description |
|---|---|---|---|---|---|---|
| ACK_OPTION | 23 | 0 = Auto Ack Disabled<br>1 = Auto Ack Enabled | None | 0 all Disabled | Read and Write | Used to set auto acknowledgment of alarms. |
| ALARM_HYS | 24 | 0 – 50 | Percent | 0.5 | Read and Write | The amount the alarm value must return within the alarm limit before the associated active alarm condition clears. |
| ALARM_SEL | 38 | HI_HI, HI, LO, LO_LO | None | Non selected | Read and Write | Used to select the process alarm conditions that will cause the OUT_D parameter to be set. |
| ALARM_SUM | 22 | Enable/Disable | None | Enable | Read and Write | The summary alarm is used for all process alarms in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status parameter. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed. |
| ALERT_KEY | 04 | 1 – 255 | None | 0 | Read and Write | The identification number of the plant unit. This information may be used in the host for sorting alarms, etc. |

| Parameter | Index No. | Available Values | Units | Default | Read/Write | Description |
|---|---|---|---|---|---|---|
| BLOCK_ALM | 21 | Not applicable | None | Not applicable | Read only | The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status parameter. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed. |
| BLOCK_ERR | 06 | Not applicable | None | Not applicable | Read only | This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown. |
| CAP_STDDEV | 40 | > = 0 | Seconds | 0 | Read and Write | The time over which the VAR_INDEX is evaluated. |
| CHANNEL | 15 | 1 = Pressure<br>2 = Housing temperature | None | AI[1]: Channel = 1<br>AI2: Channel = 2 | Read and Write | The CHANNEL value is used to select the measurement value. Refer to the appropriate device manual for information about the specific channels available in each device.<br>You must configure the CHANNEL parameter before you can configure the XD_SCALE parameter. |
| FIELD_VAL | 19 | 0 – 100 | Percent | Not applicable | Read only | The value and status from the transducer block or from the simulated input when simulation is enabled. |
| GRANT_DENY | 12 | Program<br>Tune<br>Alarm<br>Local | None | Not applicable | Read and Write | Normally the operator has permission to write to parameter values, but Program or Local remove that permission and give it to the host controller or a local control panel. |
| HI_ALM | 34 | Not applicable | None | Not applicable | Read only | The HI alarm data, which includes a value of the alarm, a timestamp of occurrence and the state of the alarm. |
| HI_HI_ALM | 33 | Not applicable | None | Not applicable | Read only | The HI HI alarm data, which includes a value of the alarm, a timestamp of occurrence and the state of the alarm. |
| HI_HI_LIM | 26 | Out_Scale[2] | Out_Scale[2] | Not applicable | Read and Write | The setting for the alarm limit used to detect the HI HI alarm condition. |
| HI_HI_PRI | 25 | 0 – 15 | None | 1 | Read and Write | The priority of the HI HI alarm. |
| HI_LIM | 28 | Out_Scale[2] | Out_Scale[2] | Not applicable | Read and Write | The setting for the alarm limit used to detect the HI alarm condition. |
| HI_PRI | 27 | 0 – 15 | None | 1 | Read and Write | The priority of the HI alarm. |
| IO_OPTS | 13 | Low Cutoff Enable/Disable | None | Disable | Read and Write | Allows the selection of input/output options used to alter the PV. Low cutoff enabled is the only selectable option. |
| L_TYPE | 16 | Direct<br>Indirect<br>Indirect Square Root | None | Direct | Read and Write | Linearization type. Determines whether the field value is used directly (Direct), is converted linearly (Indirect), or is converted with the square root (Indirect Square Root). |
| LO_ALM | 35 | Not applicable | None | Not applicable | Read only | The LO alarm data, which includes a value of the alarm, a timestamp of occurrence and the state of the alarm. |
| LO_LIM | 30 | Out_Scale[2] | Out_Scale[2] | Not applicable | Read and Write | The setting for the alarm limit used to detect the LO alarm condition. |
| LO_LO_ALM | 36 | Not applicable | None | Not applicable | Read only | The LO LO alarm data, which includes a value of the alarm, a timestamp of occurrence and the state of the alarm. |
| LO_LO_LIM | 32 | Out_Scale[2] | Out_Scale[2] | Not applicable | Read and Write | The setting for the alarm limit used to detect the LO LO alarm condition. |
| LO_LO_PRI | 31 | 0 – 15 | None | 1 | Read and Write | The priority of the LO LO alarm. |
| LO_PRI | 29 | 0 – 15 | None | 1 | Read and Write | The priority of the LO alarm. |
| LOW_CUT | 17 | > = 0 | Out_Scale[2] | 0 | Read and Write | If percentage value of transducer input fails below this, PV = 0. |
| MODE_BLK | 05 | Auto<br>Manual<br>Out of Service | None | Not applicable | Read and Write | The actual, target, permitted, and normal modes of the block.<br>Target: The mode to “go to”<br>Actual: The mode the “block is currently in”<br>Permitted: Allowed modes that target may take on<br>Normal: Most common mode for target |
| OUT | 08 | Out_Scale[2] ± 10% | Out_Scale[2] | Not applicable | Read and Write | The block output value and status. |

| Parameter | Index No. | Available Values | Units | Default | Read/Write | Description |
|---|---|---|---|---|---|---|
| OUT_D | 37 | Discrete_State 1 – 16 | None | Disabled | Read and Write | Discrete output to indicate a selected alarm condition. |
| OUT_SCALE | 11 | Any output range | All available | none | Read and Write | The high and low scale values, engineering units code, and number of digits to the right of the decimal point associated with OUT. |
| PV | 07 | Not applicable | Out_Scale(2) | Not applicable | Read only | The process variable used in block execution. |
| PV_FTIME | 18 | > = 0 | Seconds | 0 | Read and Write | The time constant of the first-order PV filter. It is the time required for a 63% change in the IN value. |
| SIMULATE | 09 | Not applicable | None | Disable | Read and Write | A group of data that contains the current transducer value and status, the simulated transducer value and status, and the enable/disable bit. |
| ST_REV | 01 | Not applicable | None | 0 | Read only | The revision level of the static data associated with the function block. The revision value will be incremented each time a static parameter value in the block is changed. |
| STATUS_OPTS | 14 | Propagate fault forward<br>Uncertain if Limited<br>Bad if Limited<br>Uncertain if Man Mode | | 0 | Read and Write | |
| STDDEV | 39 | 0 – 100 | Percent | 0 | Read and Write | The average absolute error between the PV and its previous mean value over that evaluation time defined by VAR_SCAN. |
| STRATEGY | 03 | 0 – 65535 | None | 0 | Read and Write | The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block. |
| TAG_DESC | 02 | 32 text characters | None | none | Read and Write | The user description of the intended application of the block. |
| UPDATE_EVT | 20 | Not applicable | None | Not applicable | Read only | This alert is generated by any change to the static data. |
| XD_SCALE | 10 | Any sensor range | $inH_2O$ (68 °F)<br>inHg (0 °C)<br>$ftH_2O$ (68 °F)<br>$mmH_2O$ (68 °F)<br>mmHg (0 °C)<br>psi<br>bar<br>mbar<br>$g/cm^2$<br>$kg/cm^2$<br>Pa<br>kPa<br>torr<br>atm<br>deg C<br>deg F | AI1(1): Customer specification<br><br>or<br><br>$inH_2O$ (68 °F) for DP/GP rng 1, 2, 3)<br><br>or<br><br>psi for DP/GP rng 4, 5 AP/3051T all rng<br><br>AI2 deg C | | In all Rosemount devices the units of the transducer block is forced to match the unit code. |

*(1) The host system may write over default values pre-configured by Rosemount Inc.*
*(2) Assume that when L_Type = Direct, the user configures Out_Scale which is equal to XD_Scale*

## LCD TRANSDUCER BLOCK

The LCD can display up to four different parameters. If a parameter from a function block is displayed, then the function block must be scheduled (downloaded) in order for it to be displayed on the LCD. If a parameter from a different device is displayed, it must be linked to a block in the Rosemount 3095 transmitter with the LCD display and it must be downloaded. It can display any input or output parameter of any block in the Rosemount 3095. The first display is pre-configured to show the value of the transducer block of the Rosemount 3095. This value can be left or changed.

1. Open the LCD block by double clicking on the LCD transducer block in Deltav Explorer.

For each parameter n(n =1 - 4) displayed on the LCD there are several fields in the “Local Display” tab that must be set up.

1. The first parameter is called “BLOCK TAG_n,” here you must enter the exact name of the block to be displayed. This must be the same name as the one that is stored in the device.
2. Then select “BLOCK TYPE_n”. This is a drop down menu showing the selections available in the device. Select the desired block to be displayed, in the “BLK_TYPE_n” field.
3. Select “UNITS_TYPE_n”. Select “Custom” in this parameter if bringing a value from outside the Rosemount 3095 device. “Auto” has only pressure units, which might or might not match the desired selection.
4. The next parameter is called “CUSTOM_TAG_n.” This is an optional selection in identifying which parameter, block or device to be viewed on the LCD. This can be any name up to five characters long.
5. Then select “PARAM_INDEX_n”. This is a drop down menu and the selections available in the device will appear. Select which parameter is to be displayed, in the “PARAM_INDEX_n” field.
6. Select “CUSTOM_UNITS_n” if “Custom” was selected previously in the “UNITS_TYPE_n” field above. This is limited to five characters and is where the desired units you wish to be displayed are entered.
7. To display more than one parameter be sure and check the appropriate number of boxes in the “Display Parameter Select” field.

## National Instrument (NI) Set up for LCD

This is a short procedure for displaying multiple devices on the Rosemount 3095 transmitters LCD. If a value is brought in from a different device it must be linked to a block in the Rosemount 3095 transmitter with the LCD display and it must be downloaded. The LCD can display up to four different values. It can display any input or output of any block in the Rosemount 3095. The first display is pre-configured to show the value of the transducer block of the Rosemount 3095. The first display may be changed.

1. Open the LCD block. Select the “Others” tab. Next, scroll down the list of parameters and select “DISPLAY_PARAM_SEL.” A drop down menu will appear. Select how the amount of values to be displayed on the LCD. Next, select the “Write Changes” button.
2. The first parameter is called “BLK_TYPE_n”. This is a drop down menu and the selections available in the device will appear. Select the block to be displayed, in the “BLK_TYPE_n” field.
3. Next, select “BLK_TAG_n,” enter the exact name of the block to be to displayed. This must be the same name as the one that is stored in the device or shown in the NI-Configurator screen.
4. Then select “PARAM_INDEX_n.” Use NI_Dialog for this step. The index number of the parameter that will be displayed on the LCD is needed for this step. Using NI-Dialog, open the “GetParamList” of the block in which the parameter resides. Count down the list until the desired parameter is reached. This is the number used next. Open the “GetParamList” list for the LCD block and write to parameter “PARAM_INDEX_n” the value obtained in the above parameter list, this must be in hex.
5. The next parameter is called “CUSTOM_TAG_n.” This is an optional selection that identifies which parameter, block or device you are viewing on the LCD. This can be any name up to five characters long.
6. Select “UNITS_TYPE_n”. Select “Custom” in this parameter if bringing a value from outside the Rosemount 3095 device. “Auto” has only pressure units, which might or might not match the desired selection.
7. Select “CUSTOM_UNITS_n.” This parameter is limited to five characters and is where the desired units are displayed if “Custom” was selected above.

## LCD Parameter Table

Figure D-2. LCD Transducer Block Parameters and Descriptions

| Parameter | Index | Description |
|---|---|---|
| ST_REV | 1 | The revision level of the static data associated with the function block. |
| TAG_DESC | 2 | The user description of the intended application of the block. |
| STRATEGY | 3 | The strategy field can be used to identify grouping of blocks. |
| ALERT_KEY | 4 | The identification number of the plant unit. |
| MODE_BLK | 5 | The actual, target, permitted, and normal modes of the block. |
| BLOCK_ERR | 6 | This parameter reflects the error status associated with the hardware or software components associated with a block. it is a bit string, so that multiple errors may be shown. |
| UPDATE_EVT | 7 | This alert is generated by any change to the staic data. |
| BLOCK_ALM | 8 | The BLOCK_ALM is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed. |
| TRANSDUCER_DIRCTORY | 9 | A directory that specifies the number and starting indicies of the transducers in the transducer block. |
| TRANSDUCER_TYPE | 10 | Identifies the transducer that follows. |
| XD_ERROR | 11 | Provides additional error codes related to transducer blocks. |

| Parameter | Index | Description |
|---|---|---|
| COLLECTION_DIRECTORY | 12 | A directory that specifies the number, starting indicies, and DD Item ID's of the data collections in each transducer block. |
| DISPLAY_PARAM_SEL | 13 | This will determine which Display Parameters are active.<br>Bit 0 = DP1<br>Bit 1 = DP2<br>Bit 2 = DP3<br>Bit 3 = DP4<br>Bit 4 = Bar Graph enable |
| BLK_TYPE_1 | 14 | The enumerated block type for DP1's block. |
| BLK_TAG_1 | 15 | The tag of the block containing DP1. |
| PARAM_INDEX_1 | 16 | The relative index of DP1 within its block. |
| CUSTOM_TAG_1 | 17 | The block description that is displayed for DP1. |
| UNITS_TYPE_1 | 18 | This parameter determines where the units for the display parameter come from. |
| CUSTOM_UNITS_1 | 19 | This is the user entered units that are displayed when UNITS_TYPE_1=Custom. |
| BLK_TYPE_2 | 20 | The enumerated block type for DP2's block. |
| BLK_TAG_2 | 21 | The tag of the block containing DP2. |
| PARAM_INDEX_2 | 22 | The relative index of DP2 within its block. |
| CUSTOM_TAG _2 | 23 | The block description that is displayed for DP2. |
| UNITS_TYPE_2 | 24 | This parameter determines where the units for the display parameter come from. |
| CUSTOM_UNITS _2 | 25 | This is the user entered units that are displayed when UNITS_TYPE_2=Custom. |
| BLK_TYPE_3 | 26 | The enumerated block type for DP3's block. |
| BLK_TAG_3 | 27 | The tag of the block containing DP3. |
| PARAM_INDEX_3 | 28 | The relative index of DP3 within its block. |
| CUSTOM_TAG _3 | 29 | The block description that is displayed for DP3. |
| UNITS_TYPE_3 | 30 | This parameter determines where the units for the display parameter come from. |
| CUSTOM_UNITS _3 | 31 | This is the user entered units that are displayed when UNITS_TYPE_3=Custom. |
| BLK_TYPE_4 | 32 | The enumerated block type for DP4's block. |
| BLK_TAG_4 | 33 | The tag of the block containing DP4. |
| PARAM_INDEX_4 | 34 | The relative index of DP4 within its block. |
| CUSTOM_TAG _4 | 35 | The block description that is displayed for DP4. |
| UNITS_TYPE_4 | 36 | This parameter determines where the units for the display parameter come from. |
| CUSTOM_UNITS _4 | 37 | This is the user entered units that are displayed when UNITS_TYPE_4=Custom. |

*Note: DP = Display parameters*

## RESOURCE BLOCK

This section contains information on the Rosemount 3095MV Resource Block. Descriptions of all Resource Block Parameters, errors, and diagnostics are included. Also, the modes, alarm detection, status handling and troubleshooting are discussed.

## Definition

The resource block defines the physical resources of the device. The resource block also handles functionality that is common across multiple blocks. The block has no linkable inputs or outputs.

## Parameters and Descriptions

The table lists all of the configurable parameters of the Resource Block, including the descriptions and index numbers for each.

| Parameter | Index Number | Description |
|---|---|---|
| ACK_OPTION | 38 | Selection of whether alarms associated with the function block will be automatically acknowledged. |
| ADVISE_ACTIVE | 82 | Enumerated list of advisory conditions within a device. |
| ADVISE_ALM | 83 | Alarm indicating advisory alarms. These conditions do not have a direct impact on the process or device integrity. |
| ADVISE_ENABLE | 80 | Enabled ADVISE_ALM alarm conditions. Corresponds bit for bit to the ADVISE_ACTIVE. A bit on means that the corresponding alarm condition is enabled and will be detected. A bit off means the corresponding alarm condition is disabled and will not be detected. |
| ADVISE_MASK | 81 | Mask of ADVISE_ALM. Corresponds bit of bit to ADVISE_ACTIVE. A bit on means that the condition is masked out from alarming. |
| ADVISE_PRI | 79 | Designates the alarming priority of the ADVISE_ALM |
| ALARM_SUM | 37 | The current alert status, unacknowledged states, unreported states, and disabled states of the alarms associated with the function block. |
| ALERT_KEY | 04 | The identification number of the plant unit. |
| BLOCK_ALM | 36 | The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status parameter. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed. |
| BLOCK_ERR | 06 | This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown. |
| CLR_FSAFE | 30 | Writing a Clear to this parameter will clear the device FAIL_SAFE if the field condition has cleared. |
| CONFIRM_TIME | 33 | The time the resource will wait for confirmation of receipt of a report before trying again. Retry will not happen when CONFIRM_TIME=0. |
| CYCLE_SEL | 20 | Used to select the block execution method for the resource. The 3095 supports the following:<br>Scheduled: Blocks are only executed based on the function block schedule.<br>Block Execution: A block may be executed by linking to another blocks completion. |
| CYCLE_TYPE | 19 | Identifies the block execution methods available for this resource. |
| DD_RESOURCE | 09 | String identifying the tag of the resource which contains the Device Description for this resource. |
| DD_REV | 13 | Revision of the DD associated with the resource - used by an interface device to locate the DD file for the resource. |
| DEFINE_WRITE_LOCK | 60 | Allows the operator to select how WRITE_LOCK behaves. The initial value is “lock everything”. If the value is set to “lock only physical device” then the resource and transducer blocks of the device will be locked but changes to function blocks will be allowed. |
| DETAILED_STATUS | 55 | Indicateds the state of the transmitter. See Resource Block detailed status codes. |
| DEV_REV | 12 | Manufacturer revision number associated with the resource - used by an interface device to locate the DD file for the resource. |
| DEV_STRING | 43 | This is used to load new licensing into the device. The value can be written but will always read back with a value of 0. |

| Parameter | Index Number | Description |
|---|---|---|
| DEV_TYPE | 11 | Manufacturer's model number associated with the resource - used by interface devices to locate the DD file for the resource. |
| DIAG_OPTION | 46 | Indicates which diagnostics licensing options are enabled. |
| DISTRIBUTOR | 42 | Reserved for use as distributor ID. No Foundation enumerations defined at this time. |
| DOWNLOAD_MODE | 67 | Gives access to the boot block code for over-the-wire downloads.<br>0 = Uninitialized<br>1 = Run mode<br>2 = Download mode |
| FAIL_SAFE | 28 | Condition set by loss of communication to an output block, fault promoted to an output block or physical contact. When FAIL_SAFE condition is set, then output function blocks will perform their FAIL_SAFE actions. |
| FAILED_ACTIVE | 72 | Enumerated list of failure conditions within a device. |
| FAILED_ALM | 73 | Alarm indicating a failure within a device which makes the device non-operational. |
| FAILED_ENABLE | 70 | Enabled FAILED_ALM alarm conditions. Corresponds bit for bit to the FAILED_ACTIVE. A bit on means that the corresponding alarm condition is enabled and will be detected. A bit off means the corresponding alarm condition is disabled and will not be detected. |
| FAILED_MASK | 71 | Mask of FAILED_ALM. Corresponds bit of bit to FAILED_ACTIVE. A bit on means that the condition is masked out from alarming. |
| FAILED_PRI | 69 | Designates the alarming priority of the FAILED_ALM. |
| FB_OPTION | 45 | Indicates which function block licensing options are enabled. |
| FEATURES | 17 | Used to show supported resource block options. See Error! Reference source not found. The supported features are: SOFT_WRITE_LOCK_SUPPORT, HARD_WRITE_LOCK_SUPPORT, REPORTS, and UNICODE |
| FEATURES_SEL | 18 | Used to select resource block options. |
| FINAL_ASSY_NUM | 54 | The same final assembly number placed on the neck label. |
| FREE_SPACE | 24 | Percent of memory available for further configuration. Zero in a preconfigured device. |
| FREE_TIME | 25 | Percent of the block processing time that is free to process additional blocks. |
| GRANT_DENY | 14 | Options for controlling access of host computers and local control panels to operating, tuning, and alarm parameters of the block. Not used by device. |
| HARD_TYPES | 15 | The types of hardware available as channel numbers. |
| HARDWARE_REV | 52 | Hardware revision of the hardware that has the resource block in it. |
| ITK_VER | 41 | Major revision number of the inter operability test case used in certifying this device as interoperable. The format and range are controlled by the Fieldbus Foundation. |
| LIM_NOTIFY | 32 | Maximum number of unconfirmed alert notify messages allowed. |
| MAINT_ACTIVE | 77 | Enumerated list of maintenance conditions within a device. |
| MAINT_ALM | 78 | Alarm indicating the device needs maintenance soon. If the condition is ignored, the device will eventually fail. |
| MAINT_ENABLE | 75 | Enabled MAINT_ALM alarm conditions. Corresponds bit for bit to the MAINT_ACTIVE. A bit on means that the corresponding alarm condition is enabled and will be detected. A bit off means the corresponding alarm condition is disabled and will not be detected. |
| MAINT_MASK | 76 | Mask of MAINT_ALM. Corresponds bit of bit to MAINT_ACTIVE. A bit on means that the condition is masked out from alarming. |
| MAINT_PRI | 74 | Designates the alarming priority of the MAINT_ALM |
| MANUFAC_ID | 10 | Manufacturer identification number – used by an interface device to locate the DD file for the resource. |
| MAX_NOTIFY | 31 | Maximum number of unconfirmed notify messages possible. |
| MEMORY_SIZE | 22 | Available configuration memory in the empty resource. To be checked before attempting a download. |
| MESSAGE_DATE | 57 | Date associated with the MESSAGE_TEXT parameter. |
| MESSAGE_TEXT | 58 | Used to indicate changes made by the user to the device's installation, configuration, or calibration. |
| MIN_CYCLE_T | 21 | Time duration of the shortest cycle interval of which the resource is capable. |
| MISC_OPTION | 47 | Indicates which miscellaneous licensing options are enabled. |

| Parameter | Index Number | Description |
|---|---|---|
| MODE_BLK | 05 | The actual, target, permitted, and normal modes of the block:<br>Target: The mode to “go to”<br>Actual: The mode the “block is currently in”<br>Permitted: Allowed modes that target may take on<br>Normal: Most common mode for actual |
| NV_CYCLE_T | 23 | Minimum time interval specified by the manufacturer for writing copies of NV parameters to non-volatile memory. Zero means it will never be automatically copied. At the end of NV_CYCLE_T, only those parameters which have changed need to be updated in NVRAM. |
| OUTPUT_BOARD_SN | 53 | Output board serial number. |
| RB_SFTWR_REV_ALL | 51 | The string will contains the following fields:<br>Major rev: 1-3 characters, decimal number 0-255<br>Minor rev: 1-3 characters, decimal number 0-255<br>Build rev: 1-5 characters, decimal number 0-255<br>Time of build: 8 characters, xx:xx:xx, military time<br>Day of week of build: 3 characters, Sun, Mon,...<br>Month of build: 3 characters, Jan, Feb.<br>Day of month of build: 1-2 characters, decimal number 1-31<br>Year of build: 4 characters, decimal<br>Builder: 7 characters, login name of builder |
| RB_SFTWR_REV_BUILD | 50 | Build of software that the resource block was created with. |
| RB_SFTWR_REV_MAJOR | 48 | Major revision of software that the resource block was created with. |
| RB_SFTWR_REV_MINOR | 49 | Minor revision of software that the resource block was created with. |
| RECOMMENDED_ACTION | 68 | Enumerated list of recommended actions displayed with a device alert. |
| RESTART | 16 | Allows a manual restart to be initiated. Several degrees of restart are possible. They are the following:<br>1 Run – nominal state when not restarting<br>2 Restart resource – not used<br>3 Restart with defaults – set parameters to default values. See START_WITH_DEFAULTS below for which parameters are set.<br>4 Restart processor – does a warm start of CPU. |
| RS_STATE | 07 | State of the function block application state machine. |
| SAVE_CONFIG_BLOCKS | 62 | Number of EEPROM blocks that have been modified since last burn. This value will count down to zero when the configuration is saved. |
| SAVE_CONFIG_NOW | 61 | Allows the user to optionally save all non-volatile information immediately. |
| SECURITY_IO | 65 | Status of security switch. |
| SELF_TEST | 59 | Instructs resource block to perform self-test. Tests are device specific. |
| SET_FSAFE | 29 | Allows the FAIL_SAFE condition to be manually initiated by selecting Set. |
| SHED_RCAS | 26 | Time duration at which to give up on computer writes to function block RCas locations. Shed from RCas shall never happen when SHED_ROUT = 0 |
| SHED_ROUT | 27 | Time duration at which to give up on computer writes to function block ROut locations. Shed from ROut shall never happen when SHED_ROUT = 0 |
| SIMULATE_IO | 64 | Status of simulate switch. |
| SIMULATE_STATE | 66 | The state of the simulate switch:<br>0 = Uninitialized<br>1 = Switch off, simulation not allowed<br>2 = Switch on, simulation not allowed (need to cycle jumper/switch)<br>3 = Switch on, simulation allowed |
| ST_REV | 01 | The revision level of the static data associated with the function block. |
| START_WITH_DEFAULTS | 63 | 0 = Uninitialized<br>1 = do not power-up with NV defaults<br>2 = power-up with default node address<br>3 = power-up with default pd_tag and node address<br>4 = power-up with default data for the entire communications stack (no application data) |
| STRATEGY | 03 | The strategy field can be used to identify grouping of blocks. |
| SUMMARY_STATUS | 56 | An enumerated value of repair analysis. |
| TAG_DESC | 02 | The user description of the intended application of the block. |

| Parameter | Index Number | Description |
|---|---|---|
| TEST_RW | 08 | Read/write test parameter - used only for conformance testing. |
| UPDATE_EVT | 35 | This alert is generated by any change to the static data. |
| WRITE_ALM | 40 | This alert is generated if the write lock parameter is cleared. |
| WRITE_LOCK | 34 | If set, no writes from anywhere are allowed, except to clear WRITE_LOCK. Block inputs will continue to be updated. |
| WRITE_PRI | 39 | Priority of the alarm generated by clearing the write lock. |
| XD_OPTION | 44 | Indicates which transducer block licensing options are enabled. |

## SENSOR TRANSDUCER BLOCK

The Sensor Transducer Block contains the actual measurement data including a pressure and temperature reading. The Transducer Block includes information about sensor type, engineering units, reranging, temperature compensation, and diagnostics.

| Index | Parameter | Description |
|---|---|---|
| 1 | ST_REV | The revision level of the static data associated with the function block. |
| 2 | TAG_DESC | The user description of the intended application of the block. |
| 3 | STRATEGY | The strategy field can be used to identify groupings of blocks. |
| 4 | ALERT_KEY | The identification number of the plant unit. |
| 5 | MODE_BLK | The actual, target, permitted, and normal modes of the block. |
| 6 | BLOCK_ERR | This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown. |
| 7 | UPDATE_EVT | |
| 8 | BLOCK_ALM | |
| 9 | TRANSDUCER_DIRECTORY | A directory that specifies the number and starting indicies of the transducers in the transducer block. |
| | | TRANSDUCER_DIRECTORY[0] is the number of transducers |
| | | TRANSDUCER_DIRECTORY[1] is the block/index offset of transducer 1. |
| | | TRANSDUCER_DIRECTORY[2] is the block/index offset of transducer 2. |
| | | TRANSDUCER_DIRECTORY[3] is the block/index offset of transducer 3. |
| 10 | TRANSDUCER_TYPE_1 | Identifies the transducer that follows. |
| 11 | XD_ERROR_1 | Provides additional error codes related to transducer blocks. |
| 12 | COLLECTION_DIRECTORY_1 | A directory that specifies the number, starting indicies, and DD Item ID's of the data collections in each transducer block. |
| 13 | PRIMARY_VALUE_TYPE_1 | The type of measurement represented by the primary value. |
| 14 | PRIMARY_VALUE_1 | The measured value and status available to the function block. |
| 15 | PRIMARY_VALUE_RANGE_1 | The high and low range limit values, the engineering units code and the number of digits to the right of the decimal point to be used to display the final value. |
| 16 | CAL_POINT_HI_1 | The highest calibrated value. |
| 17 | CAL_POINT_LO_1 | The lowest calibrated value. |
| 18 | CAL_MIN_SPAN_1 | The minimum calibration span value allowed. This minimum span information is necessary to ensure that when calibration is done, the two calibrated points are not too close together. |
| 19 | CAL_UNIT_1 | The Device Description engineering units code index for the calibration values. |
| 20 | SENSOR_TYPE_1 | The type of sensor connected with the transducer block. |
| 21 | SENSOR_RANGE_1 | The high and low range limit values, the engineering units code and the number of digits to the right of the decimal point for the sensor. |
| 22 | SENSOR_SN_1 | The sensor serial number. |
| 23 | SENSOR_CAL_METHOD_1 | The method of last sensor calibration. |
| 24 | SENSOR_CAL_LOC_1 | The location of the last sensor calibration. This describes the physical location at which the calibration was performed. |
| 25 | SENSOR_CAL_DATE_1 | The date of the last sensor calibration. This is intended to reflect the calibration of that part of the sensor that is usually wetted by the process. |
| 26 | SENSOR_CAL_WHO_1 | The name of the person responsible for the last sensor calibration. |
| 27 | SENSOR_ISOLATOR_MTL_1 | Defines the construction material for the isolating diaphragms. |
| 28 | SENSOR_FILL_FLUID_1 | Defines the type of fill fluid used in the sensor. |
| 29 | SECONDARY_VALUE | The secondary value, related to the sensor. |
| 30 | SECONDARY_VALUE_UNIT | The engineering units to be used with the SECONDARY_VALUE. |
| 31 | PRIMARY_FILTER_1 | Primary Value damping time in seconds. |
| 32 | SECONDARY_FILTER | Secondary Value damping time in seconds. |
| 33 | TRANSDUCER_TYPE_2 | Identifies the transducer that follows. |
| 34 | XD_ERROR_2 | Provides additional error codes related to transducer blocks. Shared between all Transducers. |

| Index | Parameter | Description |
|---|---|---|
| 35 | COLLECTION_DIRECTORY_2 | A directory that specifies the number, starting indicies, and DD Item ID's of the data collections in each transducer block. |
| 36 | PRIMARY_VALUE_TYPE_2 | The type of measurement represented by the primary value. See Table D-3 for details. |
| 37 | PRIMARY_VALUE_2 | The measured value and status available to the function block. |
| 38 | PRIMARY_VALUE_RANGE_2 | The high and low range limit values, the engineering units code and the number of digits to the right of the decimal point to be used to display the final value. |
| 39 | CAL_POINT_HI_2 | The highest calibrated value. |
| 40 | CAL_POINT_LO_2 | The lowest calibrated value. |
| 41 | CAL_MIN_SPAN_2 | The minimum calibration span value allowed. This minimum span information is necessary to ensure that when calibration is done, the two calibrated points are not too close together. |
| 42 | CAL_UNIT_2 | The Device Description engineering units code index for the calibration values. See Table D-2 for description details. |
| 43 | SENSOR_TYPE_2 | The type of sensor connected with the transducer block. See Table D-5 for details. |
| 44 | SENSOR_RANGE_2 | The high and low range limit values, the engineering units code and the number of digits to the right of the decimal point for the sensor. |
| 45 | SENSOR_SN_2 | The sensor serial number. |
| 46 | SENSOR_CAL_METHOD_2 | The method of last sensor calibration. See Table D-6 for details. |
| 47 | SENSOR_CAL_LOC_2 | The location of the last sensor calibration. This describes the physical location at which the calibration was performed. |
| 48 | SENSOR_CAL_DATE_2 | The date of the last sensor calibration. This is intended to reflect the calibration of that part of the sensor that is usually wetted by the process. |
| 49 | SENSOR_CAL_WHO_2 | The name of the person responsible for the last sensor calibration. |
| 50 | SENSOR_ISOLATOR_MTL_2 | Defines the construction material for the isolating diaphragms. See Table D-8 for details. |
| 51 | SENSOR_FILL_FLUID_2 | Defines the type of fill fluid used in the sensor. See Table D-9 for details. |
| 52 | PRIMARY_FILTER_2 | Primary Value damping time in seconds. |
| 53 | TRANSDUCER_TYPE_3 | Identifies the transducer that follows. |
| 54 | XD_ERROR_3 | Provides additional error codes related to transducer blocks. Shared between all Transducers. |
| 55 | COLLECTION_DIRECTORY_3 | A directory that specifies the number, starting indicies, and DD Item ID's of the data collections in each transducer block. |
| 56 | PRIMARY_VALUE_TYPE_3 | The type of measurement represented by the primary value. See Table D-3 for details. |
| 57 | PRIMARY_VALUE_3 | The measured value and status available to the function block. |
| 58 | PRIMARY_VALUE_RANGE_3 | The high and low range limit values, the engineering units code and the number of digits to the right of the decimal point to be used to display the final value. |
| 59 | CAL_POINT_HI_3 | The highest calibrated value. |
| 60 | CAL_POINT_LO_3 | The lowest calibrated value. |
| 61 | CAL_MIN_SPAN_3 | The minimum calibration span value allowed. This minimum span information is necessary to ensure that when calibration is done, the two calibrated points are not too close together. |
| 62 | CAL_UNIT_3 | The Device Description engineering units code index for the calibration values. See Table D-2 for details. |
| 63 | SENSOR_TYPE_3 | The type of sensor connected with the transducer block. See Table D-5 for details. |
| 64 | SENSOR_RANGE_3 | The high and low range limit values, the engineering units code and the number of digits to the right of the decimal point for the sensor. |
| 65 | SENSOR_SN_3 | The sensor serial number. |
| 66 | SENSOR_CAL_METHOD_3 | The method of last sensor calibration. See Table D-4 for details. |
| 67 | SENSOR_CAL_LOC_3 | The location of the last sensor calibration. This describes the physical location at which the calibration was performed. |
| 68 | SENSOR_CAL_DATE_3 | The date of the last sensor calibration. This is intended to reflect the calibration of that part of the sensor that is usually wetted by the process. |
| 69 | SENSOR_CAL_WHO_3 | The name of the person responsible for the last sensor calibration. |
| 70 | SENSOR_CONNECTION_3 | The external temperature sensor connection type. See Table D-10 for details. |
| 71 | PRIMARY_FILTER_3 | Primary Value damping time in seconds. |

| Index | Parameter | Description |
|---|---|---|
| 72 | FACT_CAL_RECALL | 1: Recalls the sensor calibration set at the factory for DP.<br>2: Recalls the sensor calibration set at the factory for SP.<br>3: Recalls the sensor calibration set at the factory for PT.<br>4: Saves all current sensor calibration values to a factory area for later recall. |
| 73 | TB_DETAILED_STATUS | Indicates the state of the transmitter. The parameter contains specific codes relating to the transducer block and the pressure sensor specifically. See Table D-7 for details. |
| 74 | MODULE_SW_REV | 205 Sensor Module Software Revision Number |
| 75 | MODULE_UPDATE_RATE | 205 Sensor Module Update Rate |
| 76 | FLANGE_TYPE | Indicates the type of flange that is attached to the device. See Flange Type Codes. See Table D-12 for details. |
| 77 | FLANGE_MTL | Indicates the type of material that the flange is made of. See Flange Material Codes. See Table D-11 for details. |
| 78 | REM_SEAL_NUM | Indicates the number of remote seals that are attached to the device. See Remote Seal Number Codes. See Table D-13 for details. |
| 79 | REM_SEAL_TYPE | Indicates the type of remote seals that are attached to the device. See Remote Seal Type Codes. See Table D-16 for details. |
| 80 | REM_SEAL_ISO_MTL | See Table D-15 for details. |
| 81 | REM_SEAL_FILL | See Table D-14 for details. |
| 82 | O_RING_MTL | See Table D-18 for details. |
| 83 | DRAIN_VENT_MTL | Indicates the type of material that the drain vents on the flange are made of. See Drain Vent Material Codes. See Table D-17 for details. |
| 84 | RTD_INSTALLED | Indicates if RTD is installed. |

## Sensor Transducer Block Reference Tables

Table D-2. Pressure / Temperature Units Codes (Approved)

| Value | Description |
|---|---|
| **Pressure** | |
| 1130 | Pascals |
| 1132 | Megapascals |
| 1133 | Kilopascals |
| 1137 | Bar |
| 1138 | Mbar |
| 1139 | torr @ 0C |
| 1140 | Atm |
| 1141 | Pso |
| 1142 | PsiA |
| 1143 | PsiG |
| 1144 | g/cm^2 |
| 1145 | kg/cm^2 |
| 1147 | in H2O @ 4C |
| 1148 | in H2O @ 68F |
| 1150 | mm H2O @ 4C |
| 1151 | mm H2O @ 68F |
| 1154 | ft H2O @ 68F |
| 1156 | in Hg @ 0C |
| 1158 | mm Hg @ 0C |
| **Temperature** | |
| 1001 | Degree Celsius |
| 1002 | Degree Fahrenheit |
| 1000 | Degree Kelvin |

| Value | Description |
|---|---|
| **Mass Flow** | |
| 1330 | $lb_m$/sec |
| 1331 | $lb_m$/min |
| 1332 | $lb_m$/hour |
| 1333 | $lb_m$/day |
| 1322 | kg/sec |
| 1323 | kg/min |
| 1324 | kg/hour |
| 1318 | grams/sec |
| 1319 | grams/min |
| 1320 | grams/hour |
| ** | StdCuFt/sec |
| 1360 | StdCuFt/min |
| 1361 | StdCuFt/hour |
| ** | STdCuFt/day |
| 1529 | STdCuM/hour |
| 1530 | StdCuM/day |
| 1524 | NmlCuM/hour |
| 1525 | NmlCuM/day |

*** No units codes are defined for Fieldbus. Supporting these units will require the operator to use an arithmetic block (and a custom LCD unit tag)*

Table D-3. Primary Value Type Codes (Approved)

| Value | Description |
|---|---|
| 104 | process temperature |
| 107 | differential pressure |
| 108 | gauge pressure |
| 109 | absolute pressure |
| 65535 | other |

Table D-4. Transducer Type Codes (Approved)

| Value | Description |
|---|---|
| 100 | Standard pressure with calibration |
| 101 | Standard temperature with calibration |
| 65535 | other |

Table D-5. Sensor Type Codes (Approved)

| Value | Description |
|---|---|
| 117 | Capacitance |
| 121 | Pressure sensor unknown |
| 124 | Strain gauge |
| 128 | PT100_A_385 (IEC 751) |
| 65534 | Not used |
| 65535 | Non-standard |

Table D-6. Sensor Calibration Method Codes (Approved)

| Value | Description |
|---|---|
| 100 | Volumetric |
| 101 | Static Weigh |
| 102 | Dynamic Weigh |

| Value | Description |
|---|---|
| 103 | Factory Trim Standard Calibration |
| 104 | User Trim Standard Calibration |
| 105 | Factory Trim Special Calibration |
| 106 | User Trim Special Calibration |
| 255 | Other |

Table D-7. Sensor Transducer Block Detailed Status Codes (Approved)

| Bit Enumeration Value | Description |
|---|---|
| 0 | Sensor user EEPROM corrupt |
| 1 | Sensor factory EEPROM corrupt |
| 2 | HW/SW incompatible |
| 3 | Sensor module not updating |
| 4 | Sensor module not responding |
| 5 | Sensor HW failure |
| 6 | DP out of range |
| 7 | SP out of range |
| 8 | PT out of range |
| 9 | ST out of range |
| 10 | DP sensor failure |
| 11 | SP sensor failure |
| 12 | PT sensor failure |
| 13 | ST sensor failure |
| 14 | Undefined |
| 15 | Undefined |
| 16 | Undefined |
| 17 | Undefined |
| 18 | Undefined |
| 19 | Undefined |
| 20 | Undefined |
| 21 | Undefined |
| 22 | Undefined |
| 23 | Undefined |
| 24 | Undefined |
| 25 | Undefined |
| 26 | Undefined |
| 27 | Undefined |
| 28 | Undefined |
| 29 | Undefined |
| 30 | Undefined |
| 31 | Undefined |

Table D-8. Sensor Isolator Material Codes (Approved)

| Value | Description |
|---|---|
| 2 | 316 Stainless Steel |
| 3 | Hastelloy C™ |
| 4 | Monel |
| 5 | Tantalum |
| 15 | Gold/Monel |
| 251 | “None” |
| 252 | “Unknown” |
| 252 | “Special” |

Table D-9. Sensor Fill Fluid Codes (Approved)

| Value | Description |
|---|---|
| 0 | Undefined |
| 1 | Silicone |
| 2 | Inert |
| 3 | Undefined |
| 7 | Neobee |
| 251 | “None” |
| 252 | “Unknown” |
| 253 | “Special” |

Table D-10. Sensor Connection Codes (Approved)

| Value | Description |
|---|---|
| 4 | 4-wire |

Table D-11. Flange Material Codes (Approved)

| Value | Description |
|---|---|
| 0 | Carbon Steel |
| 2 | 316 Stainless Steel |
| 3 | Hastelloy C™ |
| 4 | Monel |
| 24 | Kynar™ |
| 252 | “Unknown” |
| 253 | “Special” |

Table D-12. Flange Type Codes (Approved)

| Value | Description |
|---|---|
| 12 | Conventional (Traditional) |
| 13 | Coplaner |
| 14 | Remote Seal |
| 15 | Level; 3 in., 150 lb. |
| 16 | Level; 4 in., 150 lb. |
| 17 | Level; 3 in., 300 lb. |
| 18 | Level; 4 in., 300 lb. |
| 19 | Level; DN 80, PN 40 |
| 20 | Level; DN 100, PN 40 |
| 21 | Level; DN 100, PN 10/16 |
| 22 | Level; 2 in., 150 lb. |
| 23 | Level; 2 in., 300 lb. |
| 24 | Level; DN 50, PN 6 |
| 25 | Level; DN 50, PN 40 |
| 44 | .5 in NPTF |
| 45 | DIN 16288G 1/2 A Male |
| 46 | .25 in NPT |
| 252 | Unknown |
| 253 | Special |

Table D-13. Number of Remote Seals Codes (Approved)

| Value | Description |
|---|---|
| 1 | One Seal |
| 2 | Two Seals |

| Value | Description |
|---|---|
| 251 | None |
| 252 | Unknown |
| 253 | Special |

Table D-14. Remote Seal Fill Fluid Codes (Approved)

| Value | Description |
|---|---|
| 2 | Silicone |
| 3 | Syltherm 800 |
| 4 | Inert (Holocarbon) |
| 5 | Glycerin and Water |
| 7 | Neobee M-20 |
| 6 | Propylene Glycol and Water |
| 251 | None |
| 252 | Unknown |
| 253 | Special |

Table D-15. Remote Seal Isolator Material Codes (Approved)

| Value | Description |
|---|---|
| 2 | 316L Stainless Steel |
| 3 | Hastelloy C-276 |
| 5 | Tantalum |
| 9 | Co-Cr-Ni |
| 251 | None |
| 252 | Unknown |
| 253 | Special |

Table D-16. Remote Seal Type Codes (Approved)

| Value | Description |
|---|---|
| 0 | Undefined |
| 1 | Reserved |
| 2 | CTW |
| 3 | EFW (Expanded Flange Seal) |
| 4 | PFW (Pancake) |
| 5 | RFW (Flanged Remote) |
| 6 | RTW (Threaded Remote) |
| 7 | SCW |
| 8 | SSW |
| 9 | High Temperature |
| 10 | FFW Flanged Flush Surface |
| 11 | UCW |
| 12 | TSW |
| 251 | None |
| 252 | Unknown |
| 253 | Special |

Table D-17. Drain Vent Valve Material Type Codes (Approved)

| Value | Description |
|---|---|
| 2 | 316 Stainless Steel |
| 3 | Hastelloy C™ |
| 4 | Monel |

| Value | Description |
|---|---|
| 251 | None |
| 252 | Unknown |
| 253 | Special |

Table D-18. O-Ring Material Type Codes (Approved)

| Value | Description |
|---|---|
| 10 | PTFE (Teflon-TM) |
| 11 | Viton |
| 12 | Buna-N |
| 13 | Ethyl-Prop |
| --- | Glass-Filled TFE |
| --- | Graphite-Filled TFE |
| 252 | Unknown |
| 253 | Special |

# Appendix E HART Communicator

**EA Software/ Hart Communicator Comparison . . . . . page E-1**
**Calibration . . . . . page E-4**
**LCD Display . . . . . page E-10**
**Transient Protection Terminal Block . . . . . page E-13**

## EA SOFTWARE/ HART COMMUNICATOR COMPARISON

Table E-1 identifies the functionality of the 3095 MultiVariable Engineering Assistant and the HART Communicator.

Table E-1. EA vs. HART Communicator.

| Function | EA | HART |
|---|---|---|
| **Compensated Flow Setup** | | |
| Liquid, Gas, Steam, or Natural Gas | YES | NO |
| Differential Producer Type | YES | NO |
| Primary Element Diameter | YES | NO |
| Pipe internal Diameter | YES | NO |
| Operating Static Pressure Range | YES | NO |
| Operating Temperature Range | YES | NO |
| Pressure Standard Reference Condition | YES | NO |
| Temperature Standard Reference Condition | YES | NO |
| 12 or 63 Point Density Data | YES | NO |
| 4 Point Viscosity Data | YES | NO |
| Density at Standard Condition | YES | NO |
| Molecular Weight | YES | NO |
| Isentropic Exponent | YES | NO |
| RTD Fixed Mode | YES | YES |
| **Transmitter Setup** | | |
| Range Values (Flow, DP, AP, GP, T) | YES | YES |
| Units (Flow, DP, AP, GP, T) | YES | YES |
| Damping (DP, AP, GP, T) | YES | YES |
| Primary Variable | YES | YES |
| Device Information (tag, date, desc., etc.) | YES | YES |
| LCD Settings | YES | YES |
| Totalizer Settings | YES | YES |
| Special Units | YES | YES |
| DP Low Flow Cutoff | YES | YES |
| Burst Mode | YES | YES |
| Address | YES | YES |
| **Maintenance** | | |
| Change Password | YES | NO |
| Read Output | YES | YES |
| Module Info (range limits, matl, flange, etc.) | YES | YES |
| Identification Info (serial no., revisions) | YES | YES |
| Sensor Trim (DP, AP, GP, T) | YES | YES |
| Process Temperature Mode | YES | YES |
| Output Trim | YES | YES |
| Loop Test | YES | YES |
| Test Flow Calculation | YES | NO |
| Diagnostic Messages | YES | YES |

Figure E-1. HART Communicator Menu Tree for the 3095.

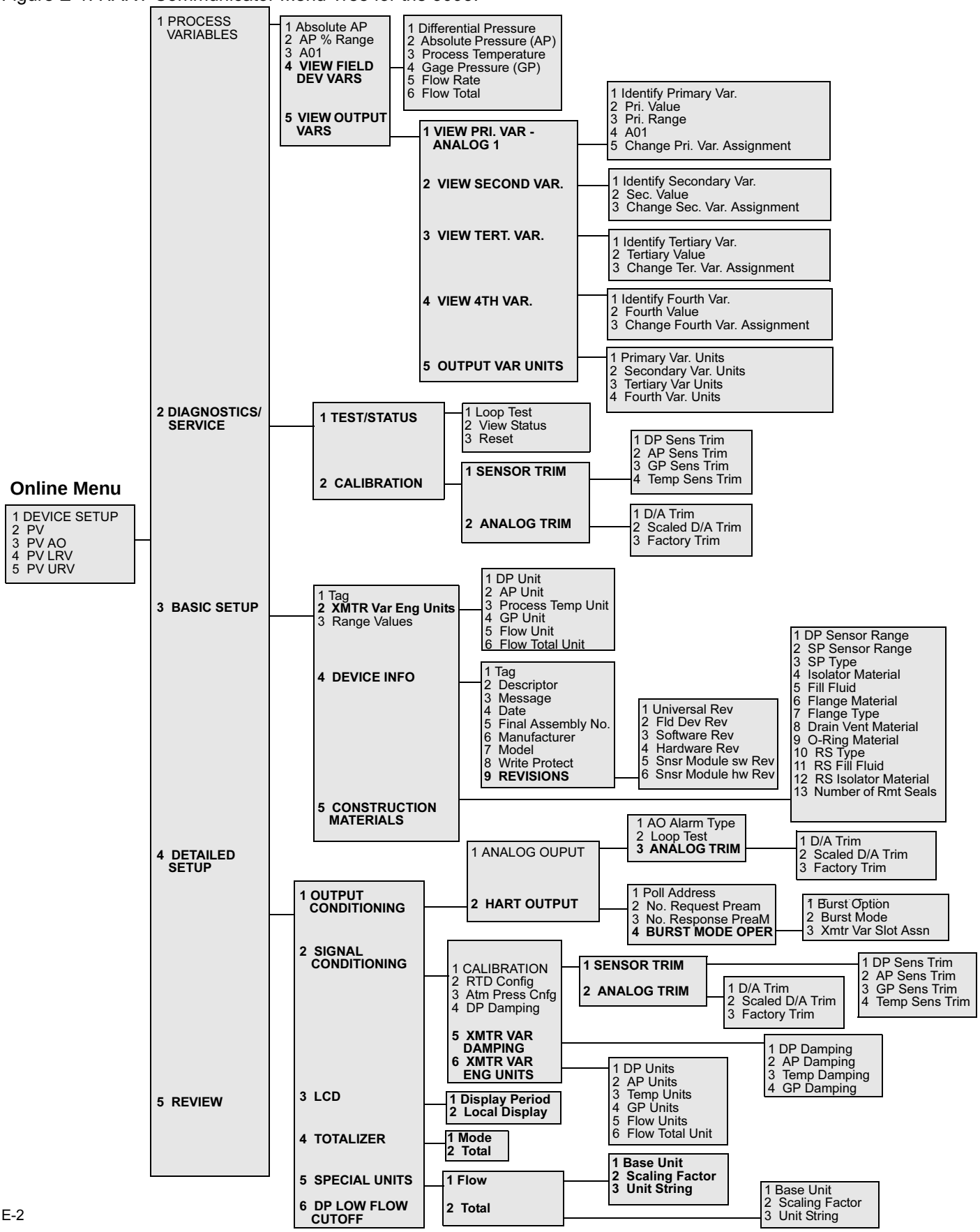


Table E-2. HART Fast Key Sequences for the 3095.

| Function | HART Communicator Fast Key Sequences |
|---|---|
| % rnge | 1, 1, 2 |
| % rnge | 1, 1, 5, 1, 3 |
| 4V is | 1, 1, 5, 4, 1 |
| AO Alrm typ | 1, 4, 1, 1, 1 |
| AO1 | 1, 1, 3 |
| AO1 | 3 |
| AP Damping | 1, 4, 2, 5, 2 |
| AP Sens Trim | 1, 2, 2, 1, 2 |
| AP Units | 1, 3, 2, 2 |
| Absolute (AP) | 1, 1, 4, 2 |
| Atm Press Cnfg | 1, 4, 2, 3 |
| Burst mode | 1, 4, 1, 2, 4, 2 |
| Burst option | 1, 4, 1, 2, 4, 1 |
| Change PV Assgn | 1, 1, 5, 1, 5 |
| Change SV Assgn | 1, 1, 5, 2, 3 |
| Change TV Assgn | 1, 1, 5, 3, 3 |
| Change 4V Assgn | 1, 1, 5, 4, 3 |
| D/A trim | 1, 2, 2, 2, 1 |
| DP Low Flow Cutoff | 1, 4, 6 |
| DP LRV | 4 |
| DP Sens Trim | 1, 2, 2, 1, 1 |
| DP Snsr Range | 1, 3, 5, 1 |
| DP URV | 5 |
| DP unit | 1, 3, 2, 1 |
| Date | 1, 3, 4, 4 |
| Descriptor | 1, 3, 4, 2 |
| Diff pres damp | 1, 4, 2, 4 |
| Diff pres | 1, 1, 1 |
| Diff pres | 2 |
| Drain vent matl | 1, 3, 5, 8 |
| Factory Trim | 1, 2, 2, 2, 3 |
| Fill fluid | 1, 3, 5, 5 |
| Final asmbly num | 1, 3, 4, 5 |
| Flange type | 1, 3, 5, 7 |
| Fld dev rev | 1, 3, 4, 9, 2 |
| Flnge matl | 1, 3, 5, 6 |
| Flo rate | 1, 1, 4, 5 |
| Flow Rate Special Units | 1, 4, 5, 1 |
| Flow Units | 1, 3, 2, 5 |
| GP Damping | 1, 4, 2, 5, 4 |
| GP Sens Trim | 1, 2, 2, 1, 3 |

| Function | HART Communicator Fast Key Sequences |
|---|---|
| GP Units | 1, 3, 2, 4 |
| Gage (GP) | 1, 1, 4, 4 |
| Hardware rev | 1, 3, 4, 9, 4 |
| Isoltr matl | 1, 3, 5, 4 |
| LCD Settings | 1, 4, 3 |
| Loop test | 1, 2, 1, 1 |
| Manufacturer | 1, 3, 4, 6 |
| Message | 1, 3, 4, 3 |
| Model | 1, 3, 4, 7 |
| Num remote seal | 1, 3, 5, 13 |
| Num req preams | 1, 4, 1, 2, 2 |
| Num resp preams | 1, 4, 1, 2, 3 |
| O ring matl | 1, 3, 5, 9 |
| PV is | 1, 1, 5, 1, 1 |
| Poll addr | 1, 4, 1, 2, 1 |
| Process temp unit | 1, 3, 2, 3 |
| Process temp | 1, 1, 4, 3 |
| RS fill fluid | 1, 3, 5, 11 |
| RS isoltr matl | 1, 3, 5, 12 |
| RS type | 1, 3, 5, 10 |
| RTD Config | 1, 4, 2, 2 |
| Range values | 1, 3, 3 |
| Reset | 1, 2, 1, 3 |
| SP Snsr Range | 1, 3, 5, 2 |
| SP Type | 1, 3, 5, 3 |
| SV is | 1, 1, 5, 2, 1 |
| Scaled D/A trim | 1, 2, 2, 2, 2 |
| Snsr module hw rev | 1, 3, 4, 9, 6 |
| Snsr module sw rev | 1, 3, 4, 9, 5 |
| Software rev | 1, 3, 4, 9, 3 |
| Status group 1 | 1, 6 |
| Totalizer | 1, 4, 4 |
| Totalizer Special Units | 1, 4, 5, 2 |
| TV is | 1, 1, 5, 3, 1 |
| Tag | 1, 3, 1 |
| Temp Sens Trim | 1, 2, 2, 1, 4 |
| Temp damp | 1, 4, 2, 5, 3 |
| Universal rev | 1, 3, 4, 9, 1 |
| View status | 1, 2, 1, 2 |
| Write protect | 1, 3, 4, 8 |
| Xmtr Var Slot Assn | 1, 4, 1, 2, 4, 3 |

## CALIBRATION

The procedures outlined below refer to the use of Rosemount's Engineering Assistant software, EA-5.0 or newer. With the exception of the Flow Computer Verification, all other functions in this procedure can also be performed using a HART Communicator.

### Static Pressure Sensor Absolute/Gage Pressure Calibration

1. Set up pressure calibrator to apply pressure to the high and low sides of the 3095.
2. With ports vented to atmosphere, right-click on the 3095 device icon in the device connection view and click on Process Variables to view measurement values. If the 3095 has a gauge pressure sensor, it should display 0 (zero) PSI gauge pressure. If not, use calibration function to zero the GP sensor by right-clicking on the device icon and scroll to Calibrate, Sensor Trim, GP Sensor Trim and choose "Zero Sensor" function. Complete the Zero Trim function to send the value to the 3095. If the 3095 has an absolute pressure sensor it should display atmospheric pressure as its absolute pressure measurement. If it does not, use calibration functions but DO NOT zero the sensor; instead, go to offset value. Complete the Offset Trim function to send the value to the 3095.
3. Apply a reference pressure test point value at which the device normally operates. Record the as found condition.
4. If the 3095 is using a gauge pressure sensor and the gauge pressure measurement agrees with the test point value within specs, no further calibration is necessary. Record as left condition.

   -or-

   If the 3095 is using an absolute pressure sensor and the absolute pressure measurement agrees with the sum of the pressure reference gauge pressure test point, plus an accurate atmospheric pressure value, no further calibration is required. Record as left condition.

   -or-

   If the Process Variables digital pressure measurement does NOT agree within specs, calibrate the 3095 pressure sensor. Right-click on the device icon and scroll down to Calibrate, Sensor Trim, and GP or AP Sensor Trim, as applicable, and click on the "Trim Sensor" functions.

5. If you have previously performed the Zero Sensor function or the Offset Sensor function per step 2 above, and now you have a reference pressure applied, choose the "Slope Trim" function. If the 3095 is using a gauge pressure sensor, enter the reference gauge pressure test point value as the Slope Trim value. If the 3095 is using an absolute pressure sensor, add the reference gauge pressure test point value and an accurate atmospheric pressure value, and enter the sum as the Slope Trim value. Complete the calibration function to send the value to the 3095.

6. If the Process Variables digital value for pressure from the 3095 still does not agree with the test point value within specs, repeat step 5. Record as left condition.
7. If the 3095 is using a gauge pressure sensor, review the Atmospheric PRessure value. Right-click on the 3095 device icon, and scroll to Calibrate, Sensor Trim, Atmospheric Press. The Atmospheric Press value entered should be representative of the average atmospheric pressure at the installation site.

## Differential Pressure Calibration

1. Set up pressure calibrator to apply pressure to only the high side port of the 3095.
2. With equalize valve open, or high and low side ports both vented, go to the Process Variables screen to view measurement. The 3095 should read 0 (zero) DP. If not, use calibration function to zero the DP sensor. Right-click on the device icon and scroll to Calibrate, Sensor Trim, DP Sensor Trim, and choose the “Zero Trim” function. Complete the Zero Trim function to send the value to the 3095.
3. Apply a reference pressure test point value as a DP that the device normally operates at. Record the as found condition.
4. If the 3095 Process Variables digital value for DP pressure agrees with the test point value within specs, no further calibration is necessary. Record as left condition. If NOT, calibrate DP pressure of 3095. Right-click on device icon and scroll down to Calibrate, Sensor Trim, DP Sensor Trim and click on the “Trim Sensor” function.
5. If you have previously performed the “Zero Trim” function per step 2 above, and now you have a reference pressure applied, choose the “Slope Trim” function. Enter the reference pressure test point value as the Slope Trim value. Complete the calibration function to send the value to the 3095.
6. If the Process Variables digital value for DP from the 3095 still does not agree with the test point value within specs, repeat step 5 above. Record as left condition.

## Temperature Sensor Calibration

1. Set up the calibrator to simulate a 100-ohm platinum, alpha 385 RTD. Wire the two red wires from the 3095 RTD cable to one connection, and the two white wires to the other connection.
2. Apply a test point temperature value that represents normal process temperature. View the temperature reading in the Process Variables screen. Record the as found condition.
3. If the 3095 Process Variables temperature value agrees with the test point value within 2 degrees, no further calibration is necessary. Record as left condition. If NOT, calibrate the temp sensor of the 3095.
4. Adjust calibrator/RTD simulator to a test point temperature value that represents a minimum process temperature (for example, 32 °F). Right-click on the 3095 device icon. Scroll to Calibrate, Sensor Trim, Temp Sensor Trim, and choose the Trim Sensor function. Then choose the Offset Trim function, and enter the low temp test point value as the Offset Trim value. Complete the calibration function to send the value to the 3095.
5. Adjust calibrator/RTD simulator to a test point temperature value that represents the maximum process temperature (for example, 140 °F). Right-click on the 3095 device icon and return to the Temp. Trim Sensor function. Choose the Slope Trim function and enter the high temp. test point value as the Slope Trim value. Complete the calibration function to send the value to the 3095.
6. Repeat steps 2 and 3. If the Process Variables temperature value from the 3095 still does not agree with the test point value within 2 degrees, repeat steps 4 and 5. If the process reading agrees with test point value, record as left condition.

## Analog Output Trim

1. Set up VOM reference meter to measure 4-20 mA.
2. Right-click on the 3095 device icon. Scroll down to Diagnostics and Tests, and click on Loop test. Choose the 4 mA output and compare to the value measured on reference meter. Record as found condition. Choose the 20 mA output and compare to reference meter. Record as found condition. If mA measurements agree to within 0.04 mA, no further trim is necessary. If NOT, perform analog output trim (D/A trim).
3. Right-click on device icon. Scroll down to Calibrate and click on D/A Trim. When the 3095 output is set to 4 mA, read the value on the reference meter and, when prompted, enter that value on the D/A trim screen. Do the same when the 3095 output is set to 20 mA.
4. Repeat step 2. Record as left condition.

## Flow Calculation Verification

1. Verify the LRV to URV range (4-20 mA). Right-click on the 3095 device icon and scroll to Configuration Properties. On the Basic Setup page, note the LRV to URV range values and unit of measure for flow rate. Edit as required per measurement requirements. Click on the “OK” button to apply any changes and close the window.
2. Right-click on the 3095 device icon. Scroll to SNAP-ON/Link Apps. and click on MultiVariable Engineering Assistant. After a “connecting to device” progress bar appears, a blank EA software screen appears. Click on the word, “transmitter”, and scroll to Test Calculation.
3. When the Test Calculation window appears, enter a DP value, a pressure value (in terms of absolute pressure), and a temperature value. These values should be from a calculation sheet that represents the primary element (for example, orifice plate) and be representative of NORMAL flowing conditions. If the Calculation sheet shows pressure as a gauge pressure value, add the assumed atmospheric pressure value to arrive at the absolute pressure value to use in the Test Calculation function.
4. In the Test Calculation window, click the “calculate” button. When the results appear, if the 3095 calculated flow rate agrees with the primary element calculation sheet to within 0.5%, no further flow computer configuration is necessary. If it does not agree, it will be necessary to use the EA software to “receive configuration” from the 3095. Then, click on Configure and Configure Flow to view the Flow Configuration Wizard file and compare to determine the reason for the discrepancy.
5. When the Test Calculation function is active, observe the 3095 mA output to verify that it agrees with the flow rate calculated, relative to the LRV to URV range values. Record the digital value of the flow rate displayed in the Test Calculation screen, and record the mA output value as the as left condition. You can also use the “Alt” and “Print Screen” buttons on the keyboard to take a copy of the Test Calculation screen; then, in a Word document, right-click and paste. Print or save as a record.

**NOTE**
If the DP, AP-GP, or Temp sensor measurement is out of spec, the “Factory Trim Recall” function can be used to set the device back to sensor trim values that were calibrated at Rosemount.

## Diagnostic Messages

The following pages contain a list of messages used by the HART Communicator (HC) and their corresponding descriptions.

Variable parameters within the text of a message are indicated with <*variable*>.

Reference to the name of another message is identified by <*message*>.

| Message | Description |
|---|---|
| Add item for ALL device types or only for this ONE device type. | Asks the user whether the hot key item being added should be added for all device types or only for the type of device that is connected. |
| Command Not Implemented | The connected device does not support this function. |
| Communication Error | Either a device sends back a response indicating that the message it received was unintelligible, or the HC cannot understand the response from the device. |
| Configuration memory not compatible with connected device | The configuration stored in memory is incompatible with the device to which a transfer has been requested. |
| Device Busy | The connected device is busy performing another task. |
| Device Disconnected | Device fails to respond to a command. |
| Device write protected | Device is in write-protect mode. Data can not be written. |
| Device write protected. Do you still want to shut off? | Device is in write-protect mode. Press YES to turn the HC off and lose the unsent data. |
| Display value of variable on hotkey menu? | Asks whether the value of the variable should be displayed adjacent to its label on the hotkey menu if the item being added to the hotkey menu is a variable. |
| Download data from configuration memory to device | Prompts user to press SEND softkey to initiate a memory to device transfer. |
| Exceed field width | Indicates that the field width for the current arithmetic variable exceeds the device- specified description edit format. |
| Exceed precision | Indicates that the precision for the current arithmetic variable exceeds the device- specified description edit format. |
| Ignore next 50 occurrences of status? | Asked after displaying device status. Softkey answer determines whether next 50 occurrences of device status will be ignored or displayed. |
| Illegal character | An invalid character for the variable type was entered. |
| Illegal date | The day portion of the date is invalid. |
| Illegal month | The month portion of the date is invalid. |
| Illegal year | The year portion of the date is invalid. |
| Incomplete exponent | The exponent of a scientific notation floating point variable is incomplete. |
| Incomplete field | The value entered is not complete for the variable type. |
| Looking for a device | Polling for multidropped devices at addresses 1–15. |
| Mark as read only variable on hotkey menu? | Asks whether the user should be allowed to edit the variable from the hotkey menu if the item being added to the hotkey menu is a variable. |
| No device configuration in configuration memory | There is no configuration saved in memory available to re-configure off-line or transfer to a device. |
| No Device Found | Poll of address zero fails to find a device, or poll of all addresses fails to find a device if auto-poll is enabled. |
| No hotkey menu available for this device. | There is no menu named “hotkey” defined in the device description for this device. |
| No offline devices available. | There are no device descriptions available to be used to configure a device offline. |
| No simulation devices available. | There are no device descriptions available to simulate a device. |
| No UPLOAD_VARIABLES in ddl for this device | There is no menu named “upload_variables” defined in the device description for this device. This menu is required for offline configuration. |
| No Valid Items | The selected menu or edit display contains no valid items. |
| OFF KEY DISABLED | Appears when the user attempts to turn the HC off before sending modified data or before completing a method. |
| Online device disconnected with unsent data. RETRY or OK to lose data. | There is unsent data for a previously connected device. Press RETRY to send data, or press OK to disconnect and lose unsent data. |
| Out of memory for hotkey configuration. Delete unnecessary items. | There is no more memory available to store additional hotkey items. Unnecessary items should be deleted to make space available. |

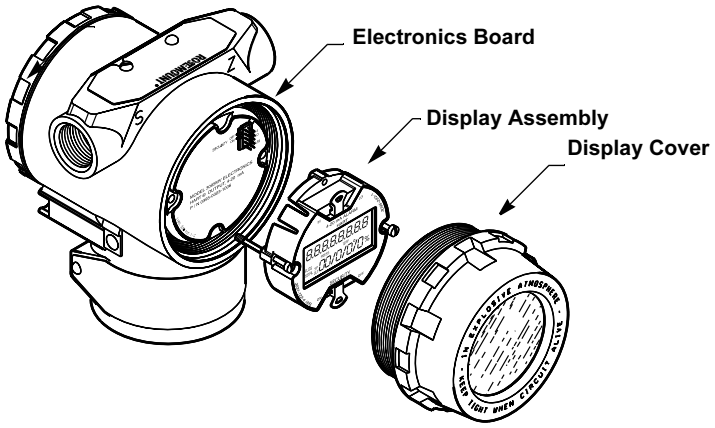
| | |
|---|---|
| Overwrite existing configuration memory | Requests permission to overwrite existing configuration either by a device-to-memory transfer or by an offline configuration. User answers using the softkeys. |
| Press OK... | Press the OK softkey. This message usually appears after an error message from the application or as a result of HART communications. |
| Restore device value? | The edited value that was sent to a device was not properly implemented. Restoring the device value returns the variable to its original value. |
| Save data from device to configuration memory | Prompts user to press SAVE softkey to initiate a device-to-memory transfer. |
| Saving data to configuration memory. | Data is being transferred from a device to configuration memory. |
| Sending data to device. | Data is being transferred from configuration memory to a device. |
| There are write only variables which have not been edited. Please edit them. | There are write-only variables which have not been set by the user. These variables should be set or invalid values may be sent to the device. |
| There is unsent data. Send it before shutting off? | Press YES to send unsent data and turn the HC off. Press NO to turn the HC off and lose the unsent data. |
| Too few data bytes received | Command returns fewer data bytes than expected as determined by the device description. |
| Transmitter Fault | Device returns a command response indicating a fault with the connected device. |
| Units for <variable> has changed. Unit must be sent before editing, or invalid data will be sent. | The engineering units for this variable have been edited. Send engineering units to the device before editing this variable. |
| Unsent data to online device. SEND or LOSE data | There is unsent data for a previously connected device which must be sent or thrown away before connecting to another device. |
| Use up/down arrows to change contrast. Press DONE when done. | Gives direction to change the contrast of the HC display. |
| Value out of range | The user-entered value is either not within the range for the given type and size of variable or not within the min/max specified by the device. |
| <message> occurred reading/writing <variable> | Either a read/write command indicates too few data bytes received, transmitter fault, invalid response code, invalid response command, invalid reply data field, or failed pre- or post-read method; or a response code of any class other than SUCCESS is returned reading a particular variable. |
| <variable> has an unknown value. Unit must be sent before editing, or invalid data will be sent. | A variable related to this variable has been edited. Send related variable to the device before editing this variable. |

## LCD DISPLAY

The LCD Display provides local display of the Rosemount 3095 process variables, calculations, and transmitter diagnostic messages. The display is located on the electronics board of the transmitter, leaving direct access to the signal terminals. An extended cover is required to accommodate the display. Figure E-2 shows the transmitter fitted with the LCD Display and extended cover.

**NOTE**
A 3-in. (76 mm) clearance is required for cover removal if a display is installed.

Figure E-2. Rosemount 3095 with Optional LCD Display




The LCD Display can be ordered factory-installed, or displays can be ordered as spare parts to retrofit existing Rosemount 3095 transmitters already in the field (see “Spare Parts List” on page A-14).

**NOTE**
For compatibility issues when retrofitting spare parts, see Appendix A: Specifications and Reference Data.

The LCD Display features a liquid crystal display that provides readouts of the Rosemount 3095 process variables and flow calculations. Use either the Rosemount 3095 Engineering Assistant Software or HART hand-held communicator to change the parameters displayed by the LCD Display (see Figure E-3 on page E-11). Any of the following parameters and calculations are available for display:

| Parameter Name | LCD Parameter Name | Engineering Unit / Example |
|---|---|---|
| Flow Rate | FLOW | SCF / H |
| Differential Pressure | DIFF PRES | INH2O |
| Totalized Flow | FLOW TOTAL | SCF |
| Gage Pressure | GAGE PRES | PSI |
| Static Pressure | STAT PRES | PSI |
| Temperature | TEMP | °F |
| Analog Output | CURR OUT | MA |
| Percent Of Range | % RANGE | % |

The default display time is three seconds to display user-selected parameters. The LCD Display display time is selectable in one second increments from two to ten seconds. The LCD scrolls through the entire list of selected parameters before repeating the displays. The LCD Display uses a two-line display to indicate the engineering unit and parameter name; a third value is displayed to indicate the parameter value.

Figure E-3. LCD Display


During Critical Alarm States or Overrange Conditions, the LCD display alternates between the selected parameters and the critical alarms or overrange conditions. For more information concerning Fatal Alarm Messages and Critical Alarm Messages, see Section 5: Troubleshooting.

## Totalizer Display

The LCD Display can display flow total as a selected variable. Depending on the Flow Total Unit selected, the display will show the measurement value to a varying decimal point. Table E-3 shows the available flow total units and maximum displayable flow total.

The non-volatile totalizer saves flow total information to the permanent memory of the transmitter. Time between saves to permanent memory is less than five minutes. In the event of power loss, no more than five minutes of flow totalization information is unretrievable.

Table E-3. Rosemount 3095 Flow Total Display

| Flow Total Unit Description | LCD Display | Maximum Displayable Flow Total on LCD Display | Maximum Displayable Flow Total on the Field Communicator or EA Software |
|---|---|---|---|
| Standard Cubic Feet | SCF | ≤ 1.100E 12 SCF or[1] ≤ 4.29 billion pounds | Flow total equivalent to 4.29 billion pounds |
| Normal Cubic Meters | NCM | ≤ 1.100E 12 NCM or[1] ≤ 4.29 billion pounds | Flow total equivalent to 4.29 billion pounds |
| Standard Cubic Meters | SCM | ≤ 1.100E 12 SCM or[1] ≤ 4.29 billion pounds | Flow total equivalent to 4.29 billion pounds |
| Normal Liters | NLT | ≤ 1.100E 12 NLT or[1] ≤ 4.29 billion pounds | Flow total equivalent to 4.29 billion pounds |
| Ounces | OZ | 6.800E 10 OZ | 6.800E 10 OZ |
| Pounds | LB | 4.290E 09 LB | 4.290E 09 LB |
| Metric Tons | MTON | 1.900E 06 MTON | 1.900E 06 MTON |
| Short Tons | STON | 2.100E 06 STON | 2.100E 06 STON |
| Long Tons | LTON | 1.900E 06 LTON | 1.900E 06 LTON |
| Grams | GM | 1.100E 12 GM | 1.950E 12 GM |
| Kilograms | KGM | 1.900E 09 KGM | 1.900E 09 KGM |
| Special Quantity Unit | User Defined | ≤ 1.100E 12 SCF or[1] ≤ 4.29 billion pounds | Flow total equivalent to 4.29 billion pounds |

*(1) Totalizer display will autoscale flow total reading. Standard display shows flow total to two decimal places. As flow total increases greater than 1,000,000; the decimal place moves to the right. At flow totals greater than 100,000,000; the flow total is displayed in exponential notation. For example, 100,000,000 lb will be displayed as 1.000 E 08*

The LCD Display will totalize flow up to a maximum value of 4.29 billion pounds or the equivalent flow total in other units of measure, after which it will scroll over to 0 Total Flow. Maximum total flow for standard volume measurements can be calculated by dividing 4.29 billion pounds or 190 billion kilograms by the standard density. For example, given a standard density for natural gas of 0.04 lbs/$ft^3$ or 0.68 kg/$m^3$; the maximum total flow value is:

4.29 billion lbs ÷ 0.04 lbs/$ft^3$ = 107.2 billion SCF

190 billion kg ÷ 0.68 kg/$m^3$ = 2.86 billion SCM

The maximum displayable value on the LCD Display of the 3095 transmitter is the lesser of the following two numbers: Base Volumetric Units expressed as 1.1E 12 or the flow total in Base Volumetric Units that is equivalent to 4.29 billion pounds.

Flow Total ≤ 1.100E 12 SCF or
Flow Total ≤ 4.29 billion pounds

## Installation

Installing the display on a 3095 transmitter requires a small instrument screwdriver and the display kit (PN 3095-0492-0001 for Aluminum Housing, PN 3095-0492-0002 for SST Housing).

The display kit includes:

- one LCD Display assembly
- one extended cover with cover O-ring installed
- two captive screws
- one display connector (10-pin male-to-male)

Table E-4. Electronics Compatibility Table

| Electronics Board Revision | Sensor Module | | | LCD display |
|---|---|---|---|---|
| | Rev. 142(a) | Rev. 142(b) | Rev. 149 | |
| Electronics Board Rev. 4 and 5 | Compatible | Compatible | Not Compatible | Not Compatible |
| Electronic Board Rev. 8, 9, and 10 | Compatible | Compatible | Not Compatible | Not Compatible |
| Electronics Board Rev. 12 and 13 | Compatible | Compatible | Compatible | Compatible |
| Electronic Board Rev. 15 | Compatible | Compatible | Compatible | Compatible |

**NOTE**
The LCD Display requires a Revision 12 or higher electronics board. See Table E-4 for compatibility information.

Use the following steps to install the display. See Figure E-2 on page E-10 for an illustration.

1. If the transmitter is installed in a loop, secure the loop and disconnect power.
2. Remove the transmitter cover opposite the field terminal side.
3. Note location of security/alarm jumpers. Remove the jumpers and discard. Insert the display connector into the ten-pin socket on the electronics circuit board (see Figure E-2).
4. Remove the two circuit board captive screws. To do this, loosen the screws to release the board, then pull out the screws until they are stopped by the captive thread inside the circuit board standoffs. Continue unscrewing and remove the two screws; the circuit board remains.
5. The electronics housing may be rotated to improve field access to the two compartments. To rotate the housing less than 180 degrees, release the housing rotation set screw and turn the housing not more than 180 degrees. To rotate the housing greater than 180 degrees, see “Housing Rotation” on page 2-8.

**NOTE**
The display may be installed in 90-degree increments for easy viewing. One of the four connectors on the back of the display assembly must be positioned to accept the display connector.

Rotating the housing greater than 180 degrees without performing the disassembly procedure may damage the 3095 sensor module.

6. Decide which direction the display should be oriented. Insert the long display screws into the two holes on the display assembly that coincide with the holes on the circuit board.
7. Attach the display assembly to the circuit board by threading the screws into captive threads and attaching the display assembly to the display connector. Tighten the display screws in the standoffs to secure the display assembly and electronic circuit board in place. The display screws are designed to be captive screws, so they must first be tightened past the captive thread within the standoffs and then tightened again to hold the display/circuit board assembly to the housing.
8. Check security and alarm jumpers for desired operation. Adjust if necessary.
9. Attach the extended cover metal to metal.

## TRANSIENT PROTECTION TERMINAL BLOCK

The transient protection terminal block option increases the 3095 ability to withstand electrical transients induced by lightning, welding, or heavy electrical equipment. The 3095, with integral transient protection installed, meets the standard performance specifications as outlined in this product manual. In addition, the transient protection circuitry meets IEEE Standard 587, Category B and IEEE Standard 472, Surge Withstand Capability.

Transient protection terminal blocks can be ordered factory-installed, or they can be ordered as a spare part to retrofit existing Rosemount 3095 transmitters already in the field. See “Spare Parts List” on page A-14.

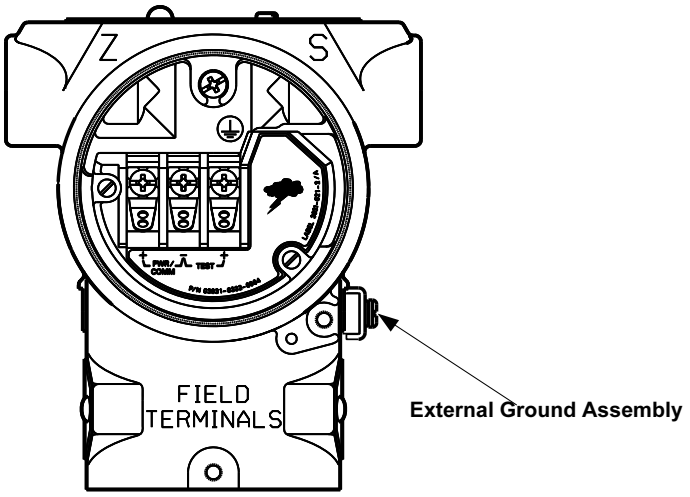
## Installation

The transient protection terminal block is shipped installed when ordered at the same time as the Rosemount 3095. Use the following procedure to install the terminal block when the option is ordered as a spare part or retrofit.

1. Remove the cover above the side marked FIELD TERMINALS on the Rosemount 3095 electronics housing.
2. Loosen the two terminal block mounting screws and pull the standard terminal block out.
3. If present, transfer the signal wires from the old terminal block to the transient protection terminal block. Be sure that the + signal wire is reconnected to the SIG + or PWR + terminal, and the – signal wire is reconnected to the SIG – or PWR – terminal.
4. Install the terminal block by positioning the terminal block above the post connector pins, and press into place.
5. Use the captive mounting screws on the terminal block to secure it to the electronics housing.
6. Ground the terminal block using one of the options described on 2-13.
7. Replace the 3095 cover.
8. If desired, re-trim the transmitter (see “Sensor Trim Procedure” on page 3-13).

**NOTE**
Installation of the Transient Protection Terminal Block does not provide transient protection unless the 3095 is properly grounded. See 2-13 for grounding information.

Figure E-4. Transient Protection Terminal Block with External Ground Assembly.



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