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English
Rev. GA

Model 3095 MV™ Multivariable™ Mass Flow Transmitter

PlantWeb™

ROSEMOUNT®

FISHER-ROSEMOUNT™ Managing The Process Better.™

Model 3095 MV™ Multivariable™ Mass Flow Transmitter

Model 3095 MV Software Revision 13
Engineering Assistant Software Revision 4.00
HART Communicator Software Revision 2.1

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.

Within the United States, Rosemount Inc. has two toll-free assistance numbers.

Customer Central: 1-800-999-9307 (*7:00 a.m. to 7:00 p.m. CST)*
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⚠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.

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Section **1**

Introduction

USING THIS MANUAL

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

This manual consists of the following sections:

Section 2: Initial Checkout and Field Installation

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

Section 3: Options and Accessories

describes options available with the Model 3095 MV: the LCD meter, the mounting brackets, and the transient protection terminal block.

Section 4: Using the Model 3095 MV Engineering Assistant Software

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

Section 5: Troubleshooting and Maintenance

provides troubleshooting instructions for dealing with potential mechanical or electrical difficulties.

Section 6: Theory of Operation

discusses the operating principles of the transmitter and provides information about DP flow.

Section 7: Specifications and Reference Data

includes specification data for the Model 3095 MV and spare parts information.

Appendix A: HART® Communicator

contains a communicator overview, a HART Communicator menu tree for the Model 3095 MV, and a table of HART Communicator fast key sequences. A table of diagnostic messages associated with this communicator is also included.

Appendix B: Approval Drawings

contains Factory Mutual (FM) and Canada Standards Association (CSA) certified drawings.

Appendix C: EA Error Message Summary

identifies possible error messages that might occur when using the Engineering Assistant software.

Appendix D: Critical Alarms for Previous Software Revisions

contains troubleshooting information for previous electronics board and sensor module revisions.

Appendix E: Compatibility Issues

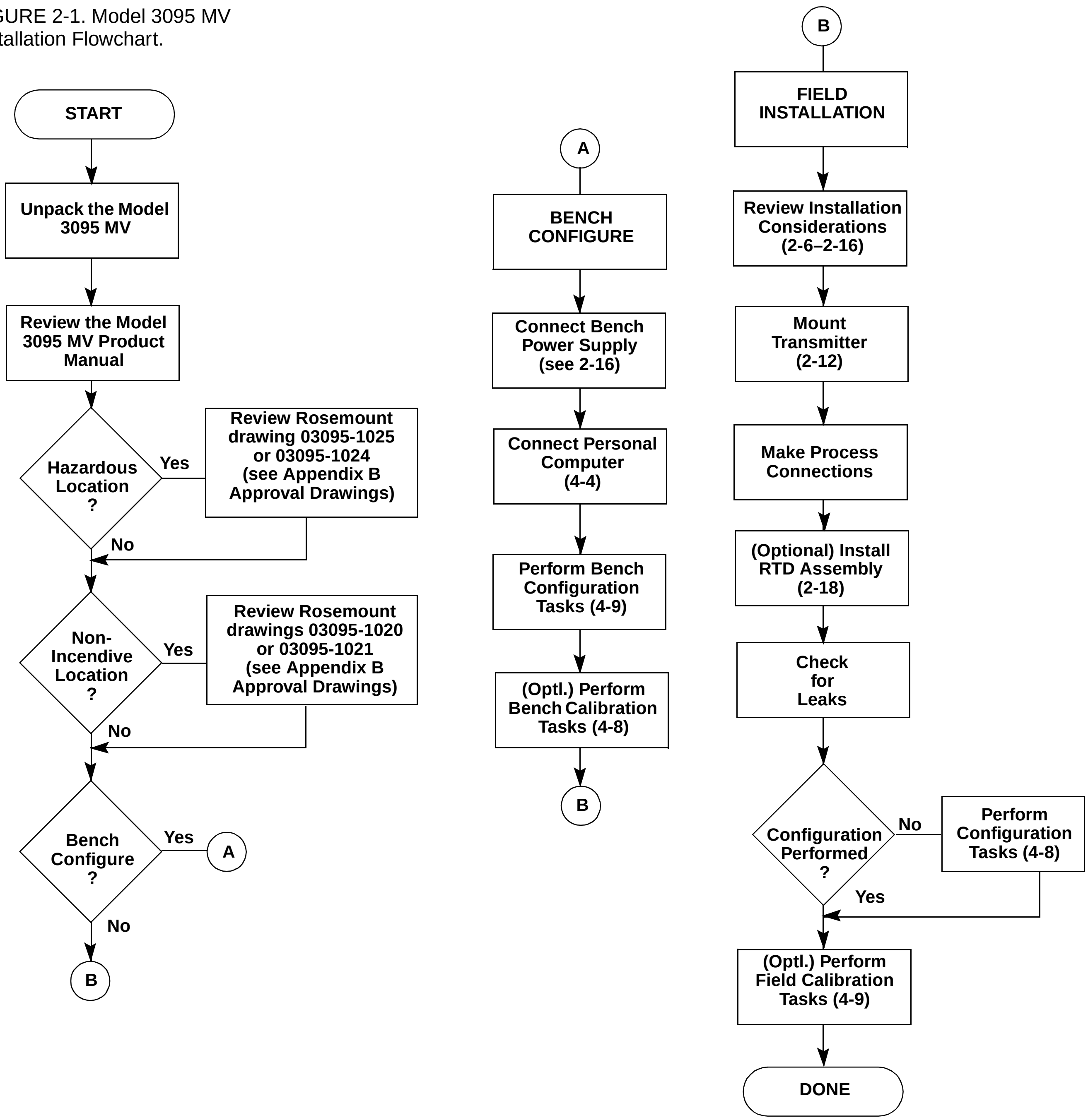
contains compatibility information for retrofitting previous Model 3095 MV versions with new parts.

Section 2

Initial Checkout and Field Installation

This section contains an installation flowchart, information on the Model 3095 MV system, installation considerations, and a field installation procedure. The suggested sequence of Model 3095 MV installation and wiring is shown in Figure 2-1.

FIGURE 2-1. Model 3095 MV Installation Flowchart.



UNPACKING THE MODEL 3095 MV

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

Model 3095 MV

This box contains the Model 3095 MV. If ordered, this package also contains an RTD cable and optional mounting hardware. One Model 3095 MV Multivariable Transmitter Product Manual is included with each order of transmitters.

Engineering Assistant Software Package (Accessory)

The complete Engineering Assistant Software Package includes two installation 3.5-in. floppy disks, one HART modem and cables, and the Model 3095 MV Multivariable Transmitter Product Manual. 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.

BECOMING FAMILIAR WITH THE MODEL 3095 MV

Figure 2-2 illustrates a typical Model 3095 MV installation site, and Figure 2-3 illustrates the exploded view of the Model 3095 MV. Major components of the Model 3095 MV System and the Model 3095 MV Multivariable Transmitter are identified in these figures.

FIGURE 2-2. Typical Model 3095 MV Installation Site.

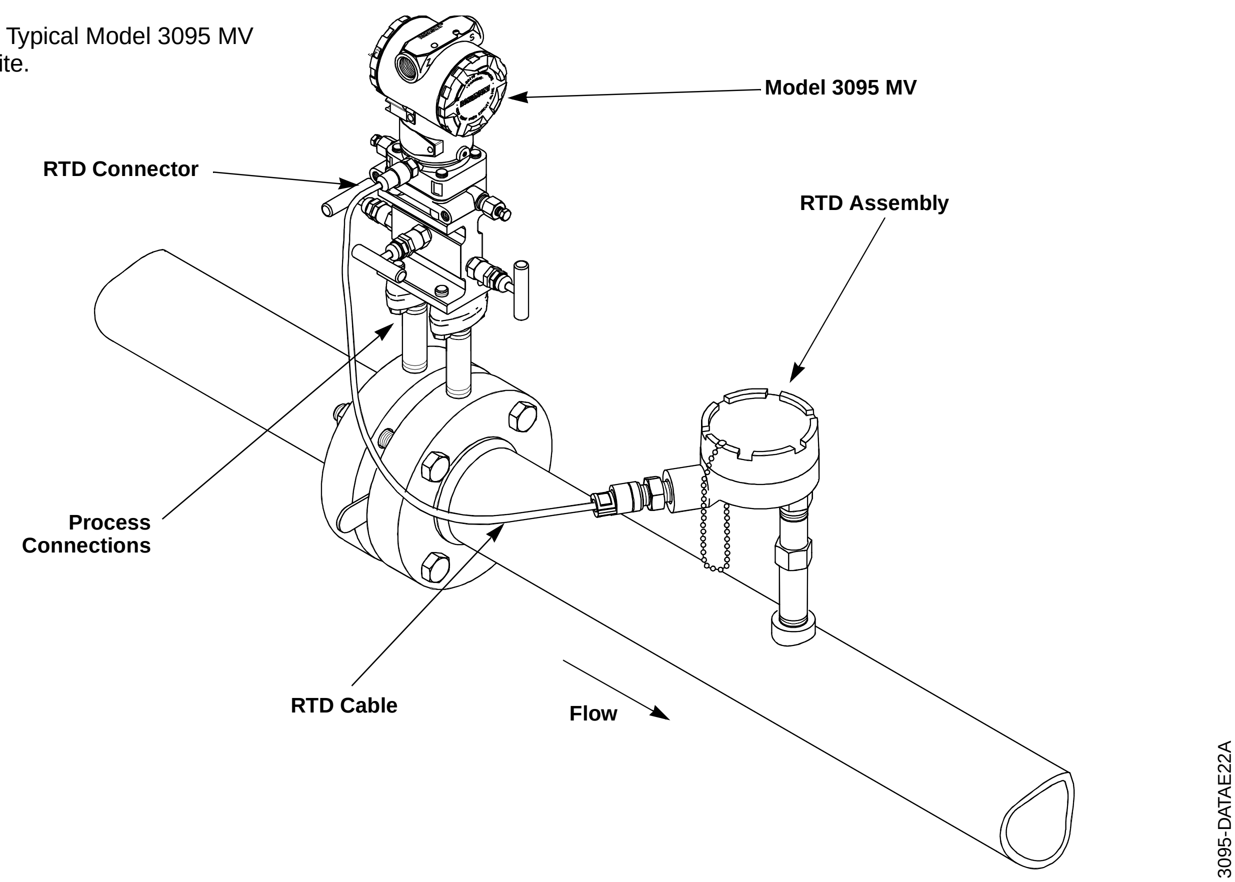
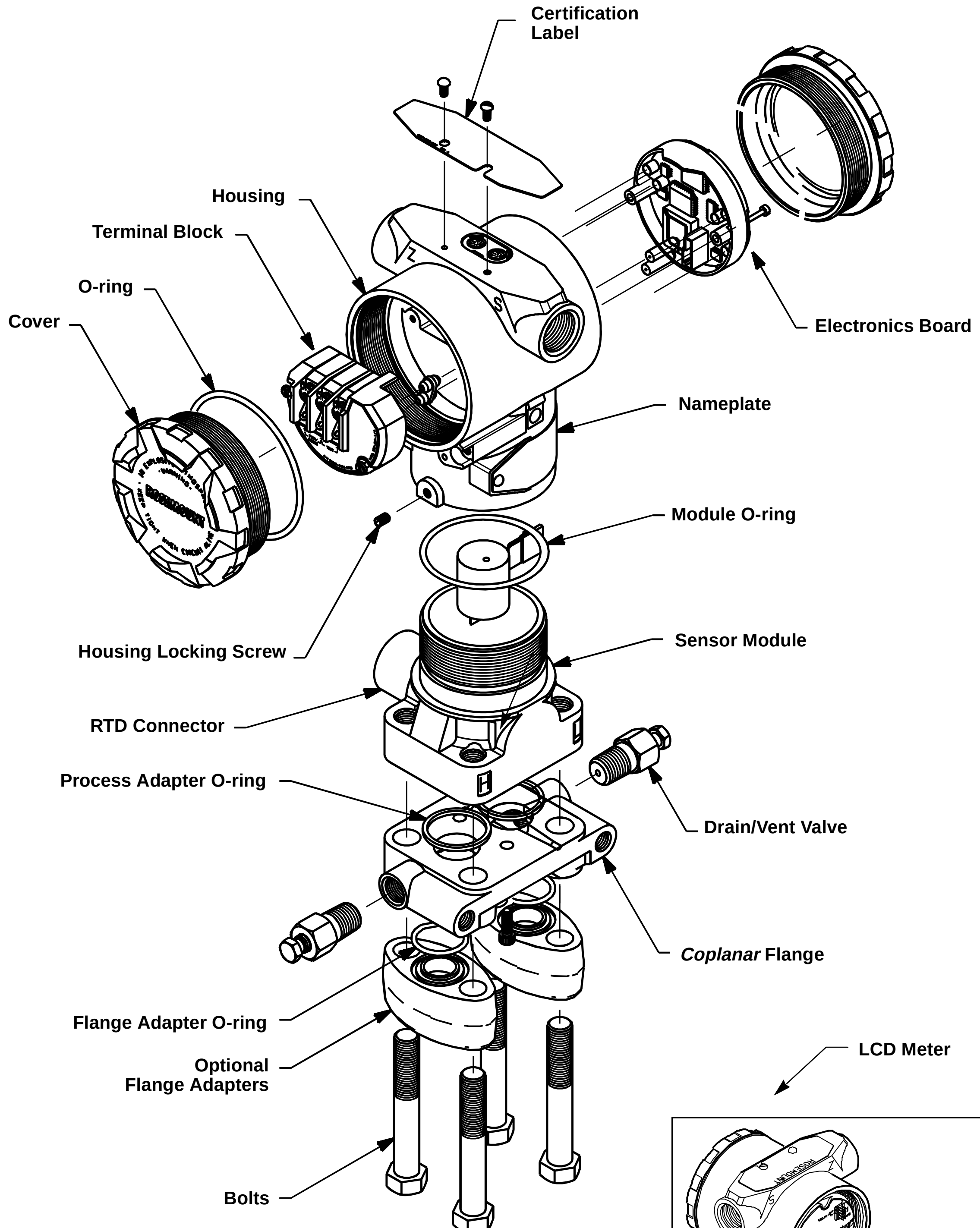
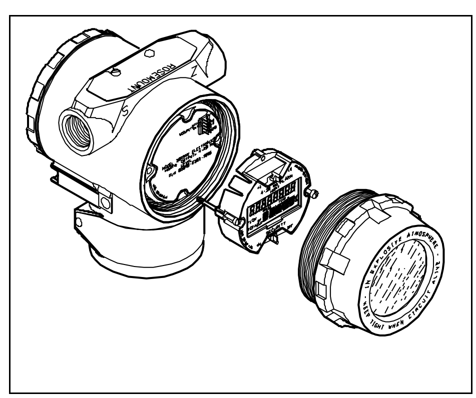


FIGURE 2-3. Exploded View of Model 3095 MV Multivariable Transmitter and LCD Meter.





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INITIAL INSPECTION

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

Bench Configuration and Calibration

Before mounting the Model 3095 MV in the field, the Multivariable Transmitter can be configured on the bench using a personal computer and the Engineering Assistant (EA) Software.

The EA software provides advanced configuration capabilities, including flow parameters such as AIChE fluid, meter tube bore, differential producer bore, and differential producer material.

After bench configuration, the Model 3095 MV may be bench calibrated. These procedures include absolute or gage pressure and differential pressure sensor offset (zero) and slope (span) trim, and RTD calibration.

For information on bench configuration and bench calibration, see **Bench Configuration (Standard)** on page 4-8 and **Bench Calibration Procedure** on page 4-9.

Write Protect and Failure Mode Alarm Jumpers

Once 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 Model 3095 MV continuously monitors its own operation. This 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 2-4). 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 4–20 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:

⚠WARNING

Explosions can cause death or serious injury. Do not remove the instrument cover in explosive atmospheres when the circuit is alive.

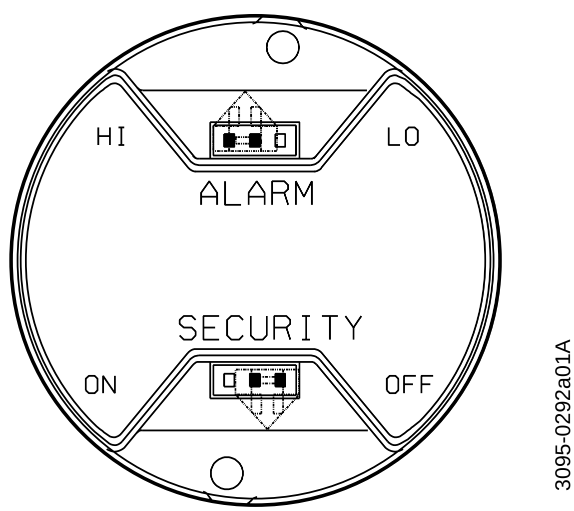
1. If the transmitter is installed, secure the loop and remove power.
2. Remove the housing cover opposite the field terminal side.
3. Locate the jumper on the electronics board (see Figure 2-5), then move the jumper to the desired setting.

⚠WARNING

Explosions can cause death or serious injury. Both transmitter covers must be fully engaged to meet explosion-proof requirements.

4. Reattach the transmitter cover. To avoid condensation, metal to metal contact is preferred.
5. If the transmitter is installed, reapply power.

FIGURE 2-4. Write Protect and Alarm Jumpers.



ELECTRONICS BOARD

NOTE
Security jumper not installed = Not Write Protected.
Alarm jumper not installed = High Alarm.

GENERAL CONSIDERATIONS

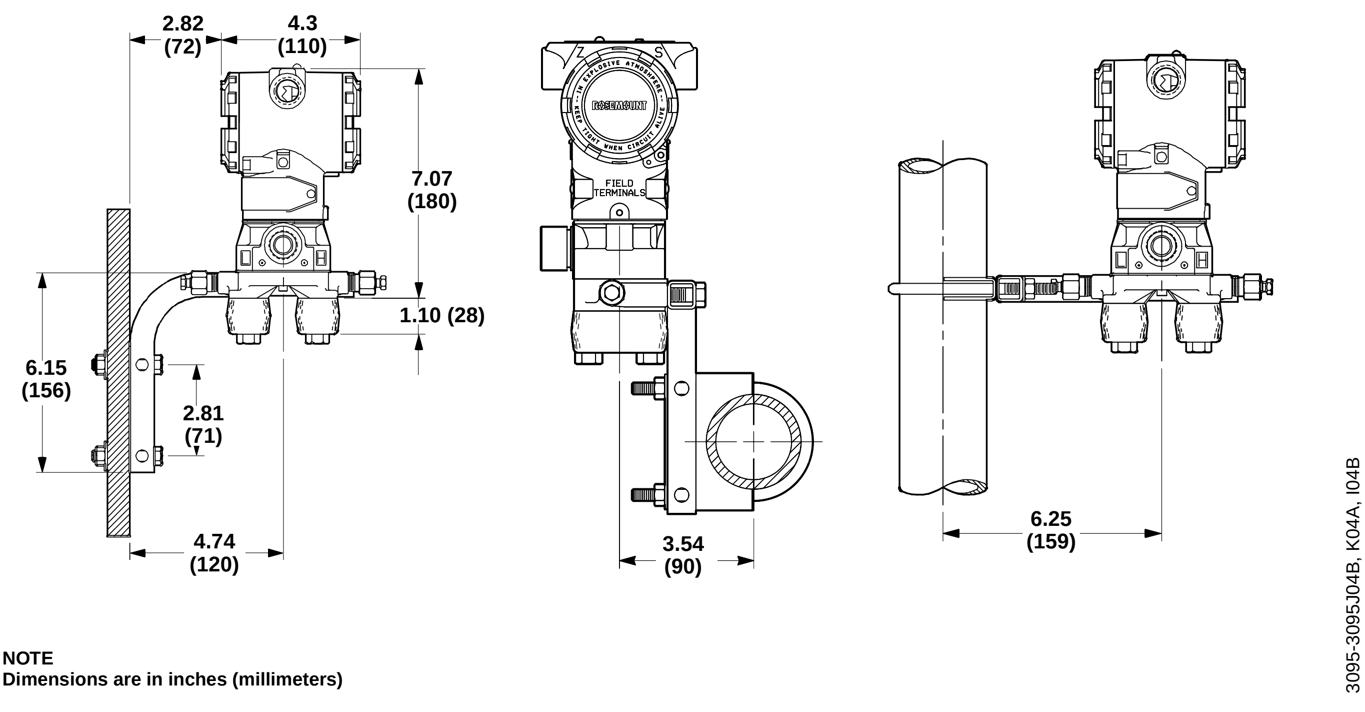
The accuracy of a flow or pressure measurement depends on proper installation of the transmitter and impulse piping. The piping between the process and the transmitter must accurately transfer the pressure in order to obtain accurate measurements. Mount the transmitter close to the process and use a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

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

MECHANICAL CONSIDERATIONS

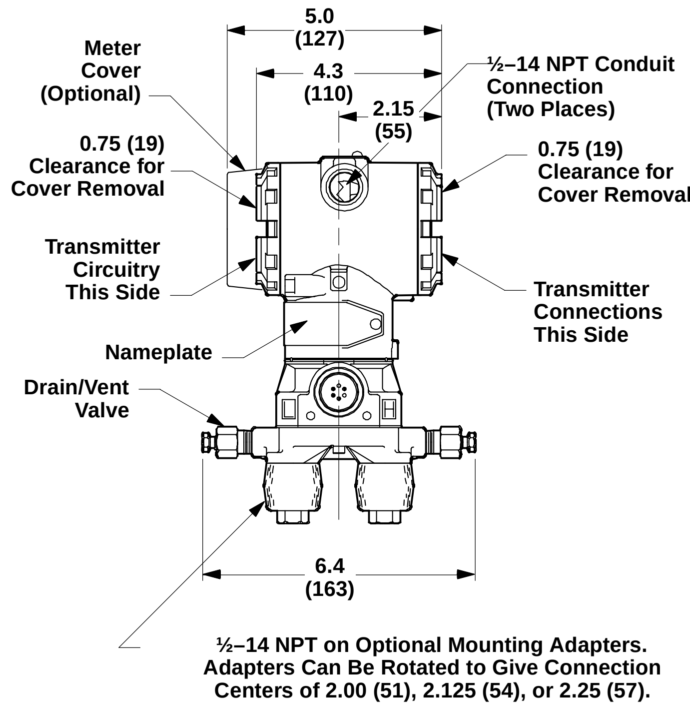
The Rosemount Model 3095 MV may be panel-mounted, wall-mounted, or attached to a two-inch pipe with an optional mounting bracket. Figure 2-5 illustrates Model 3095 MV mounting configurations, Figure 2-6 shows the transmitter dimensions, and Figure 2-7 illustrates example installations.

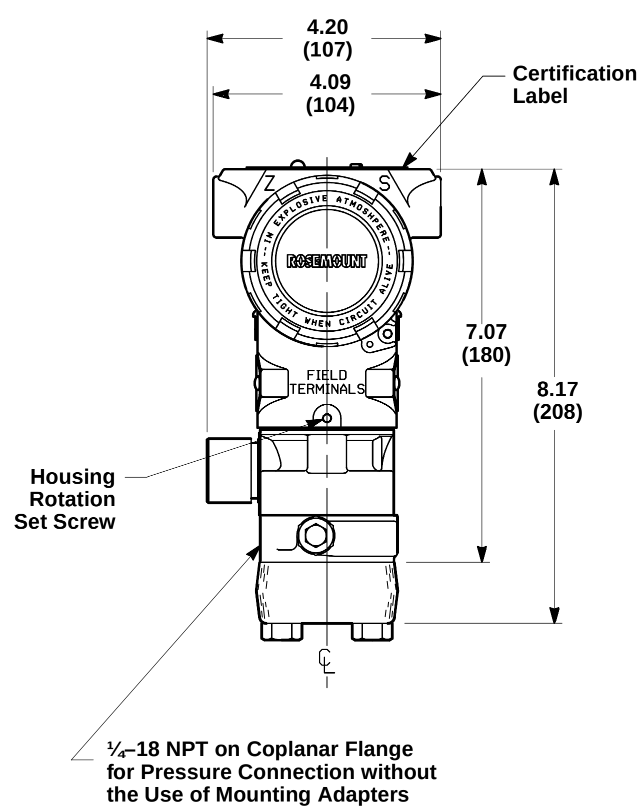
FIGURE 2-5. Mounting Configurations.



NOTE
Dimensions are in inches (millimeters)

FIGURE 2-6. Dimensional Drawings of Model 3095 MV.





NOTE
Dimensions are in inches (millimeters)

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Taps

Different measurement conditions call for different piping configurations.

Liquid Flow

For liquid flow measurement, place taps to 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

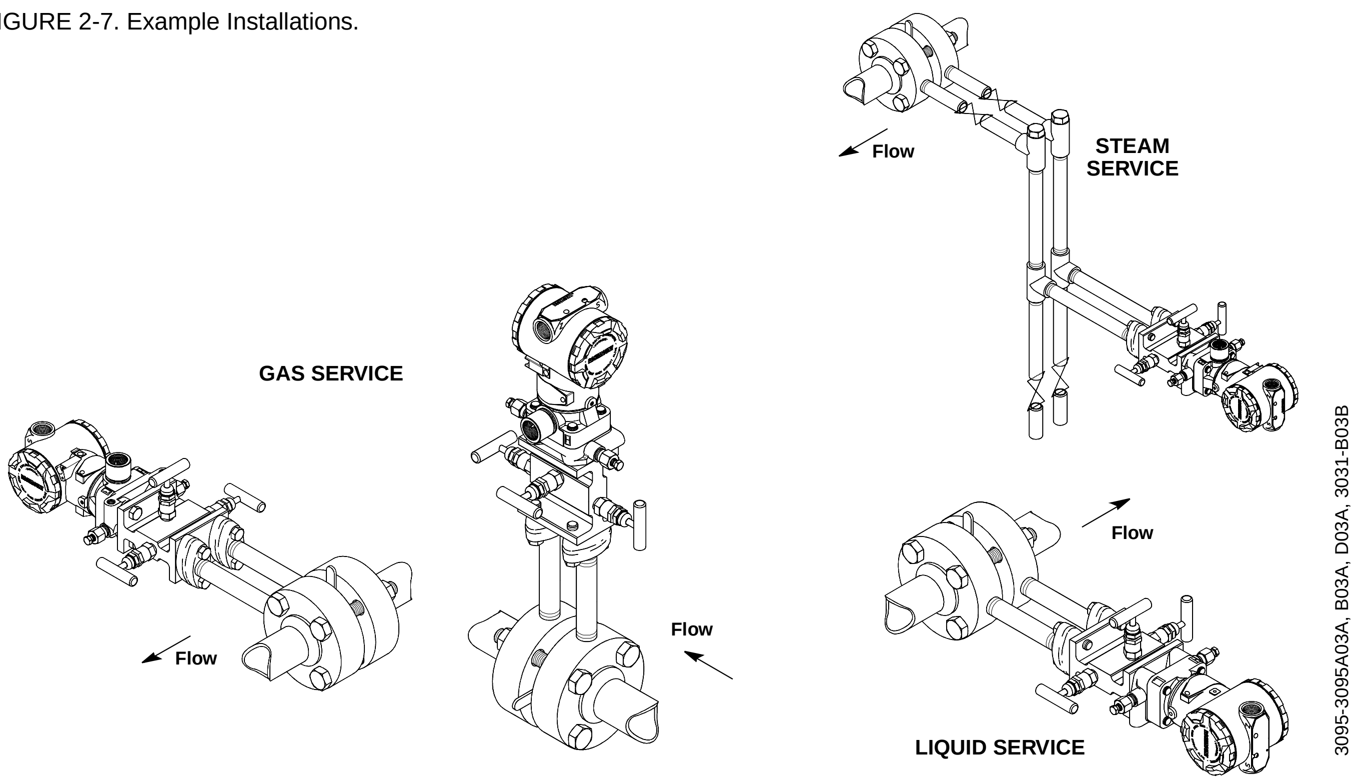
For steam flow measurement, place taps to the side of the line, with the transmitter mounted below them to ensure that the impulse piping stays filled with condensate.

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 2-7 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 2-7. Example Installations.



NOTE
In steam service, lines should be filled with water to prevent contact of the live steam with the transmitter. Condensate chambers are not needed because the volumetric displacement of the transmitter is negligible.

Impulse Piping

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 legs.

The best location for the transmitter in relation to the process pipe depends on the process itself. 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 CONSIDERATIONS

Mount the transmitter to minimize ambient temperature changes. **Section 6 Specifications and Reference Data** 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 2-7 on page 2-8. To rotate the housing greater than 180 degrees, follow steps 1–6 of the disassembly procedure on page 5-12.

> ⚠CAUTION
>
> Rotating the housing greater than 180 degrees without performing the disassembly procedure may damage the Model 3095 MV 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 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 clearance if possible to allow access.

Process Considerations

⚠WARNING

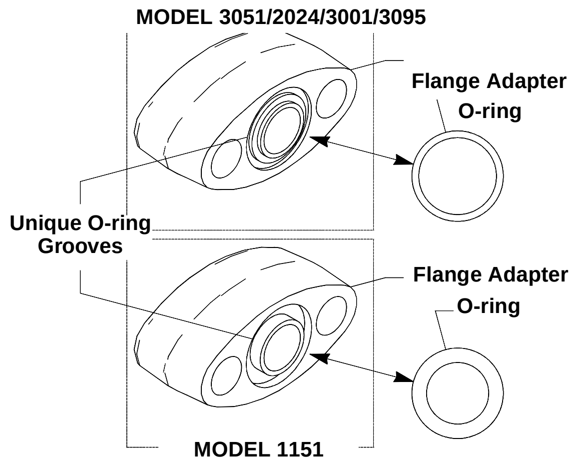
Explosions can cause death or serious injury. Check transmitter materials of construction and fill fluid for compatibility with the intended process fluid.

Model 3095 MV 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.

⚠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 List on page 6-12 for the correct part numbers of the flange adapters and O-rings designed for the Model 3095 MV Multivariable Transmitter.

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. Refer to the process sensor body reassembly procedure on page 5-16.

Mounting Considerations

The Model 3095 MV Multivariable Transmitter total weight varies depending on the components ordered (see Table 2-1). This weight must be securely supported.

TABLE 2-1. Transmitter Weight.

Component	Weight lb (kg)
Model 3095 MV 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 Model 3095 MV facilitate mounting to a panel, wall, or 2-in. pipe. The bracket option for use with the Coplanar flange is 316 SST with 316 SST bolts. Figure 2-8 shows bracket dimensions and mounting configurations for this option.

When installing the transmitter to one of the mounting brackets, torque the bolts to 125 in-lb (169 n-m).

Mounting Pressure Effect

To correct for mounting position effects, the Model 3095 MV should be field calibrated, using the field calibration procedure described on page 4-9.

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 Model 3095 MV transmitter.

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

- Four 2.25-inch manifold/flange bolts for mounting the Coplanar flange on a three-valve manifold. In this configuration, the 1.75-inch 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 flange/adapter bolts for mounting the flange adapters to the Coplanar flange.

Figure 2-8 shows the optional mounting bracket and mounting configurations. Figure 2-9 shows mounting bolts and bolting configuration for the Model 3095 MV with 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:

Carbon Steel Head Markings (CS)

Stainless Steel Head Markings (SST)

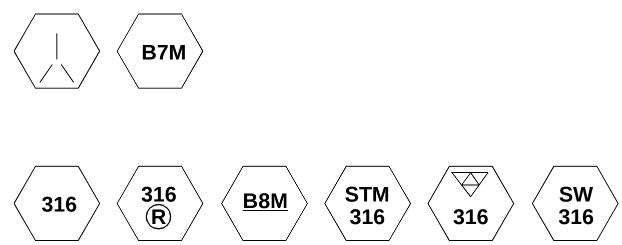
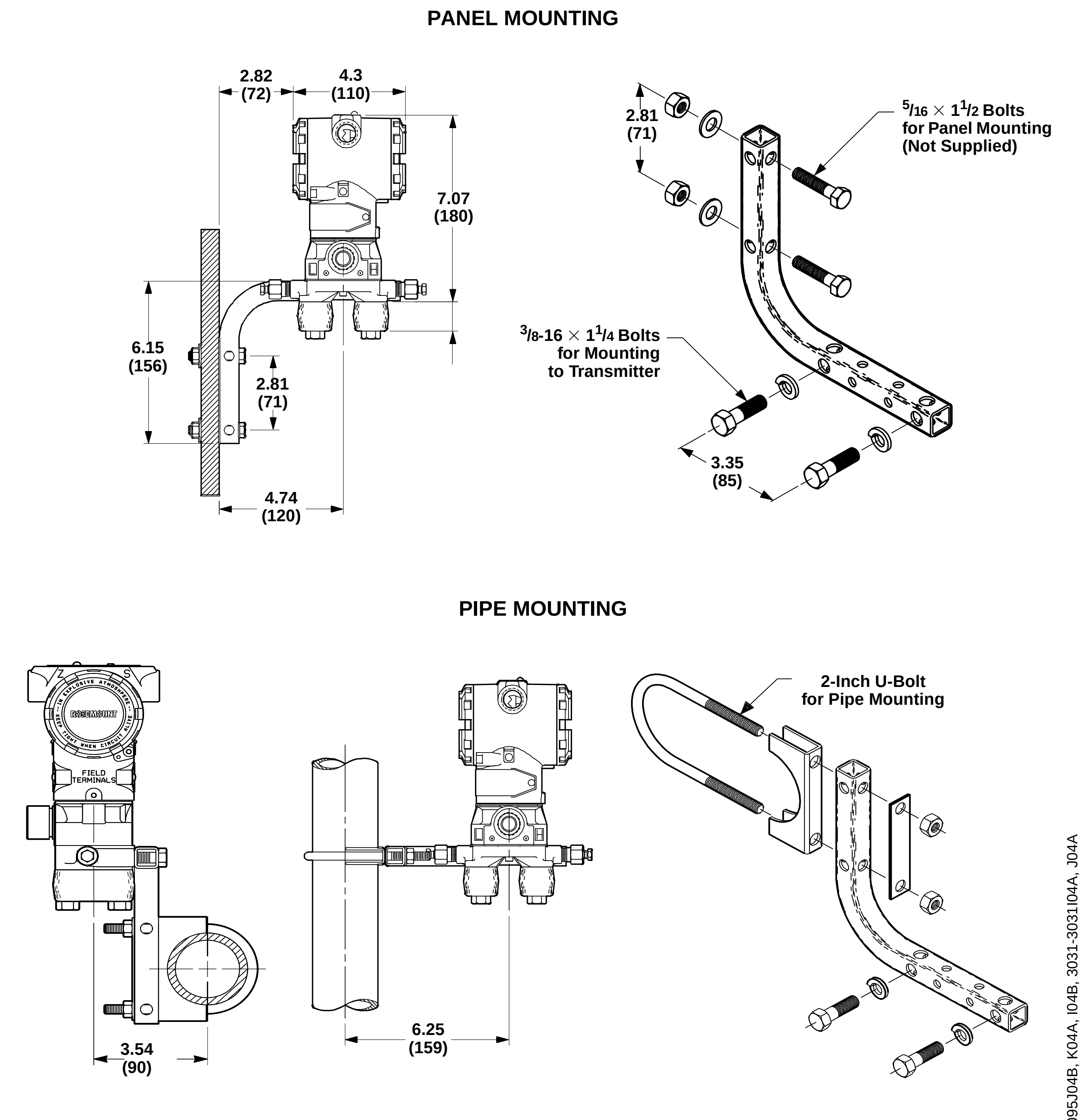


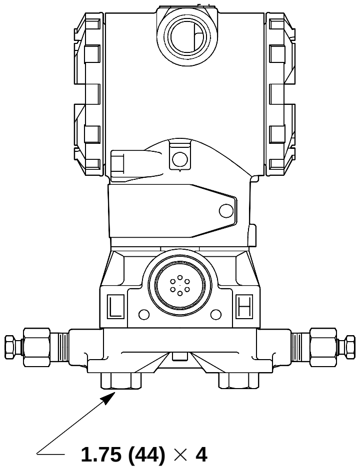
FIGURE 2-8. Optional Mounting Bracket
and Mounting Configurations.



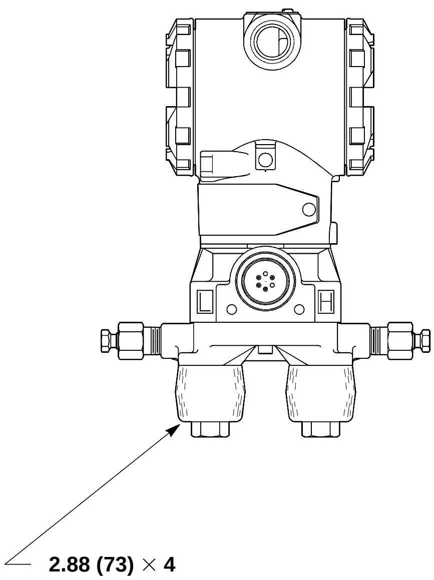
NOTE
Dimensions are in inches (millimeters).

FIGURE 2-9. Coplanar Mounting Bolts and Bolting Configurations for Coplanar Flange.

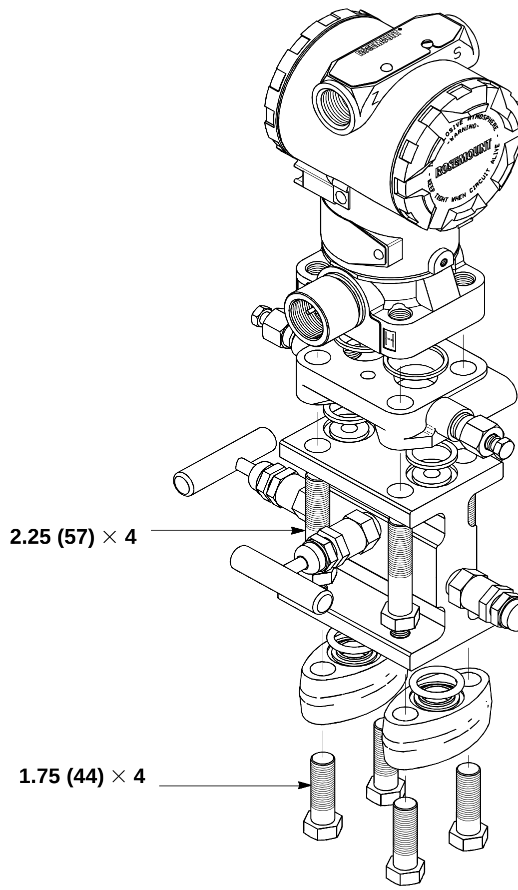
Description	Qty.	Size in. (mm)
Flange bolts	4	1.75 (44)
Flange/adapter bolts	4	2.88 (73)
Manifold/flange bolts	4	2.25 (57)



TRANSMITTER WITH FLANGE BOLTS



TRANSMITTER WITH OPTIONAL FLANGE ADAPTERS AND FLANGE/ADAPTER BOLTS



TRANSMITTER WITH 3-VALVE MANIFOLD MANIFOLD/FLANGE BOLTS FLANGE ADAPTERS AND FLANGE/ADAPTER BOLTS

3095-3095E05E, 3095E05F, 3095B29C

NOTE
Dimensions are in inches (millimeters).

ELECTRICAL CONSIDERATIONS

The signal terminals are located in a compartment of the electronics housing separate from the transmitter electronics. Figure 2-10 illustrates power supply load limitations for the transmitter.

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

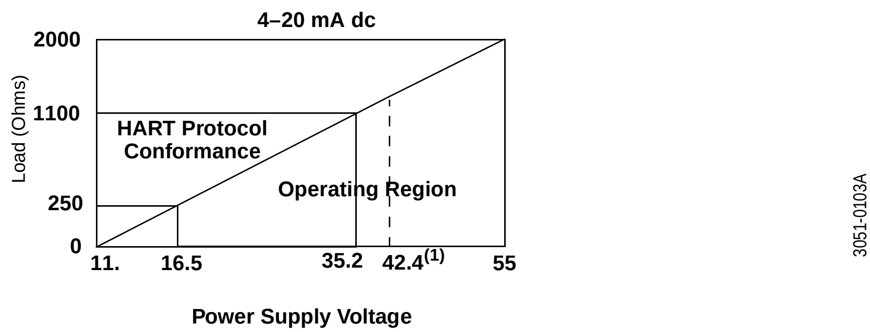
A loop resistance between 250–1100 ohms inclusive is required to communicate with a personal computer. With 250 ohms of loop resistance, a power supply voltage of at least 16.5 V dc is required. (1)

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

FIGURE 2-10. Power Supply Load Limitations.

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

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



HART protocol communication requires a loop resistance value between 250–1100 ohms, inclusive.

(1) For CSA approval, power supply must not exceed 42.4 V dc.

HAZARDOUS LOCATIONS

The Model 3095 MV 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 Section 6 Specifications and Reference Data for specific approval categories, and see Appendix B Approval Drawings for installation drawings.

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

FIELD INSTALLATION EQUIPMENT

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

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

FIELD INSTALLATION PROCEDURE

⚠WARNING

For explosion-proof installations, installation location must be selected in accordance with Rosemount drawing 03095-1025 or 03095-1024.

For instrinsically safe installations, installation must be selected in accordance with Rosemount drawings 03095-1020 or 03095-1021.

Review Installation Considerations

1. Review the installation considerations described on pages 2-6–2-15 to determine the location for the Model 3095 MV.

Mount Transmitter and Install Bolts

2. Mount the Model 3095 MV in the desired location, and install flange or flange/adaptor bolts.

⚠WARNING

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

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 (407 n-m)	650 in-lb (881 n-m)
Stainless Steel (SST)	150 in-lb (203 n-m)	300 in-lb (407 n-m)

When installing the transmitter to one of the mounting brackets, torque the mounting bracket bolts to 125 in-lb (169 n-m).

⚠WARNING

Process leaks can cause death or serious injury. 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.

Make Process Connections

3. Connect the transmitter to the process.

Install RTD Assembly

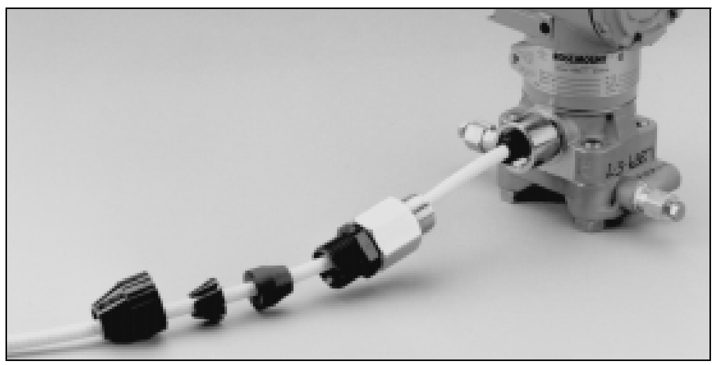
4. (Optional) Install the Series 68 or Series 78 RTD Assembly.

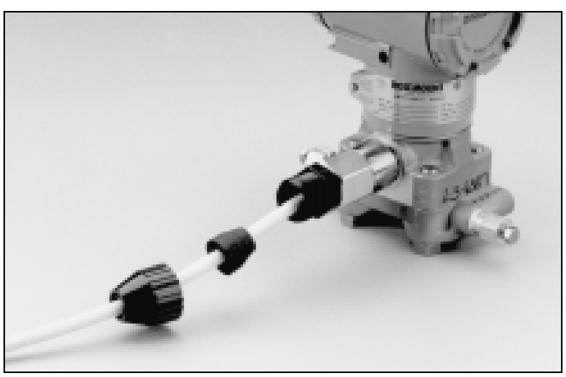
NOTE
To meet ISSep/CENELEC Flameproof certification, only European Flameproof Cable Assemblies (Process Temperature Input Codes A, B, or C) may be used for RTD cable installation.

---

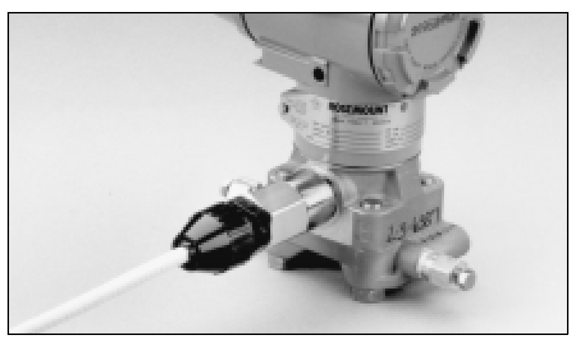
   a. Mount the RTD Assembly in the desired location. Refer to the appropriate differential producer standard concerning recommended RTD installation location.
   b. Connect the RTD cable to the Model 3095 MV RTD connector. **First fully engage the black cable connector**, then screw in and tighten the cable adapter until metal to metal contact occurs (see photos).

FIRST, FULLY ENGAGE THE BLACK CABLE CONNECTOR





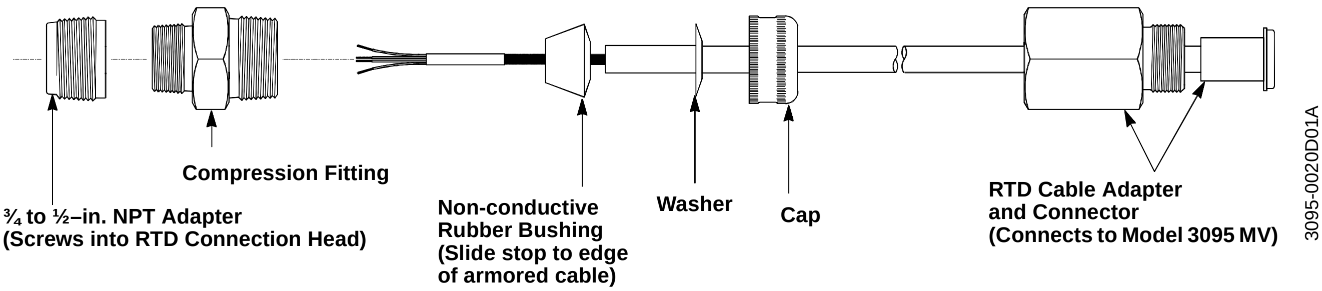
SECOND, SCREW IN AND TIGHTEN THE CABLE ADAPTER UNTIL METAL TO METAL CONTACT OCCURS



THIRD, SCREW IN AND TIGHTEN THE STRAIN RELIEF CLAMP

3095-069AB, 068AB, 067AB

c. (Optional) If using an armored, shielded cable, install the armored cable compression seal as illustrated below, and use a pliers to tighten the cap onto the compression fitting.



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

Check for Leaks

5. Check all process penetrations for leaks.

Field Wiring (Power and Signal)

6. Make field wiring connections (see Figure 2-11). 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).

⚠CAUTION

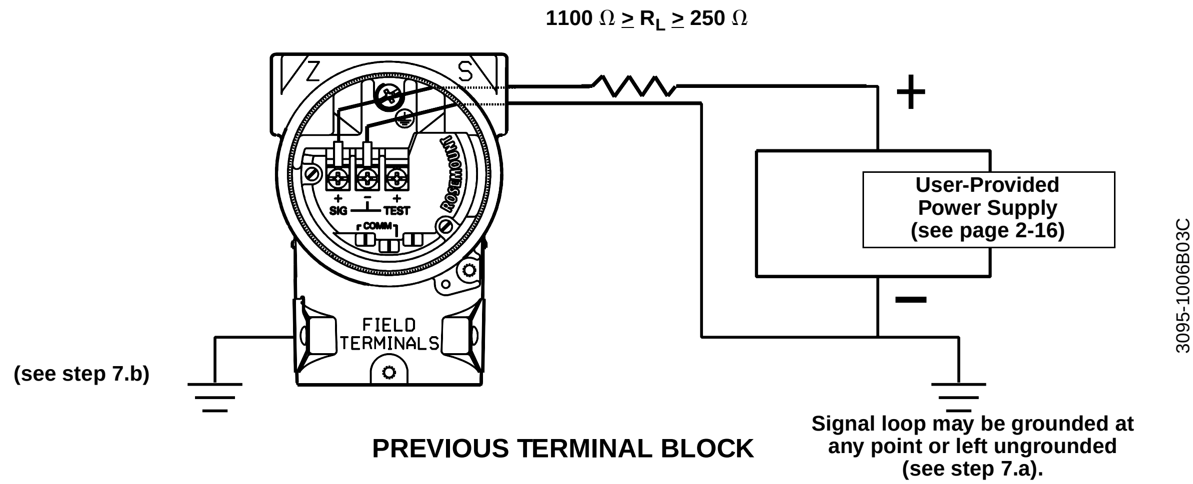
Incorrect field wiring connections may damage the Model 3095 MV. Do not connect field wiring to the “TEST +” terminals.

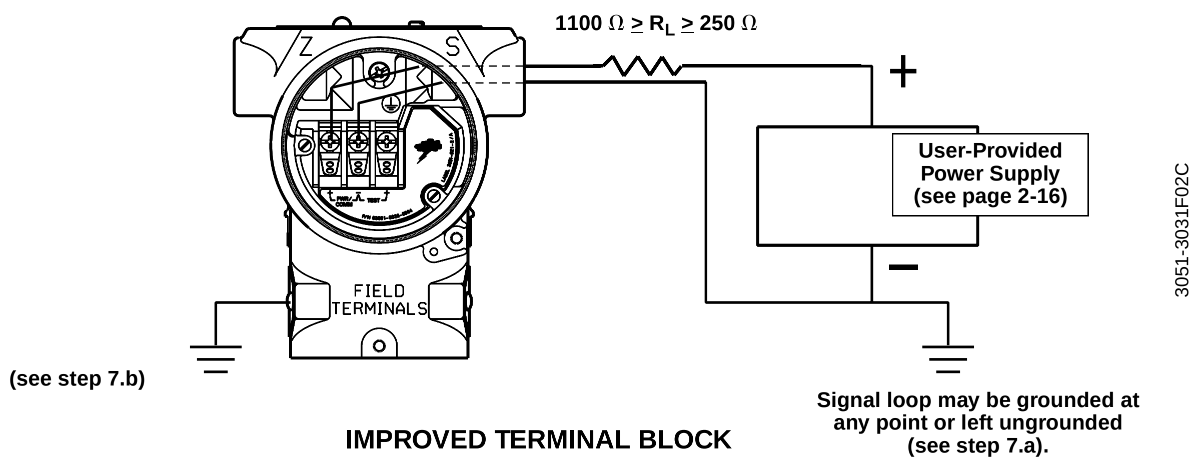
a. Remove the cover on the side marked FIELD TERMINALS on the electronics housing.

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.

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

FIGURE 2-11. Field Wiring Connections.





⚠WARNING

Explosions can cause death or serious injury. The unused conduit opening on the transmitter housing must be plugged and sealed to meet explosion-proof requirements.

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.

Install Grounds

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

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 (03031-0398-0001).
- **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.

Replace Cover

⚠WARNING

Explosions can cause death or serious injury. Both transmitter covers must be fully engaged to meet explosion-proof requirements.

8. Replace the cover.

CALIBRATION

After completing the installation, the Model 3095 MV can be field calibrated. See **Field Calibration Procedure** on page 4-9 for recommended field calibration procedures.

Section **3**

Options and Accessories

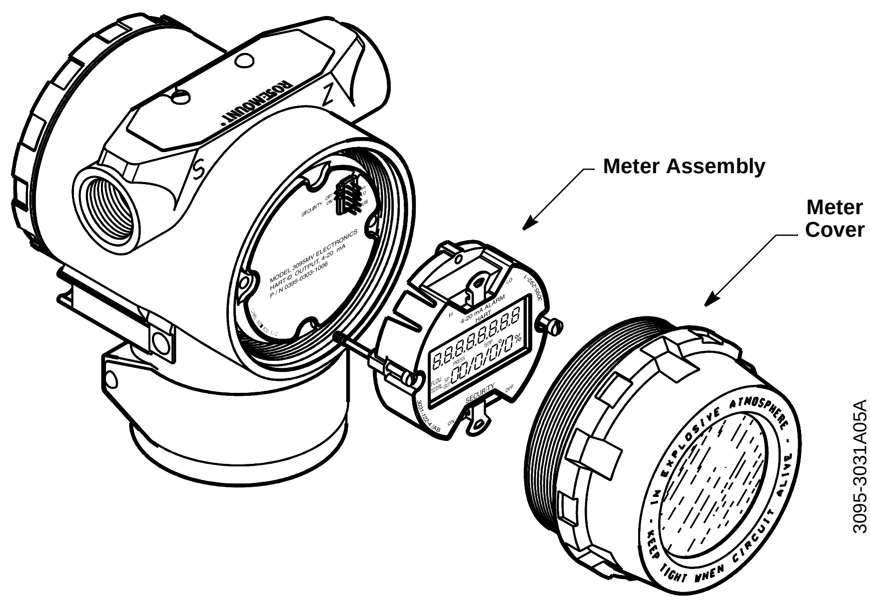
Options and accessories available with the Model 3095 MV can facilitate installation and operation or enhance the security of the system. These items include the LCD meter, mounting brackets, custom configuration, optional bolt materials, the transient protection terminal block, and manifold options.

LCD METER

The LCD meter provides local display of Model 3095 MV process variables, calculations, and transmitter diagnostic messages. The meter is located on the circuit side of the transmitter, leaving direct access to the signal terminals. An extended cover is required to accommodate the meter. Figure 3-1 shows the transmitter fitted with the LCD meter and extended cover.

NOTE
A 3-in. (76 mm) clearance is required for cover removal if a meter is installed.

FIGURE 3-1. Model 3095 MV with Optional LCD Meter.



The LCD Meter can be ordered factory-installed, or meters can be ordered as spare parts to retrofit existing Model 3095 MV transmitters already in the field.

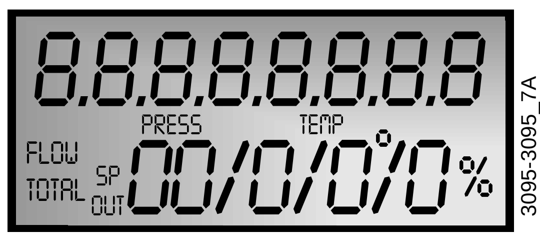
NOTE
For compatibility issues when retrofitting spare parts, see **Appendix E Compatibility Issues**.

The LCD meter features a liquid crystal display that provides readouts of Model 3095 MV process variables and flow calculations. Use the Model 3095 MV User Interface Software to change the parameters displayed by the LCD meter (see **Transmitter LCD Settings** on page 4-39). Any of the following parameters and calculations are available for display:

Parameter Name	LCD Parameter Name	Engineering Unit/Example
Flow Rate	FLOW	SCFD
Differential Pressure	PRESS	IN_H2O
Totalized Flow	TOTAL	SCF
Static Pressure	SP	PSI
Temperature	TEMP	°F
Analog Output	OUT	MA
Percent Of Range	%	%

The default display time is three seconds to display user-selected parameters. The LCD meter 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 meter uses a two line display to indicate the engineering unit and parameter name; a third value is displayed to indicate the parameter value.

FIGURE 3-2. LCD Meter 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 **Revision 12 and 13 Electronics Board Alarms And Error Conditions** on page 5-2.

Totalizer Display

The LCD meter can display flow total as a selected variable. Depending on the Flow Total Unit selected, the meter will display the measurement value to a varying decimal point. Table 3-1 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 3-1. Model 3095 MV Flow Total Display.

Flow Total Unit Description	LCD Display	Maximum Displayable Flow Total on LCD Meter	Maximum Displayable Flow Total on 275 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 meter 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 meter of the Model 3095MV 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

Installing the Meter

Installing the meter on a Model 3095 MV transmitter requires a small instrument screwdriver and the meter kit (PN 3095-0492-0001 for Aluminum Housing, PN 3095-0492-0002 for SST Housing).

The meter kit includes:

- one LCD meter assembly
- one extended cover with cover O-ring installed
- two captive screws
- one meter connector (10-pin male-to-male)

NOTE
The LCD Meter requires a Revision 12 or higher electronics board. See Table E-6 on page E-3 for compatibility information.

Use the following steps to install the meter. See Figure 3-1 for an illustration.

⚠WARNING

Explosions can cause death or serious injury. Do not remove the instrument cover in explosive atmospheres when the circuit is alive.

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.

⚠CAUTION

The circuit board is electrostatically sensitive. Be sure to observe handling precautions for static-sensitive components.

3. Note location of security/alarm jumpers. Remove the jumpers and discard. Insert the meter connector into the ten-pin socket on the electronics circuit board (see Figure 3-1).
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 from the orientation shown in Figure 2-6. To rotate the housing greater than 180 degrees, see **Disassembly Procedures** on page 5-12.

NOTE
The meter may be installed in 90-degree increments for easy viewing. One of the four connectors on the back of the meter assembly must be positioned to accept the meter connector.

⚠CAUTION

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

6. Decide which direction the meter should be oriented. Insert the long meter screws into the two holes on the meter assembly that coincide with the holes on the circuit board.

7. Attach the meter assembly to the circuit board by threading the screws into captive threads and attaching the meter assembly to the meter connector. Tighten the meter screws in the standoffs to secure the meter assembly and electronic circuit board in place. The meter 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 meter/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.

⚠WARNING

Explosions can cause death or serious injury. Both transmitter covers must be fully engaged to meet explosion-proof requirements.

Note the following LCD temperature limits:
Operating: –13 to 185 °F (–25 to 85 °C)
Storage: –40 to 185 °F (–40 to 85 °C)

SST MOUNTING BRACKETS

Optional mounting brackets are available to facilitate mounting to a panel, wall, or 2-in. pipe. The bracket option for use with the Coplanar flange is 316 SST with 316 SST bolts. Figure 2-8 on page 2-14 shows bracket dimensions and mounting configurations for the SST mounting bracket option.

ENGINEERING ASSISTANT SOFTWARE

The Engineering Assistant software package is available with or without the HART modem and connecting cables (see **Accessories** on page 6-10 for available packages). The complete package contains the following items:

- Two 3.5-in. floppy disks containing the Model 3095 MV User Interface Software
- One HART modem
- One set of modem cables

Two types of licenses are available for the Engineering Assistant software: Single CPU License (for installing on one computer), and Site License (for installing on more than one computer).

Section 4 in this manual provides information for using the Model 3095 MV Engineering Assistant Software to configure and calibrate the Model 3095 MV.

TRANSIENT PROTECTION TERMINAL BLOCK

The transient protection terminal block option increases the Model 3095 MV ability to withstand electrical transients induced by lightning, welding, or heavy electrical equipment. The Model 3095 MV, 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 Model 3095 MV transmitters already in the field. The Rosemount spare part number for the transient protection terminal block is 3095-0302-0002.

Installation Procedure

The transient protection terminal block is shipped installed when ordered at the same time as the Model 3095 MV. Use the following procedure to install this terminal block when this option is ordered as a spare part or retrofit.

⚠WARNING

Explosions can cause death or serious injury. Do not remove the instrument cover in explosive atmospheres when the circuit is alive.

1. Remove the cover above the side marked FIELD TERMINALS on the Model 3095 MV 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 page 2-21.

⚠WARNING

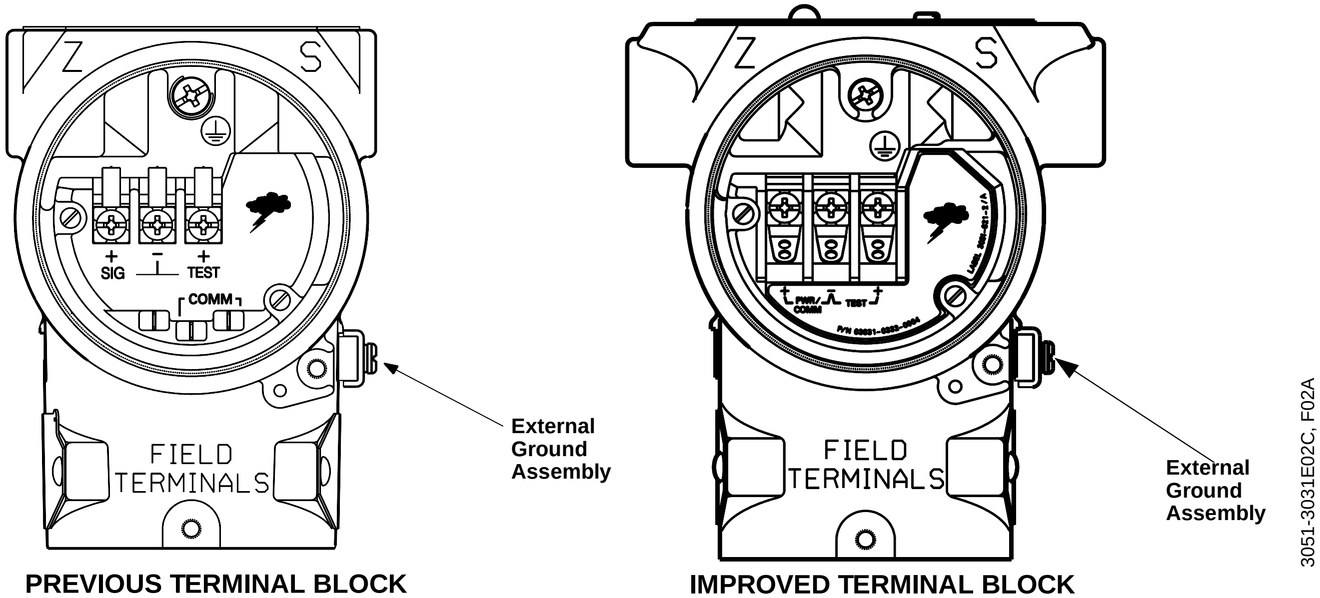
Explosions can cause death or serious injury. Both transmitter covers must be fully engaged to meet explosion-proof requirements.

7. Replace the Model 3095 MV cover.
8. If desired, re-trim the transmitter (see **Sensor Trim Procedure (For Bench Calibration)** on page 4-44 or **Sensor Trim Procedure (For Field Calibration)** on page 4-46).

NOTE

Installation of the Transient Protection Terminal Block does not provide transient protection unless the Model 3095 MV is properly grounded. See **Install Grounds** on page 2-21 for grounding information.

FIGURE 3-3. Transient Protection Terminal Block with External Ground Assembly.



CUSTOM CONFIGURATION (OPTION CODE C2)

Option Code C2 allows a customer to receive a Model 3095 MV that contains a Custom Flow Configuration for their application.

See the Configuration Data Sheet on page 6-18 for more information.

FLANGE ADAPTERS (OPTION CODE DF)

Three types of flange adapters are available for use with the Model 3095 MV: Plated CS, SST, and Hastelloy C. Flange adapters are illustrated in Figure 2-3 on page 2-3. When ordered with the transmitter, the shipped flange adapters match the ordered flange material. Option Code DF includes bolts.

MODEL 305 INTEGRAL MANIFOLD (OPTION CODE S5)

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

MODEL 1195 INTEGRAL ORIFICE ASSEMBLY (OPTION CODE S4)

Model 3095 MV Transmitter and Model 1195 Integral Orifice Assembly are fully assembled, calibrated, and seal tested by the factory.

For installation instructions, refer to the product manual for the Model 1195 (00809-0100-4686).

ANNUBAR ASSEMBLY (OPTION CODE S4)

Model 3095 MV Transmitter and Annubar Assembly are fully assembled, calibrated, and seal tested by the factory.

For installation instructions, refer to the Annubar product manual (00809-0100-4760).

Section 4

Using the Engineering Assistant Software

This section explains how to use the Model 3095 MV Engineering Assistant (EA) Software with the Model 3095 MV Mass Flow Transmitter, and is divided into four sub-sections:

- Install the Model 3095 MV Engineering Assistant Software.
- Establish communications between a personal computer and a Model 3095 MV.
- Procedure Outlines (page 4-8).
- Engineering Assistant Software Screens (page 4-10).

INSTALLING THE ENGINEERING ASSISTANT SOFTWARE

The Engineering Assistant Software package is available with or without the HART modem and connecting cables. The complete Engineering Assistant package contains two 3.5-in. floppy disks, one HART modem, and a set of cables for connecting the computer to the Model 3095 MV (see Figure 4-1).

MINIMUM EQUIPMENT AND SOFTWARE

- DOS-based 386 computer or above
- 640K base RAM with 8 MB extended
- Mouse or other pointing device
- Color computer display
- Model 3095 MV Engineering Assistant Software, HART modem, set of modem cables
- MS DOS® 3.1 or higher
- Microsoft® Windows® 3.1, Windows for Workgroups 3.11, or Windows 95

NOTE
The EA software does not work with Windows NT.

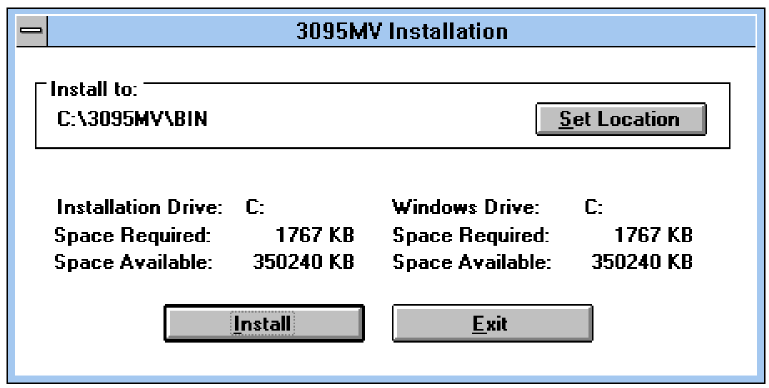
NOTE
The EA software does not work with revision 4.04.9. of Phoenix BIOS. We do not recommend installing the Engineering Assistant on computers that use this BIOS.

INSTALLATION PROCEDURE

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

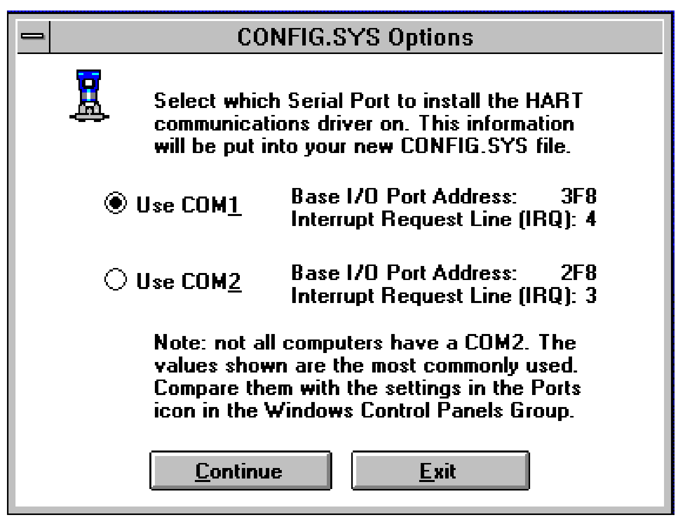
NOTE
In this manual, ***return*** indicates to press the return or enter key.

1. Power on the computer.
2. After completion of boot-up procedures, verify that the computer is in Microsoft Windows. If the computer is at the DOS prompt (for example, C:\), type win ***return*** to open Windows.
3. Insert the floppy disk containing the Engineering Assistant Software into the personal computer disk drive.
4. Select File, then select Run to display the Run window. Depending on the disk drive, enter either a: setup or b: setup, then select OK to display the following screen:



3095-30950080

5. If desired, change the file location, then select the Install button,

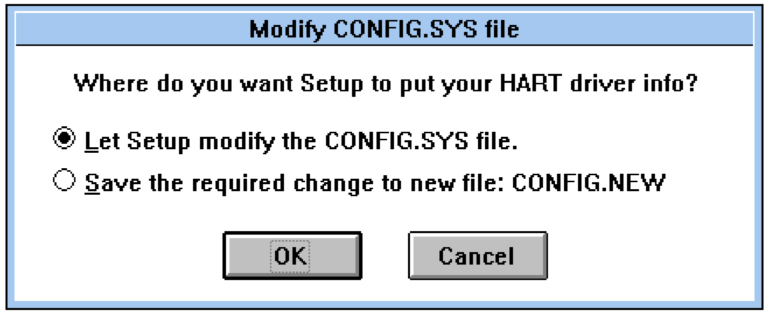


3095-30950081

6. Decide which serial port will be assigned as the HART communications port, then select continue.

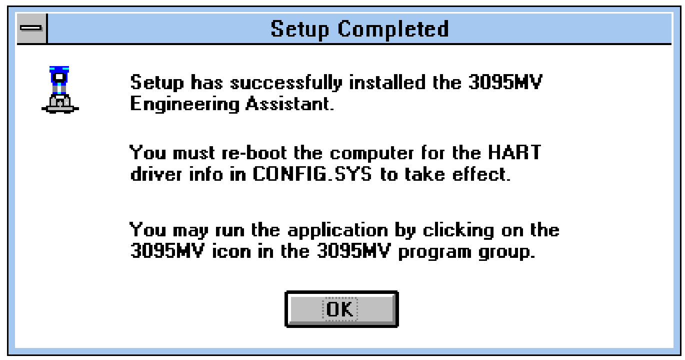
NOTE
This screen defines the HART communications port as either COM1 or COM 2. The HART communications port must be different than the mouse port.

7. After installing files, the installation program then prompts for CONFIG.SYS choices.



3095-30950083

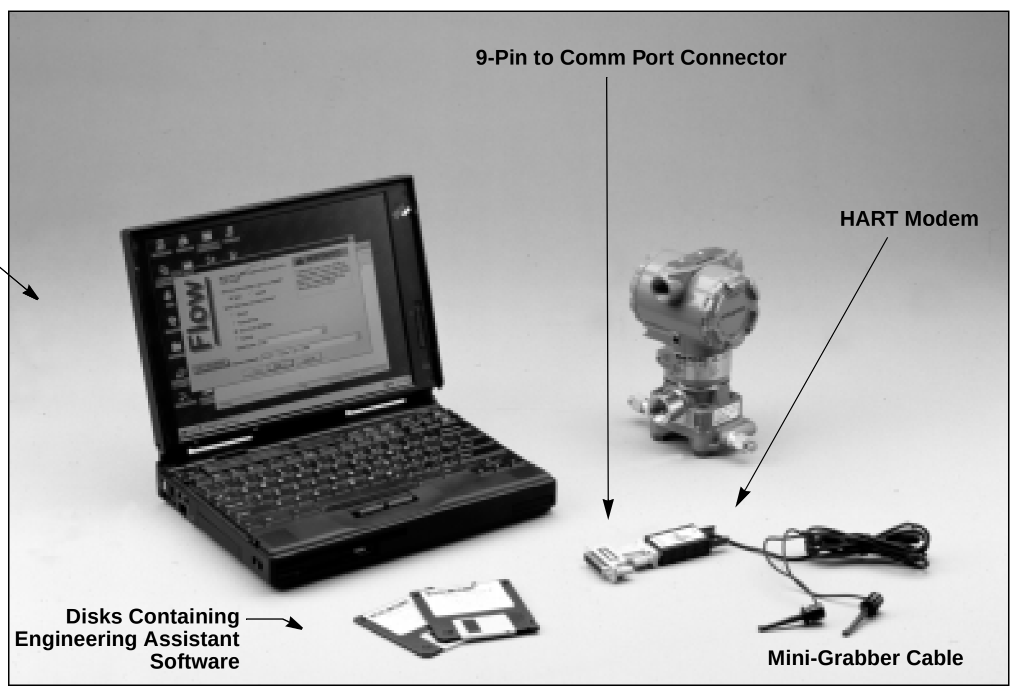
8. When finished, the installation program requests that the user reboot their computer.



3095-30950085

9. Push the computer reset button to reboot the computer, or press CTL-ALT-DEL.

FIGURE 4-1. Model 3095 MV Engineering Assistant Equipment.



3095-3095MV03

CONNECTING TO A PERSONAL COMPUTER

Figure 4-2 illustrates how to connect a computer to a Model 3095 MV.

⚠WARNING

Explosions can cause death or serious injury. Before making any computer connections, ensure that the Model 3095 MV area is non-hazardous.

1. Connect the computer to the Model 3095 MV. See Warning above, as well as Figure 4-1 and Figure 4-2.
   a. Connect one end of the 9-pin to 9-pin cable to the HART communications port on the personal computer.
   b. Connect the 9-pin HART modem cable to the 9-pin communications port on the computer.

⚠WARNING

Explosions can cause death or serious injury. Do not remove the instrument cover in explosive atmospheres when the circuit is alive.

   c. Open the cover above the side marked Field Terminals, and connect the mini-grabbers to the two Model 3095 MV terminals marked COMM as shown in Figure 4-2.
2. Power on the computer.
3. Type win and press ***return*** at the DOS prompt.
4. Double click on the EA icon.
5. If password security is enabled, the Engineering Assistant Privileges Screen appears:
6. Enter a password and press ***return***.

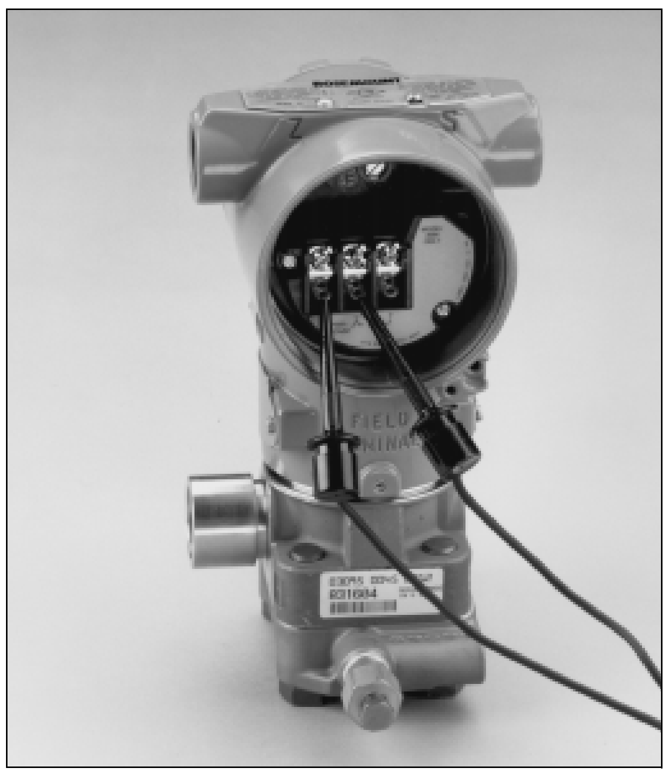
Symptom	Corrective Action
No Communication between the Engineering Assistant Software and the Model 3095 MV	**LOOP WIRING** • HART protocol communication requires a loop resistance value between 250–1100 ohms, inclusive. • Check for adequate voltage to the transmitter. (If the computer is connected and 250 ohms resistance is properly in the loop, a power supply voltage of at least 16.5 V dc is required.) • Check for intermittent shorts, open circuits, and multiple grounds. • Check for capacitance across the load resistor. Capacitance should be less than 0.1 microfarad. **ENGINEERING ASSISTANT (EA) INSTALLATION** • Verify that the install program modified the CONFIG.SYS file. • Verify computer reboot followed EA installation. • Verify correct COMM port selected (see page 4-2). • Verify laptop computer is not in low energy mode (certain laptops disable all COMM ports in low energy mode). • Did you install EA software onto Windows NT platform? • Check if HART driver is loaded and installed.

FIGURE 4-2. Connecting a Personal Computer to a Model 3095 MV.

3095-018AB

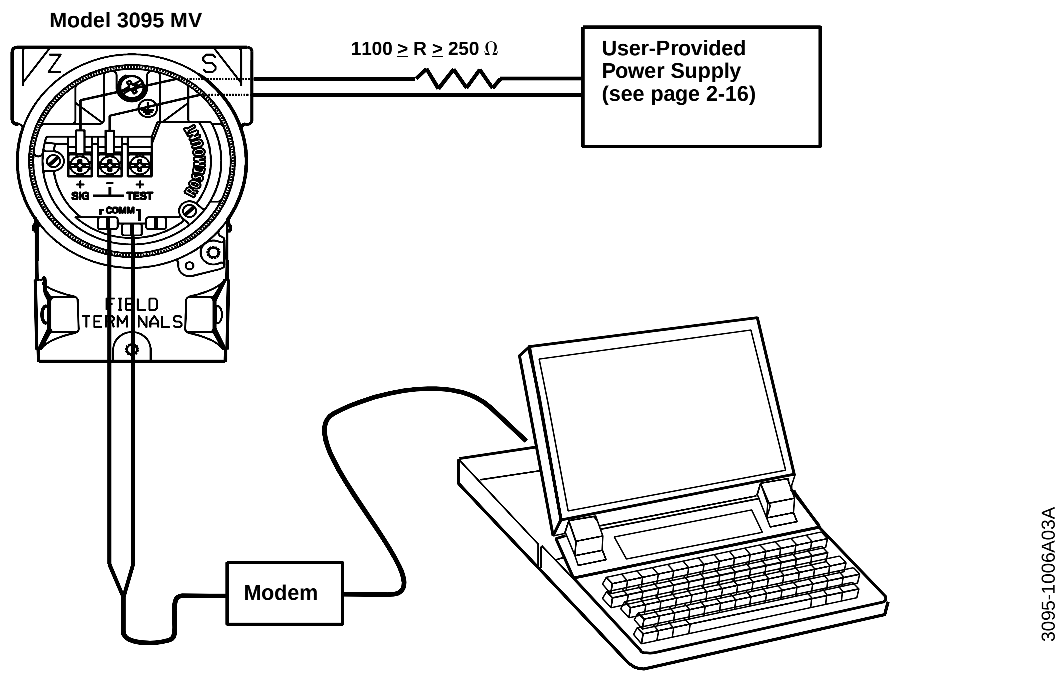
PREVIOUS TERMINAL BLOCK

IMPROVED TERMINAL BLOCK

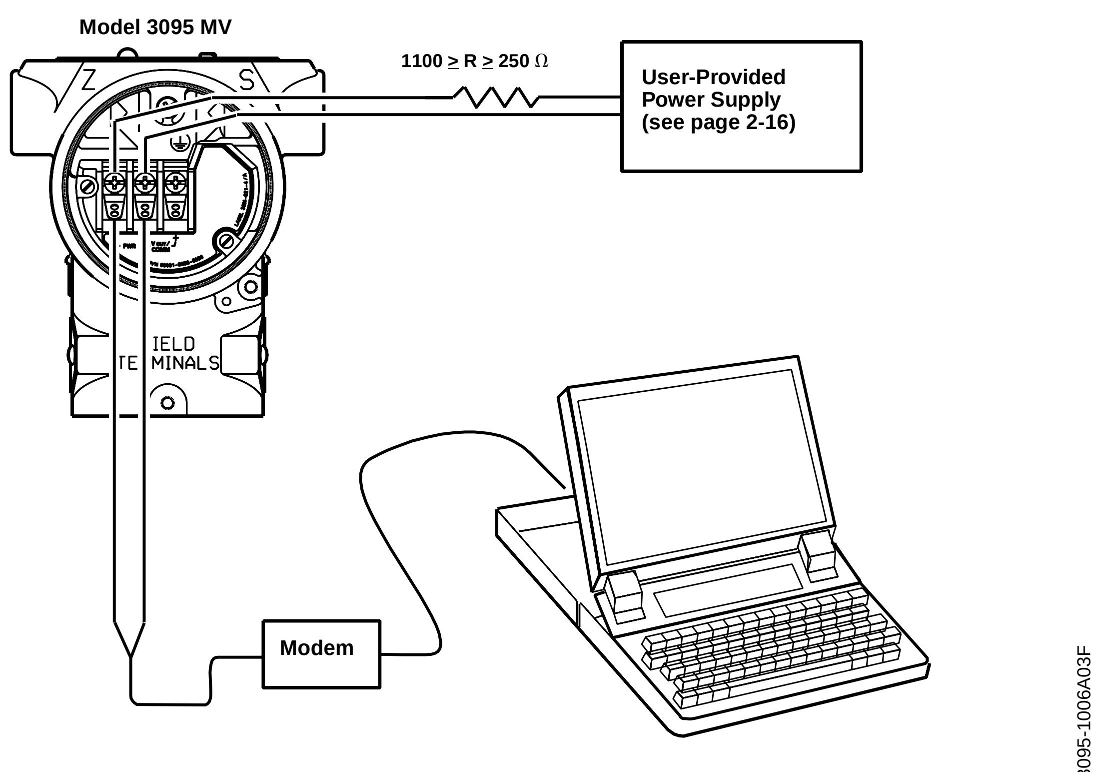


3095-3095MV03

FIGURE 4-2. (continued).



PREVIOUS TERMINAL BLOCK

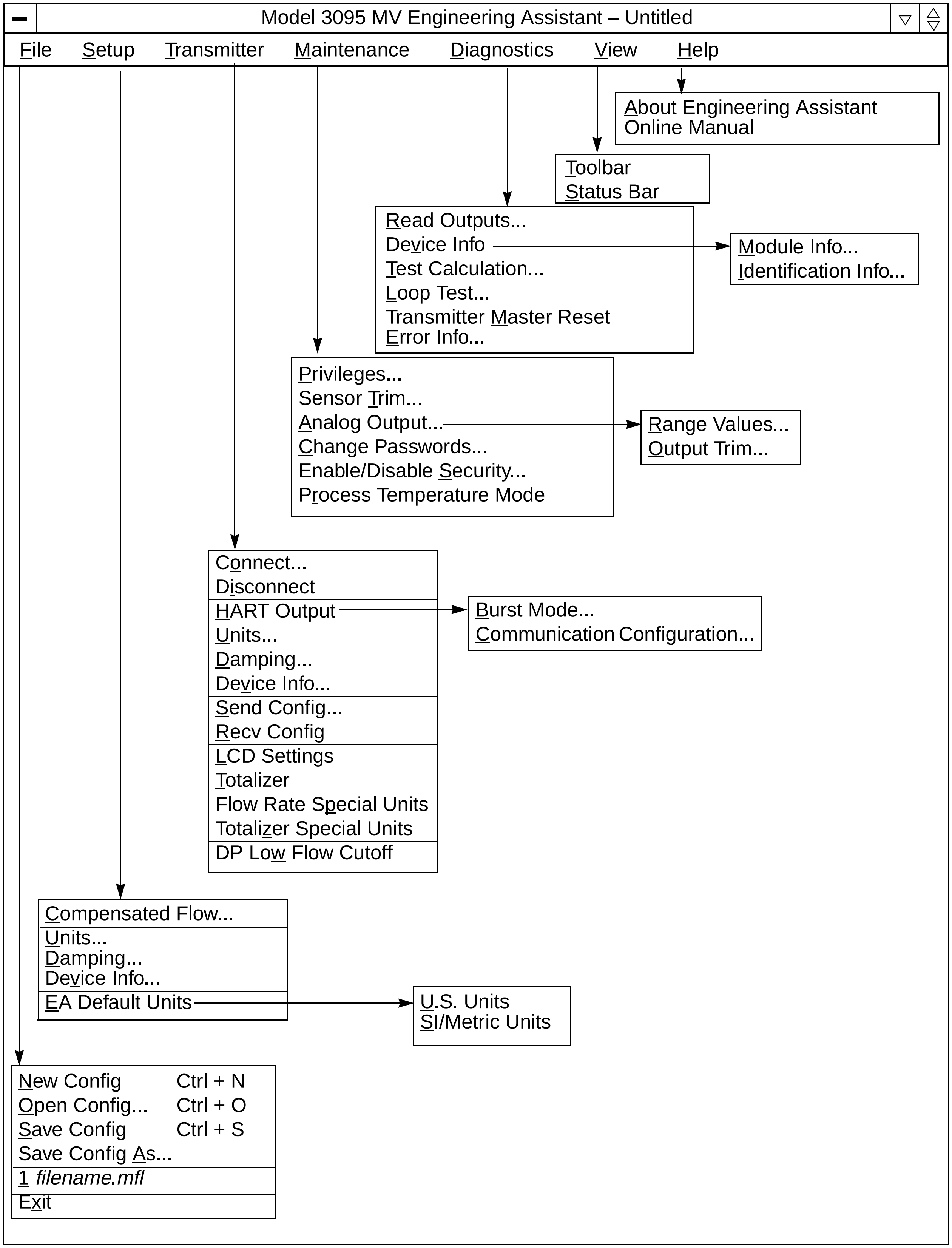


IMPROVED TERMINAL BLOCK

MENU STRUCTURE

Figure 4-3 illustrates the menu structure for the Engineering Assistant Software.

FIGURE 4-3. Engineering Assistant Menu Structure.



Menu Categories

The Model 3095 MV menu bar identifies seven menu categories:

File

The File category contains screens for reading and writing Model 3095 MV configuration files.

Setup

The Setup category contains Model 3095 MV screens which are only available when the Engineering Assistant is "disconnected." These screens also determine the contents of a configuration file, and are used to define a Compensated Flow measurement solution.

Transmitter

Except for "Disconnect" and "Recv Config," any changes made in this series of screens occurs **immediately** to the connected transmitter.

Maintenance

The Maintenance screens perform typical transmitter maintenance functions, including set the analog output, set range values, output trim, and sensor trim. Any changes made in this series of screens occurs **immediately** to the connected transmitter.

Diagnostics

The Diagnostic screens provide troubleshooting and diagnostic screens.

View

The View selections determine whether the toolbar and the status bar are displayed.

Help

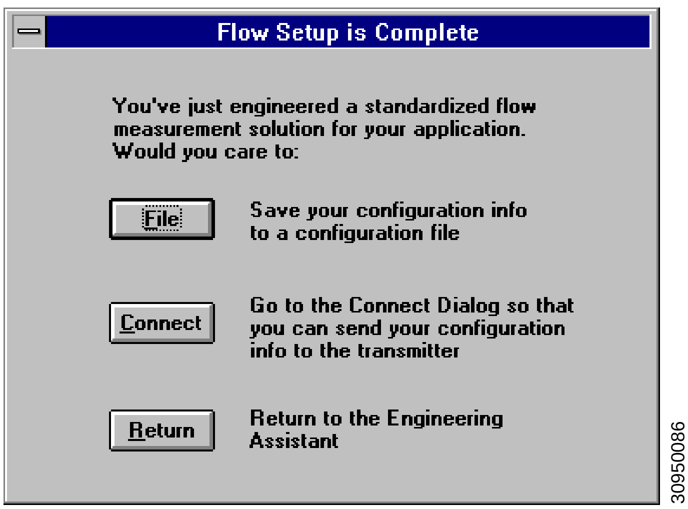
The Help selection identifies the current EA software revision.

PROCEDURE OUTLINES

These procedures only outline the major steps for each procedure. Refer to the individual screen explanations for additional information.

Bench Configuration (Standard)

1. (If needed) Select Transmitter, Disconnect to switch to disconnect mode.
2. (Optional) If a configuration file is already created, select File, Open Config to retrieve those configuration settings.
3. Select Setup, Units..., then verify the units parameters.
4. Select Setup, Damping..., then verify the damping parameters.
5. Select Setup, Device Info..., then fill in the device information screen.
6. Select Setup, Compensated Flow..., then follow the series of three flow configuration screens, filling in the information for your flow application. When finished, the following screen is displayed:



7. Select File to save your configuration to disk.
8. Select Transmitter, Connect to connect to a transmitter.
9. Select Transmitter, Send Config to sent the configuration.

Bench Calibration Procedure

After a transmitter is bench configured, the transmitter can be bench calibrated.

1. Select Maintenance, Analog Output, Range Values...
   a. Select Assign Variables, then verify the process variable output order.
   b. Set the range values and units.
2. Select Maintenance, Sensor Trim..., then perform sensor trim procedures:
   a. Trim SP Offset (zero).
   b. Trim SP Slope (span).
   c. Trim DP Offset (zero).
   d. Trim DP Slope (span).
   e. Trim PT Offset (zero).
   f. Trim PT Slope (span).
3. Select Maintenance, Analog Output, Output Trim..., then perform the output trim procedures.

Field Calibration Procedure

To correct for mounting position effects, field calibrate the Model 3095 MV after installation:

1. Establish communications (see page 4-4).
2. Perform a Trim DP Offset (zero).
3. (Optional) If a barometer that is three times as accurate as the Model 3095 MV AP sensor is available, perform an SP Offset (zero).

Automatic Error Messages

Whenever the EA sends a command to a transmitter, the EA checks for error conditions in the transmitter. If an error is found, an error message is displayed.

To acknowledge the error, select OK.

If the error is non-critical, select the “Ignore status on next 50 commands” box, then select OK.

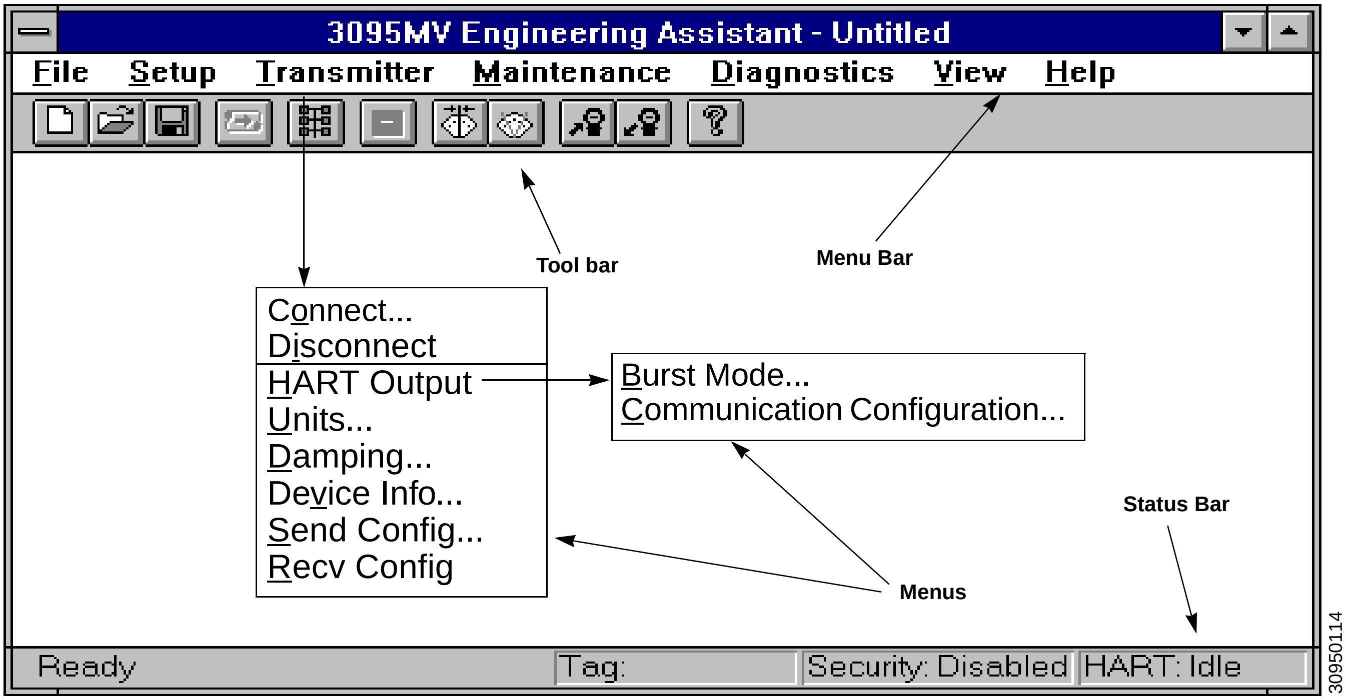
Appendix C identifies possible warnings and errors that might occur when using the EA software.

ENGINEERING ASSISTANT SOFTWARE SCREENS

This section illustrates each major Model 3095 MV EA screen, and provides information about using the screen.

Screen Components

The following figure shows the basic screen components:



The EA software uses standard Windows elements and tools, including scroll bars, minimize button, maximize button, window border, mouse pointer, and buttons. It is beyond the scope of this manual to discuss basic Windows terminology and techniques. For additional information concerning Windows, refer to Microsoft Windows documentation.

Status Bar Codes

The status bar provides up to four status items:

- The first field in the status bar is a message field.
- Tag: indicates if a configuration file (*filename*.MFL) was loaded into the EA memory. Other options:
  (Uploaded Data) indicates that the current configuration information was uploaded from a transmitter.
  (Blank) indicates configuration information has not been loaded in from a transmitter or from a configuration file.
- Security: indicates security status: disabled, low, high, medium, or off-line.
- HART field indicates communication status: Idle or Busy.

Hot Keys

An underline character in a menu selection indicates the Hot Key for that selection. Press the character to select that menu item.

Path Name Convention

In this section, each heading also identifies the path name. For example, consider the following heading:

Maintenance
Analog Output
Range Values...

This indicates that the menu is found under the Maintenance, Analog Output, Range Values... path. This menu can be accessed in multiple ways. Three examples are shown:

- Select Maintenance, select Analog Output, select Range Values...
- Press Alt-M, A, R.
- Press Alt-M, use the arrow keys to highlight Analog Output and press ***return***, use the arrow keys to highlight Range Values and press ***return***.

Procedure Convention

Rather than explaining all of the possible ways to access a particular screen, procedures in this manual use the term "Select" to indicate there are multiple ways to select an option. For example, the first step in the Sensor Trim procedure is illustrated below.

1. Select Maintenance, Sensor Trim to display the Sensor Trim Select screen.

Cancel Buttons

All EA screens that allow data entry or transmitter action contain a Cancel button. Select Cancel to exit the screen without making any changes.

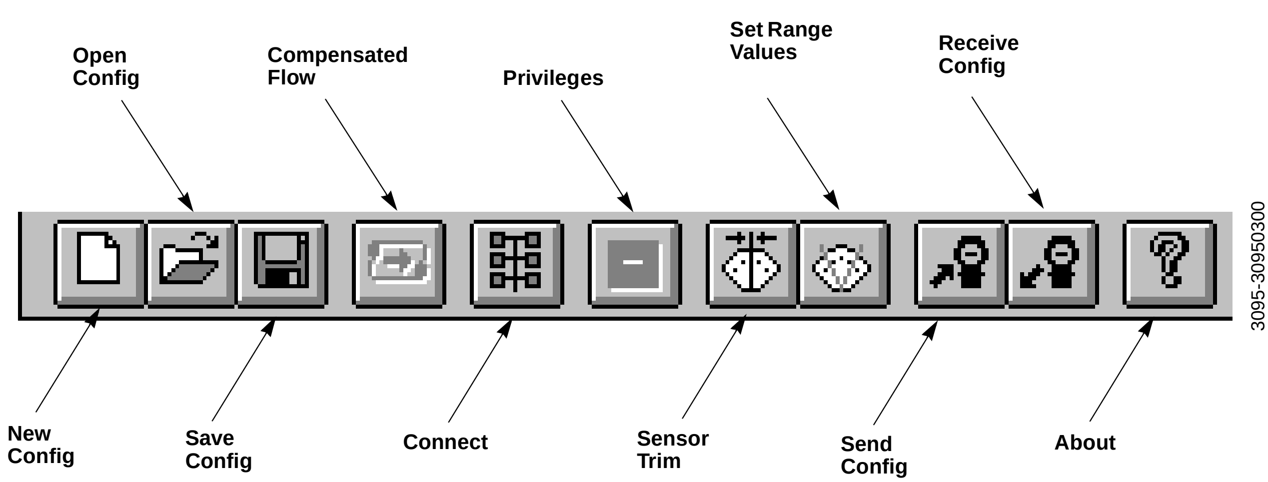
Fast Keys

Certain menu selections have fast keys assigned, and they are indicated in the menu structure. For example, pressing Ctrl + O is the fast way to open a configuration file.

Toolbar

Another fast way to access EA screens is the tool bar (see Figure 4-4). Simply click on the icon to access the screen.

FIGURE 4-4. Model 3095 MV Engineering Assistant Toolbar.



Setup Screens

The setup screens are used to define a compensated flow solution, and to create flow configuration files for sending to a transmitter. These screens are only available when the EA is not connected to a transmitter.

- If the fluid is a gas, use the procedure starting below.
- If the fluid is steam, use the procedure starting on page 4-17.
- If the fluid is a liquid, use the procedure starting on page 4-21.
- If the fluid is natural gas, use the procedure starting on page 4-24.

NOTE
If the Setup menu selections are grayed out, the EA is currently connected with a Model 3095 MV transmitter. Select Transmitter, Disconnect to disconnect the EA from a Model 3095 MV, which will then enable the Setup menu selections.

Setup Compensated Flow (Gas Configuration)

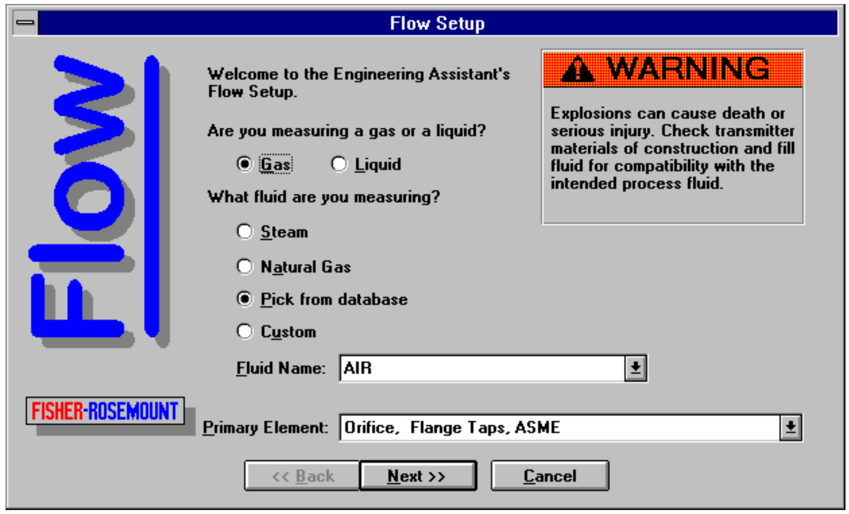
The Compensated Flow selection allows you to configure the Model 3095 MV to measure flow of a particular fluid. The following screens illustrate how to define a gas configuration. Table 4-1 lists the liquids and gases available in the Engineering Assistant database.

TABLE 4-1. Liquids and Gases included in Engineering Assistant AIChE Physical Properties Database. (1)

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 GlycolEthylene	m–Dichlorobenzene	Propane	1–Nonanal
Argon	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	Isobutyl	n–Butyronitrile	1–Decene	1,4–Hexadiene
Cyclopentane	benzene	n–Decane	1–Decanal	2–Methyl–1–Pentene
Cyclopentene	Isopentane	n–Dodecane	1–Decanol	2,2–Dimethylbutane
	Isoprene	n–Heptadecane	1–Dodecene	

(1) This list subject to change without notice.

FIGURE 4-5. Flow Setup Screen.



3095-30950805

1. Select Gas radio button.
2. Select “Pick from database” radio button and select a Fluid Name from the database picklist (see Table 4-1 on page 4-12 for database options),

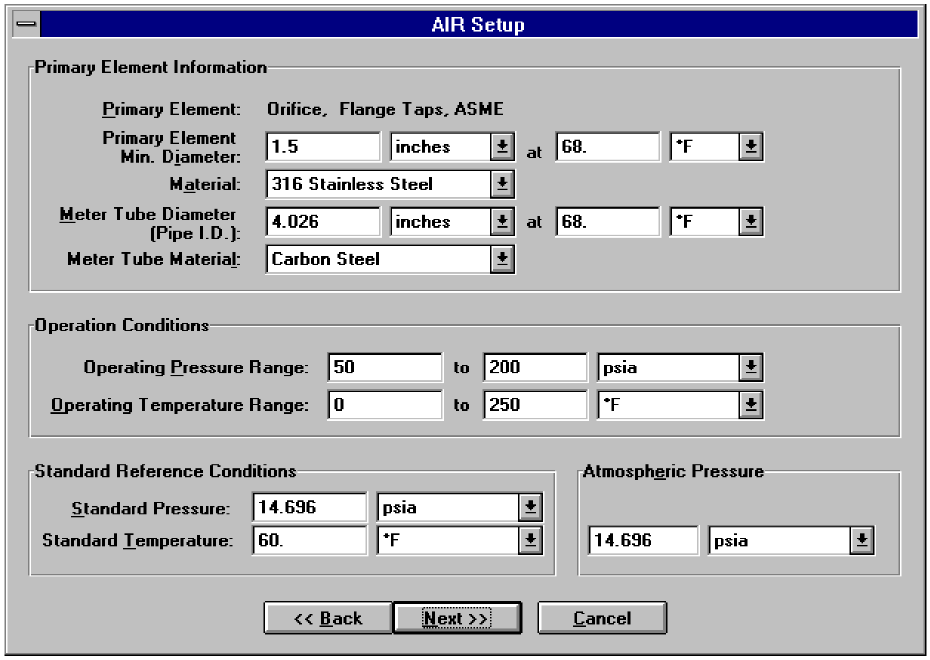
   or

   Select “Custom” radio button and enter your own fluid name.
3. Select Primary Element (see Table 4-4 on page 4-17 for primary element options).
4. Select Next.

NOTE

This manual does not contain instructions regarding the Calibrated Annubar Diamond II+/Mass ProBar Primary Element. For information concerning this option, call 1-800-999-9307, and ask for Model 3095 MV Technical Support.

FIGURE 4-6. Flow Setup Screen (Gas Configuration).



3095-30950755

5. Define Primary Element Information.

TABLE 4-3. Annubar Diamond II+ Sensor Series No. Cross-Reference Table.

Sensor Series No.	Nominal Pipe Size in. (mm)
10	½ – 2 (13 – 51)
15, 16	2 – 5 (51 – 127)
25, 26	5 – 42 (127 – 1067)
35, 36	12 – 72 (305 – 1829)
45, 46	24 – 72 (610 – 1829)

a. Enter Primary Element (bore or throat) Diameter and units at reference temperature. (If Annubar Diamond II+ is selected, enter the Sensor Series No. from Table 4-3).

b. Enter Primary Element Material.

c. Enter Meter Tube Diameter (pipe ID) and units at reference temperature.

d. Enter Meter Tube Material.

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 will not stop the operator from proceeding with a flow configuration because of this type of exception.

6. Enter Operating Conditions.

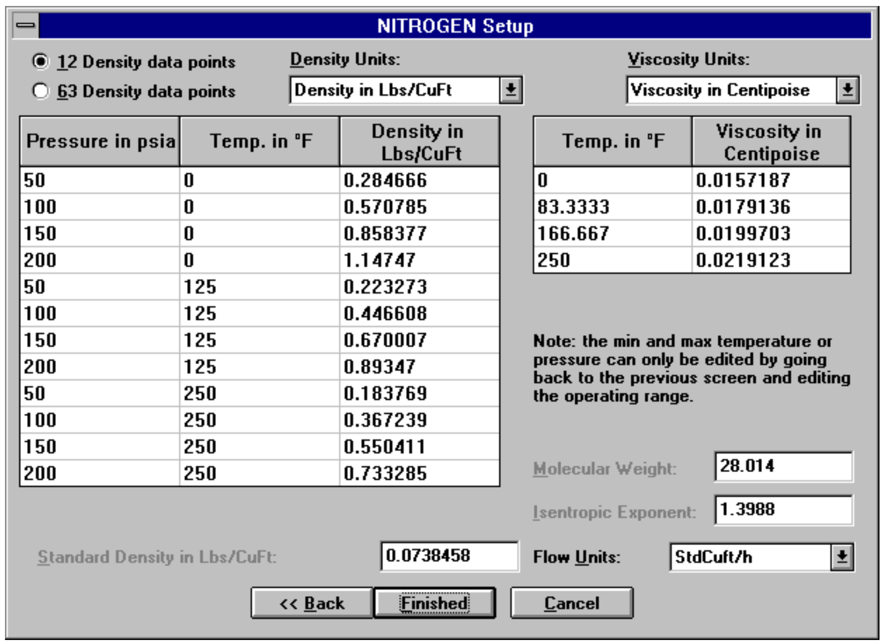
a. Enter Operating Pressure Range and Units.

b. Enter Operating Temperature Range and Units.

7. (Optional) If desired, modify standard pressure and/or temperature conditions. These values apply only if flow units are set to: StdCuft/s, StdCuft/min, StdCuft/h, StdCuft/d, StdCum/s, StdCum/min, StdCum/h, StdCum/d, or NmlCuft/s, NmlCuft/min, NmlCuft/h, NmlCuft/d, NmlCum/s, NmlCum/min, NmlCum/h, NmlCum/d.
8. Select Next.
9. If you selected an AIChE database fluid, this screen is already populated with AIChE data. If desired, this data may be edited. However, if a change is made to either a density or viscosity value, the EA considers the fluid to be “Custom Fluid.”

   If you entered a custom fluid, fill in the compressibility/density column, the viscosity column, the molecular weight, the isentropic exponent, and the standard density.

FIGURE 4-7. Compressibility and Viscosity Table (Gas configuration).

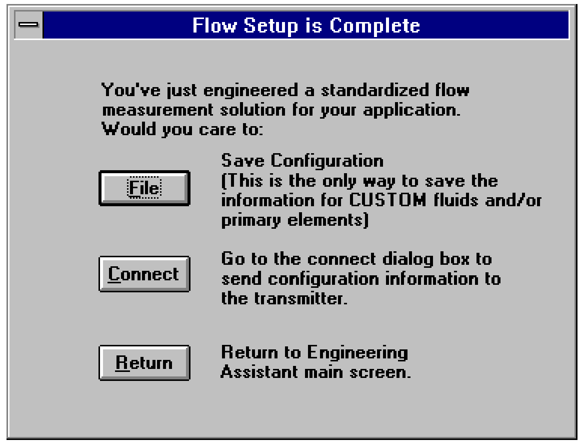


3095-30950756

NOTE
Table values automatically convert if a different unit of measure is selected.

All data fields can be edited.

10. Select Flow Units.
11. Select Finish.



3095-30950912

12. This screen has three options.
    - File saves the flow information to a configuration file, which can be sent by selecting Transmitter, Send Config... as explained on page 4-38. (recommended).
    - Connect switches to the Connect screen so that the flow configuration can be sent to a transmitter.
    - Return switches to the EA.

NOTE

File is recommended because you have an electronic record of your flow configuration.

⚠CAUTION

If you selected custom fluid, or made density or viscosity changes to an AIChE fluid, be sure to save your 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.

Table 4-4 lists the primary elements available in the Engineering Assistant database.

TABLE 4-4. Primary Element Options.

1195 Integral Orifice	Orifice, Flange Taps, AGA3
Annubar® Diamond II/Mass ProBar	Orifice, Flange Taps, ASME
Annubar® Diamond II+/Mass ProBar	Orifice, Flange Taps, ISO
Calibrated Annubar® Diamond II+/Mass ProBar (see note)	Small Bore Orifice, Flange Taps, ASME
Calibrated Annubar® Diamond II/Mass ProBar (see note)	Venturi Nozzle, ISO
Nozzle, Long Radius Wall Taps, ASME	Venturi, Rough Cast/Fabricated Inlet, ASME
Nozzle, Long Radius Wall Taps, ISO	Venturi, Rough Cast Inlet, ISO
Nozzle, ISA 1932, ISO	Venturi, Machined Inlet, ASME
Orifice, 2½D & 8D Taps	Venturi, Machined Inlet, ISO
Orifice, Corner Taps, ASME	Venturi, Welded Inlet, ISO
Orifice, Corner Taps, ISO	
Orifice, D & D/2 Taps, ASME	
Orifice, D & D/2 Taps, ISO	

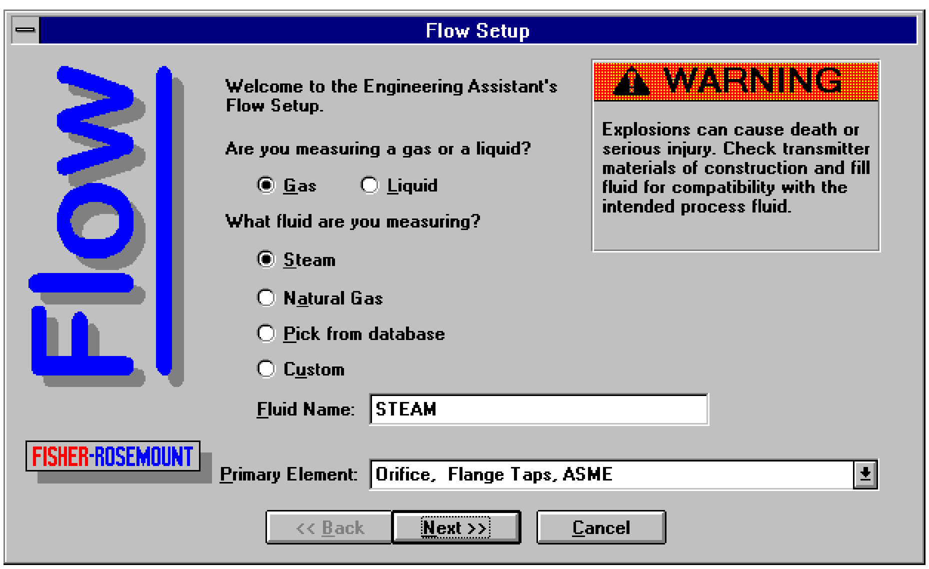
Other: (1)	Primary Element Setup Options		
– Calibrated Orifice: Flange, Corner or D & D/2 Taps	Constant Cd, Discharge Coefficient	or	20 × 2 Calibrated Data Table
– Calibrated Orifice: 2 ½ D & 8D Taps	Constant Cd, Discharge Coefficient	or	20 × 2 Calibrated Data Table
– Calibrated Nozzle	Constant Cd, Discharge Coefficient	or	20 × 2 Calibrated Data Table
– Calibrated Venturi	Constant Cd, Discharge Coefficient	or	20 × 2 Calibrated Data Table
– Area Averaging Meter	Constant K, Flow Coefficient		
– V-Cone®	Constant Cf, Coefficient of Flow		

(1) Selecting a primary element from the other list requires additional setup information regarding the primary element. This information should be obtained from the primary element manufacturer or from your own test data. If the calibrated data table is selected, a minimum of two completed rows is required.

Setup
Compensated Flow
(Steam Configuration)

The Compensated Flow selection allows you to configure the Model 3095 MV to measure steam flow. This following screens illustrates how to define a steam configuration.

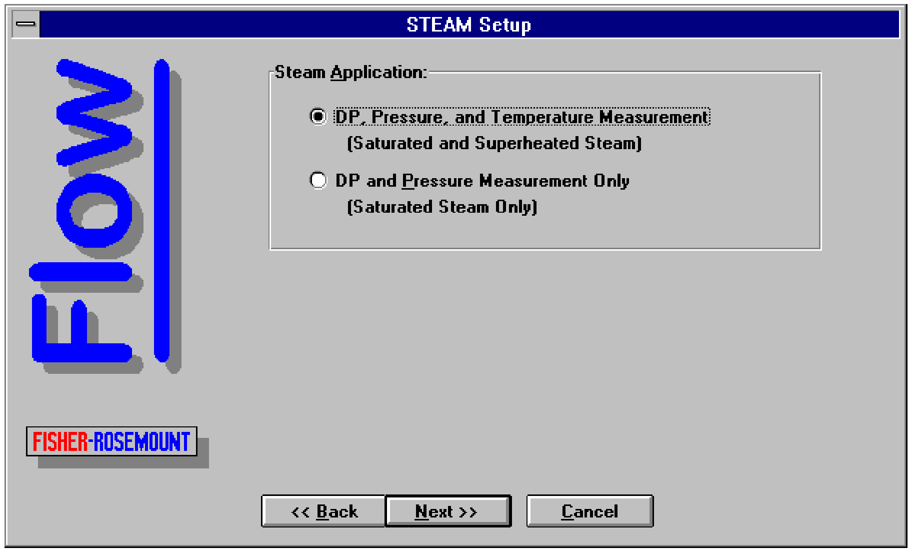
FIGURE 4-8. Flow Setup Screen.



3095-30950757

1. Select Gas radio button.
2. Select Steam radio button.
3. Select Primary Element (see Table 4-2 for primary element options).
4. Select Next.

FIGURE 4-9. Steam Selection Screen.



3095-30950758

NOTE
Step 8b is not part of the "DP and Pressure" configuration procedure.

5. Select type of steam measurement:

   DP, Pressure, and Temperature compensated steam measurement (Saturated and/or Superheated steam)
   or
   DP and Pressure compensated steam measurement (Saturated Steam Only)

NOTE
DP, Pressure, and Temperature is the most common option. With this option, the Model 3095 MV will compensate for both saturated and superheated steam.

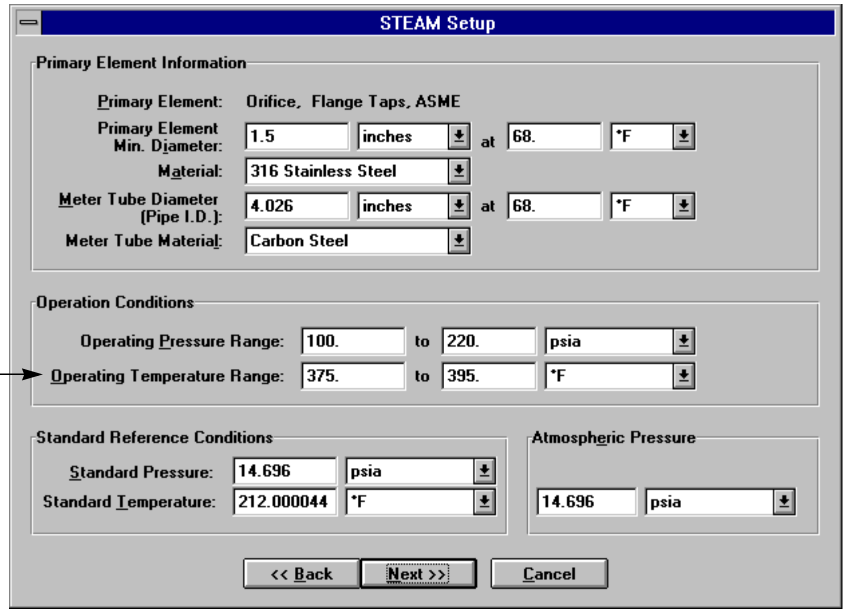
NOTE
DP and Pressure should be selected ONLY if the steam being measured is always saturated. With this option, the density of the saturated steam is based on the actual static pressure measurement. This option also requires that the Model 3095 MV is set to fixed temperature mode.

With this option, saturated steam density is calculated based on ASME steam tables, and dynamic temperature compensation is not performed. If dynamic temperature compensation is desired, select the DP, Pressure, and Temperature option.

---

6. Select Next.

FIGURE 4-10. Steam Setup Screen.



NOTE
The Operating Temperature Range selection is not displayed if "DP and Pressure" is selected.

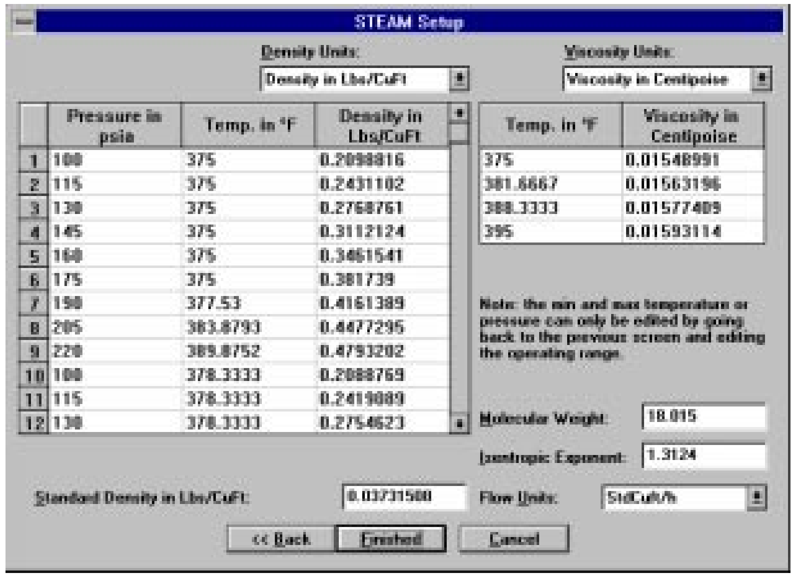
7. Define Primary Element Information
   a. Enter Primary Element (bore or throat) Diameter and units at reference temp.
   b. Enter Primary Element Material.
   c. Enter Meter Tube Diameter (pipe ID) and units at reference temperature.
   d. Enter Meter Tube Material.
8. Enter Operating Conditions.
   a. Enter Operating Pressure Range and Units.
   b. Enter Operating Temperature Range and Units. The operating temperature range points must be equal to or greater than the saturation temperature at the given operating pressures.
9. (Optional) If desired, modify standard pressure and/or temperature conditions.
10. Select Next.
11. The Steam Setup screen is automatically populated with steam data based on the ASME steam equations.

    If desired, all data fields can be edited. However, if a change is made to either a density or viscosity value, the EA considers the fluid to be "Custom Fluid."

FIGURE 4-11. Compressibility and Viscosity Table
(Steam Configuration).

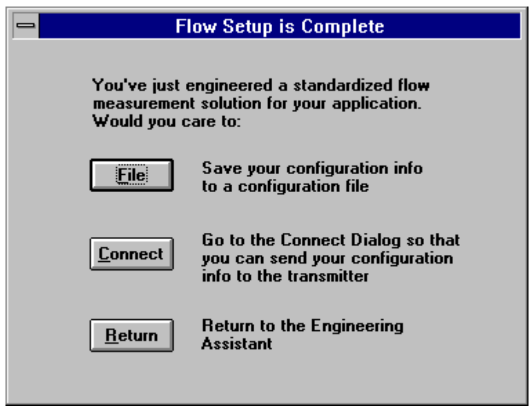
NOTE
Table values automatically convert if a different unit of measure is selected.

All data fields can be edited.



3095-30950760

12. Select Flow Units.
13. Select Finish.



3095-30950761

14. This screen provides you three options.
   - File saves the flow information to a configuration file, which can be sent by selecting Transmitter, Send Config... as explained on page 4-38. (recommended).
   - Connect switches to the Connect screen so that the flow configuration can be sent to a transmitter.
   - Return switches to the EA.

NOTE
File is recommended because you have an electronic record of your flow configuration.

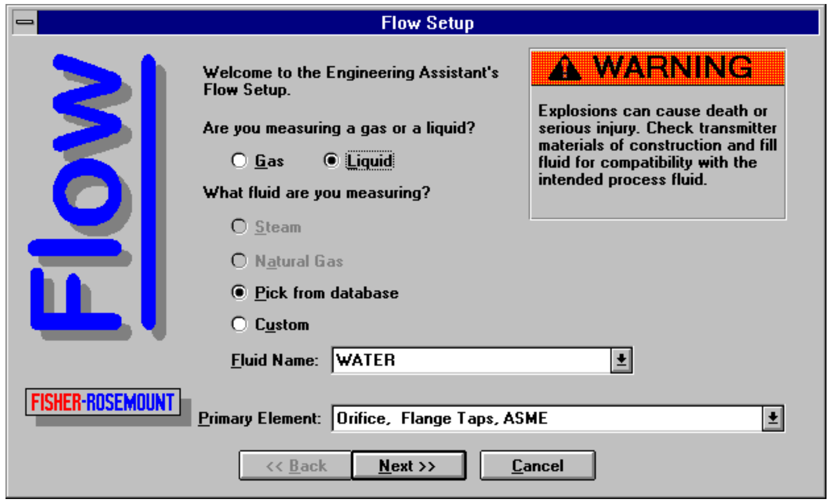
⚠CAUTION

If you selected custom fluid, or made density or viscosity changes to an AIChE fluid, save your information to a configuration file so you can modify the flow configuration information at a later date.
Although you can read a flow configuration from a transmitter, you **CANNOT** retrieve custom density, custom viscosity, or custom primary element information. Therefore, be sure to save custom fluid configurations to a unique file.

Setup
Compensated Flow
(Liquid Configuration)

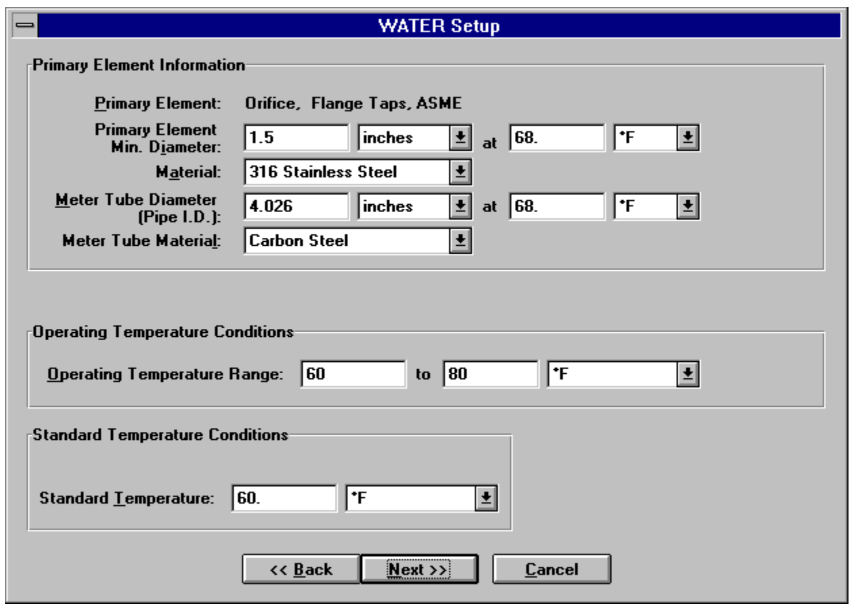
The Compensated Flow selection enters the user into the procedure for configuring the Model 3095 MV to measure flow of a particular fluid. The following screens illustrate how to define a liquid configuration.

FIGURE 4-12. Flow Setup Screen (Liquid Configuration).



3095-30950751

FIGURE 4-13. Flow Setup Screen (Liquid Configuration).



3095-30950403

1. Select Liquid.
2. Select "Pick from database" radio button and select a Fluid Name from the database picklist (see Table 4-1 for database options),
   or
   Select "Custom" radio button and enter your own fluid name.
3. Select Primary Element Information (see Table 4-4 for options).
4. Select Next.
5. Define Primary Element Information
   a. Enter Primary Element (bore or throat) Diameter and units at reference temp.
   b. Enter Primary Element Material.
   c. Enter Meter Tube Diameter (pipe ID) and units at reference temperature.
   d. Enter Meter Tube Material.

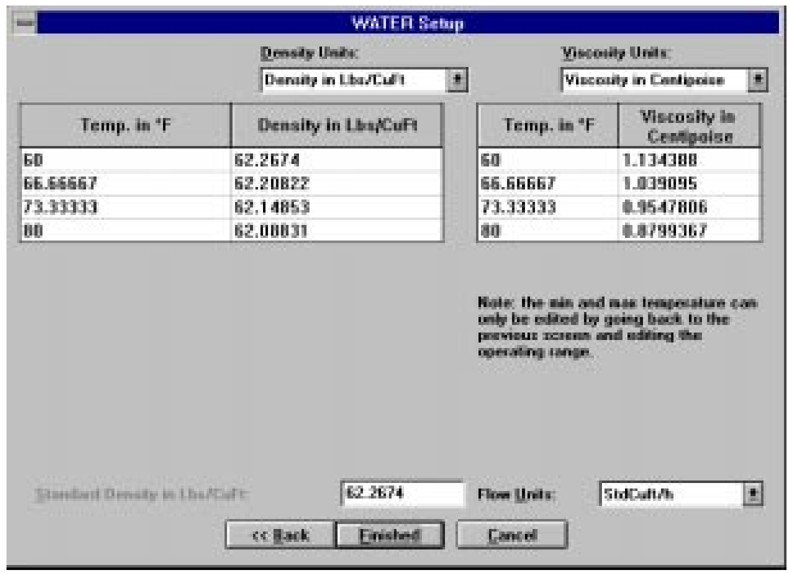
6. Enter Operating Temperature Range and Units.
7. (Optional) If desired, modify standard temperature conditions.
8. Select Next.
9. If you selected your own fluid name, fill in the density column and the viscosity column.

   If you used an AIChE database fluid, this table is already populated with AIChE data. However, if a change is made to either a density or viscosity value, the EA considers the fluid to be “Custom Fluid.”

FIGURE 4-14. Flow Setup Compressibility and Viscosity Table (Liquid Configuration).

NOTE
Table values automatically convert if a different unit of measure is selected.

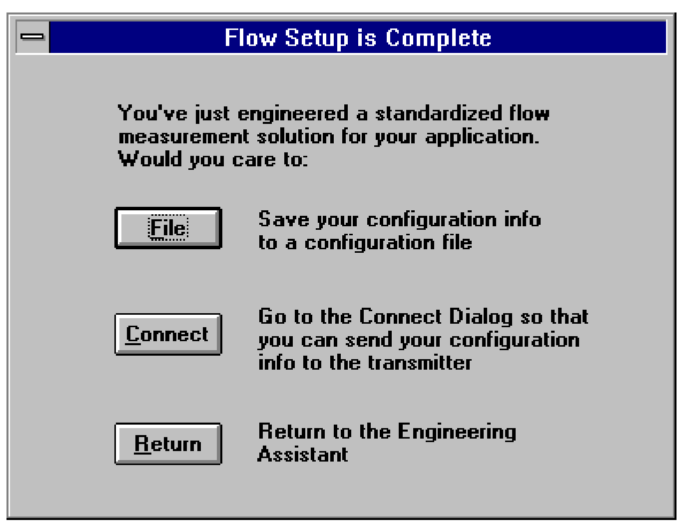
All data fields can be edited.



3095-30950404

10. Select Flow Units.
11. Select Finish.

FIGURE 4-15. Flow Setup is Complete Screen.



3095-30950086

12. This screen gives you three options.
    - File saves the flow information to a configuration file, which can be sent by selecting Transmitter, Send Config... as explained on page 4-38. (recommended).
    - Connect switches to the Connect screen so that the flow configuration can be sent to a transmitter.
    - Return switches to the EA.

NOTE
File is recommended because you have an electronic record of your flow configuration.

⚠CAUTION

If you selected custom fluid, or made density or viscosity changes to an AIChE fluid, be sure to save your 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.

Setup
Compensated Flow
(Natural Gas Configuration)

Gross versus Detail Characterization

The Engineering Assistant calculates the natural gas compressibility factor using either gross or detail characterization methods. 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 A.G.A. computes compressibility factors. Table 4-6 identifies the acceptable ranges for both of these characterization methods.

NOTE
A.G.A. Report No. 8 specifies that it is only valid for the gas phase. The Detail Characterization method allows water, n-Hexane, n-Heptane, n-Octone, n-Nonane, and n-Decane to be present up to the dew point. When entering these component values, be sure that these components have not reached their respective dew points.

TABLE 4-6. Acceptable Ranges:
Gross vs. Detail Characterization Methods.

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

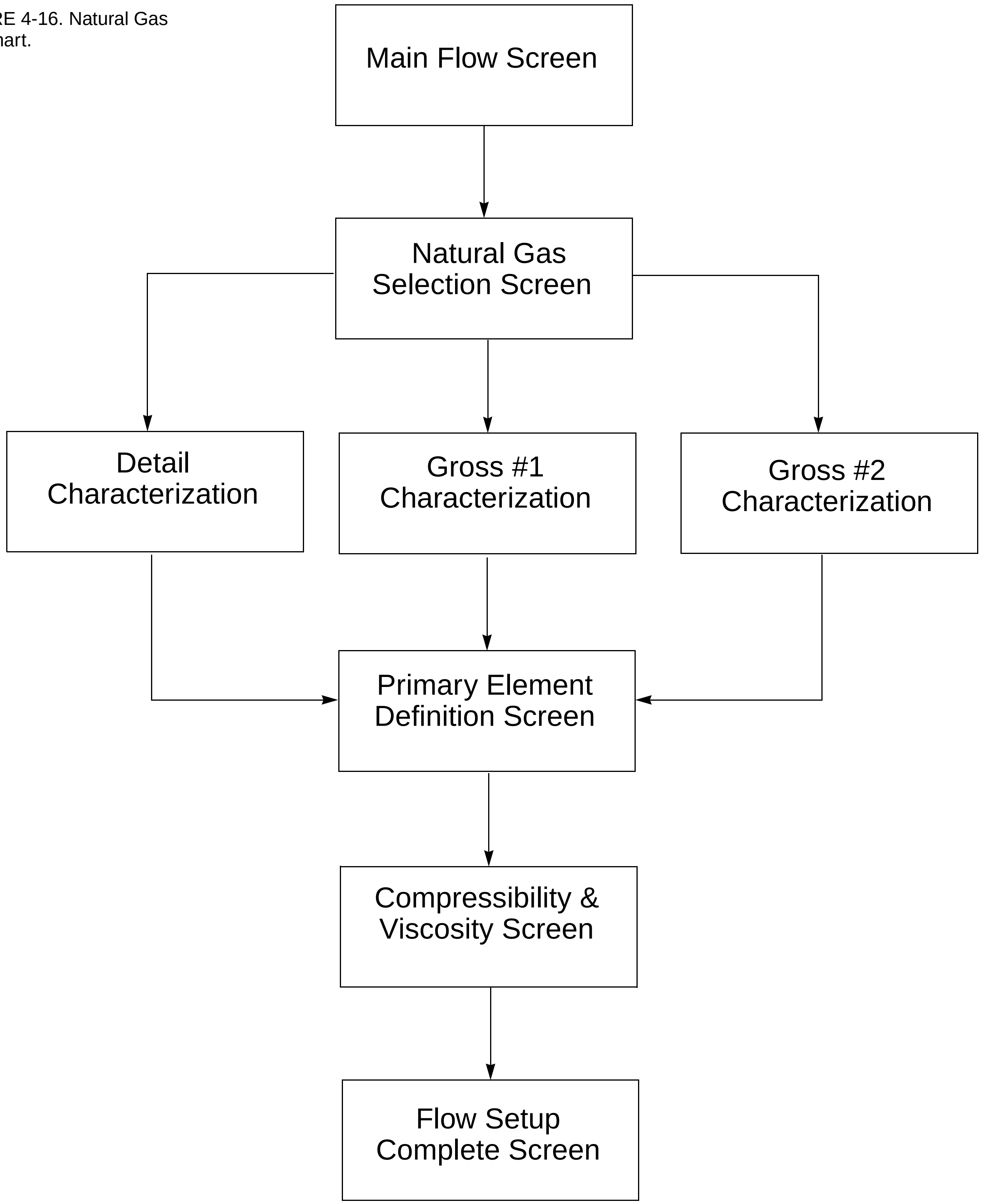
NOTE
Reference conditions are 14.73 psia and 60 °F for Gross Method.

(1) The Model 3095 MV 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.

Setup
Compensated Flow
(Natural Gas Flowchart)

The flowchart in Figure 4-16 illustrates the Engineering Assistant Screens used to define a natural gas flow configuration.

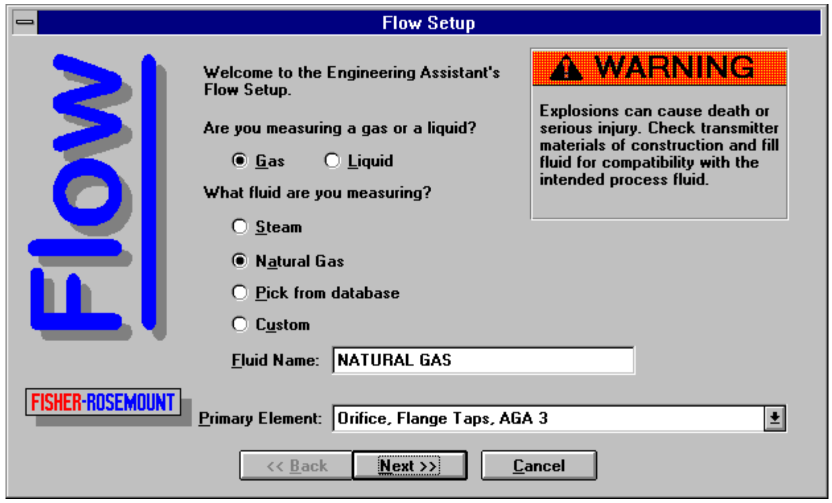
FIGURE 4-16. Natural Gas Flowchart.



Setup
Compensated Flow
(Natural Gas Procedure)

1. Select Gas.
2. Select Natural Gas.
3. Select Primary Element Information (see Table 4-4 for options).
4. Select Next.

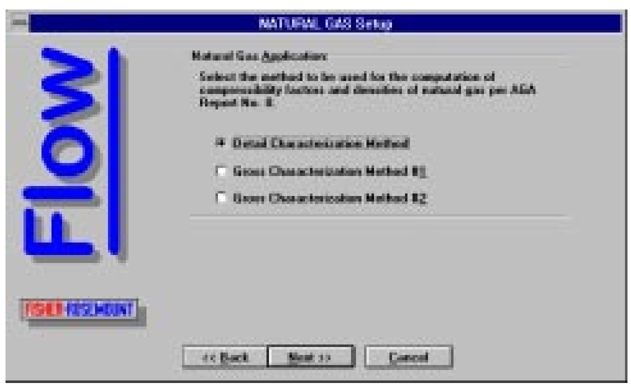
FIGURE 4-17. Flow Setup Screen (Natural Gas Configuration).



3095-30950903

5. Select the desired characterization method, then select Next.
   - If the Detail Method is selected, turn to page 4-26.
   - If the Gross 1 Method is selected, turn to page 4-27.
   - If the Gross 2 Method is selected, turn to page 4-28.

FIGURE 4-18. Flow Setup Screen (Natural Gas Applications).



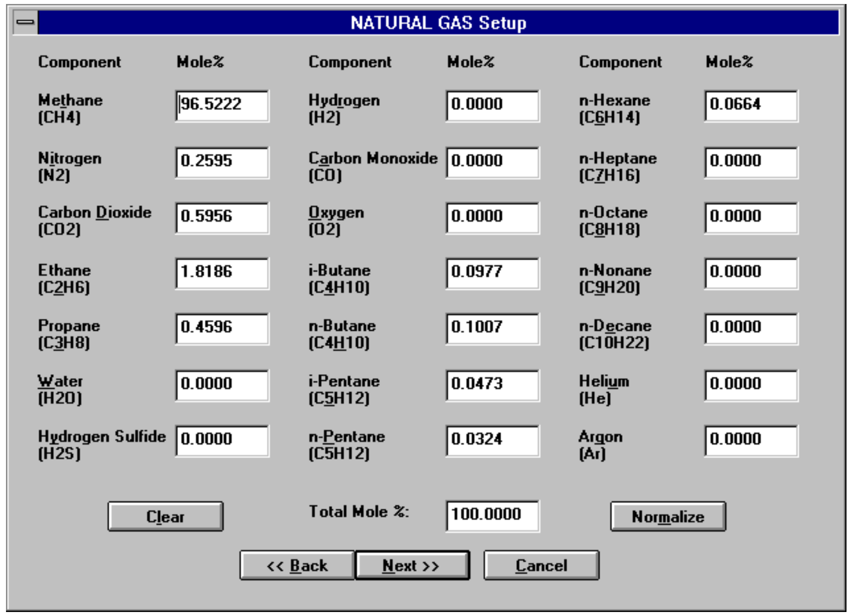
3095-30950904

Detail Characterization Method

The AGA8 Detail method allows entry of up to 21 different gas composition mole percentages as illustrated in Figure 4-19. Table 4-6 on page 4-24 identifies the valid range for each variable.

6. Enter a Mole% value into each of the desired Natural Gas component fields.
   - When entering numbers into the natural gas screen, the Total Mole % field indicates the sum of all percentages entered. The Total Mole % field must add up to 100.0000 percent for the Engineering Assistant to accept the new values.
   - To zero all 21 fields, select clear.
   - The normalize button provides a method to automatically modify all non-zero values so that they add up to 100.0000.

FIGURE 4-19. Natural Gas Setup Screen (Detail Characterization).



3095-30950905

7. After all the desired mole @ are entered, Select Next.

For additional information concerning the Detail Characterization Method, refer to the A.G.A. Report No.8/API MPMS Chapter 14.2, Second Printing, July 1994.

Gross Characterization Method #1

The gross characterization method 1 requires the entry of real gas specific gravity, heating value, and CO2 mole percent, and also allows entry of H2 mole percent and CO mole percent. H2 and CO are typically zero for natural gas applications.

The valid ranges for gross characterization method 1 components are:

Real gas relative density (specific gravity) at 60 °F, 14.73 psia
0.554–0.87.

Volumetric Gross Dry Heating Value at 60 °F, 14.73 psia
477–1150 BTU/SCF.

CO2 (carbon dioxide) mole percent
0–30 percent.

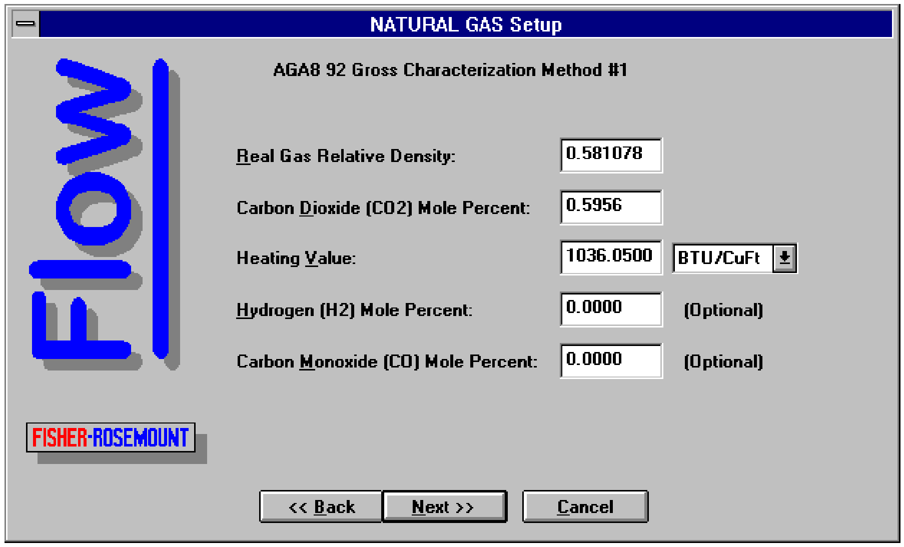
H2 (hydrogen) mole percent (optional)
0–10 percent.

CO (carbon monoxide) mole percent (optional)
0–3 percent.

NOTE
See steps 1–5 on page 4-26 for the beginning of this procedure.

6. Enter a value into each of the desired Natural Gas component fields.

FIGURE 4-20. Natural Gas Setup Screen (Gross Characterization Method 1).



3095-30950907

7. After all the percentages are entered, Select Next.

Gross Characterization Method #2

The gross characterization method 2 requires the entry of real gas specific gravity, value, CO2 mole percent, and N2 mole percent, also allows entry of H2 mole percent and CO mole percent. H2 and CO are typically zero for natural gas applications.

The valid ranges for gross characterization method 2 components are:

Real gas relative density (specific gravity) at 60 °F, 14.73 psia
0.554–0.87.

CO2 (carbon dioxide) mole percent
0–30 percent.

N2 (hydrogen) mole percent
0–50 percent.

H2 (hydrogen) mole percent (optional)
0–10 percent.

CO (carbon monoxide) mole percent (optional)
0–3 percent.

NOTE
See steps 1–5 on page 4-26 for the beginning of this procedure.

6. Enter a value into each of the desired Natural Gas component fields.

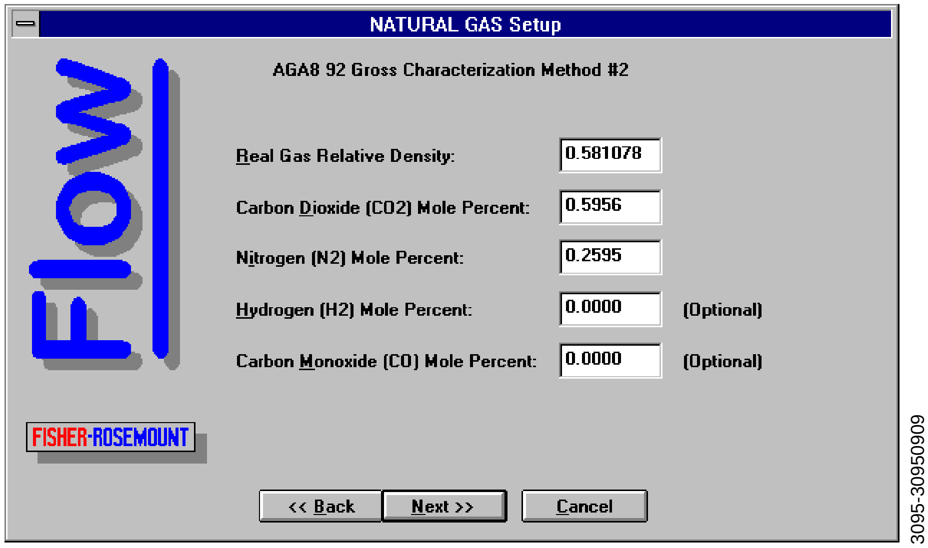


FIGURE 4-21. Natural Gas Setup Screen (Gross Characterization Method 2).

7. After all the percentages are entered, Select Next.

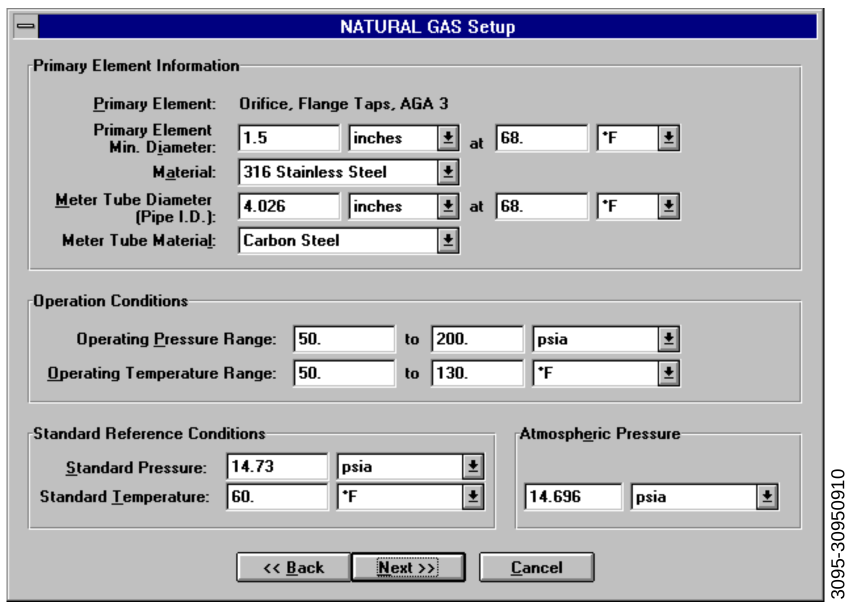


FIGURE 4-22. Natural Gas Setup Screen.

NOTE
To comply with A.G.A. Report No. 3, the primary element must be "Orifice, Flange Taps, AGA 3."

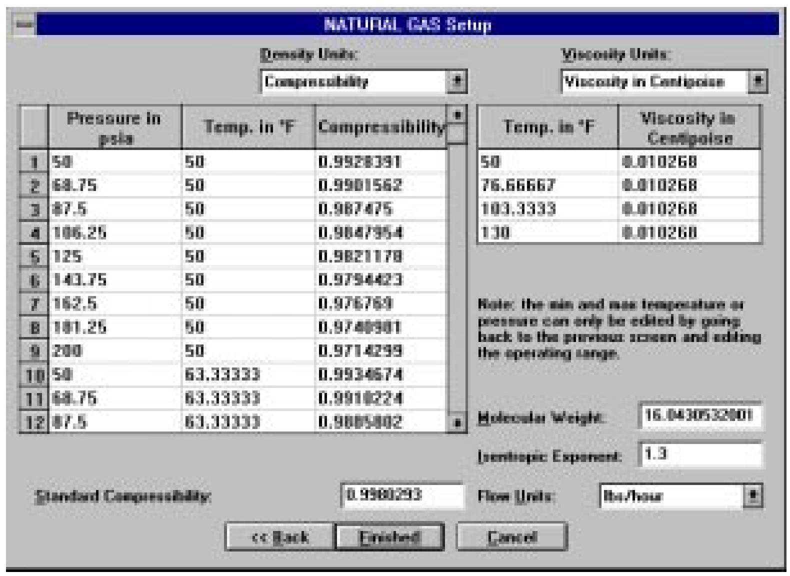
8. Define Primary Element Information:
   a. Enter Primary Element (bore or throat) Diameter and units at reference temperature.
   b. Enter Primary Element Material.
   c. Enter Meter Tube Diameter (pipe ID) and units at reference temperature.
   d. Enter Meter Tube Material.

9. Enter Operating Conditions.
   a. Enter Operating Pressure Range and Units.
   b. Enter Operating Temperature Range and Units. The operating temperature range points should be entered for nominal conditions.
10. (Optional) If desired, modify standard pressure and/or temperature conditions.
11. Select Next.
12. The displayed values are calculated per A.G.A. 8.

    If desired, all data fields can be edited. However, if a change is made to either a density or viscosity value, the EA considers the fluid to be "Custom Fluid."

    Data fields should conform to density or compressibility factor information as published by A.G.A. 8. (A.G.A. 3 recommends viscosity values of 6.9 $\times$ 10^{-6} pounds mass per foot-second or 0.010268 centipoise. Another available reference is the *Gas Orifice Flow Program* published by the Gas Research Institute.

FIGURE 4-23. Compressibility and Viscosity Table (Steam Configuration).

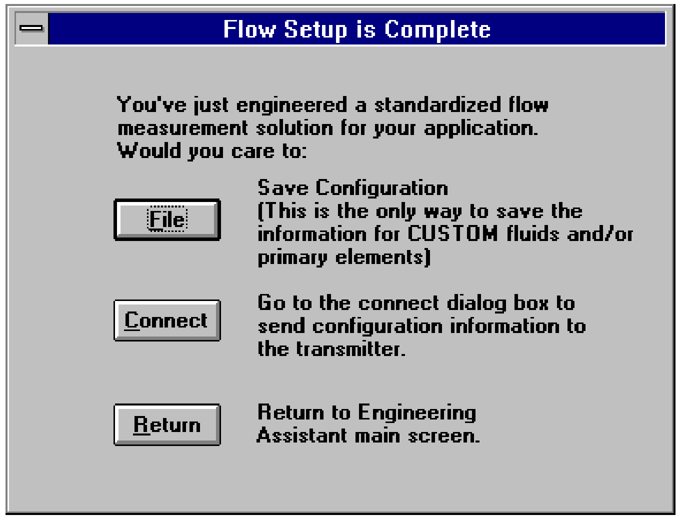


3095-30950911

NOTE
Table values automatically convert if a different unit of measure is selected.

All data fields can be edited.

13. Select Flow Units.
14. Select Finish.



3095-30950912

15. This screen provides you three options.
    - File saves the flow information to a configuration file, which can be sent by selecting Transmitter, Send Config... as explained on page 4-38. (recommended).
    - Connect switches to the Connect screen so that the flow configuration can be sent to a transmitter.
    - Return switches to the EA.

NOTE

File is recommended because you have an electronic record of your flow configuration.

⚠CAUTION

If you selected custom fluid, or made density or viscosity changes to an AIChE fluid, be sure to save your 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.

Setup
Units

This screen sets the units for the six process variables: Differential Pressure, Absolute Pressure, Gage Pressure, Process Temperature, Flow, and Flow Total units.

NOTE

Units can be entered off-line in Setup, Units (Flow Configuration Information), or on-line in Transmitter, Units (Transmitter Specific Information). If the units entered are different, the Transmitter Specific Information overwrites the Flow Configuration Information.

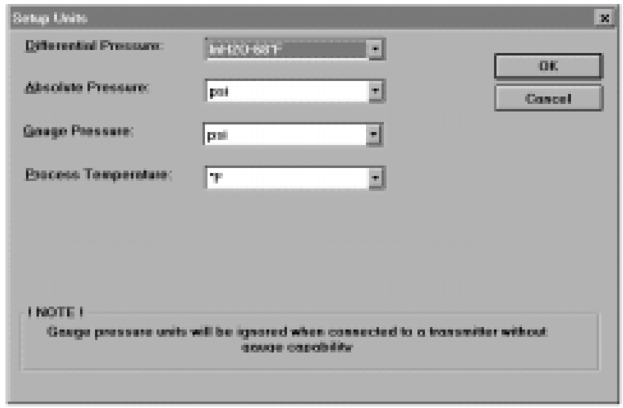


FIGURE 4-24. Setup Units Screen.

3095-S-UNITS

Setup
Damping

This screen sets the damping for four process variables: Differential Pressure, Absolute Pressure, Gage Pressure, and Process Temperature.

NOTE
Since the Compensated Flow procedure automatically includes these settings as the damping parameters for either a configuration file, or as the damping values sent to the transmitter, be sure that this screen is set correctly before performing the Compensated Flow procedure.

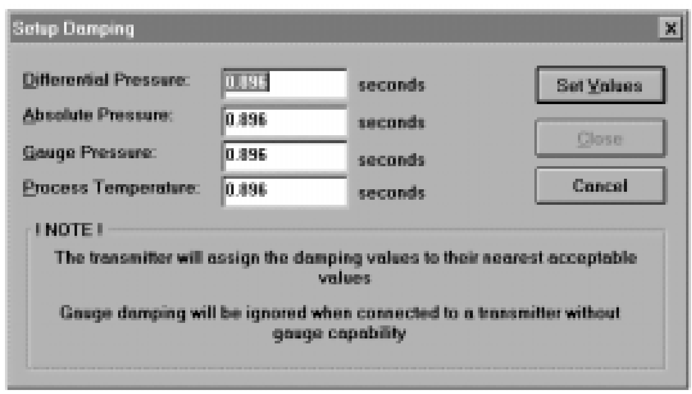


FIGURE 4-25. Setup Damping Screen.

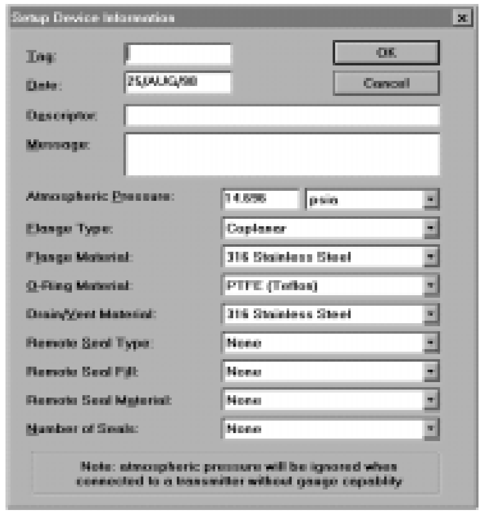
3095-S-DMPG

Setup
Device Info

This screen sets the device information for a transmitter.

NOTE
Since the Compensated Flow procedure automatically includes these settings as the device information for either a configuration file, or as the device information sent to the transmitter, be sure that this screen is set correctly before performing the Compensated Flow procedure.

FIGURE 4-26. Setup Device Info Screen.



3095-S-DVINFO

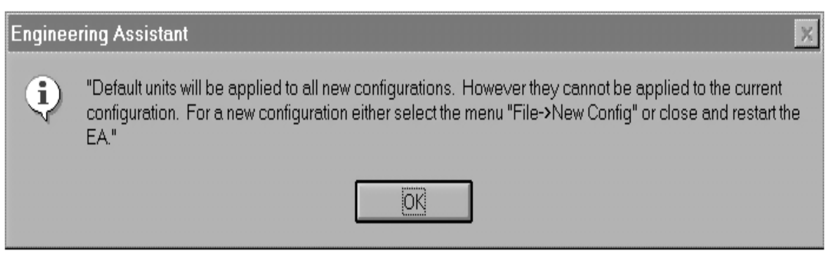
Setup
EA Default Units
U.S. Units
SI/Metric Units

These menu selections set the default units for the EA as either U.S. Units, or SI/Metric units.

The selected units will be automatically selected during the next time you restart the EA software, or the next time you select File, New Config.

This selection does not change the units for a flow configuration that has already been saved to a file or sent to a transmitter.

FIGURE 4-27. Default Units Message Screen.



3095-S-DFUNITS

Transmitter Screens

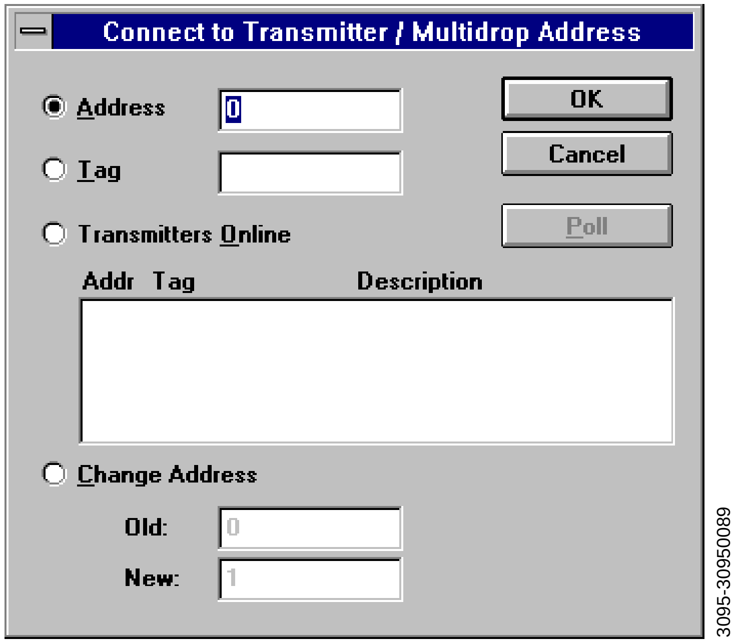
Transmitter
Disconnect

If the Setup menu selections are grayed out, this indicates that the EA is currently on-line with a Model 3095 MV transmitter. Use this selection to disconnect the EA from a Model 3095 MV, which will then enable the Setup menu selections.

Transmitter
Connect

The connect screen provides two functions: to change the address for the connected Model 3095 MV transmitter, and to change the Model 3095 MV that the EA is connected to during multidrop applications.

FIGURE 4-28. Connect Screen.



When this screen is accessed, it always appears as illustrated in Figure 4-28: the address is 0, and there are no devices on-line.

Change Address

Use the following procedure to change the Model 3095 MV address.

1. Select Transmitter, Connect to display the Connect screen.
2. Select Transmitters Online.
3. Select Poll.
   The EA searches for all connected Model 3095 MV transmitters, then displays found transmitters in the "Transmitters Online" box. Devices are identified by the software tag and description entered in the Device Information screen (see Figure 4-20 on page 4-28).
4. Select the desired device from the Model 3095 MVs identified in the "Transmitters Online" window.
5. Select the "Change Address" radio button appears.
6. Enter old address.
7. Enter new address, then select OK.

Change Connection

During multidrop applications, the Model 3095 MV EA is connected to one device at a time. Use the following procedure to change this connection pointer.

1. Select Transmitter, Connect to display the Connect screen
2. Select Transmitters Online.
3. Select Poll.
   The EA searches for all connected Model 3095 MV transmitters, then displays found transmitters in the "Devices Online" box. Devices are identified by address and software tag.
4. Select the desired device from the Model 3095 MVs identified in the "Transmitters Online" window and select OK.
   The Model 3095 MV EA is now connected to the device selected in Step 4. If security is enabled, the EA displays the Privileges screen.
5. Enter a password for the new device, then select OK.

Transmitter
HART Output
Burst Mode

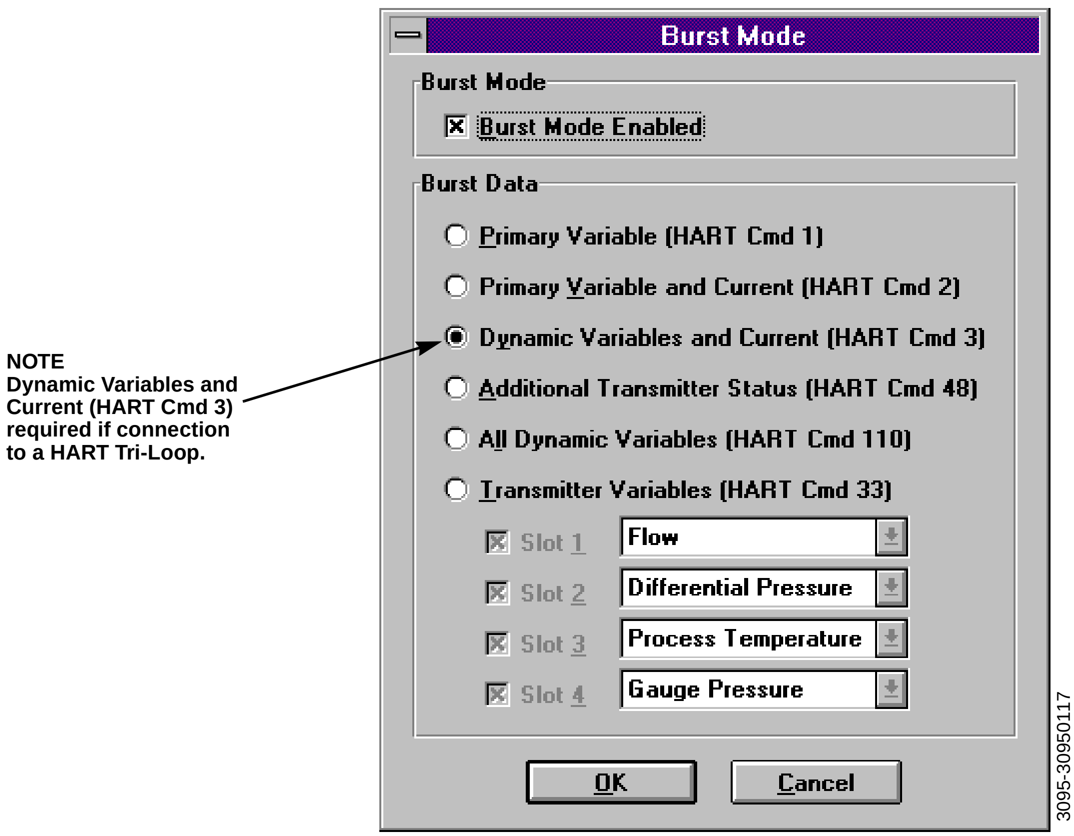
When the Model 3095 MV is configured for burst mode, it provides faster digital communications from the transmitter to the control system by eliminating the time required for the control system to request information from the transmitter.

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 is receiving the digital information. Burst mode applies only to the transmission of burst data (see Figure 4-29 below), and does not affect the way other transmitter data is accessed.

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. Between each burst message sent by the transmitter, a short pause allows the EA or control system to initiate a request. The transmitter will receive the request, process the response message, and then continue "bursting" the data approximately three times per second.

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

FIGURE 4-29. Burst Mode Screen.

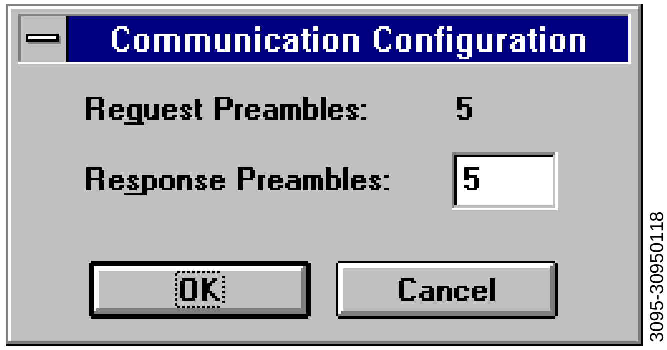


Transmitter
HART Output
Communication Configuration

The communication configuration screen sets the number of response preambles for transmitter to EA communication. The valid range for this setting is 2–20 preambles. The default setting is five.

Typically, this value is left at five. Increase this value only if the transmitter is installed in an electrically noisy environment.

FIGURE 4-30. Communication Configuration Screen.



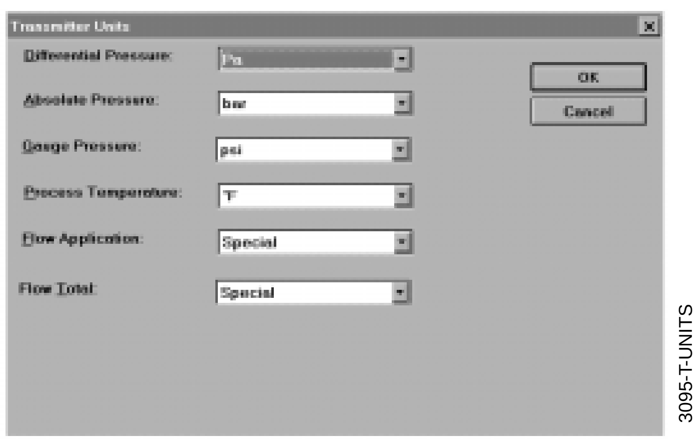
Transmitter
Units

This screen sets the units for the five process variables: Differential Pressure, Absolute Pressure, Gage Pressure, Process Temperature, Flow, and Flow Total units.

Modifying the information on this screen and selecting OK immediately changes the connected transmitter.

NOTE
Units can be entered off-line in Setup, Units (Flow Configuration Information), or on-line in Transmitter, Units (Transmitter Specific Information). If the units entered are different, the Transmitter Specific Information overwrites the Flow Configuration Information.

FIGURE 4-31. Transmitter Units Screen.



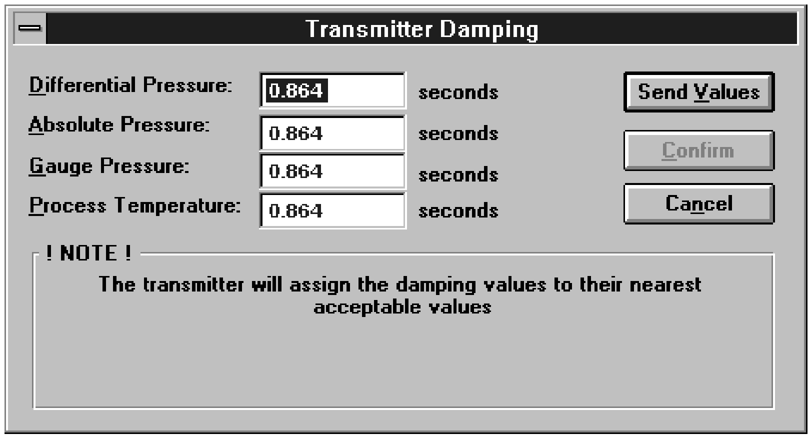
Transmitter Damping

This screen sets the damping for four process variables: Differential Pressure, Absolute Pressure, Gage Pressure, and Process Temperature

Modifying the information on this screen and selecting OK immediately changes the connected transmitter.

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 4-32. Transmitter Damping Screen.



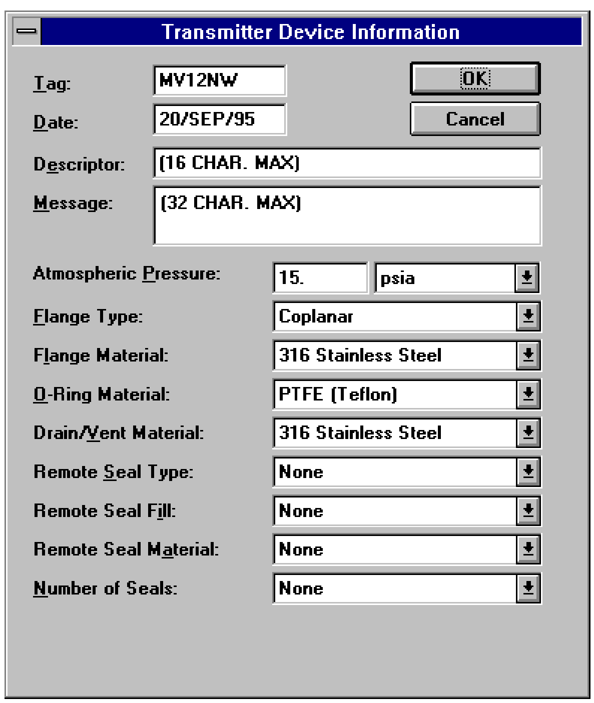
3095-30950093

Transmitter Device Info

This screen sets the device information for a transmitter.

Modifying the information on this screen and selecting OK immediately changes the connected transmitter.

FIGURE 4-33. Device Info Screen.



3095-30950094

Transmitter
Send Config

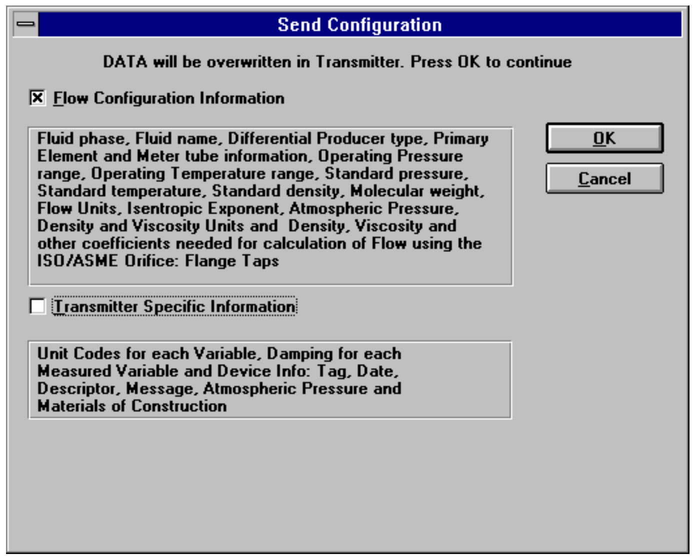
This screen allows sending three different types of configuration data to a transmitter.

- Flow Configuration information only.
- Transmitter Specific information only.
- Both Flow Configuration and Transmitter Specific information.

Figure 4-33 identifies the contents for each type of file. An "X" in the corresponding box indicates that the listed information will be overwritten in the transmitter.

NOTE
When the Transmitter Specific Information is sent to a transmitter, all previous transmitter information will be overwritten

FIGURE 4-34. Send Config Screen.



3095-30950121

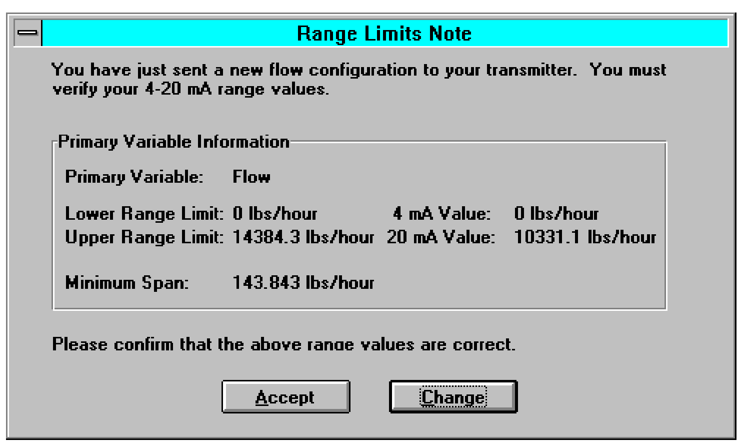
Transmitter
Recv Config

This screen receives the configuration information from a transmitter.

Range Limits Note

This screen verifies your 4–20 mA range values when you send a new flow configuration to a transmitter. It shows the current values and allows you to either confirm or change them. If you select Change, the Range Values screen appears (see Figure 4-44 on page 4-45).

FIGURE 4-35. Range Limits Note Screen.



3095-30950448

Transmitter LCD Settings

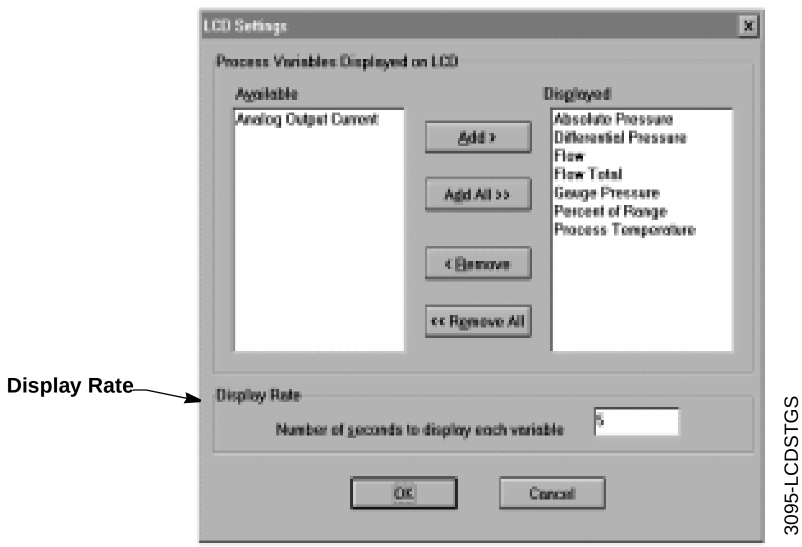
The LCD Settings screen sets the display of process variables on the LCD meter. The following eight process variables are available:

- Absolute Pressure
- Analog Output Current
- Differential Pressure
- Flow
- Flow Total
- Gauge Pressure
- Percent of Range
- Process Temperature

Display Rate, at the bottom of the screen, sets the display time of each parameter selected (i.e., listed in the Displayed box). Display time is selectable in one-second increments from two to ten seconds.

In Figure 4-36 below, the variables Absolute Pressure, Differential Pressure, Flow, Flow Total, Gauge Pressure, Percent of Range, and Process Temperature will be displayed on the LCD meter for 5 seconds each:

FIGURE 4-36. LCD Settings Screen.



Transmitter Totalizer

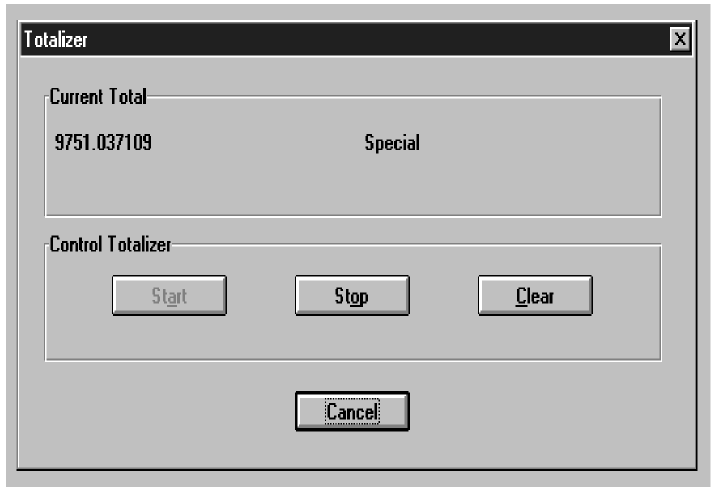
The Totalizer screen displays and controls the settings for totalizing mass flow in the connected transmitter.

The Current Total box contains the flow total and units information.

The Control of Totalizer settings box contains the totalizer settings:

- Start: Starts totalizing flow in the transmitter
- Stop: Stops totalizing flow in the transmitter
- Clear: Resets the flow total

FIGURE 4-37. Totalizer Screen.



3095-TTLZR

Transmitter Flow Rate Special Units

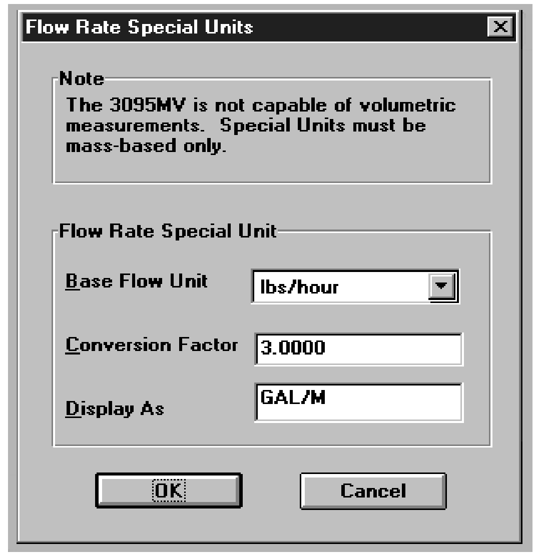
The Flow Rate Special Units screen allows the display and measurement of units considered nonstandard by the EA.

NOTE
The Model 3095MV supports only mass or standard volume measurements.

To select a special flow rate unit:

1. Select Transmitter, Units.
2. Select the right drop down arrow of the Flow Application box. Select Special, then select OK.
3. Select Transmitter, Flow Rate Special Units.
4. Select the right drop down arrow of Base Flow Unit, then select the Base Flow Unit desired.
5. Select the Conversion Factor box. Type in a conversion factor. The conversion factor multiplied by the Base Flow Unit will equal the Flow Rate Special Unit.
6. Select the Display As box. Type in the desired display units, for example, GAL/M. Select OK. You can enter up to five characters for display of special units, including all alphanumeric characters and the forward slash ("/") key.

FIGURE 4-38. Flow Rate Special Units Screen.



Transmitter Totalizer Special Units

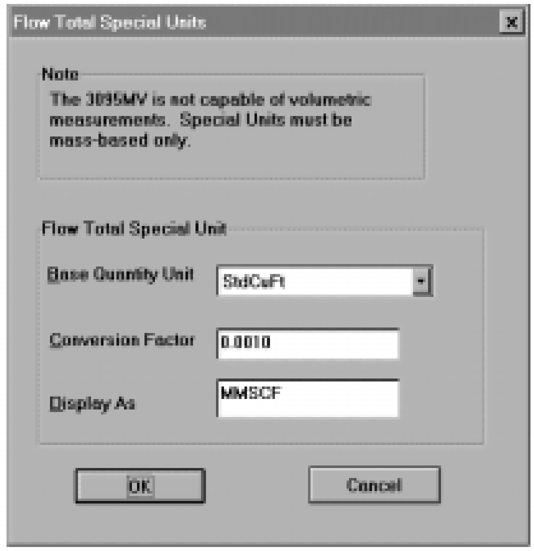
The Flow Total Special Units screen allows the display and measurement of flow total in units considered nonstandard by the EA.

NOTE
The Model 3095MV supports only mass or standard volume measurements.

To select a special flow total unit:

1. Select Transmitter, Units.
2. Select the right drop down arrow of the Flow Total box. Select Special, then select OK.
3. Select Transmitter, Totalizer Special Units.
4. Select the right drop down arrow of Base Quantity Unit, then select the unit desired.
5. Select the Conversion Factor box. Type in a conversion factor. The conversion factor multiplied by the Base Quantity Unit will equal the Flow Total Special unit.
6. Select the Display As box. Type in the desired display units. Select OK. You can enter up to five characters for display of special units, including all alphanumeric characters and the forward slash ("/") key.

FIGURE 4-39. Flow Total Special Units Screen.



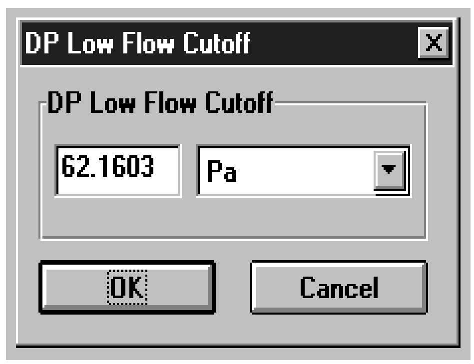
3095-FLTLSPCL

Transmitter
DP Low Flow Cutoff

The DP Low Flow Cutoff screen controls the minimum differential pressure (DP) limit, where flow is calculated. At DPs less than the low flow cutoff, flow equals zero.

The lowest limit for the DP Low Flow Cutoff equals 0.02 inH20 (5 Pa).

FIGURE 4-40. DP Low Flow Cutoff Screen.



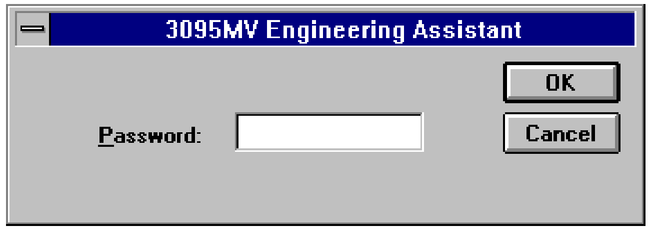
3095-LOFLOW

Maintenance Screens

Maintenance Privileges

This screen allows changing password security levels. For information about passwords, see page 4-48.

FIGURE 4-41. Privileges Screen.



3095-30950095

Maintenance Sensor Trim

The sensor trim screens are used during bench and field calibration of the Model 3095 MV.

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

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

Table 4-7 identifys the LRL and URL for the Model 3095 MV.

TABLE 4-7. Model 3095 MV Sensor Limits.

Sensor Range	LRL	URL
DP Range 1	–25 inH2O @ 68 °F	25 inH2O @ 68 °F
DP Range 2	–250 inH$_2$0 at 68 °F	250 inH$_2$0 at 68 °F
DP Range 3	–1,000 inH$_2$0 at 68 °F	1,000 inH$_2$0 at 68 °F
AP Range 3	0.5 psia	800 psia
AP Range 4	0.5 psia	3,626 psia
GP Range C	0 psig	800 psig
GP Range D	0 psig	3,626 psig
PT (1)	–300 °F (–185 °C)	1,500 °F (815 °C)

(1) In the fixed temperature mode, PT range is –459 to 3500 °F (–273 to 1927 °C).

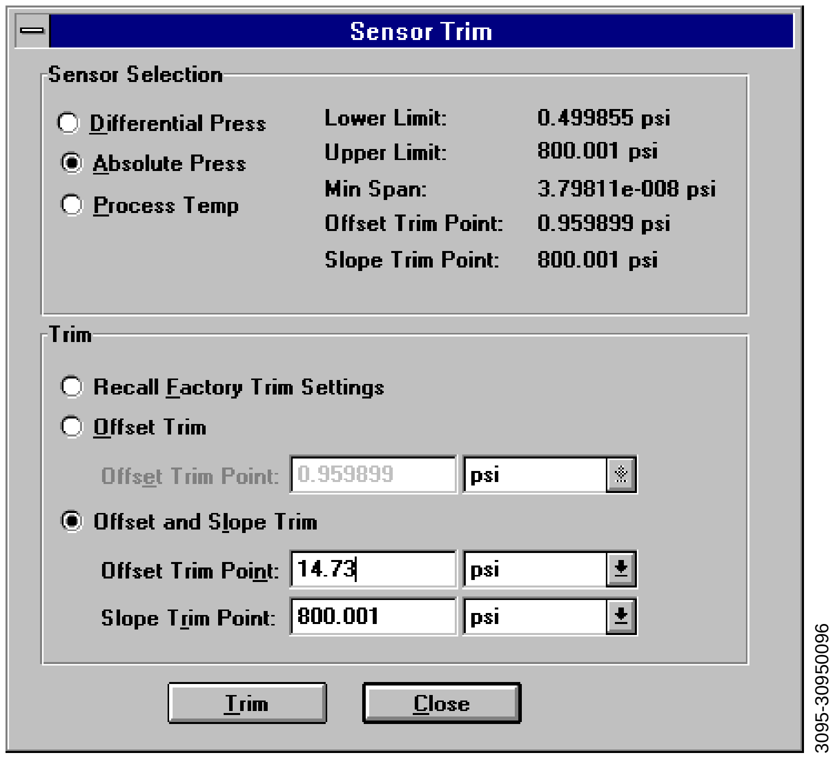
Sensor Trim Procedure (For Bench Calibration)

NOTE

The EA software is capable of calibrating absolute or gauge pressure sensors. Either “Gauge Sensor” or “Absolute Sensor” will populate the sensor selection, depending on Assigned Variables (Figure 4-46 on page 4-47). The Gauge Pressure Sensor Trim Procedure is similar to the Absolute Pressure Sensor Trim procedure given here.

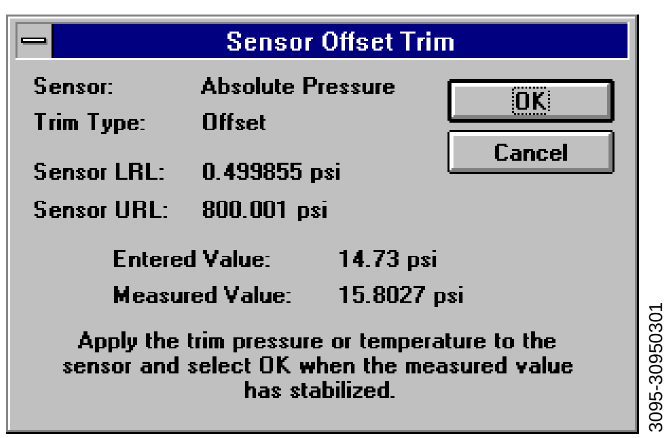
1. Trim Absolute (or Gauge) Pressure Offset (zero).
   a. Select Maintenance, Sensor Trim to display the Sensor Trim screen.

FIGURE 4-42. Sensor Trim Screen.



   b. Select Absolute Press, then select Offset & Slope Trim. Set Offset Trim Point and units, set Slope Trim Point and units, then select Trim to display the “Sensor Offset Trim” screen.

FIGURE 4-43. Sensor Offset Trim Screen.

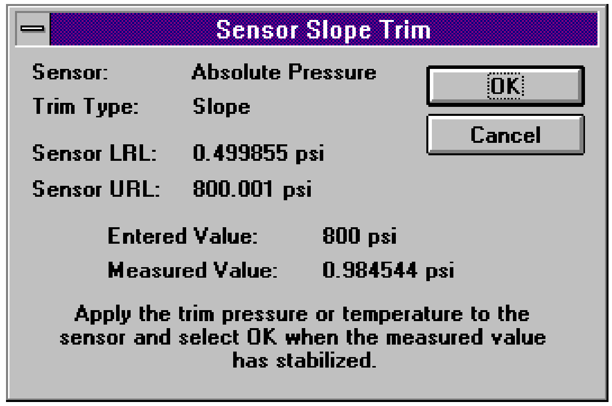


c. If using a vacuum pump, pull a vacuum to both the low and high sides of the transmitter, wait for the measured value to stabilize, then select OK.

or

If using a barometer, select OK to display the Sensor Slope Trim screen (Figure 4-44).

FIGURE 4-44. Sensor Slope Trim Screen.



3095-30950302

2. Trim Absolute (or Gauge) Pressure Slope (span).
   a. Using the dead-weight tester, apply the desired high pressure to both the low and high sides of the transmitter.
   b. Wait for the Measured Value to stabilize, then select OK.

3. Trim Differential Pressure Offset (zero).
   a. Select Differential Press and Offset & Slope Trim, set Offset Trim Point and units, set Slope Trim Point and units, then select Trim to display the “Sensor Offset Trim” screen.
   b. Using the dead-weight tester, apply the desired low pressure value to the high side of the transmitter.

NOTE
If zero is the desired low value, do not use the dead weight tester. Instead, enter zero as the trim value, select the units, then select OK.

   c. Wait for the Measured Value to stabilize, then select OK to display the Sensor Slope Trim Screen.
4. Trim Differential Pressure Slope (span).
   a. Using the dead-weight tester, apply the desired high pressure to the high side of the transmitter.
   b. Wait for the Measured Value to stabilize, then select OK.
5. Trim Process Temperature Offset (zero).
   a. Select Process Temp then select Offset & Slope Trim. Set Offset Trim Point and units, set Slope Trim Point and units, then select Trim to display the “Sensor Offset Trim” screen.
   b. Insert the RTD probe into an ice bath, wait for the Measured Value to stabilize, then select OK to display the Sensor Slope Trim screen.
6. Trim Process Temperature Slope (span).
   a. Insert the RTD probe into a hot oil bath.
   b. Wait for the Measured Value to stabilize, then select OK.

Sensor Trim Procedure (For Field Calibration)

To correct mounting position effects, field calibrate the Model 3095 MV after installation:

1. Establish communications (see **Connecting to a Personal Computer** on page 4-4).
2. Perform a Trim DP Offset (zero).
   a. Select Maintenance, Sensor Trim to display the Sensor Trim Select screen.
   b. Select Differential Press then select Offset Trim. Enter the low pressure value as the Offset Trim Point, set the units, then select Trim to display the “Sensor Offset Trim” screen.
   c. Wait for the Measured Value to stabilize, then select OK.
3. (Optional) If a barometer that is *at least* 3 times as accurate as the Model 3095 MV AP sensor is available, perform an SP Offset (zero).
   a. Select Maintenance, Sensor Trim to display the Sensor Trim Select screen.
   b. Select Absolute Press then select Offset Trim. Enter the barometric pressure reading as the Offset Trim Point, set the units, then select Trim to display the “Sensor Offset Trim” screen.
   c. Select OK.

Recall Factory Trim Settings Procedure

Use the following procedure to change trim settings to the factory installed settings.

1. Establish communications (see **Connecting to a Personal Computer** on page 4-4).
2. Enter a valid password.
3. Select the desired sensor (DP, SP, PT) and Recall Factory Trim Settings, then select Trim.
4. Repeat step 3 above for each of the other sensors.

Maintenance
Analog Output
Range Values...

The Range Values screen sets the range values for the primary variable, and also allows for reassigning the process variable output order. Setting the range points involves redefining the pressure points corresponding to the transmitter 4 and 20 mA setpoints.

NOTE
The Primary Variable (Figure 4-46) is also assigned as the 4–20 mA analog output.

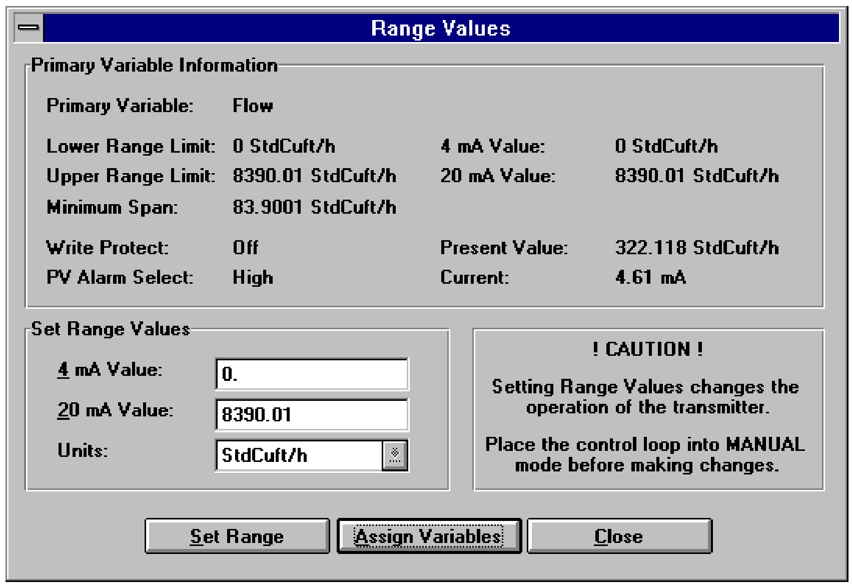
The top half of this screen provides information on the primary variable, while the bottom half allows setting the range values.

1. Select Assign Variables, then verify that the variable order is correct (see Figure 4-46).
2. Fill in the Range Values (4 mA Value and 20 mA Value), select the Units, then select Set Range.

NOTE
The Process Variable output order is critical if using the Model 3095MV transmitter in conjunction with the Model 333 Triloop HART-to-Analog Signal Converter. The process variable order and units of the Model 3095MV must match the process variable order and units in the Model 333 Triloop.

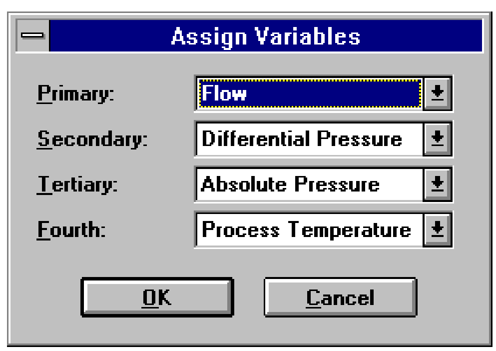
NOTE
Range values must be within the lower range limit, the upper range limit, and the minimum span as indicated in the top portion of the Set Range Values screen. The 4 and 20 mA range values cannot be equal.

FIGURE 4-45. Range Values Screen.



3095-30950097

FIGURE 4-46. Assign Variables Screen.



3095-30950116

NOTE
This screen determines the order of HART Burst Command 3 Variables. This information is required if connecting to a HART Tri-Loop.

Maintenance
Analog Output
Output Trim...

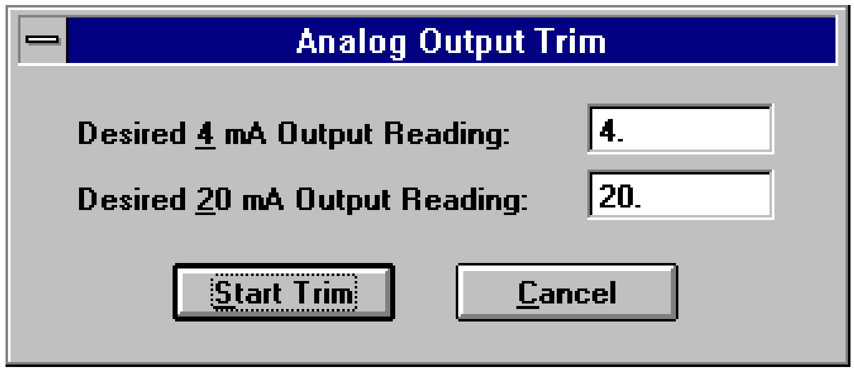
This screen allows the user to adjust the transmitter digital to analog converter at the end points of the transmitter output scale to compensate for component aging effects.

This function also allows the user to enter the endpoints and the meter readings in an alternative scale. For example, endpoints using a 500 ohm resistor with a voltmeter would be 2 and 10 volts.

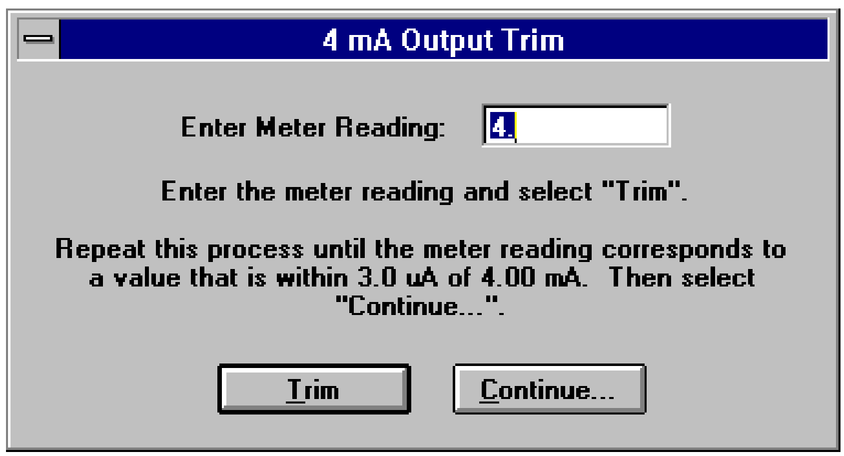
Fill in the upper and lower analog output trim points according to the units in the measuring device, then select Start Trim.

Continue to follow the instructions as prompted by the EA.

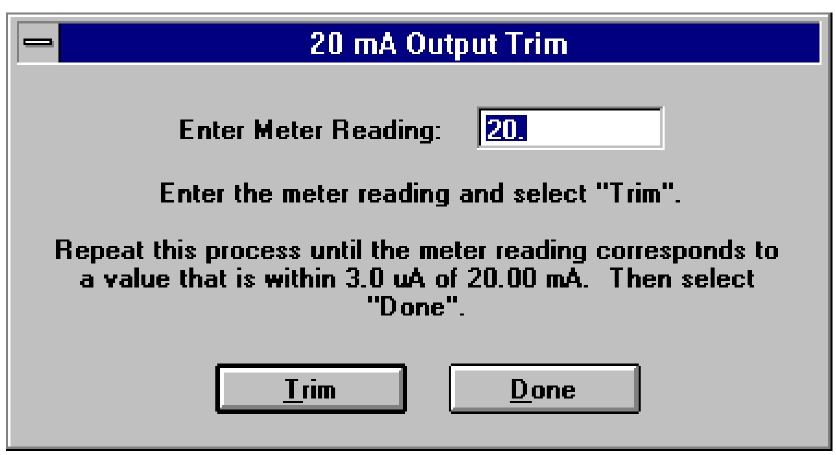
FIGURE 4-47. Analog Output Trim Screens.



3095-30950098



3095-30950122



3095-30950123

Maintenance
Change Passwords...

Figure 4-48 illustrates the Change Passwords screen. Security must be enabled (see page 4-50) before you can gain access to this screen.

NOTE
When shipped from the factory, all medium level passwords are “3095MV,” and the high level password is blank. Press ***return*** when the login screen appears, and High Level (System Administration) access is granted.

Before filling in this screen, consider the following issues concerning EA passwords:

- If a password is left blank, pressing ***return*** at the login screen accesses that password level.
- If passwords are identical, the higher level access is granted.
- Passwords are up to 8 characters in length.

Once a password is entered, the title bar indicates current password access. Each password level allows access to specific functions.

Medium Level Passwords

Provides full access except the operator cannot change passwords, or enable or disable security.

System administrator

Provides full access for the system administrator.

NOTE
Be sure to record passwords in a safe location. If the System Administrator password is lost or forgotten, consult the factory.

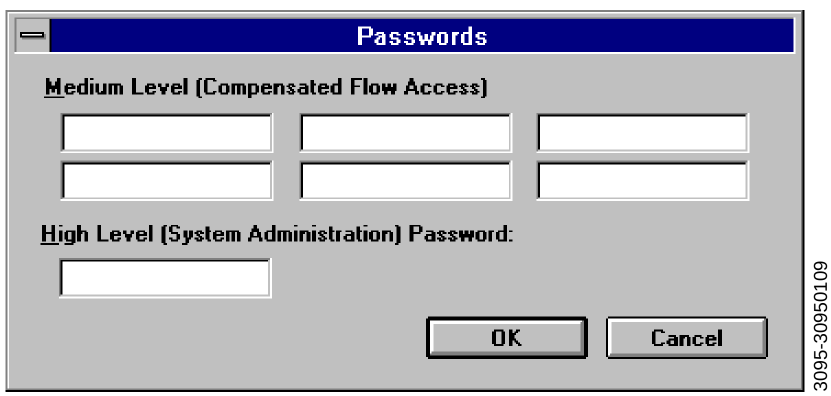


FIGURE 4-48. Change Password Screen.

Maintenance
Enable/Disable Security...

This selection allows enabling or disabling security. You must have System Administrator authority to enable or disable security.

NOTE
When shipped from the factory, all medium level passwords are "3095MV,"and the high level password is blank. Press ***return*** when the login screen appears, and High Level (System Administration) access is granted.

FIGURE 4-49. Enable/Disable Security Screen.

Maintenance
Process Temperature Mode

This selection specifies the process temperature (PT) mode. It allows you to enable or disable PT input or to specify automatic backup mode.

To enable process temperature input, select Normal PT Mode. In this mode, the transmitter uses the external RTD for automatic PT measurement. In the event of an RTD failure, the transmitter goes into alarm condition.

To disable process temperature input, select Fixed PT Mode, enter the desired fixed value, then select OK.

Use the Backup PT Mode selection to specify a value to be used for temperature in the event the RTD fails or is disconnected. Upon failure, the transmitter will use this 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 fail 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).

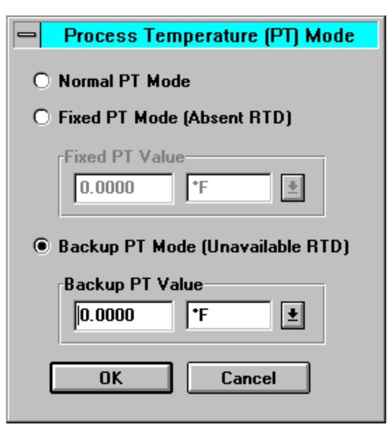


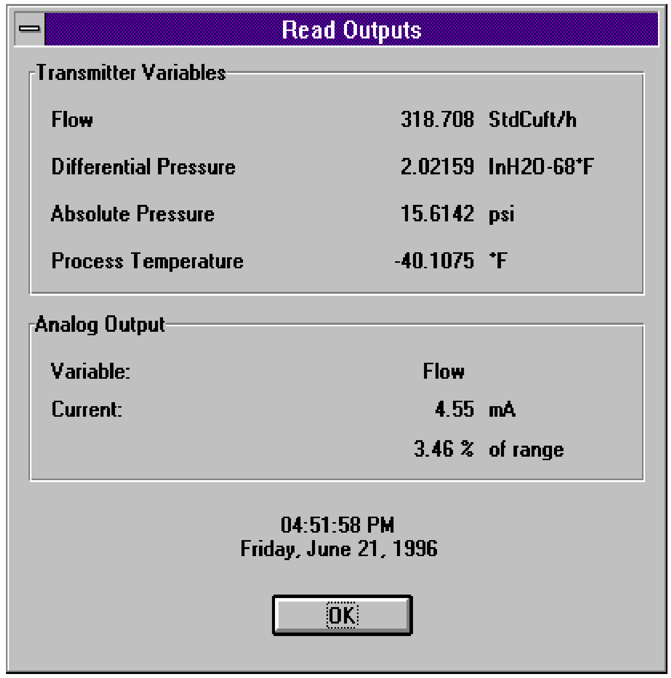
FIGURE 4-50. Process Temperature (PT) Mode Screen.

Diagnostics Screens

Diagnostics
Read Outputs...

This selection displays the current process variable values as illustrated in Figure 4-51. This screen continuously updates with current data. To exit this screen, select OK.

FIGURE 4-51. Read Outputs Screen.

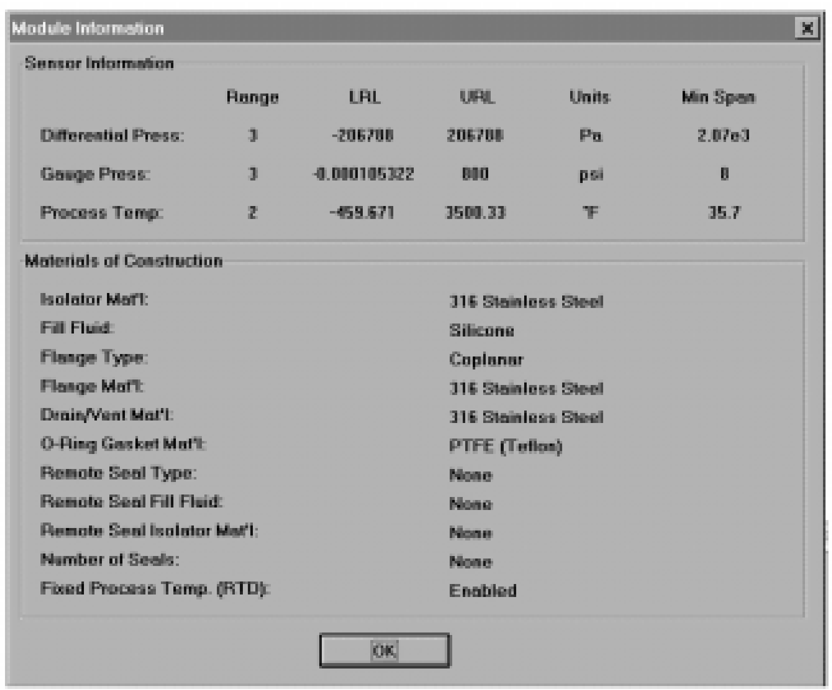


3095-30950099

Diagnostics
Device Info
Module Info...

This selection displays module information as illustrated in Figure 4-52. This is a read-only screen.

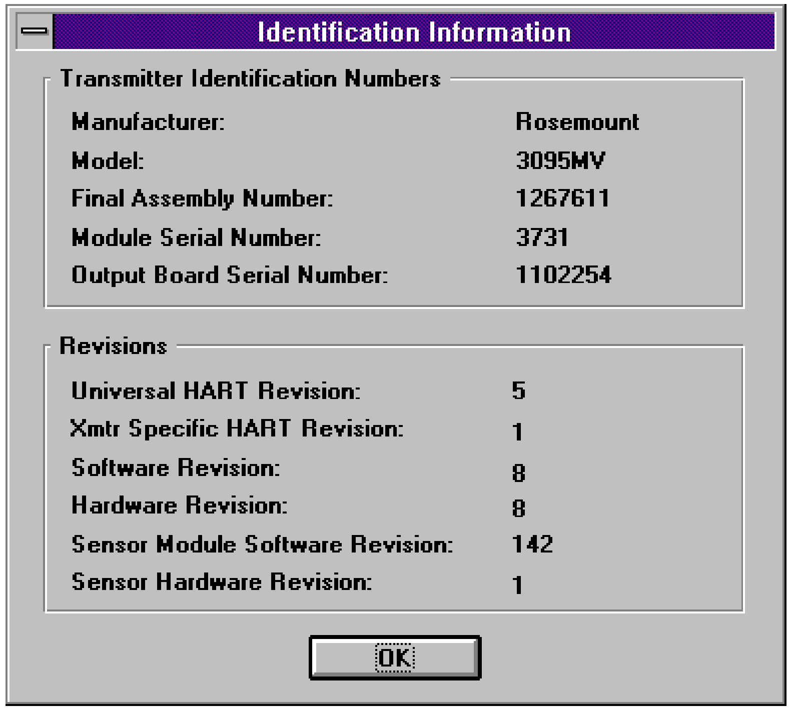
FIGURE 4-52. Module Information Screen.



3095-3MODINFO

Diagnostics
Device Info
Identification Info...

This selection displays transmitter identification numbers as well as current software and hardware revision levels. To exit this screen, select OK.



3095-30950100

FIGURE 4-53. Identification Info Screen.

Diagnostics
Test Calculation...

The test calculations screen provides a method to view the Model 3095 MV mass flow calculations for the current process variables. Optionally, the system administrator can enter process variable values, and then view the calculation results.

NOTE
Since the test calculation procedure actually changes flow and output values during the test, the control loops should be put into manual mode and taken out of flow totalization mode for the duration of the test.

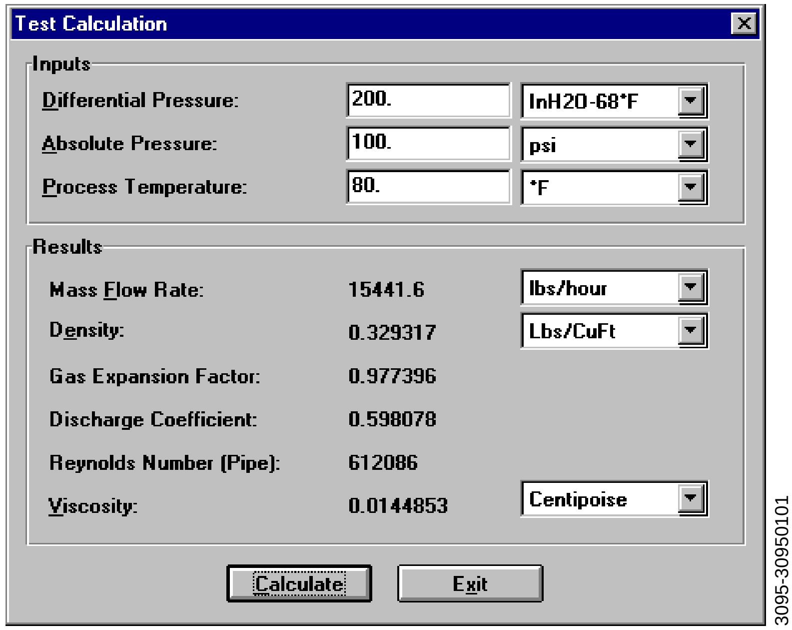
NOTE
The test calculation results displayed by this screen are calculated in the attached transmitter, not the EA.

Also, the calculation update time for this screen is not indicative of the actual transmitter update rate. (The Model 3095 MV sensor update rate is nine times per second.)

1. Select Diagnostics, Test Calculation to display the Test Calculation screen. The initial values indicate current process variable readings.
2. (Optional) Enter values and units for Differential Pressure, Static Pressure, and Process Temperature process variables and units.
3. Select the Calculate button. After a short delay, the results box is populated with calculation results.

4. If desired, the Mass Flow Rate, Density, and Viscosity results can be displayed in different units.
5. When finished with your test calculations, select Exit.

FIGURE 4-54. Test Calculation Screen.

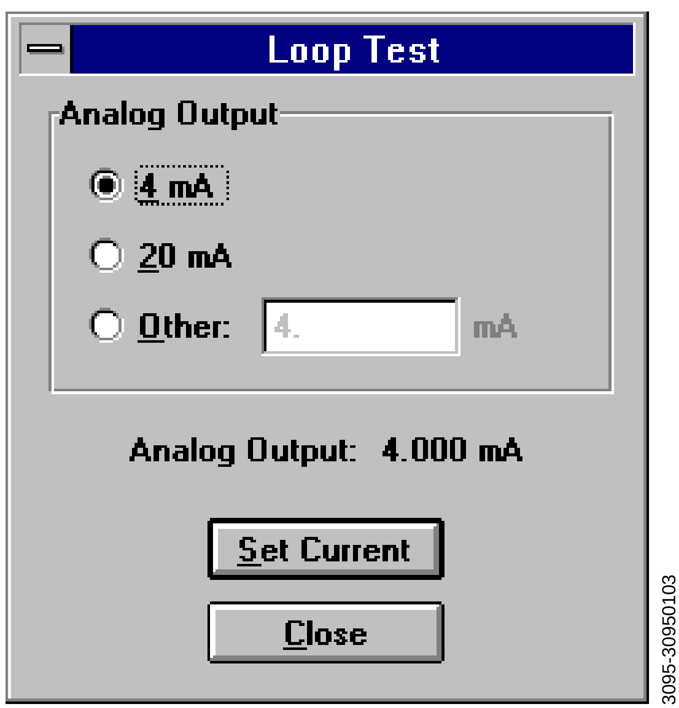


Diagnostics
Loop Test...

The loop test screen provides a method to test the transmitter analog output.

1. Select the desired current (4 mA, 20 mA, or Other).
2. Select Set Current.
3. The analog output field will state the actual transmitter analog output.
4. Select Close. This step returns the transmitter to normal operation.

FIGURE 4-55. Loop Test Screen.



Diagnostics
Master Reset...

The transmitter master reset selection reinitializes the transmitter microprocessor. This is the equivalent of removing and then reapplying power to the transmitter.

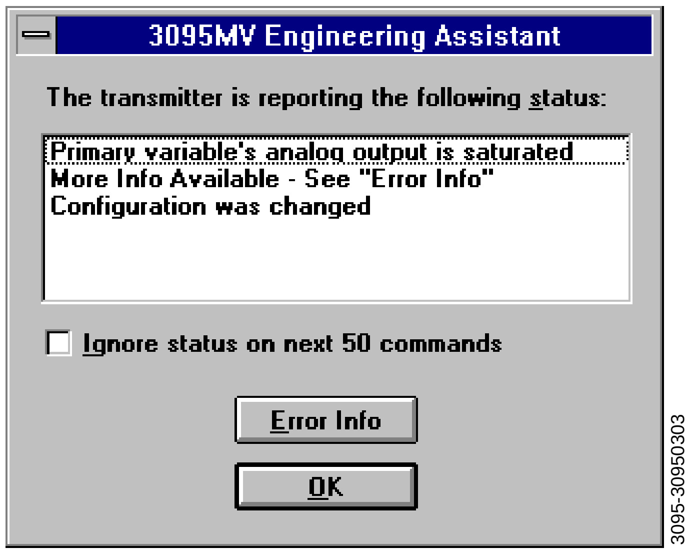
NOTE
This procedure does not return the transmitter to factory trim settings (see 4-43).

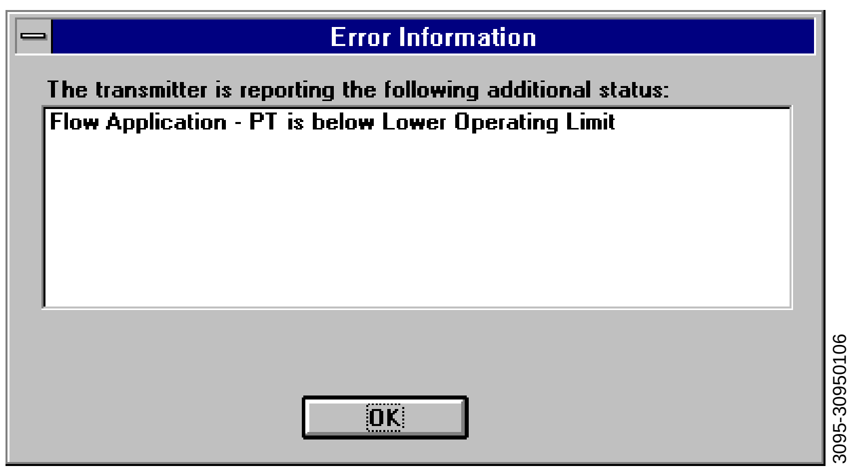
Diagnostics
Error Info...

The transmitter Error Info selection identifies the current error status for the Model 3095 MV transmitter.

If there are additional errors not displayed on the original screen, the Error Info button will be enabled. Select Error Info to view the additional errors.

FIGURE 4-56. Error Info Screen.





MISCELLANEOUS EA SELECTIONS

View
Toolbar...

This selection toggles the toolbar on and off.

View
Status Bar...

This selection toggles the status bar on and off.

Help

This selection identifies the current EA software revision and provides access to online help.

Section 5

Troubleshooting and Maintenance

This section describes troubleshooting and maintenance tasks associated with the Model 3095 MV. These include communication and compatibility issues, critical alarms, maintenance procedures, and field replaceable part procedures.

⚠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.

NOTE
For previous software information, see **Critical Alarms for Previous Software Revisions** on page D-1. For compatibility issues of previous Model 3095 MV software, sensor modules, and hardware, see **Compatibility Issues** on page E-1.

TROUBLESHOOTING

If a malfunction is suspected, follow the procedures described here to verify that transmitter hardware and process connections are in good working order. Under each major symptom, specific suggestions are offered for solving the problem. Always deal with the most likely and easiest-to-check conditions first.

Alarm Abbreviations

Table 5-1 shows standard alarm abbreviations used in Section 5:

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 $\times$ 250) = 275
LRL–	LRL – (10%LRL) (For example, LRL– = –250 –[0.10 $\times$ (250)] = –275

EA COMMUNICATION PROBLEMS

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

TABLE 5-2. Corrective Action for EA Communication Problems.

Symptom	Corrective Action
No Communication between the EA Software and the Model 3095 MV	**LOOP WIRING** • HART protocol communication requires a loop resistance value between 250–1100 ohms, inclusive. • 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.) • Check for intermittent shorts, open circuits, and multiple grounds. • Check for capacitance across the load resistor. Capacitance should be less than 0.1 microfarad. **EA INSTALLATION** • Verify that the install program modified the CONFIG.SYS file. • Verify computer reboot followed EA installation. • Verify correct COMM port selected (see page 4-2). • Verify laptop computer is not in low energy mode (certain laptops disable all COMM ports in low energy mode). • Did you install EA software onto Windows NT platform? • Check if HART driver is loaded and installed.

REVISION 12 AND 13 ELECTRONICS BOARD ALARMS AND ERROR CONDITIONS

The Model 3095 MV 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 Model 3095MV 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 E.

LCD Display

Critical alarms and overrange conditions are displayed as one of the selected variables on the LCD meter. During a critical alarm or overrange condition, the meter scrolls through all selected variables and the error message, displaying each for a fixed amount of time, as set by the user. See **LCD Meter** on page 3-1 for more information.

Critical Alarms

Critical alarms are the highest priority Model 3095 MV alarms, and indicate an error that prevents accurate sensor or flow measurements. Table 5-3 shows the LCD Display, the EA display, analog output, digital output, and the recommended corrective for critical alarms.

TABLE 5-3. Critical Alarms.

LCD Display	EA Display (Diagnostics, Error Info)	Analog Output	Digital Output	Corrective Action
Error "OB_FT"	**Output Board EEPROM Not Initialized** **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 5-12. Contact your Field Service Center.
Error "SM_FT"	SB EEProm Burn Failure SB EEProm Not Initialized			The sensor module has not been properly initialized at the factory. Replace the sensor module as described on page 5-12. 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 5-12. 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 as described in Section 4.
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 5-12.
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.

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

TABLE 5-4. 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 5-5. 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 5-15.
"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 5-15
"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 5-15.
"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 5-6. Model 3095 MV 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 inH$_2$0 < DP $\leq$ low-flow cutoff"[4]	Unreliable flow output	Unreliable flow output		0
no display[2]	"DP $\leq$ –2 inH$_2$0"	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 inH$_2$O.
(5) Saturate low if direct acting (URV>LRV), Saturate high if reverse acting (URV<LRV).

Sensor Limits

Table 5-7 identifies sensor limits for Model 3095MV transmitters with serial numbers less than 40,000.

TABLE 5-7. Model 3095 MV Sensor Limits (for transmitters with serial numbers less than 40000.)

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 inH_20 at 68 °F	–250 inH_20 at 68 °F	250 inH_20 at 68 °F	275 inH_20 at 68 °F
DP Range 3	–1,100 inH_20 at 68 °F	–1,000 inH_20 at 68 °F	1,000 inH_20 at 68 °F	1,100 inH_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	–0.15 psig	0 psig	800 psig	880 psig
GP Range D	–0.15 psig	0 psig	3,626 psig	3,988 psig
PT (5)	–330 °F (–201 °C)	–300 °F (–185 °C)	1,500 °F (815 °C)	1,550 °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).

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 5-8. Unexpected Process Variable (PV) Readings.

Symptom	Corrective Action
High PV Reading	**DIFFERENTIAL PRODUCER** • Check for restrictions at the differential producer. • Check the installation and condition of the differential producer. • Note any changes in process fluid properties that may affect output. **IMPULSE PIPING** • Check to ensure that the pressure connection is correct. • Check for leaks or blockage. • Check to ensure that blocking valves are fully open. • Check for entrapped gas in liquid lines and for liquid in gas lines. • Check to ensure that the density of fluid in impulse lines is unchanged. • Check for sediment in the transmitter process flange. • Make sure that process fluid has not frozen within the process flange. **POWER SUPPLY** ⚠**CAUTION** **Do not use higher than the specified voltage to check the loop, or damage to the transmitter electronics may result.** • Check the output voltage of the power supply at the transmitter. It should be 11 to 55 V dc with no load at the transmitter terminals. **TRANSMITTER ELECTRONICS** • 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. • Connect a personal computer and using the EA Software, select Diagnostics, Error Info (see page 4-54) to detect any electronic failures. • Make sure the post connectors are clean. • Confirm that the electronics housing is properly sealed against moisture. • If the electronics are still suspect, substitute new electronics. **SENSING ELEMENT** • 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 5-8. (continued).

Symptom	Corrective Action
Erratic PV Reading	**DIFFERENTIAL PRODUCER** • Check the installation and condition of the differential producer. **LOOP WIRING** ⚠**CAUTION** **Do not use higher than the specified voltage to check the loop, or damage to the transmitter electronics may result.** • Check for adequate voltage to the transmitter. It should be 11 to 55 V dc with no load at the transmitter terminals. • Check for intermittent shorts, open circuits, and multiple grounds. **PROCESS PULSATION** • Adjust the electronic damping (see page 4-17). **TRANSMITTER ELECTRONICS** • 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. • Connect a personal computer and using the EA Software, select Diagnostics, Error Info (see page 4-54) to detect any electronic failures. • Make sure the post connectors are clean. • Confirm that the electronics housing is properly sealed against moisture. • If the electronics are still suspect, substitute new electronics. **IMPULSE PIPING** • Check for entrapped gas in liquid lines and for liquid in gas lines. • Make sure that process fluid has not frozen within the process flange. **SENSING ELEMENT** • 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 5-8. (continued).

<table>
<tr><th>Symptom</th><th>Corrective Action</th></tr>
<tr><td>Low PV Reading or No PV Reading</td><td>DIFFERENTIAL PRODUCER
• Check the installation and condition of the differential producer.
• Note any changes in process fluid properties that may affect output.
LOOP WIRING

⚠CAUTION
Do not use higher than the specified voltage to check the loop, or damage to the transmitter electronics may result.

• Check for adequate voltage to the transmitter. It should be 11 to 55 V dc with no load at the transmitter terminals.
• Check the milliamp rating of the power supply against the total current being drawn for all transmitters being powered.
• Check for shorts and multiple grounds.
• Check for proper polarity at the signal terminal.
• Check loop impedance.
• Check the wire insulation to detect possible shorts to ground.
IMPULSE PIPING
• Check to ensure that the pressure connection is correct.
• Check for leaks or blockage.
• Check to ensure that blocking valves are fully open and that bypass valves are tightly closed.
• Check for entrapped gas in liquid lines and for liquid in gas lines.
• Check for sediment in the transmitter process flange.
• Make sure that process fluid has not frozen within the process flange.
TRANSMITTER ELECTRONICS
• 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.
• Connect a personal computer and using the EA Software, select Diagnostics, Error Info (see page 4-54) to detect any electronic failures.
• Make sure the post connectors are clean.
• Confirm that the electronics housing is properly sealed against moisture.
• If the electronics are still suspect, substitute new electronics.
SENSING ELEMENT
• 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.</td></tr>
</table>

TABLE 5-8. (continued).

Symptom	Corrective Action
Sluggish Output Response/Drift	**DIFFERENTIAL PRODUCER** • Check for restrictions at the differential producer. **IMPULSE PIPING** • Check for leaks or blockage. • Ensure that blocking valves are fully open • Check for sediment in the transmitter process flange. • Check for entrapped gas in liquid lines and for liquid in gas lines. • Ensure that the density of fluid in impulse lines is unchanged. • Make sure that process fluid has not frozen within the process flange. **TRANSMITTER ELECTRONICS** • Connect a personal computer and using the EA Software, select Diagnostics, Error Info (see page 4-54) to detect any electronic failures. • Confirm that damping is correctly set. • Confirm that the electronics housing is properly sealed against moisture. **SENSING ELEMENT** • 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. • 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 2-3 shows an exploded view of the transmitter.

⚠WARNING

Explosions can result in death or serious injury.
Do not remove the instrument cover in explosive environments.

Removing the Process Sensor Body

NOTE
Do not leave inoperable transmitters in service.

Be aware of the following:

⚠CAUTION

Process should be isolated from the transmitter and vented before the transmitter is removed from service for disassembly.

- The process flange can be detached by removing the four flange bolts and the two alignment screws that secure it.

⚠CAUTION

To prevent damage which may lead to inaccurate measurements, do not scratch, puncture, or depress the isolating diaphragms.

- Isolating diaphragms can be cleaned with a soft rag, mild cleaning solution, and clear water rinse.

⚠CAUTION

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

- 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.

⚠CAUTION

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

To remove the electronics board:

⚠WARNING

Explosions can result in death or serious injury.
Do not remove the instrument cover in explosive environments.

1. Remove the housing cover opposite the field terminal side.

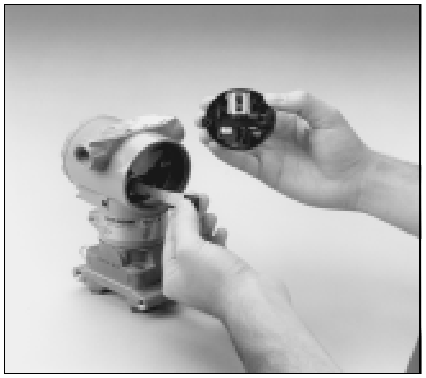
2. Loosen the two captive screws that anchor the board.

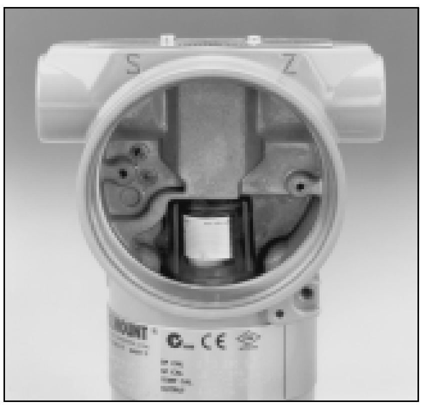
⚠CAUTION

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.

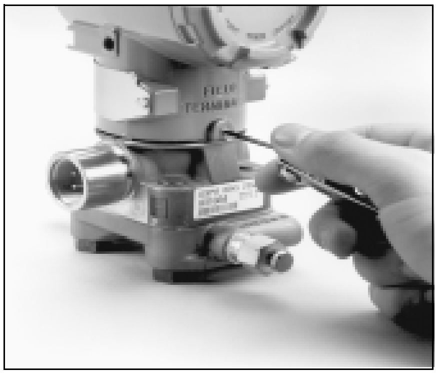
⚠CAUTION

Do not remove the housing until the cable connector has been completely tucked inside the internal shroud. Damage to the sensor module ribbon cable may occur if the connector does not rotate with the sensor module.

Removing the Sensor Module

⚠CAUTION

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.

⚠CAUTION

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.

⚠CAUTION

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.

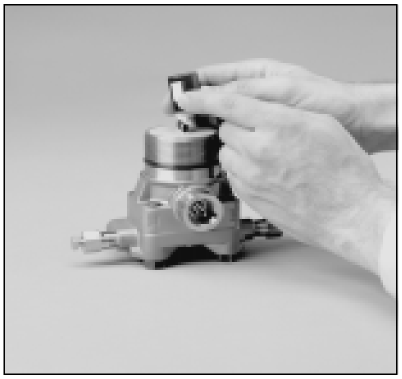
The sensing module is a complete assembly and cannot be further disassembled.

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.



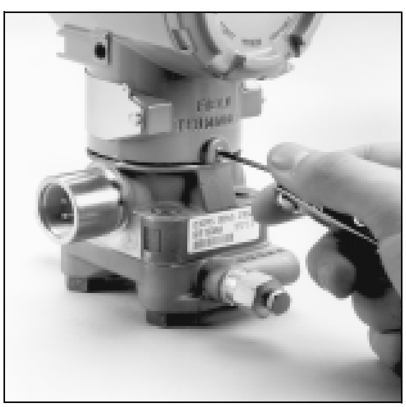
2. Carefully tuck the cable connector completely inside the internal shroud. To do this, turn the shroud and cable counterclockwise one rotation to tighten the cable.

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.

⚠CAUTION

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.

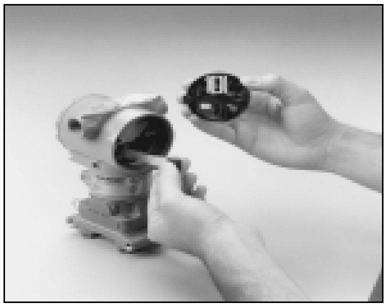


⚠WARNING

Explosions can result in death or serious injury.
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.

⚠WARNING

Explosions can cause death or serious injury. Both transmitter covers must be fully engaged to meet explosion-proof requirements.

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 2-15 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:

- 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.
- 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.
- Tighten the drain/vent valve to 250 in-lb.

RETURN OF MATERIALS

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.

⚠CAUTION

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 6

Specifications and Reference Data

FUNCTIONAL SPECIFICATIONS

Service

Gas, liquid, or steam.

Differential Sensor

Ranges

Code 1: 0–0.5 to 0–25 inH_2O (0–0.12 to 0–6.22 kPa).
Code 2: 0–2.5 to 0–250 inH_2O (0–0.62 to 0–62.2 kPa).
Code 3: 0–10 to 0–1000 inH_2O (0–2.48 to 0–248 kPa).

Limits

Code 1: –25 to 25 inH_2O (–6.22 to 6.22 kPa).
Code 2: –250 to 250 inH_2O (–62.2 to 62.2 kPa).
Code 3: –1000 to 1000 inH_2O (–248 to 248 kPa).

Absolute Sensor

Ranges

Code 3: 0–8 to 0–800 psia (0–55.16 to 0–5515.8 kPa).
Code 4: 0–36.26 to 0–3,626 psia (0–250 to 0–25000 kPa).

Limits

Code 3: 0.5 to 800 psia (3.4 to 5515.8 kPa).
Code 4: 0.5 to 3,626 psia (3.4 to 25000 kPa).

Gage Sensor

Ranges

Code C: 0–8 to 0–800 psig (0–55.16 to 0–5515.8 kPa).
Code D: 0–36.26 to 0–3,626 psig (0–250 to 0–25000 kPa).

Limit

Code C: 0 to 800 psig (0 to 5515.8 kPa).
Code D: 0 to 3,626 psig (0 to 25000 kPa).

Temperature Sensor

Process Temperature Range

–300 to 1500 °F (–185 to 815°C)

Fixed Temperature Range

–459 to 3500 °F (–273 to 1927 °C)

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.

Zero Suppression

Can be set anywhere within the sensor limits as long as the span is greater than or equal to the minimum span, the lower range value does not exceed the lower range limit, and the upper range value does not exceed the upper range limit.

Humidity Limits

0–100% relative humidity.

Overpressure Limit

0 psia to two times the absolute pressure sensor range with a maximum of 3,626 psia (25000 kPa).

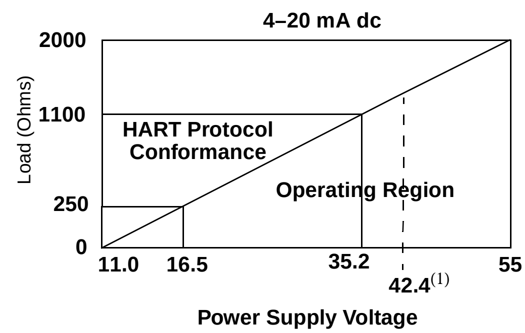
Static Pressure Limit

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

Load Limitations

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

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



HART protocol communication requires a loop resistance value between 250–1100 ohms, inclusive.

(1) For CSA approval, power supply must not exceed 42.4 V dc.

Hazardous Locations Certifications

Factory Mutual (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 hazardous locations. Factory Sealed. Provides nonincendive RTD connections for Class I, Division 2, Groups A, B, C, and D. Install per Rosemount drawing 03095-1025.

B Combination of Approval Code A and the following: Intrinsically Safe for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor (NEMA 4X) locations. Non-incendive for Class I, Division 2, Groups A, B, C, and D. Temperature Code T4. Factory Sealed. Install per Rosemount drawing 03095-1020.

FM Approved Entity Parameters for Model 3095 MV(1)	FM Approved for Class I, II, III, Division 1 and 2, Groups:
V_{Max} = 40 V dc	A–G
I_{Max} = 165 mA	A–G
I_{Max} = 225 mA	C–G
I_{Max} = 160 mA (Terminal Block Option Code B)	A–G
P_{Max} = 1 W	A–G
C_I = 0.012 µF	A–G
L_I = 20 µH	A–G
L_I = 1.05 mH (Terminal Block Option Code B)	A–G

(1) When connected in accordance with Rosemount drawings.

Canadian Standards Association (CSA) Approvals

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.

D Combination of Approval Code C and the following: 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.

CSA Approved Barriers for Model 3095 MV(1)	CSA Approved for Class I, Division I and 2, Groups:
≤ 30 V, ≥ 330 Ω; ≤ 28 V, ≥ 300 Ω; ≤ 25 V, ≥ 200 Ω; ≤ 22 V, ≥ 180 Ω; ≤ 30 V, ≥ 150 Ω	A–D A–D C–D

(1) When connected in accordance with Rosemount drawings.

BASEEFA/CENELEC Intrinsic Safety Certification

F EEx ia IIC T5 (–45 °C ≤ Tamb ≤40 °C).
EEx ia IIC T4 (–45 °C ≤ Tamb ≤70 °C).

Connection Parameters (Power/Signal Terminals)

U_i = 30 V dc
I_i = 200 mA dc
W_i = 1.0 W
C_i = 0.012 μF
L_i = 0

Temperature Sensor Connection Parameters

U_o = 30 V
I_o = 19 mA
W_o = 140 mW
C_i = 0
L_i = 0

Connection Parameters for Temperature Sensor Terminals	Gas Group
C_o = 0.066 μF	IIC
C_o = 0.560 μF	IIB
C_o = 1.820 μF	IIA
L_o = 96 mH	IIC
L_o = 365 mH	IIB
L_o = 696 mH	IIA
L_o/R_o = 247 μH/ohm	IIC
L_o/R_o = 633 μH/ohm	IIB
L_o/R_o= 633 μH/ohm	IIA

Special Conditions for Safe Use with Transient Terminal Block

Transmitters supplied 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.

BASEEFA/CENELEC Type N Certification

G EEx nL IIC T5 (–45 °C ≤ Tamb ≤40 °C).
EEx nL IIC T4 (–45 °C ≤ Tamb ≤70 °C).

Special Conditions for Safe Use with Transient Terminal Block

Transmitters supplied with the transient terminal block (order code B) are not capable of withstanding the 500 volts insulation test required by EN 50021, Clause 9.1 (1998). This condition must be accounted for during installation.

ISSeP/CENELEC Flameproof Certification

H EEx d IIC T6 (Tamb = 40 °C).
EEx d IIC T5 (Tamb = 70 °C).

Temperature Limits

Process (at transmitter isolator flange):

Silicone fill: –40 to 250 °F (–40 to 121 °C).
Inert fill: 0 to 185 °F (–18 to 85 °C).

(Process temperatures 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).

Storage:

–50 to 230 °F (–46 to 110 °C).

Failure Mode Alarm

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.

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.

Damping

Response to step input change can be user-selectable from 0 to 29 seconds for one time constant. This is in addition to sensor response time of 0.2 seconds.

PERFORMANCE SPECIFICATIONS

Performance specifications are based on these criteria: Zero-based spans, reference conditions, silicone oil fill, 316 SST isolating diaphragms, 4–20 mA analog output.

Specification Conformance

The Model 3095 MV maintains a specification conformance of at least 3σ.

Mass Flow

Fully compensated for pressure, temperature, density, and viscosity variances over operating range. **$Qm=NC_dEY_1d^2\{DP(\rho)\}^{1/2}$**.

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 Reference Accuracy

±1.0% of Total Mass Flow.
Note: Assume 64:1 DP range for liquids and gases.

(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 spanned at up to 1/10th full scale with DP trimmed for optimum flow accuracy/rangeability.)

Differential Pressure (DP)

Range 1: 0–0.5 to 0–25 inH_2O (0–0.12 to 0–6.22 kPa) (50:1 rangeability is allowed).

Range 2: 0–2.5 to 0–250 inH_2O (0–0.62 to 0–62.2 kPa) (100:1 rangeability is allowed).

Range 3: 0–10 to 0–1000 inH_2O (0–2.48 to 0–248 kPa) (100:1 rangeability is allowed).

DP Reference Accuracy (including Linearity, Hysteresis, Repeatability)

Ranges 2–3:
±0.075% of span for spans from 1:1 to 10:1 of URL.
For rangedowns greater than 10:1 of URL,

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

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

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

DP Ambient Temperature Effect per 50 °F (28 °C)

Ranges 2–3:
±(0.025% of URL + 0.125% of span) spans from 1:1 to 30:1.
±(0.035% of URL – 0.175% of span) spans from 30:1 to 100:1.
Range 1:
±(0.20% of URL + 0.25% of span) spans from 1:1 to 30:1.
±(0.24% of URL +0.15% of span) spans from 30:1 to 50:1.

DP Static Pressure Effects

Ranges 2–3:
Zero error = ±0.10% of URL per 1,000 psi (6894 kPa).
Span error = ±0.20% of reading per 1,000 psi (6894 kPa).
Range 1:
Zero error = ±0.10% of URL per 800 psi (5516 kPa).
Span error = ±0.40% of reading per 800 psi (5516 kPa).

DP Stability
Ranges 2–3:
±0.1% of URL for 12 months.
Range 1:
±0.2% of URL for 12 months.

Absolute/Gage Pressure (AP/GP)

Range 3 (absolute) /Range C (gage):
0–8 to 0–800 psia (0–55.16 to 0–5515.8 kPa)
(100:1 rangeability is allowed).

Range 4 (absolute) /Range D (gage):
0–36.26 to 0–3,626 psia (0–250 to 0–25000 kPa) (100:1 rangeability is allowed).

AP/GP Reference Accuracy
(including Linearity, Hysteresis, Repeatability)
±0.075% of span for spans from 1:1 to 6:1 of URL.

For rangedowns greater than 6:1 of URL,

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

AP/GP 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.

AP/GP Stability
±0.1% of URL for 12 months.

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 ∝ = 0.00385. Examples of compatible RTDs include the Rosemount Series 68 and 78 RTD Temperature Sensors.

RTD Range
–300 to 1500 °F (–185 to 815C).

PT Accuracy (including Linearity, Hysteresis, Repeatability)

For 12 and 24 ft. Cables:
±1.0 °F (0.56 °C) for process temperatures from –300 to 1200 °F (–185 to 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 –300 to 1200 °F (–185 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 SPECIFICATIONS

Electrical Connections

½–14 NPT, M20 × 1.5 (CM20), PG-13.5.

Process Connections

Transmitter: ¼–18 NPT on 2¹⁄₈-in. centers.
½–14 NPT on 2-, 2¹⁄₈-, or 2¼-in. centers with optional flange adapters.
RTD: RTD dependent.

Process Wetted Parts

Isolating Diaphragms

316L SST or Hastelloy C-276®.

Drain/Vent Valves

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

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.

Weights

Component	Weight in lb (kg)
Model 3095 MV 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)

ORDERING INFORMATION

Model	Product Description	
3095M	Multivariable Meter	
Code	**Output**	
A	4–20 mA with Digital Signal Based on *HART* Protocol	
Code	**Differential Pressure Range**	
1[1]	0–0.5 to 0–25 inH_2O (0–0.12 to 0–6.22 kPa)	
2	0–2.5 to 0–250 inH_2O (0–0.62 to 0–62.2 kPa)	
3	0–10 to 0–1000 inH_2O (0–2.48 to 0–248 kPa)	
Code	**Static Pressure Ranges**	
3	0–8 to 0–800 psia (0–55.16 to 0–5515.8 kPa)	
4	0–36.26 to 0–3,626 psia (0–250 to 0–25000 kPa)	
C	0–8 to 0–800 psig (0–55.16 to 0–5515.8 kPa)	
D	0–36.26 to 0–3.626 psig (0–250 to 0–25000 kPa)	
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	
0	None (Required for Option Code S5)	
Code	**Drain/Vent Material**	
A	SST	
C[2]	*Hastelloy C*	
0	None (Required for Option Code 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.)	
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	
7	RTD Input with 75 ft (22.86 m) of 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 CENELEC Flameproof Cable	
B	RTD Input with 24 ft (7.32 m) of CENELEC Flameproof Cable	
C	RTD Input with 75 ft (22.86 m) of CENELEC Flameproof Cable	
D[5]	RTD Input with 21 in. (53 cm) of CENELEC 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	**Meter**	
0	None	
1	LCD Meter	
Code	**Bracket**	
0	None	
1	*Coplanar* SST Flange Bracket for 2-in. Pipe or Panel Mount, SST Bolts	

Code	Bolts
0	CS Bolts
1	Austenitic 316 SST Bolts
N	None (Required for Option Code S5)
Code	**Approvals**
0	None
A	Factory Mutual (FM) Explosion-Proof Approval
B	Factory Mutual (FM) Explosion-Proof Approval and Non-Incendive/Intrinsic Safety Approval Combination
C	Canadian Standards Association (CSA) Explosion-Proof Approval
D	Canadian Standards Association (CSA) Explosion-Proof Approval and Non-Incendive/Intrinsic Safety Approval Combination
F	BASEEFA/CENELEC Intrinsic Safety Certification
G	BASEEFA/CENELEC Type N Certification
H	ISSeP/CENELEC Flameproof Certification
Code	**Engineered Measurement Solution (EMS)**
B	Mass Flow and Measured Variables (DP, P, and T)
Code	**Options**
C2	Custom Flow Configuration (Requires completed Configuration Data Sheet 00806-0100-4716.)
S4(6)	Factory Assembly to Rosemount Primary Element Model Annubar or Model 1195 Integral Orifice (Requires corresponding model number – see 00813-0100-4760)
S5	Assembly with Model 305 Integral Manifold (Requires integral manifold model number – see 00813-0100-4733)
P1	Hydrostatic Testing
P2	Cleaning for Special Services
Q4	Inspection Certificate for Calibration Data
Q8(7)	Material Inspection Certificate per EN 10204 3.1B
DF(8)	Flange Adapters — Adapter Type Determined by Selected Flange Material: { Plated CS / SST / *Hastelloy C* }
Typical Model Number	**3095M 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) Meets NACE material recommendations per MR 01–75.
(3) Only available with C or D Gage Sensor Modules.
(4) Requires that Drain/Vent Material Code set to 0 (none).
(5) For use with Annubars with integral RTDs.
(6) With a primary element installed, the maximum operating pressure will be the lesser of either the transmitter or the primary element.
(7) This option is available for the sensor module housing, Coplanar and Coplanar flange adapters.
(8) Not available with assembly to Model 1195 Integral Orifice Option Code S4.

Options

Standard Configuration

Unless otherwise specified, transmitter is shipped as follows:

Engineering units:	
Differential	inH_2O (all ranges)
Absolute/Gage	psi (all ranges)
Process Temp.	°F
Flow	SCFH
Output:	Linear
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
Software tag:	(Blank)

Software tag (8 characters maximum) is left blank unless specified.

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 ISO/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, 0–100 psia operating pressure range, and 50–100 °F operating temperature range.

Fixed Process Temperature

If process temperature input code is set to 0, the desired fixed process temperature can be specified during order entry.

Custom Configuration (Option Code C2)

If Option Code C2 is ordered, the customer specifies the custom flow configuration parameters in addition to the standard configuration parameters. Refer to Configuration Data Sheet 00806-0100-4716.

Tagging

Three customer tagging options are available:

1. Standard SST tag is wired to the transmitter. Tag character height is 0.125 in. (3,18 mm), 85 characters maximum.
2. Tag may be permanently stamped on transmitter nameplate upon request. Tag character height is 0.0625 in. (1,59 mm), 65 characters maximum.
3. Tag may be stored in transmitter memory. Software tag (8 characters maximum) is left blank unless specified.

Accessories

Model 3095 MV Engineering Assistant Software Packages

The Model 3095 MV Engineering Assistant software package is available with or without the HART modem and connecting cables. All configurations are packaged separately.

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

- DOS-based 386 personal computer or above
- 640K Base RAM memory with 8 MB extended
- Mouse or other pointing device
- 4 MB of available hard disk space
- Color computer display
- Windows™ 3.1, Windows for Workgroups 3.11, Windows 95
- DOS 5.0 or higher Optional Model 305 Integral Manifolds

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

Optional Three-Valve Manifolds

Anderson, Greenwood & Co. (Packaged Separately).

Temperature Sensors and Assemblies

Fisher-Rosemount offers many types of temperature sensors and assemblies. Contact your Fisher-Rosemount Sales Engineer for a product data sheet.

Model 333 HART Tri-Loop™ HART-to-Analog Signal Converter

- The Model 333 HART Tri-Loop, when connected to a Model 3095 MV, can provide up to three extra 4–20 mA signals. The HART Tri-Loop can be installed without disconnecting or disrupting existing Model 3095 MV wiring, and the additional analog outputs are available for monitoring or other controlling purposes without additional penetrations into the pipe. Refer to PDS 00813-0100-4754 for additional information.

Engineering Assistant Software Packages

Code	Product Description
EA	Engineering Assistant Software Program
Code	**Diskette Type**
1	2–3.5-in. Diskettes
Code	**Language**
E	English
Code	**HART Modem and Connecting Cables**
0 H	None HART Modem and Cables included
Code	**Operating Software**
W	Windows Version 3.1, Windows Workgroup 3.11, or Windows 95
Code	**License**
1 2	Single PC License Site License
Code	**Additional Software**
0	None
Typical Model Number:	**EA 1 E 0 W 1 0**

Model 333 HART Tri-Loop™ HART-to-Analog Signal Converter

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

HART Tri-Loop Configurator Software Packages

Item Description	Part Number
HART Tri-Loop Configurator Software Site License, HART Modem, Cables.	03095-0821-0001
HART Tri-Loop Configurator Software Site License Only	03095-0820-0002
HART Modem and Cables Only	03095-5105-0001

SPARE PARTS

Spare Parts List

(1) Spares Category: "A" – One spare part for every 25 transmitters recommended
"B" – One spare part for every 50 transmitters recommended

SENSOR MODULES		Part Number	Spares (1) Category
9	**Silicone Fill Sensor Module**		B
	Differential: 0–0.5/25 inH_2O, Range 1/Absolute: 0–8/800 psia, Range 3		
	316L SST	03095-0345-1312	
	Differential: 0–2.5/250 inH_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 inH_2O, Range 2/Absolute: 0–36.26/3,626 psia, Range 4		
	316L SST	03095-0345-2412	
	Hastelloy C-276	03095-0345-2413	
	Differential: 0–10/1000 inH_2O, Range 3/Absolute: 0–8/800 psia, Range 3		
	316L SST	03095-0345-3312	
	Hastelloy C-276	03095-0345-3313	
	Differential: 0–10/1000 inH_2O, Range 3/Absolute: 0–36.26/3,626 psia, Range 4		
	316L SST	03095-0345-3412	
	Hastelloy C-276	03095-0345-3413	
	Differential: 0–0.5/25 inH_2O, Range 1/Gage: 0–8/800 psig, Range C		
	316L SST	03095-0345-1812	
	Differential: 0–2.5/250 inH_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 inH_2O, Range 2/Gage: 0–36.26/3.626 psig, Range D		
	316L SST	03095-0345-2912	
	Hastelloy C-276	03095-0345-2913	
	Differential: 0–10/1000 inH_2O, Range 3/Gage: 0–8/800 psig, Range C		
	316L SST	03095-0345-3812	
	Hastelloy C-276	03095-0345-3813	
	Differential: 0–10/1000 inH_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 inH_2O, Range 2/Gage: 0–8/800 psig, Range C		
	316L SST	03095-0345-2822	
	Hastelloy C-276	03095-0345-2823	
	Differential: 0–2.5/250 inH_2O, Range 2/Gage: 0–36.26/3,626 psig, Range D		
	316L SST	03095-0345-2922	
	Hastelloy C-276	03095-0345-2923	
	Differential: 0–10/830 inH_2O, Range 3/Gage: 0–8/800 psig, Range C		
	316L SST	03095-0345-3822	
	Hastelloy C-276	03095-0345-3823	
	Differential: 0–10/830 inH_2O, Range 3/Gage: 0–36.26/3,626 psig, Range D		
	316L SST	03095-0345-3922	
	Hastelloy C-276	03095-0345-3923	
ELECTRONICS BOARD ASSEMBLY HARDWARE		**Part Number**	**Spares (1) Category**
6	Output Electronics Board, Mass Flow	03095-0303-1005	A
LCD METER		**Part Number**	**Spares (1) Category**
18	LCD Meter Kit for Standard Aluminum Housing (includes meter, cover, screws, and connector)	03095-0492-0001	A
	LCD Meter Kit for 316 SST Housing (includes meter, cover, screws, and connector)	03095-0492-0002	
	LCD Meter (includes meter only)	03095-0492-0101	
	LCD Meter Cover for Aluminum Housing	03031-0193-0002	
	LCD Meter Cover for 316 SST Housing	03031-0193-0012	

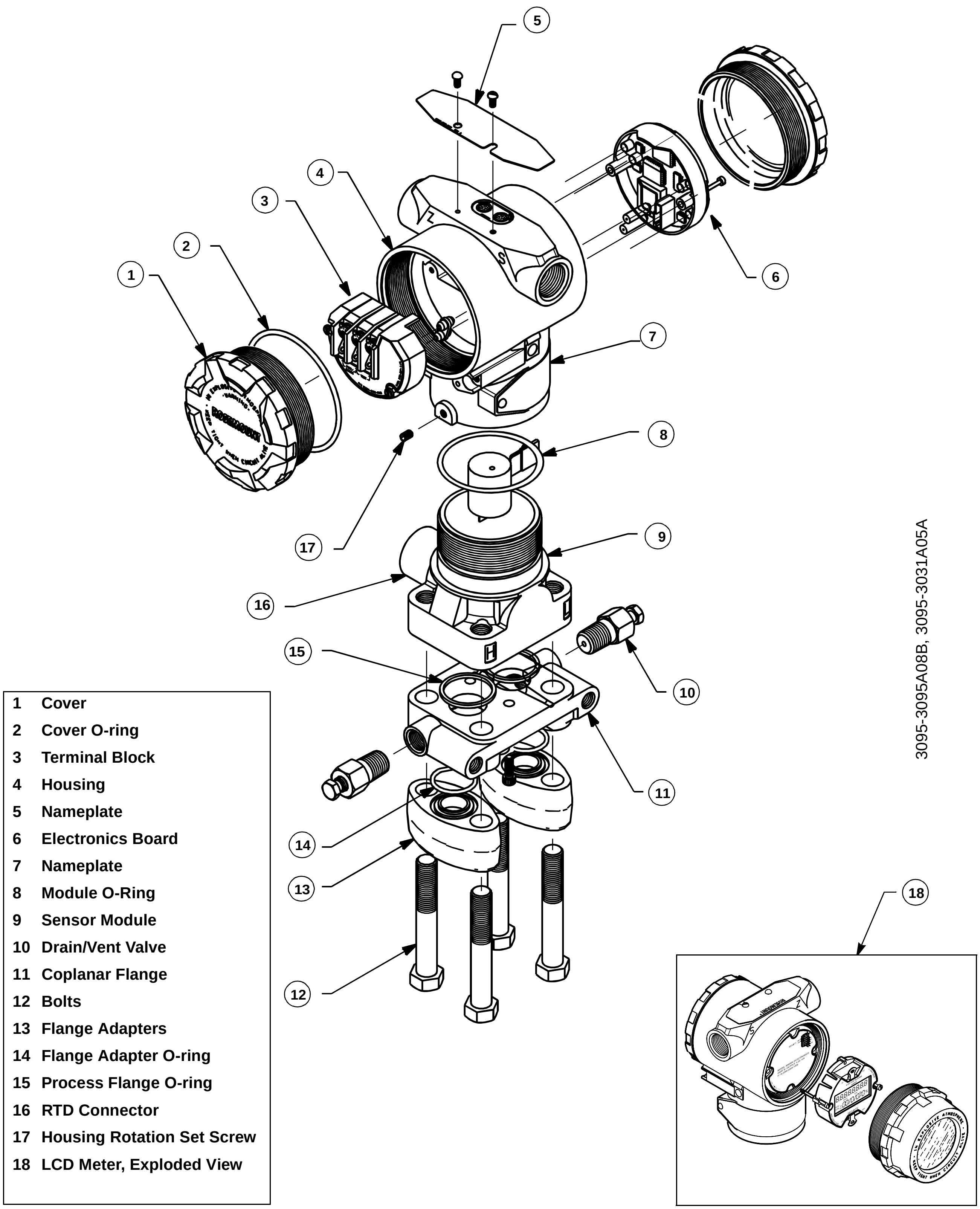
Spare Parts List

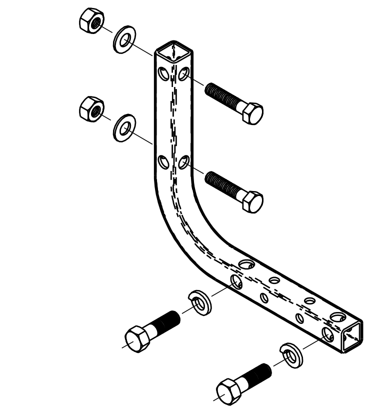
	HOUSING, COVERS, TERMINAL BLOCKS	Part Number	Spares (1) Category
	Standard Aluminum Housing		
4	Electronics Housing without Terminal Block (½–14 NPT conduit with RFI filters)	03031-0635-0201	
1	Electronics Cover	03031-0292-0001	
3	Standard Terminal Block Assembly	03031-0332-0007	B
3	Transient Protection Terminal Block Assembly	03031-0332-0008	A
3	External Ground Assembly	03031-0398-0001	B
	316 SST Housing		A
4	Electronics Housing without Terminal Block (½-14 NPT conduit with RFI filters)	03031-0635-0211	
1	Electronics Cover	03031-0292-0002	
	FLANGES	**Part Number**	**Spares (1) Category**
	Process Flanges		A
11	Differential *Coplanar* Flange (Figure 7-1)		
	Nickel-plated Carbon Steel	03031-0388-0025	
	316L SST	03031-0388-0022	
	Hastelloy C	03031-0388-0023	
	Coplanar Flange Alignment Screw	03031-0309-0001	
	(package of 12 screws)		
	FLANGE ADAPTER UNION	**Part Number**	**Spares (1) Category**
13	Nickel-plated Carbon Steel	02024-0069-0005	B
	316L SST	02024-0069-0002	
	Hastelloy C	02024-0069-0003	
	DRAIN/VENT VALVE KITS	**Part Number**	**Spares (1) Category**
10	**Vent Valve Kits**		A
	316L SST Valve Stem and Seat Kit	01151-0028-0022	
	Hastelloy C Valve Stem and Seat Kit	01151-0028-0023	
	(Each kit contains parts for one transmitter.)		
	O-RING PACKAGES	**Part Number**	**Spares (1) Category**
2	Electronic Housing, Cover (Standard and Meter)	03031-0232-0001	B
8	Electronics Housing, Module	03031-0233-0001	B
15	Process Flange, Glass-filled *Teflon*	03031-0234-0001	B
14	Flange Adapter, Glass-filled *Teflon*	03031-0242-0001	B
	(Each package contains 12 O-rings.)		
	MOUNTING BRACKETS	**Part Number**	**Spares (1) Category**
	***Coplanar* Flange Bracket Kit (Figure 7-2)**		
	SST Bracket, 2-in. Pipe or Panel Mount, SST Bolts	03031-0189-0003	B

Spare Parts List

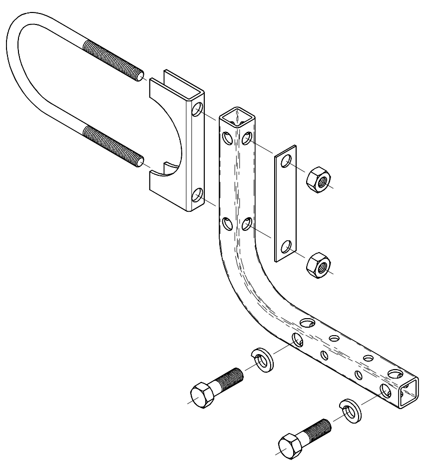
	BOLT KITS	Part Number	Spares (1) Category
	***Coplanar* Flange (Figure 7-5)**		B
23	Flange Bolt Kit		
	Carbon Steel (set of 4)	03031-0312-0001	
	316 SST (set of 4)	03031-0312-0002	
24	Flange/Adapter Bolt Kit		
	Carbon Steel (set of 4)	03031-0306-0001	
	316 SST (set of 4)	03031-0306-0002	
25	Manifold/Flange 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	Use Bolts Supplied	
	Carbon Steel	with Anderson	
	316 SST	Greenwood Manifold	
	RTD Cables, Adapters and Plugs	**Part Number**	**Spares (1) Category**
	RTD Input with 12 ft (3.66 m) of Shielded Cable (Intended for use with conduit.)	03095-0320-0011	B
	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	
	¾–14 to ½–14 NPT Adapter (conduit adapter for *Rosemount* RTD Connection Head)	03095-0308-0001	
	Armored Cable Compression Seal	03095-0325-0001	
	NOTE: *The following connect to the Model 3095MV RTD Connector:*		
20	RTD Connector Plug (for transmitters without an RTD)	03095-0323-0001	
19	½–14 NPT RTD Cable Adapter	03095-0322-0001	
	Accessories	**Part Number**	**Spares (1) Category**
	Model 3095MV Engineering Assistant Software (Figure 4)		
22	HART Modem and Cables	03095-5105-0001	

FIGURE 6-1. Model 3095MV Flow Transmitter Exploded View (with Coplanar Flange).



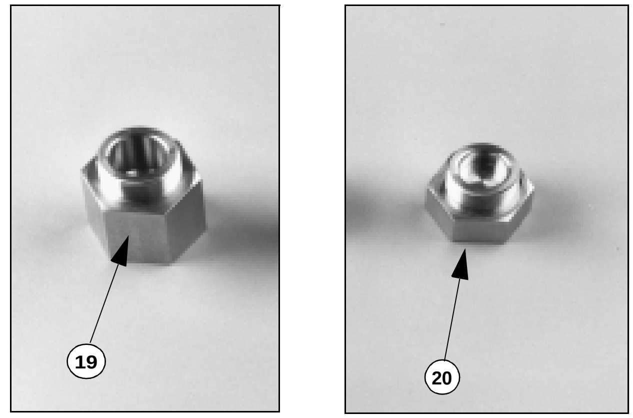


PANEL MOUNT



PIPE MOUNT

3051-3031I04B, J04B

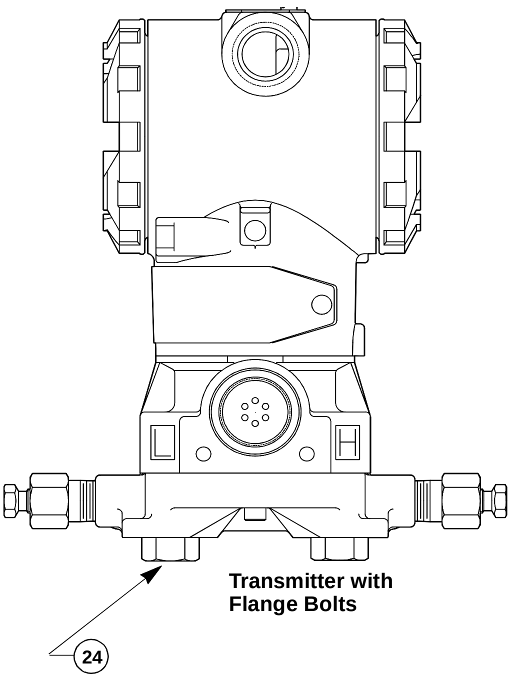


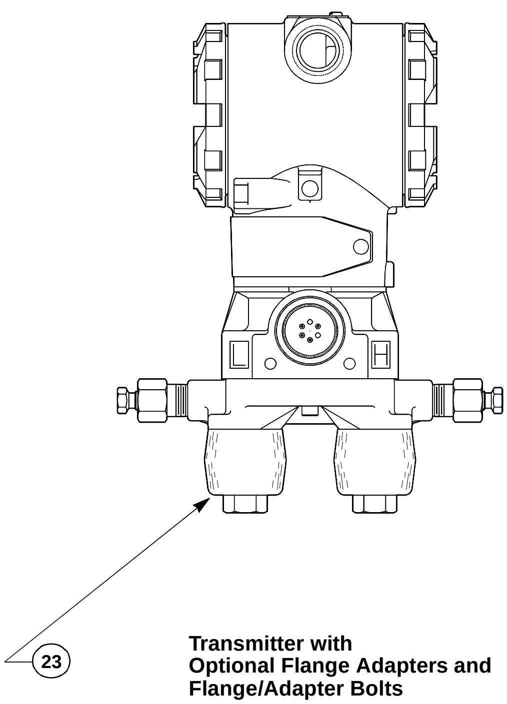
3095-007BB, 007BC

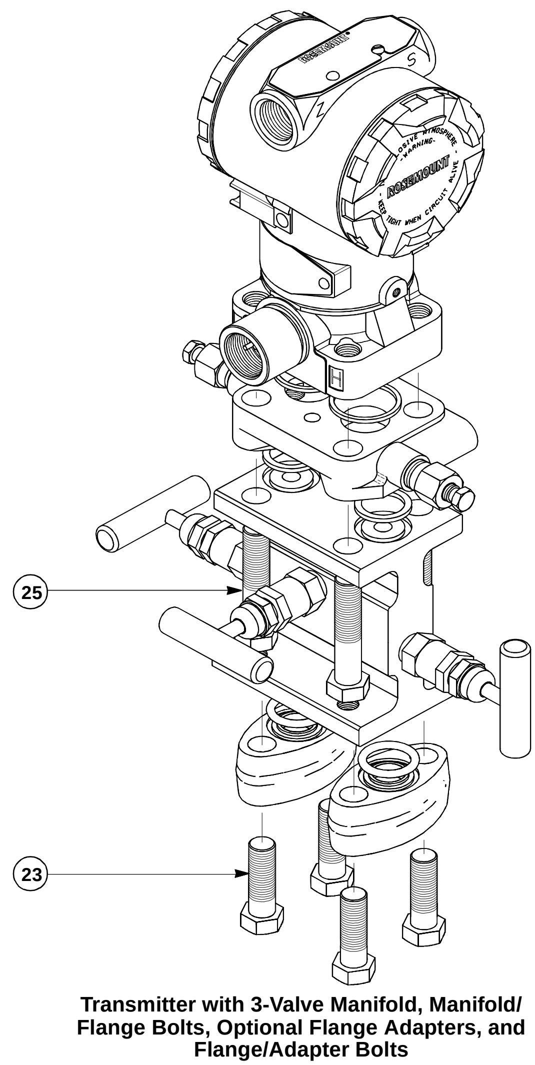
19	RTD Cable Adapter
20	RTD Conector Plug
21	Engineering Assistant Software
22	HART Modem and Cables

Laptop Computer (not included)

3095-3095MV02







BOLTS REQUIRED FOR ASSEMBLY

Item No.	Description	Qty	Size in. (mm)
23	Flange Bolts	4	1.75 (44)
24	Flange/Adapter Bolts	4	2.88 (73)
25	Manifold/Flange Bolts	4	2.25 (57)

3095-3095E05E, B29C, E05F

FIGURE 6-2. Bolting Configurations.

MODEL 3095 MV CONFIGURATION DATA SHEET

00806-0100-4716
English
Rev. AA

Complete this form to define a Custom Flow Configuration for the Model 3095 MV.
Unless specified, the Model 3095 MV will ship with the default values identified by the ★ symbol.

For technical assistance in filling out this CDS, call Rosemount Customer Central at 1-800-999-9307.

NOTE: Any missing information will be processed with the indicated default values.

OPTION CODE C2

Customer: ______________________________

Customer P.O. No.: ______________________________

Customer Line Item: ______________________________

Model No.:(1) ______________________________

Tag Type: ☐ SST Wire-on Tag (85 characters maximum) ☐ Stamped on Nameplate (65 characters maximum)

Tag Information: ______________________________

TRANSMITTER INFORMATION (optional)

Software Tag: |___|___|___|___|___|___|___|___|
(8 characters)

Descriptor: |___|___|___|___|___|___|___|___|___|___|___|___|___|___|___|___|
(16 characters)

Message: |___|___|___|___|___|___|___|___|___|___|___|___|___|___|___|___|

|___|___|___|___|___|___|___|___|___|___|___|___|___|___|___|___|
(32 characters)

Date: |___|___| |___|___|___| |___|___|
(dd) (mmm) (yy)

TRANSMITTER INFORMATION (required)

Failure Mode Alarm Direction (select one): ☐ Alarm High ★ ☐ Alarm Low

(1) A complete model number is required before Rosemount Inc. can process this custom configuration order.

★ ***Indicates default value.***

For RMD internal use only:

House Order No: ______________________________

Line Item No: ______________________________

Transmitter Serial No: ______________________________

RCC Tech: ______________________________

LCD Meter Configuration

Process Variables displayed on LCD:

☐ Absolute Pressure	☐ Flow Total
☐ Analog Output Current	☐ Gauge Pressure
☐ Differential Pressure	☐ Percent of Range
☐ Flow	☐ Process Temperature

Number of seconds to display each variable:_______________________
(available ranges from 2–10 seconds, in one second increments)

FLOW CONFIGURATION (required)

Select units for each Process Variable, then enter *sensor* Lower Trim Value (LTV) and *sensor* Upper Trim Value (UTV).
Note: LTV and UTV must be within the range limits stated in the Range Limits Table (see page 6-26).

Differential Pressure:

DP Units					
☐ inH_2O–68 °F★	☐ inHg–0 °C	☐ ftH_2O–68 °F	☐ mmH_2O–68 °F	☐ mmHg–0 °C	☐ psi
☐ bar	☐ mbar	☐ g/SqCm	☐ Kg/SqCm	☐ Pa	☐ kPa
☐ torr	☐ Atm	☐ inH_2O–60 °F			

Trim Values LTV:_______________________(0 ★)___ UTV:_______________________(URL inH_2O–68 °F ★)___

Static Pressure:

Static Units					
☐ inH_2O–68 °F	☐ inHg–0 °C	☐ ftH_2O–68 °F	☐ mmH_2O–68 °F	☐ mmHg–0 °C	☐ psi ★
☐ bar	☐ mbar	☐ g/SqCm	☐ Kg/SqCm	☐ Pa	☐ kPa
☐ torr	☐ Atm	☐ MPa	☐ inH_2O–60 °F		

Trim Values(2) LTV:_______________________(0 ★)___ UTV:_______________________(URL psi ★)___

Process Temperature:

PT Units ☐ °F ★ ☐ °C

Trim Values LTV:_______________________(–300 ★)___ UTV:_______________________(1500 °F ★)___

Flow Rate:

Flow Units:				
☐ StdCuft/s	☐ StdCuft/min	☐ StdCuft/h	☐ StdCuft/d	☐ StdCum/h
☐ StdCum/d	☐ lbs/sec	☐ lbs/min	☐ lbs/hour ★	☐ lbs/day
☐ grams/sec	☐ grams/min	☐ grams/hour	☐ kg/sec	☐ kg/min
☐ kg/hour	☐ NmlCuM/hour	☐ NmlCuM/day	☐ Special (see Flow Rate Special Units)	

Flow Rate Special Units (use if "Special" is checked in Flow Rate above):

NOTE: Flow Rate Special Units = Base Flow Unit multiplied by Conversion Factor.

Base Flow Units (select from above Flow Rate units): ______________________________

Conversion Factor: ______________________________

Display As: |___|___|___|___|___| *(available units A–Z, 0–9)*

Flow Rate Output:
Low PV (4 mA) ___________________________(0.00 ★) High PV (20 mA)_______________________________

FLOW CONFIGURATION CONT. (required)

Flow Total:

Flow Units: ☐ Grams ☐ Kilograms ☐ Metric Tons ☐ Pounds ☐ Short Tons
☐ Long Tons ☐ Ounces ☐ NmlCuM ☐ Normal Liters ☐ StdCuM
☐ StdCuFt ☐ Special (see Flow Total Special Units)

Flow Total Special Units (use this section if "Special" is checked in Flow Total above):

NOTE: Flow Rate Special Units = Base Flow Unit multiplied by Conversion Factor.

Base Flow Units (select from above Flow Total units): ______________________________

Conversion Factor: ______________________________

Display As: |___|___|___|___|___| *(available units A–Z, 0–9)*

Flow Total Output:

Low PV (4 mA) ___________________________(0.00 ★) High PV (20 mA)_______________________________

Damping: Enter a damping value for each variable (valid range: 0.1 – 29 seconds).
(Transmitter will round to nearest available damping value.)

Differential Pressure = _______________(0.864★) Temperature = _______________(0.864★)

Static Pressure = _______________(0.864★)

(2) If absolute pressure module, then lower static pressure values must be ≥ 0.5 psia (3.45 kPa).

★ ***Indicates default value.***

NOTE ***The information on Pages 6-21–6-25 can be sent in on a floppy disk by creating a .MFL file with the EA Software or EA Demo Disk. Call 1-800-999-9307 for more information.***

PRIMARY ELEMENT INFORMATION

Select Differential Producer (Select One)

- ☐ 1195 Integral Orifice
- ☐ Annubar® Diamond II+/Mass ProBar+
- ☐ Nozzle, Long Radius Wall Taps, ASME
- ☐ Nozzle, Long Radius Wall Taps, ISO
- ☐ Nozzle, ISA 1932, ISO
- ☐ Orifice, 2½D & 8D Taps
- ☐ Orifice, Corner Taps, ASME
- ☐ Orifice, Corner Taps, ISO
- ☐ Orifice, D & D/2 Taps, ASME
- ☐ Orifice, D & D/2 Taps, ISO
- ☐ Orifice, Flange Taps, AGA3
- ☐ Orifice, Flange Taps, ISO
- ☐ Small Bore Orifice, Flange Taps, ASME
- ☐ Venturi Nozzle, ISO
- ☐ Venturi, Rough Cast/Fabricated Inlet, ASME
- ☐ Venturi, Rough Cast Inlet, ISO
- ☐ Venturi, Machined Inlet, ASME
- ☐ Venturi, Machined Inlet, ISO
- ☐ Venturi, Welded Inlet, ISO

Selecting Area Averaging Meter or V-Cone® requires a constant value for discharge coefficient: ______________________

☐ Area Averaging Meter ☐ V-Cone

Primary Element Minimum Diameter (d) ____________________ ☐ in. ☐ mm at ______________ ☐ °F ☐ °C in. at 68 °F ★

or

Diamond II Sensor Series No. _______ (see table on page 6-26)

Differential Producer Material (Select One) ☐ Carbon Steel ☐ SST 304 ☐ SST 316★ ☐ *Hastelloy C* ☐ *Monel*

Pipe Tube Diameter (Pipe ID) (D) ________________ ☐ in. ☐ mm at ______________ ☐ °F ☐ °C in. at 68 °F ★

Pipe Tube Material: ☐ Carbon Steel★ ☐ SST 304 ☐ SST 316 ☐ *Hastelloy C* ☐ *Monel*

PROCESS OPERATING CONDITIONS

Operating Pressure Range ______________ to _______________ ☐ psia ☐ psig ☐ kPa (absolute) ☐ kPa (gage) ☐ bar

Operating Temperature Range ______________ to _______________ ☐ °F ☐ °C

For fixed process temperatures (Model Code = 0), enter value _________________________.
Valid range: –459 to 3500 °F (–273 to 1927 °C)

NOTE: For steam applications, temperatures must be equal to or greater than the saturation temperature at the given pressures.

ATMOSPHERIC PRESSURE

Atmospheric Pressure = ______________ ☐ psia ☐ kPa(absolute) ☐ bar 14.696 psia ★

STANDARD REFERENCE CONDITIONS

NOTE: This information is only required if any of the following flow units were selected: StdCuft/s, StdCuft/min, StdCuft/h, StdCuft/d, StdCum/h, StdCum/d

Standard Reference Conditions:

Standard Pressure = ____________________ ☐ psia ☐ bar ☐ kPa(absolute) 14.696 psia ★
(gas/steam only)

Standard Temperature = _________________ ☐ °F ★ ☐ °C 60 °F ★ (For Steam, 212 °F ★)

★ ***Indicates default value.***

FLUID TYPE (Select One)

☐ Gas ☐ Liquid

FLUID INFORMATION (Complete one section only)

☐ **Steam (ASME) Saturated and/or Superheated**

==

☐ **Natural Gas**

NOTE: If you selected Natural Gas, complete the information on page 6-23.

==

☐ **Gas or Liquid from AIChE database**: Circle **ONE** fluid name below:

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 GlycolEthylene	m–Dichlorobenzene	Propane	1–Nonanal
Argon	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	

==

☐ **Custom Gas or Liquid**

Enter your custom fluid name ____

NOTE: If you are defining a custom fluid, complete the density and viscosity information on page 6-25.

★ ***Indicates default value.***

NOTE ***Only fill out this page if you selected natural gas.***

COMPRESSIBLITY FACTOR INFORMATION:

Choose desired characterization method, and only enter values for that method:

☐ Detail Characterization Method, (AGA8 1992)

			Mole	Valid Range
CH_4	Methane mole percent	____________	%	0–100 percent
N_2	Nitrogen mole percent	____________	%	0–100 percent
CO_2	Carbon Dioxide mole percent	____________	%	0–100 percent
C_2H_6	Ethane mole percent	____________	%	0–100 percent
C_3H_8	Propane mole percent	____________	%	0–12 percent
H_2O	Water mole percent	____________	%	0–Dew Point
H_2S	Hydrogen Sulfide mole percent	____________	%	0–100 percent
H_2	Hydrogen mole percent	____________	%	0–100 percent
CO	Carbon Monoxide mole percent	____________	%	0–3.0 percent
O_2	Oxygen mole percent	____________	%	0–21 percent
C_4H_{10}	i-Butane mole percent	____________	%	0–6 percent (1)
C_4H_{10}	n-Butane mole percent	____________	%	0–6 percent (1)
C_5H_{12}	i-Pentane mole percent	____________	%	0–4 percent (2)
C_5H_{12}	n-Pentane mole percent	____________	%	0–4 percent (2)
C_6H_{16}	Hexane mole percent	____________	%	0–Dew Point
C_7H_{16}	n-Heptane mole percent	____________	%	0–Dew Point
C_8H_{18}	n-Octane mole percent	____________	%	0–Dew Point
C_9H_{20}	n-Nonane mole percent	____________	%	0–Dew Point
$C_{10}H_{22}$	n-Decane mole percent	____________	%	0–Dew Point
He	Helium mole percent	____________	%	0–3.0 percent
Ar	Argon mole percent	____________	%	0–1.0 percent

(1) The summation of i-Butane and n-Butane cannot exceed 6 percent.

(2) The summation of i-Pentane and n-Pentane cannot exceed 4 percent.

☐ Gross Characterization Method, Option 1 (AGA8 Gr-Hv-CO2)

			Valid Range
Specific gravity at 14.73 psia and 60 °F	____________		0.554–0.87
Volumetric Gross Heating Value at Base Conditions	____________	BTU/SCF	477–1150 BTU/SCF
Carbon dioxide mole percent	____________	%	0–30 percent
Hydrogen mole percent	____________	%	0–10 percent
Carbon monoxide mole percent	____________	%	0–3 percent

☐ Gross Characterization Method, Option 2 (AGA8 Gr-CO2-N2)

			Valid Range
Specific Gravity at 14.73 psia and 60 °F	____________		0.554–0.87
Carbon dioxide mole percent	____________	%	0–30 percent
Nitrogen mole percent	____________	%	0–50 percent
Hydrogen mole percent	____________	%	0–10 percent
Carbon monoxide mole percent	____________	%	0–3 percent

★ ***Indicates default value.***

NOTE ***Only fill out this page if you selected a custom gas.***

GAS COMPRESSIBLITY AND VISCOSITY INFORMATION

1. Fill in the following operating pressures and operating temperatures.
   (Min and max values must match values entered on 6-21.)

Operating Pressures	Operating Temperatures	
(1)__________ min	(5)__________ min	(8)__________[$^1/_3$(max–min)]+min
(2)__________ [$^1/_3$(max–min)]+min	(6)__________ [½ (max–min)]+min	(9)__________[$^2/_3$(max–min)]+min
(3)__________ [$^2/_3$(max–min)]+min	(7)__________ max	
(4)__________ max		

2. **Transfer the values from the above section to the numbered lines below.**
3. Check one Density/Compressibility box, then enter the 12 values for each pressure/temperature range.
4. Check one Viscosity box, then enter values for each temperature. (At least one viscosity value is required.)
5. Enter values for molecular weight, isentropic exponent, and standard density (or standard compressibility).

Pressure	Temp.	☐ Density in Kg/CuM ☐ Density in Lbs/CuFt ☐ Compressibility	Temp.	☐ Viscosity in Centipoise ☐ Viscosity in Lbs/Ft sec ☐ Viscosity in Pascal sec
(1)__________	(5)______	__________________	(5)______	__________________
(2)__________	(5)______	__________________	(8)______	__________________
(3)__________	(5)______	__________________	(9)______	__________________
(4)__________	(5)______	__________________	(7)______	__________________
(1)__________	(6)______	__________________		
(2)__________	(6)______	__________________	Molecular Weight ______________	
(3)__________	(6)______	__________________		
(4)__________	(6)______	__________________	Isentropic Exponent ____________ 1.4 ★	
(1)__________	(7)______	__________________		
(2)__________	(7)______	__________________		
(3)__________	(7)______	__________________		
(4)__________	(7)______	__________________		

Standard density/compressibility __________________
(at standard reference conditions specified on page 6-21.)

★ ***Indicates default value.***

NOTE: Custom Gas Configuration order will be delayed if any fields on this page are left blank.

NOTE ***Only fill out this page if you have selected a custom liquid.***

LIQUID DENSITY AND VISCOSITY INFORMATION

1. Fill in the following operating temperatures. (Min and max values must match values entered on 6-21.)

Operating Temperatures

(a)____________ min

(b)____________ [$^1/_3$(max–min)] + min

(c)____________ [$^2/_3$(max–min)] + min

(d)____________ max

2. **Transfer the values from the above section to the numbered lines below.**
3. Check one Density box, then enter values for each temperature and the standard density.
4. Check one Viscosity box, then enter values for each temperature. (At least one viscosity value is required.)

Temp.	☐ Density in Lbs/CuFt ☐ Density in Kg/CuM	Temp.	☐ Viscosity in Centipoise ☐ Viscosity in Lbs/Ft sec ☐ Viscosity in Pascal sec
(a)________	______________________	(a)______	____________________________
(b)________	______________________	(b)______	____________________________
(c)________	______________________	(c)______	____________________________
(d)________	______________________	(d)______	____________________________

Standard density ______________________
(at standard reference conditions specified on page 6-21)

Note: Custom Liquid Configuration order will be delayed if any fields on this page are left blank.

Units	Model 3095 MV Multivariable Transmitter Range Limits									
	Range 1 DP Span		Range 2 DP Span		Range 3 DP Span		Range 3 (AP) Range C (GP) Span		Range 4 (AP) Range D (GP) Span	
	min	max	min	max	min	max	min	max	min	max
inH_2O	0.5	25	2.5	250	10	1000	221.837	22183.7	1005.48	100548.5
inHg	0.036712	1.8356	0.18356	18.356	0.73424	73.424	16.2882	1628.82	73.8261	7382.61
ftH_2O	0.041666	2.08333	0.20833	20.8333	0.83333	83.333	18.4864	1848.64	83.78961	8378.961
mmH_2O	12.7	635	63.5	6350	254	25400	5634.66	563466	25539.08	2553908.
mmHg	0.932486	46.6243	4.66243	466.243	18.6497	1864.97	413.72	41372	1875.18	187518.
psi	0.018032	0.90156	0.09016	9.0156	0.36063	36.063	8	800	36.26	3626.
bar	0.001244	0.062161	0.00622	0.62161	0.02486	2.486	0.55158	55.1581	2.5000	250.00
mbar	1.243212	62.1606	6.21606	621.606	24.8642	2486.42	551.581	55158.1	2500.04	250004.
g/cm^2	1.267722	63.3861	6.33861	633.861	25.3545	2535.45	562.456	56245.6	2549.33	254933.
kg/cm^2	.001268	0.063386	0.00634	0.63386	0.02535	2.535	0.56246	56.2456	2.549332	254.9332
Pa	124.3212	6216.06	621.606	62160.6	2486.42	248642	55158.1	5515811	250004	25000400
kPa	0.124322	6.21606	.62161	62.1606	2.48842	248.842	55.1581	5515.81	250.004	25000.4
torr	0.932484	46.6242	4.66242	466.242	18.6497	1864.97	413.719	41371.9	1875.182	187518.2
atm	0.001226	0.061348	0.00613	0.61348	0.02454	2.454	0.54437	54.4368	2.4673	246.73

Diamond II+ Sensor Series No.	Nominal Pipe Size in. (mm)
10	½ – 2 (13 – 51)
15, 16	2 – 5 (51 – 127)
25, 26	5 – 42 (127 – 1067)
35, 36	12 – 72 (305 – 1829)
45, 46	24 – 72 (610 – 1829)

Appendix A HART® Communicator

INTRODUCTION

This brief appendix provides basic instructions for connecting and using the Model 275 HART Communicator with a Model 3095 MV. For more complete information on the HART Communicator, refer to the HART Communicator Product Manual 00809-0100-4275.

EA SOFTWARE/ HART COMMUNICATOR COMPARISON

Table A-1 identifies the functionality of the Model 3095 MV Engineering Assistant and the Model 275 HART Communicator.

TABLE A-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 A-1. HART Communicator Menu Tree for the Model 3095 MV.

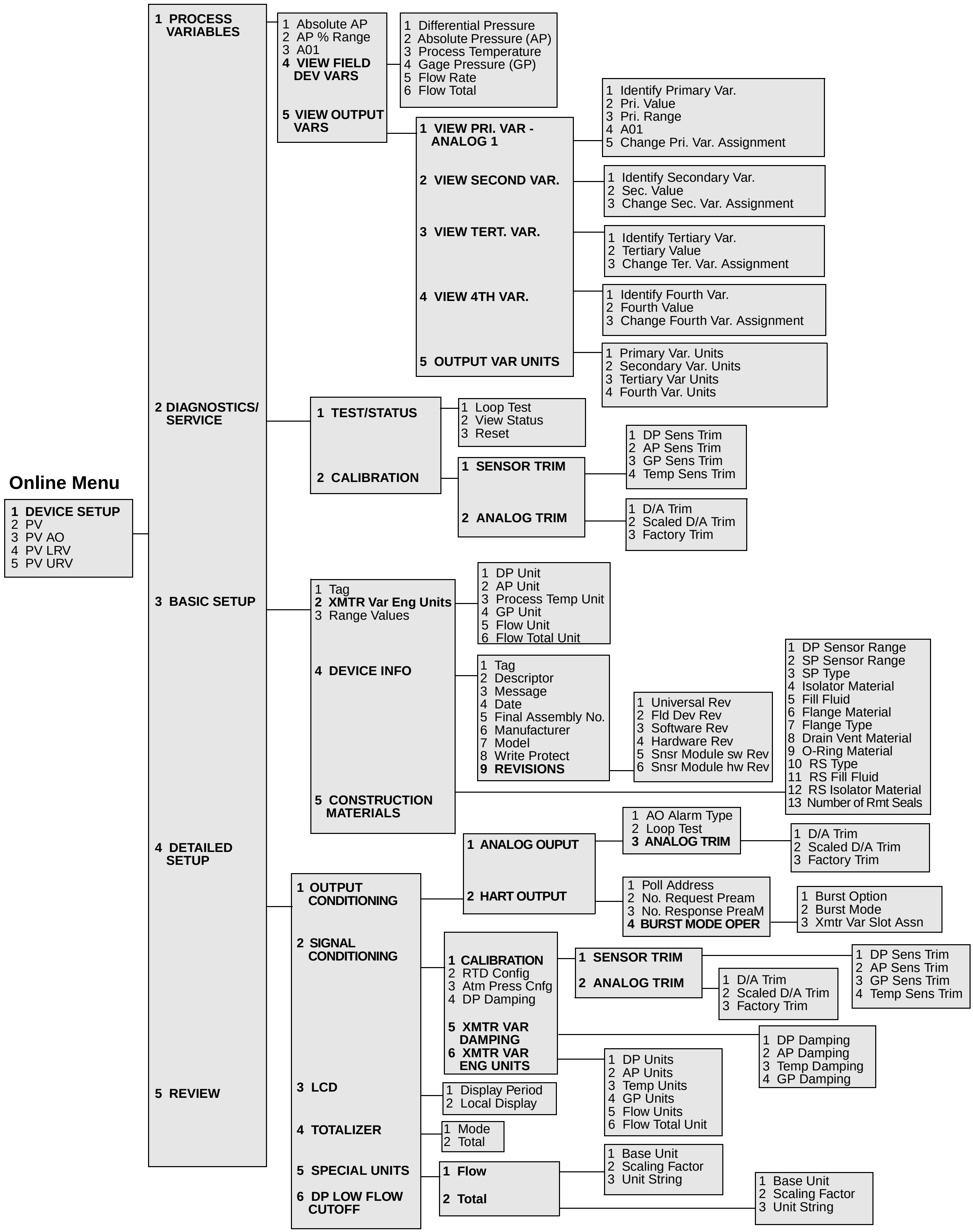


TABLE A-2. HART Fast Key Sequences for the Model 3095 MV.

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

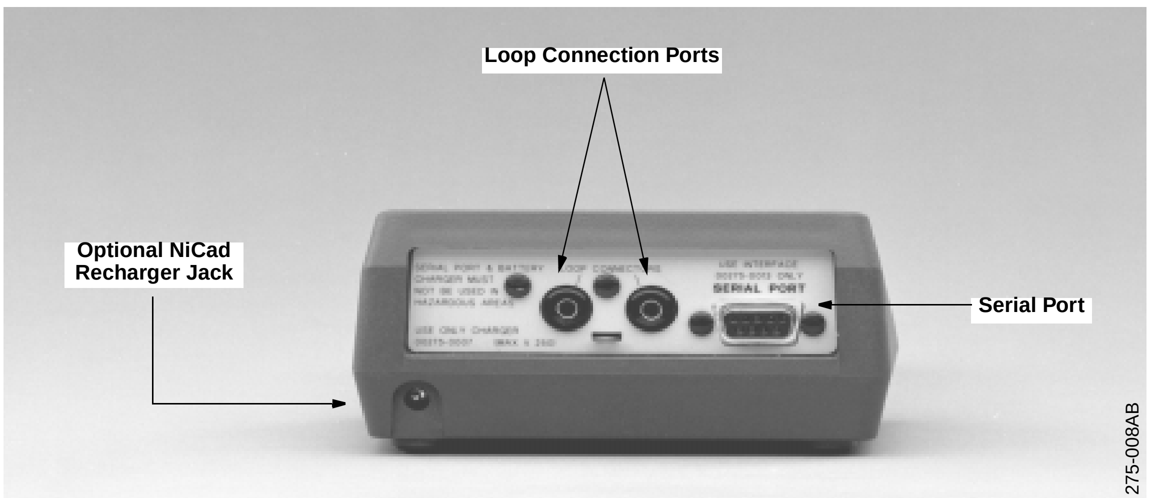
CONNECTIONS AND HARDWARE

The HART Communicator Model 275 can interface with a transmitter from the control room, the instrument site, or any wiring termination point in the loop through the rear connection panel as shown in Figure A-2. To communicate, connect the HART Communicator in parallel with the instrument or load resistor. The connections are non-polarized.

⚠WARNING

Explosions can result in death or serious injury. Do not make connections to the serial port or NiCad recharger jack in an explosive atmosphere.

FIGURE 1-2. Rear Connection Panel with Optional NiCad Recharger Pack.



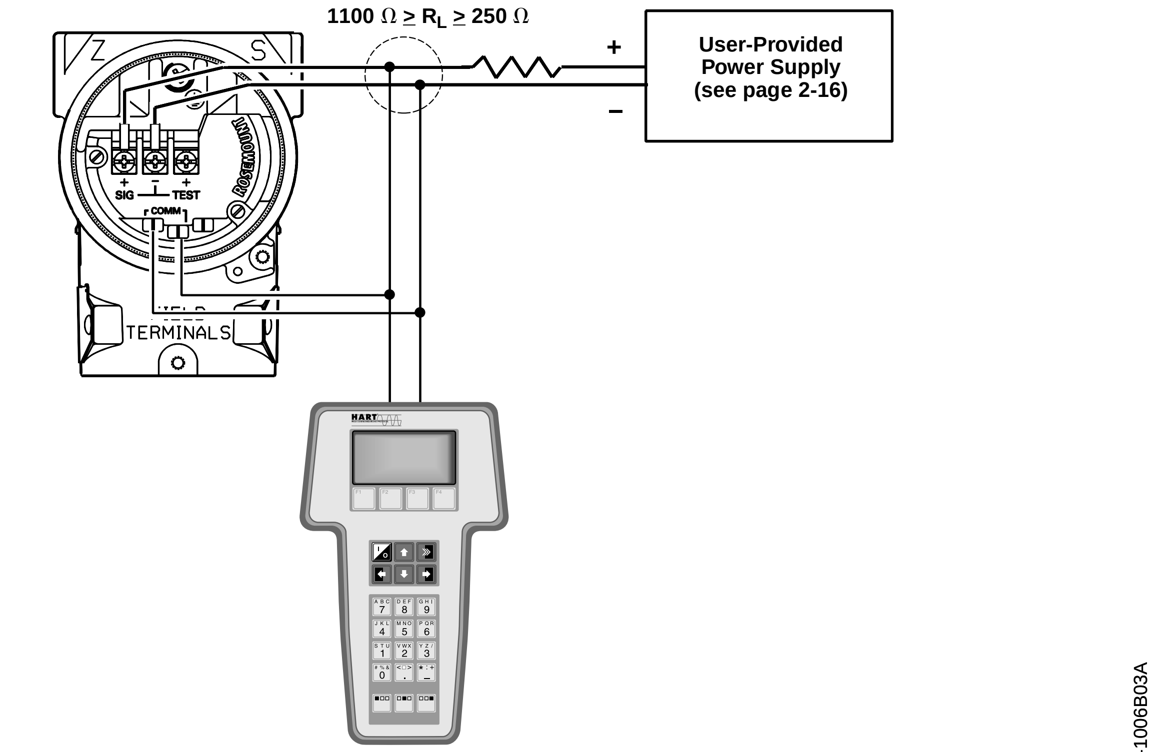
⚠WARNING

Explosions can result in death or serious injury. Before connecting the HART Communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or nonincendive field wiring practices.

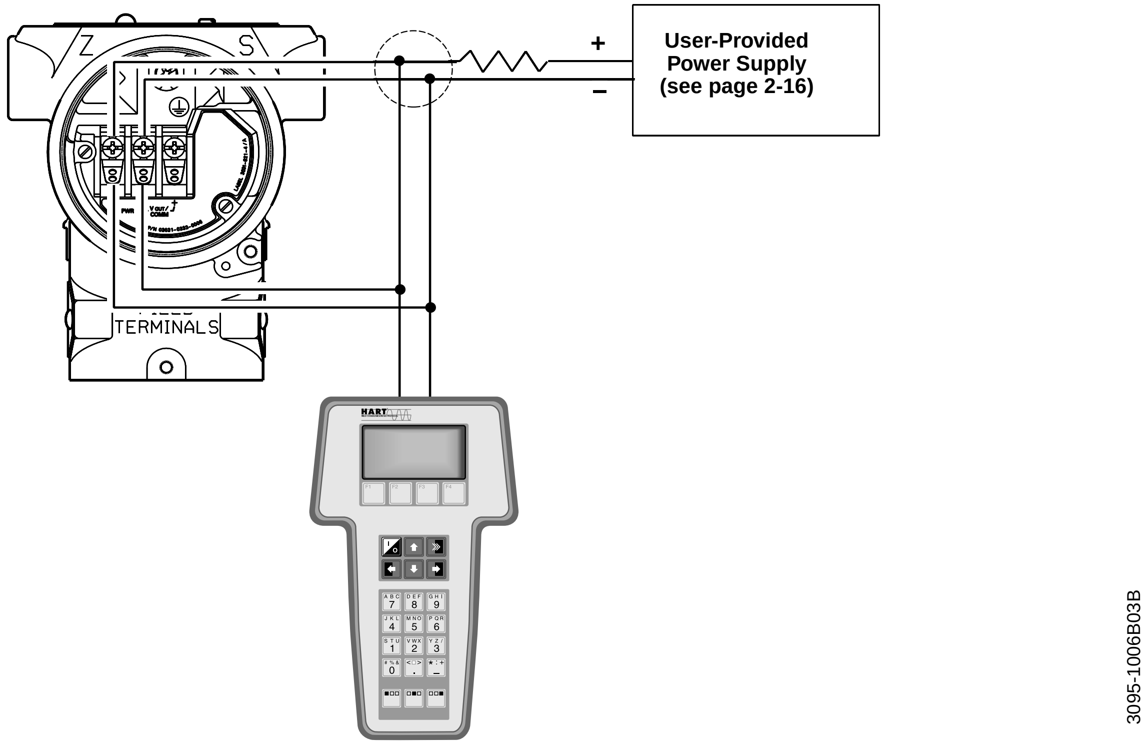
NOTE

The HART Communicator needs a minimum of 250 ohms resistance in the loop to function properly. The HART Communicator does not measure loop current directly.

FIGURE A-3. Wiring Connections.



PREVIOUS TERMINAL BLOCK

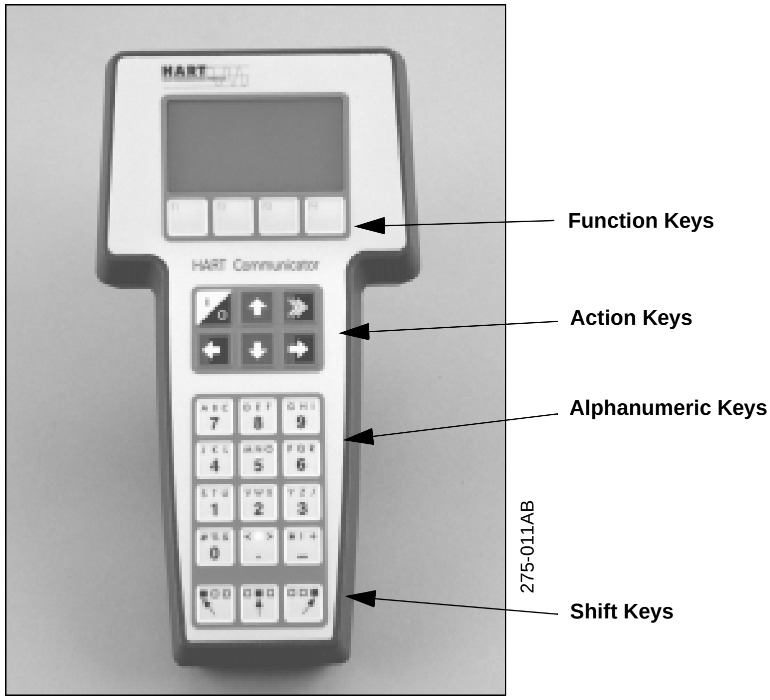


IMPROVED TERMINAL BLOCK

COMMUNICATOR KEYS

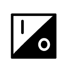
The keys of the HART Commuincator include action, function, alphanumeric, and shift keys

FIGURE A-4. The HART Communicator.

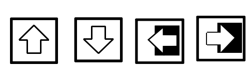


Action Keys

As shown in Figure A-4, the action keys are the six blue, white, and black keys located above the alphanumeric keys. The function of each key is described as follows:

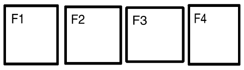
ON/OFF Key 
Use this key to power the HART Communicator. When the communicator is turned on, it searches for a transmitter on the 4–20 mA loop. If a device is not found, the communicator displays the message, “No Device Found. Press OK.”

If a HART-compatible device is found, the communicator displays the Online Menu with device ID and tag.

Directional Keys 
Use these keys to move the cursor up, down, left, or right. The right arrow key also selects menu options, and the left arrow key returns to the previous menu.

HOT Key 
Use this key to quickly access important, user-selectable options when connected to a HART-compatible device. Pressing the Hot Key turns the HART Communicator on and displays the Hot Key Menu.
See Customizing the Hot Key Menu in the HART Communicator manual for more information.

Function Keys

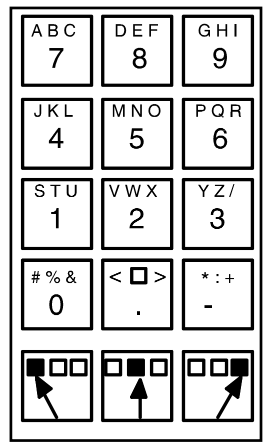


Use the four software-defined function keys, located below the LCD, to perform software functions. On any given menu, the label appearing above a function key indicates the function of that key for the current menu. As you move among menus, different function key labels appear over the four keys. For example, in menus providing access to on-line help, the HELP label may appear above the F1 key. In menus providing access to the Online Menu, the HOME label may appear above the F3 key. Simply press the key to activate the function. See your HART Communicator manual for details on specific function key definitions.

Alphanumeric and Shift Keys

The alphanumeric keys (Figure A-5) perform two functions: the fast selection of menu options and data entry.

FIGURE A-5. HART Communicator Alphanumeric and Shift Keys.

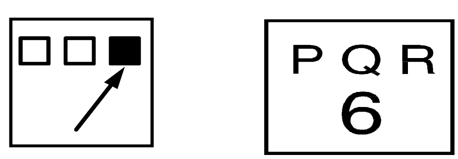


Data Entry

Some menus require data entry. Use the alphanumeric and shift keys to enter all alphanumeric information into the HART Communicator. If you press an alphanumeric key alone from within an edit menu, the bold character in the center of the key appears. These large characters include the numbers zero through nine, the decimal point (.), and the dash symbol (—).

To enter an alphabetic character, first press the shift key that corresponds to the position of the letter you want on the alphanumeric key. Then press the alphanumeric key. For example, to enter the letter R, first press the right shift key, then the “6” key (see Figure A-6). Do not press these keys simultaneously, but one after the other.

FIGURE A-6. Data Entry Key Sequence.



Fast Key Sequences

HART fast key sequences provide quick on-line access to transmitter variables and functions. Instead of stepping your way through the menu structure using the action keys, you can press a HART fast key sequence to move from the Online Menu to the desired variable or function. On-screen instructions guide you through the rest of the screens.

Fast Key Sequence Conventions

The fast key sequences for the Model 275 use the following conventions for their identification:

1 through 9–Refer to the keys located directly below the dedicated keypad.

Left Arrow–Refers to the left arrow directional key.

Fast Key Sequence Example

HART fast key sequences are made up of the series of numbers corresponding to the individual options in each step of the menu structure. For example, from the Online Menu you can change the **Date**. Following the menu structure, press 1 to reach **Device Setup**, press 3 for **Basic Setup**, press 4 for **Device Info**, press 4 for **Date**. The corresponding HART fast key sequence is 1, 3, 4, 4.

HART fast keys are operational only from the Online Menu. If you use them consistently, you will need to return to the Online Menu by pressing HOME (F3) when it is available. If you do not start at the Online Menu, the HART fast key sequences will not function properly.

Use Table A-2, an alphabetical listing of every on-line function, to find the corresponding HART fast key sequences. These codes are applicable only to Level Controller and the HART Communicator.

MENUS AND FUNCTIONS

The HART Communicator is a menu driven system. Each screen provides a menu of options that can be selected as outlined above, or provides direction for input of data, warnings, messages, or other instructions.

Main Menu

When the HART Communicator is turned on, one of two menus will appear. If the HART Communicator is connected to an operating loop, the communicator will find the device and display the Online Menu (see below). If it is not connected to a loop, the communicator will indicate that no device was found. When you press OK (F4), it will display the Main menu.

The Main menu provides the following options:

- *Offline*–The Offline option provides access to offline configuration data and simulation functions.
- *Online*–The Online option checks for a device and if it finds one, brings up the Online Menu.
- *Transfer*–The Transfer option provides access to options for transferring data either from the HART Communicator (memory) to the transmitter (device) or vice versa. Transfer is used to move off-line data from the HART Communicator to the transmitter, or to retrieve data from a transmitter for off-line revision.

NOTE
Online communication with the transmitter automatically loads the current transmitter data to the HART Communicator. Changes in on-line data are made active by pressing SEND (F2). The transfer function is used only for off-line data retrieval and sending.

- *Frequency Device*–The Frequency Device option displays the frequency output and corresponding pressure output of current-to-pressure transmitters.
- *Utility*–The Utility option provides access to the contrast control for the HART Communicator LCD screen and to the autopoll setting used in multidrop applications.

Once selecting a Main menu option, the HART Communicator provides the information you need to complete the operation. If further details are required, consult the HART Communicator manual.

Online Menu

The Online Menu can be selected from the Main menu as outlined above, or it may appear automatically if the HART Communicator is connected to an active loop and can detect an operating transmitter.

NOTE
The Main menu can be accessed from the Online Menu. Press the left arrow action key to deactivate the on-line communication with the transmitter and to activate the Main menu options.

When configuration variables are reset in the on-line mode, the new settings are not activated until the information is sent to the transmitter. Press SEND (F2) when it is activated to update the process variables of the transmitter.

On-line mode is used for direct evaluation of a particular meter, re-configuration, changing parameters, maintenance, and other functions.

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.

Message	Description
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.

Message	Description
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.

Appendix B Approval Drawings

Approval Drawings

Model 3095MV Explosion-Proof Installation Drawing,
Factory Mutual (Drawing Number 03095-1025, Rev AA) Page B-2

Index of I.S. F.M. for 3095
(Drawing Numbers 03095-1020, Rev AB) Page B-5

Model 3095MV Explosion-Proof Installation Drawing,
Canadian Standards Association
(Drawing Number 03095-1024, Rev AA) Page B-13

Index of I.S. CSA for 3095
(Drawing Number 03095-1021, Rev AB) Page B-16

CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY

REVISIONS

REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AA	ADD 2Ø55	RTC1ØØ42Ø7	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, Ø.1A, 25MW, OR 2ØμJ (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 4Ø°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 25ØVAC.

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 [Ø.5]
.XXX ± .Ø1Ø [Ø.25]
FRACTIONS ± 1/32
ANGLES ± 2°

DO NOT SCALE PRINT

CONTRACT NO.

DR. Myles Lee Miller 7/21/93

CHK'D BLL

APP'D. BEN LOUWAGIE 8/17/93

APP'D. GOVT.

ROSEMOUNT® MEASUREMENT
FISHER-ROSEMOUNT

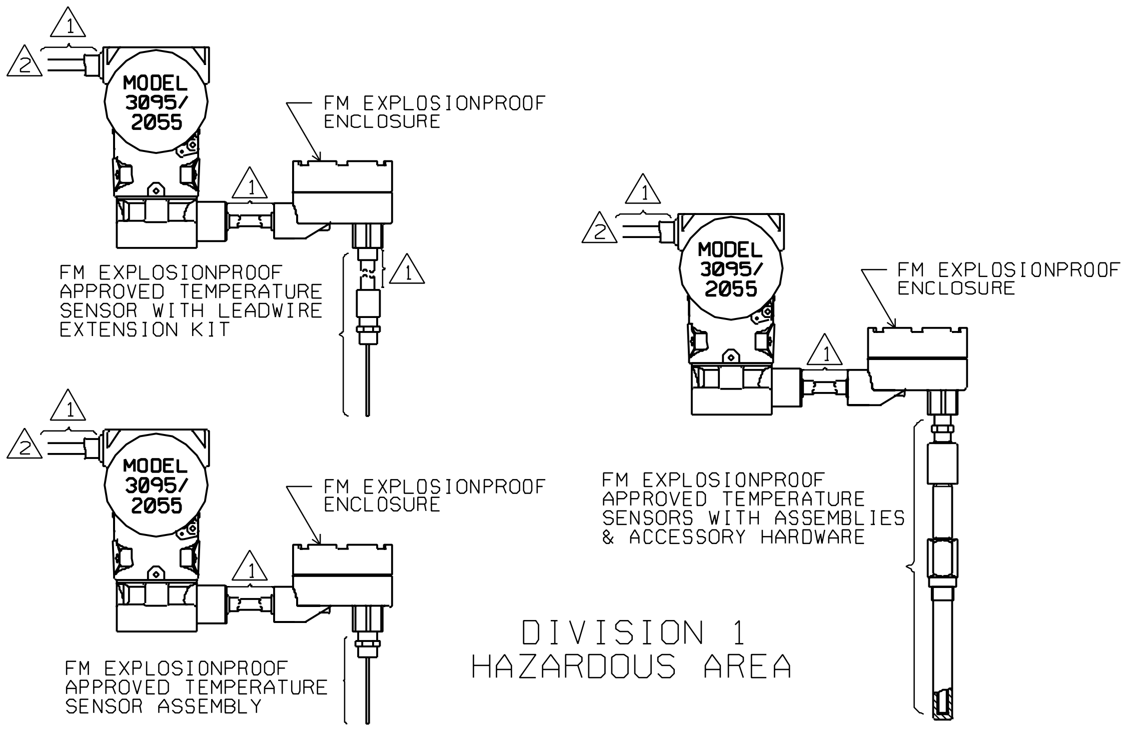
ROSEMOUNT INC.
12001 TECHNOLOGY DRIVE
EDEN PRAIRIE, MN 55344 USA

TITLE
MODEL 3Ø95/2Ø55 EXPLOSIONPROOF INSTALLATION DRAWING, FACTORY MUTUAL

SIZE A | FSCM NO | DWG NO. Ø3Ø95-1Ø25

SCALE | WT. | SHEET 1 OF 3

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AA		RTC1004207		



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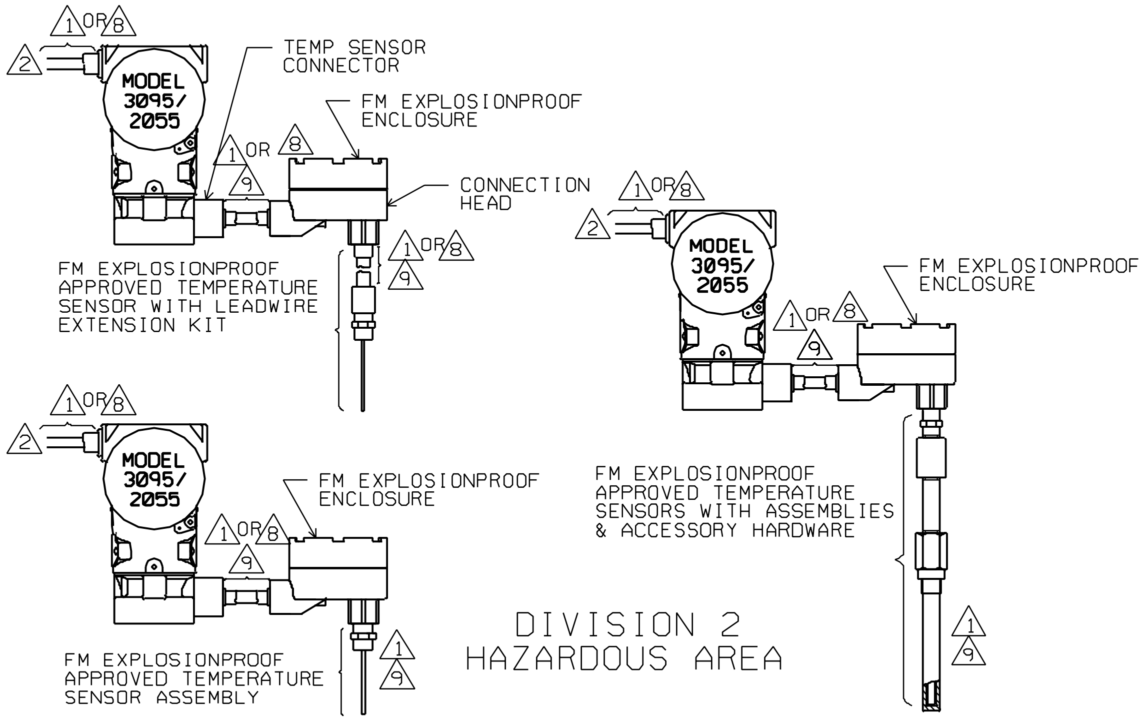
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03095-1025	
ISSUED	SCALE N/A	WT. ————	SHEET 2 OF 3	

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AA		RTC1004207		



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DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03095-1025	
ISSUED	SCALE N/A	WT. ———	SHEET 3 OF 3	

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REVISIONS

REV	DESCRIPTION	CHG. NO.	APP'D	DATE
B	ADD OPTIONAL COMPUTER CONNECTION	655550	D.E.W.	8/17/94
C	CORRECT ENTITY PARAMETERS	660398	K.D.V.	5/16/94
D	INCREASE VMAX	660728	K.D.V.	6/1/94
AA	ADD 3095C	RTC1003705	G.H.	4/17/98
AB	ADD 2055	RTC1004254	L.M.E.	6/9/98

ENTITY APPROVALS
FOR
3095/2055

THE ROSEMOUNT TRANSMITTERS LISTED ABOVE ARE F.M. APPROVED AS INTRINSICALLY SAFE WHEN USED IN CIRCUIT WITH F.M. 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 F.M. APPROVED AS INTRINSICALLY SAFE WHEN CONNECTED IN CIRCUIT WITH ROSEMOUNT TRANSMITTERS (FROM ABOVE) AND F.M. APPROVED BARRIERS WHICH MEET THE ENTITY PARAMETERS LISTED FOR CLASS I, II, AND III, DIVISION 1, GROUPS INDICATED, TEMP CODE T4.

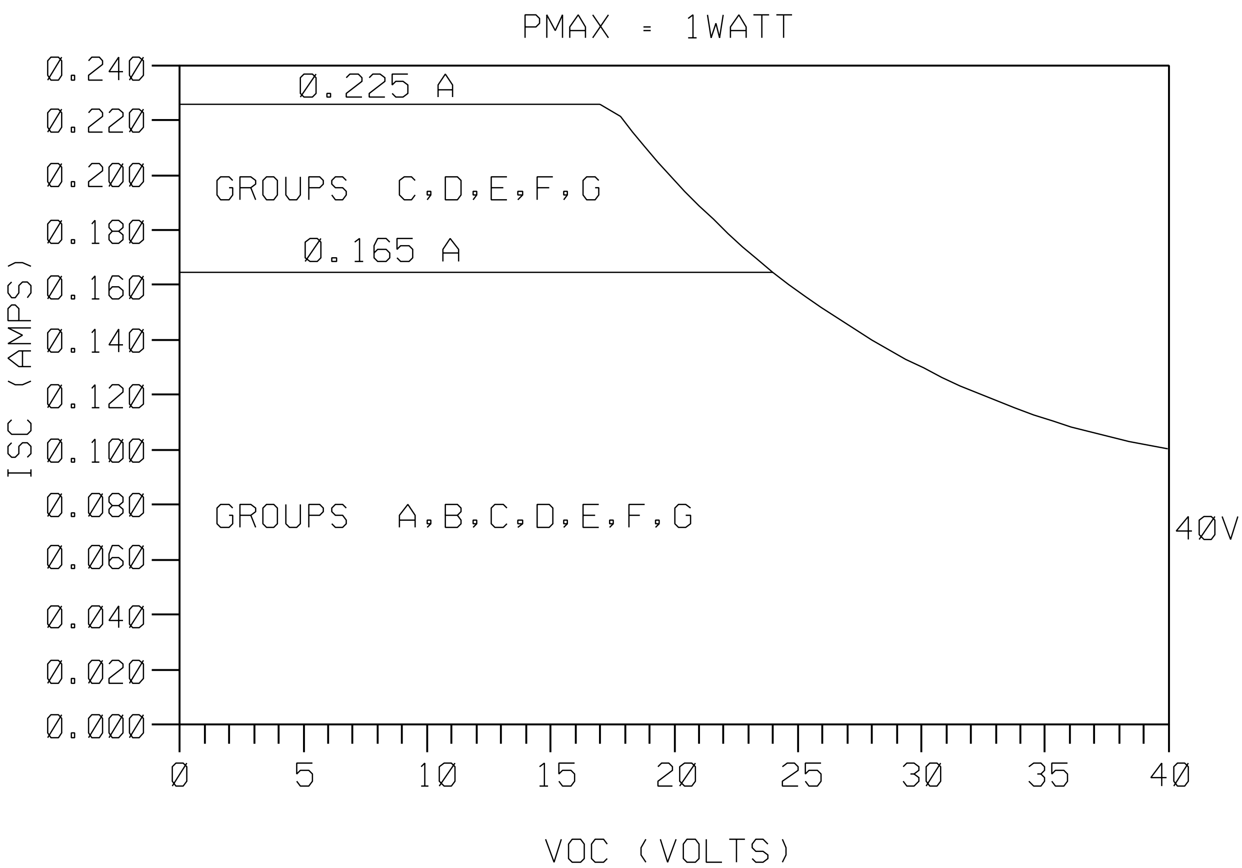
TO ASSURE AN INTRINSICALLY SAFE SYSTEM, THE TRANSMITTER AND BARRIER MUST BE WIRED IN ACCORDANCE WITH THE BARRIER MANUFACTURER'S FIELD WIRING INSTRUCTIONS AND THE APPLICABLE CIRCUIT DIAGRAM INDICATED ON SHEET 3,5, OR 7.

CAD Maintained, (MICROSTATION).

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125	CONTRACT NO.	ROSEMOUNT MEASUREMENT FISHER-ROSEMOUNT — ROSEMOUNT INC. 12001 TECHNOLOGY DRIVE EDEN PRAIRIE, MN 55344 USA
-TOLERANCE- .X ± .1 [2.5] .XX ± .02 [0.5] .XXX ± .010 [0.25] FRACTIONS ± 1/32 ANGLES ± 2°	DR. Myles Lee Miller 3/19/93	TITLE INDEX OF I.S. F.M. FOR 3095
	CHK'D	
	APP'D. Kevin Voegele 4/8/93	SIZE A — FSCM NO — DWG NO. 03095-1020
DO NOT SCALE PRINT	APP'D. GOVT.	SCALE N/A — WT. — SHEET 1 OF 8

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB		RTC1004254		

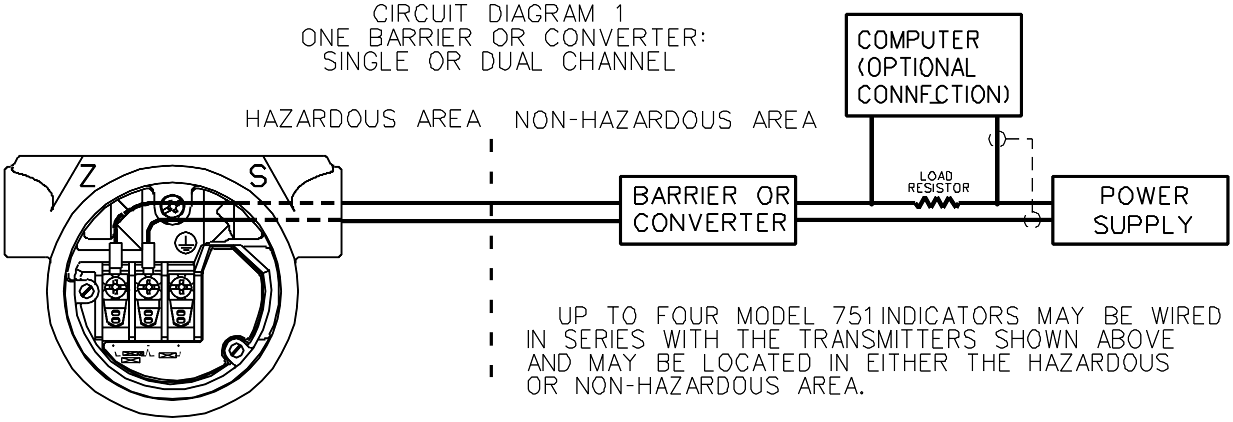
BARRIER PARAMETERS



ROSEMOUNT INC. 12001 TECHNOLOGY DRIVE EDEN PRAIRIE, MN 55344 USA	CAD Maintained, (MICROSTATION).			
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03095-1020	
ISSUED	SCALE N/A	WT. ———	SHEET 2 OF 8	

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB		RTC1004254		

CIRCUIT DIAGRAM 1
ONE BARRIER OR CONVERTER:
SINGLE OR DUAL CHANNEL

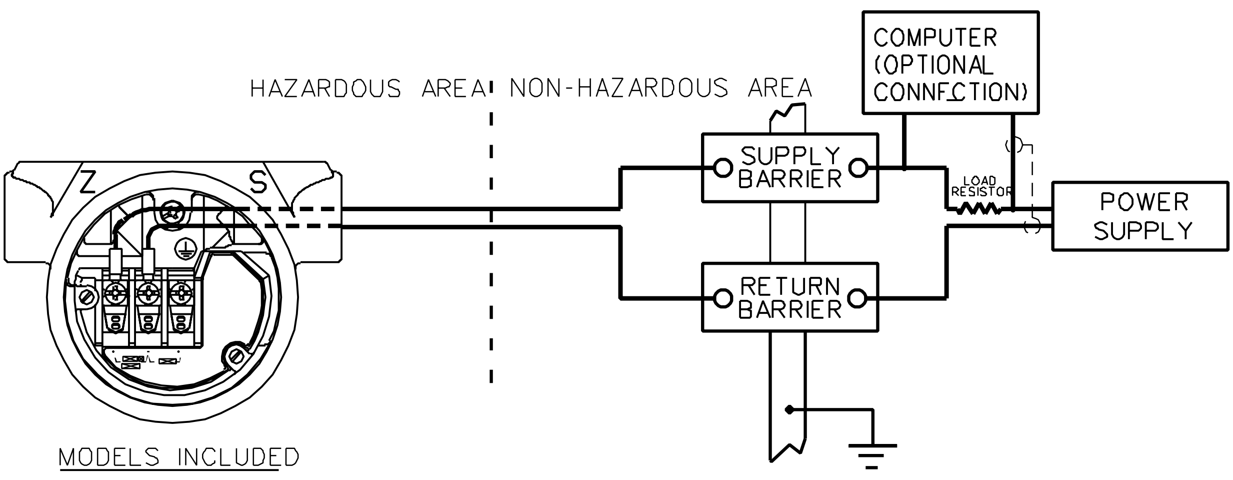


UP TO FOUR MODEL 751 INDICATORS MAY BE WIRED IN SERIES WITH THE TRANSMITTERS SHOWN ABOVE AND MAY BE LOCATED IN EITHER THE HAZARDOUS OR NON-HAZARDOUS AREA.

MODELS INCLUDED

3095M

CIRCUIT DIAGRAM 2
SUPPLY AND RETURN BARRIERS
(ONLY FOR USE WITH BARRIERS APPROVED IN THIS CONFIGURATION)



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.
12001 TECHNOLOGY DRIVE
EDEN PRAIRIE, MN 55344 USA

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DR. Myles Lee Miller

ISSUED

SIZE A | FSCM NO | DWG NO. 03095-1020

SCALE N/A | WT. | SHEET 3 OF 8

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB		RTC1004254		

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 (CI) 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 (LI) OF THE INTRINSICALLY SAFE APPARATUS.

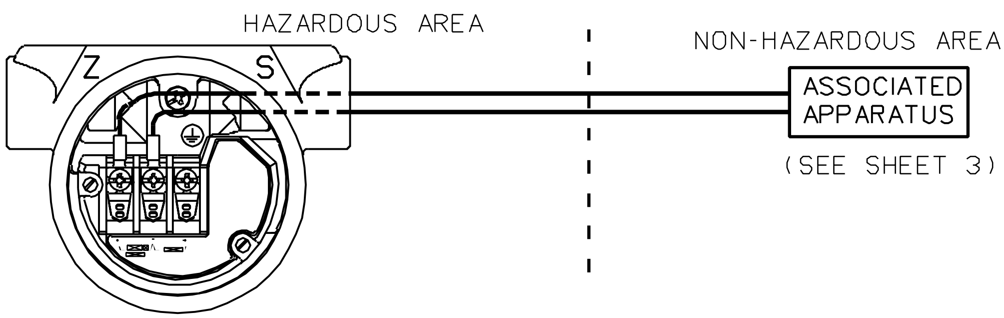
NOTE: ENTITY PARAMETERS LISTED APPLY ONLY TO ASSOCIATED APPARATUS WITH LINEAR OUTPUT.

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

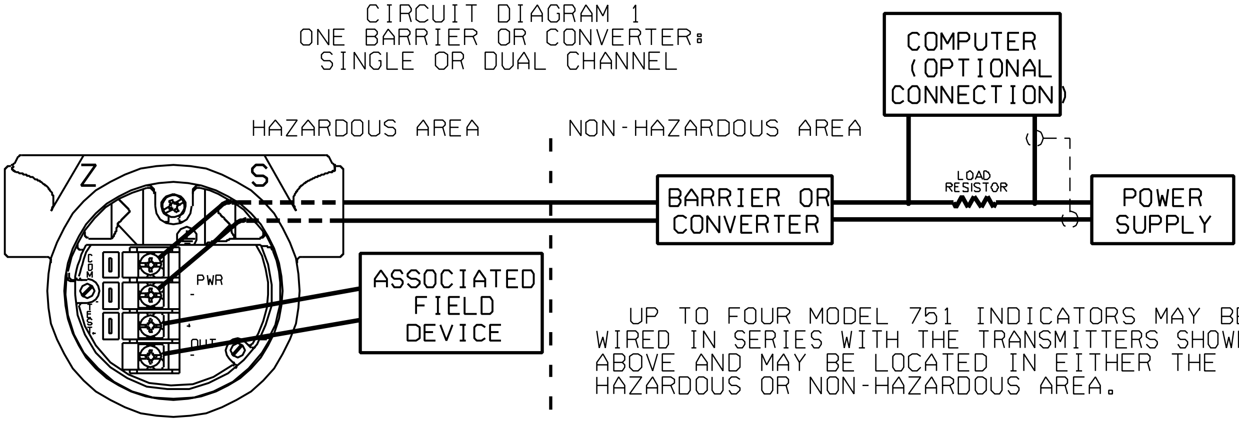
ROSEMOUNT INC.
12001 TECHNOLOGY DRIVE
EDEN PRAIRIE, MN 55344 USA

CAD Maintained, (MICROSTATION).

DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03095-1020
ISSUED	SCALE N/A	WT. ————	SHEET 4 OF 8

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB		RTC1004254		

CIRCUIT DIAGRAM 1
ONE BARRIER OR CONVERTER:
SINGLE OR DUAL CHANNEL

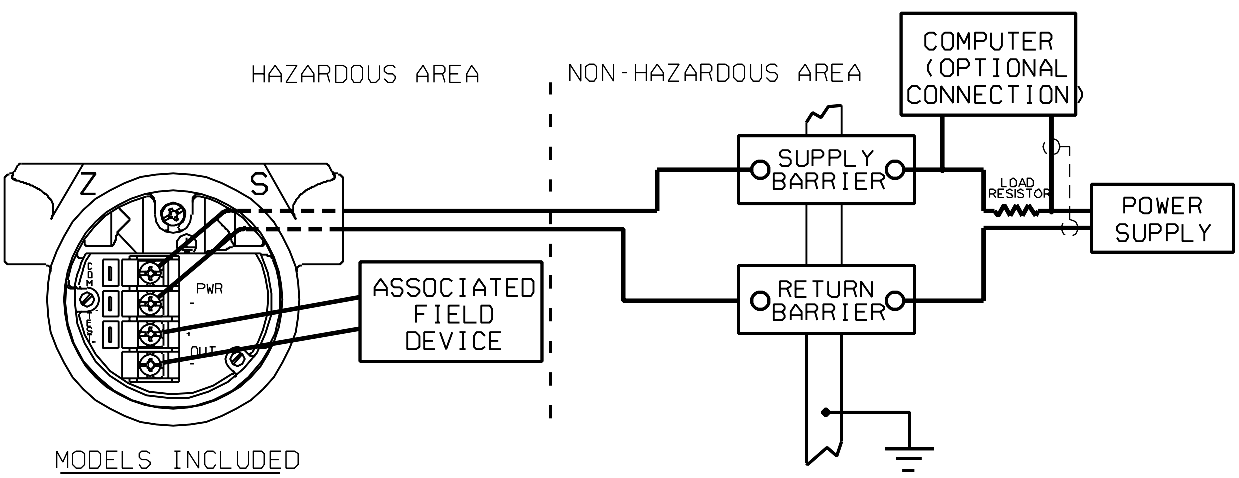


UP TO FOUR MODEL 751 INDICATORS MAY BE WIRED IN SERIES WITH THE TRANSMITTERS SHOWN ABOVE AND MAY BE LOCATED IN EITHER THE HAZARDOUS OR NON-HAZARDOUS AREA.

MODELS INCLUDED

3095C

CIRCUIT DIAGRAM 2
SUPPLY AND RETURN BARRIERS
(ONLY FOR USE WITH BARRIERS APPROVED IN THIS CONFIGURATION)



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.
12001 TECHNOLOGY DRIVE
EDEN PRAIRIE, MN 55344 USA

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DR. Myles Lee Miller

ISSUED

SIZE A | FSCM NO | DWG NO. 03095-1020

SCALE N/A | WT. | SHEET 5 OF 8

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB		RTC1004254		

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 (CI) 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 (LI) OF THE INTRINSICALLY SAFE APPARATUS.

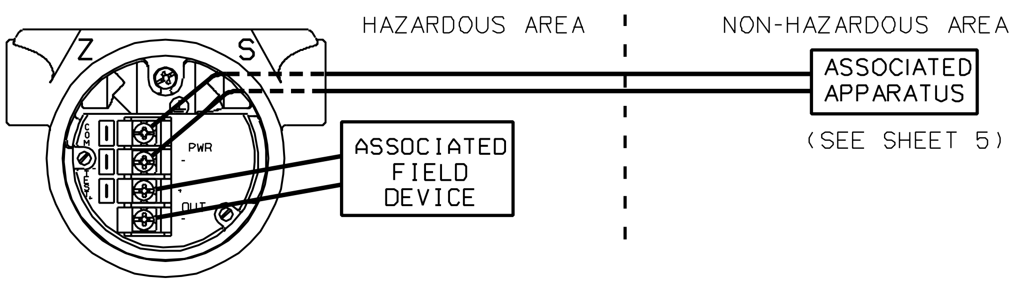
NOTE: ENTITY PARAMETERS ARE FOR 3095C ONLY. USER MUST TAKE ENTITY PARAMETERS OF THE ASSOCIATED FIELD DEVICE INTO CONSIDERATION FOR INSTALLATION.

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



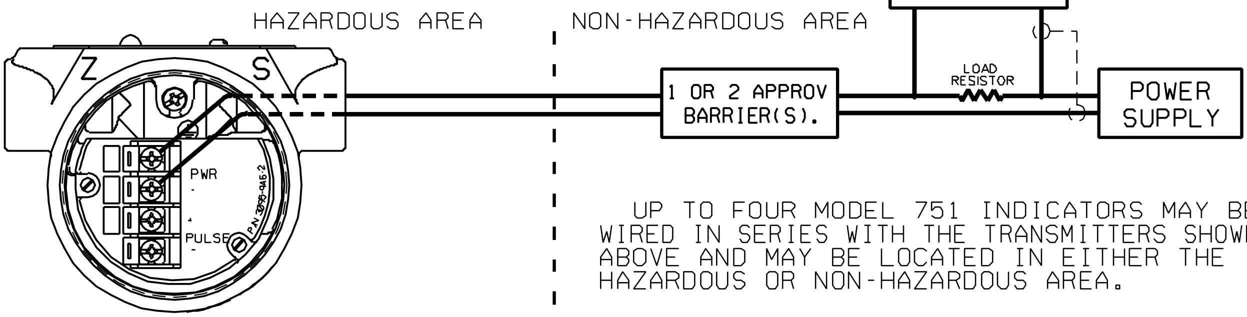
MODELS INCLUDED

3095C

ROSEMOUNT INC. 12001 TECHNOLOGY DRIVE EDEN PRAIRIE, MN 55344 USA		CAD Maintained, (MICROSTATION).			
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03095-1020		
ISSUED	SCALE N/A	WT. ————	SHEET 6 OF 8		

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB		RTC1004254		

CIRCUIT DIAGRAM 1
ORIFICE OR LINEAR DEVICE WITH
A PASSIVE PULSE ENCODER.
ONE BARRIER OR CONVERTER:
SINGLE OR DUAL CHANNEL

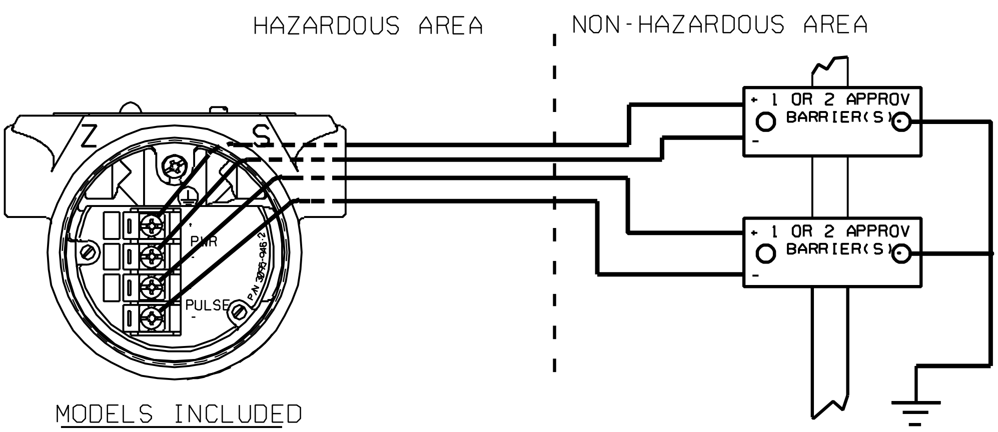


UP TO FOUR MODEL 751 INDICATORS MAY BE WIRED IN SERIES WITH THE TRANSMITTERS SHOWN ABOVE AND MAY BE LOCATED IN EITHER THE HAZARDOUS OR NON-HAZARDOUS AREA.

MODELS INCLUDED

2055/3095FT

CIRCUIT DIAGRAM 2
LINEAR DEVICE WITH AN ACTIVE PULSE SIGNAL
REQUIRING EXTERNAL POWER.
(ONLY FOR USE WITH BARRIERS APPROVED IN THIS CONFIGURATION)



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.
12001 TECHNOLOGY DRIVE
EDEN PRAIRIE, MN 55344 USA

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DR. Myles Lee Miller

ISSUED

SIZE A | FSCM NO | DWG NO. 03095-1020

SCALE N/A | WT. ——— | SHEET 7 OF 8

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB		RTC1004254		

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 (CI) 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 (LI) OF THE INTRINSICALLY SAFE APPARATUS.

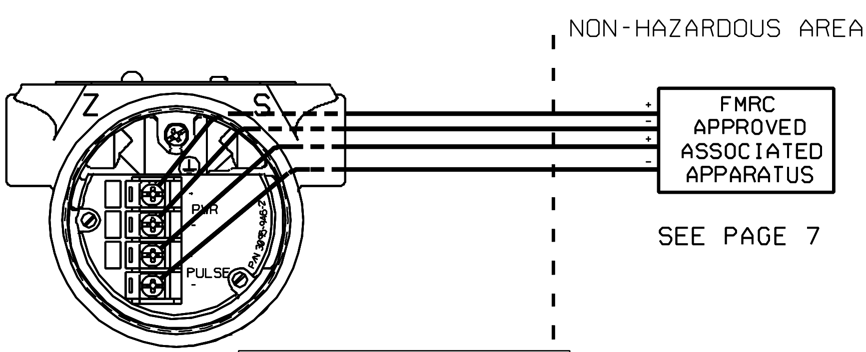
NOTE: ENTITY PARAMETERS LISTED APPLY ONLY TO ASSOCIATED APPARATUS WITH LINEAR OUTPUT.

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

2055/3095FT

ROSEMOUNT INC.
12001 TECHNOLOGY DRIVE
EDEN PRAIRIE, MN 55344 USA

CAD Maintained, (MICROSTATION).

DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03095-1020
ISSUED	SCALE N/A	WT. ————	SHEET 8 OF 8

CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY

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, 0.1A, 25MW, OR 20μJ (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

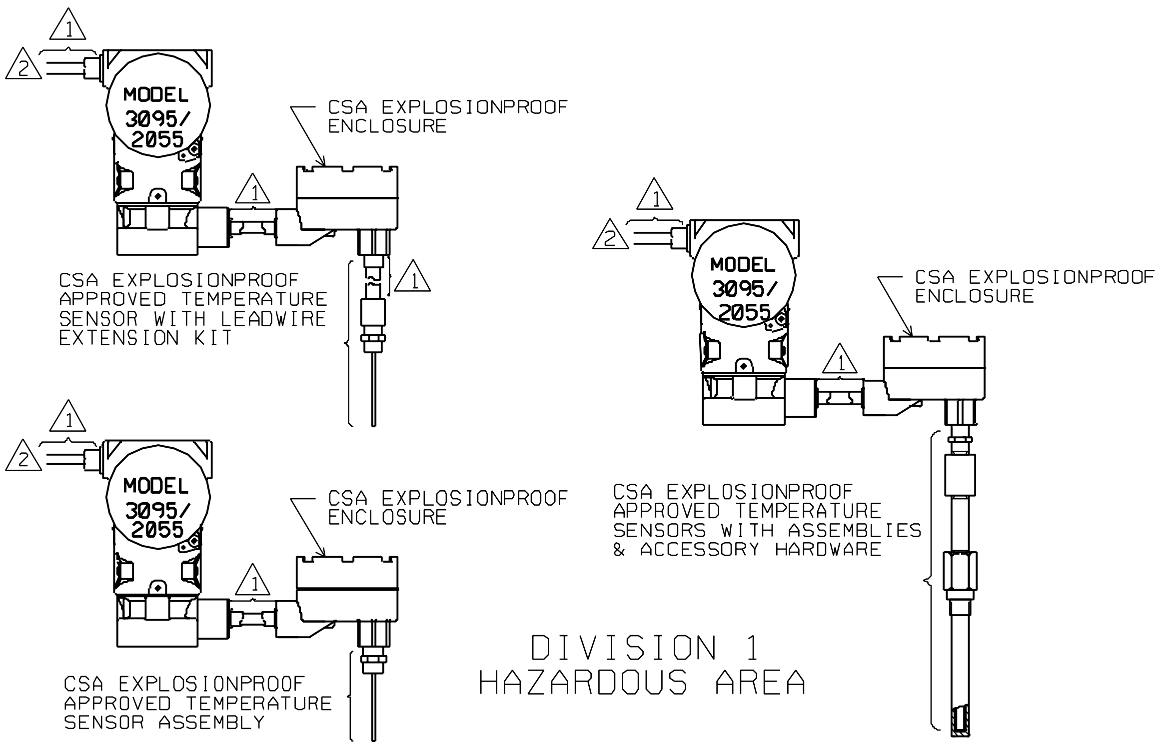
ROSEMOUNT INC.
12001 TECHNOLOGY DRIVE
EDEN PRAIRIE, MN 55344 USA

TITLE MODEL 3095/2055 EXPLOSIONPROOF INSTALLATION DRAWING, CSA

SIZE A | FSCM NO | DWG NO. 03095-1024

SCALE | WT. | SHEET 1 OF 3

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AA		RTC1004254		



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12001 TECHNOLOGY DRIVE
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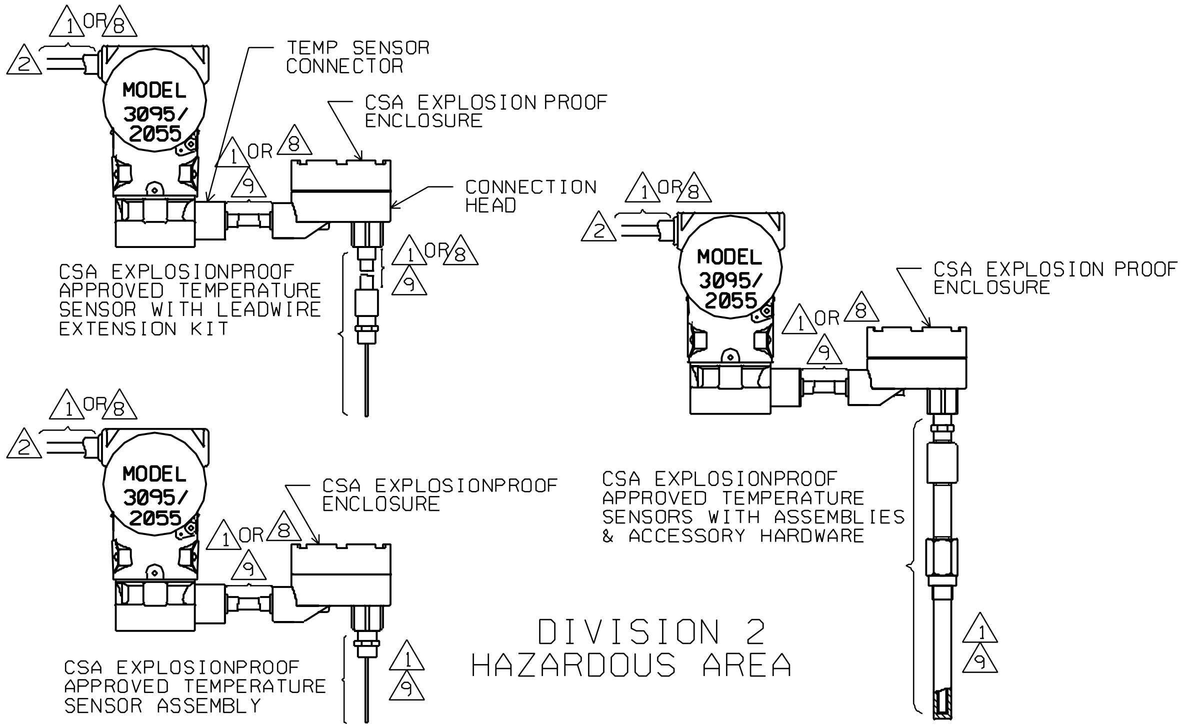
CAD Maintained, (MICROSTATION).

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		



ROSEMOUNT INC.
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CAD Maintained, (MICROSTATION).

DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03095-1024	
ISSUED	SCALE N/A	WT. ————	SHEET 3 OF 3	

REVISIONS

REV	DESCRIPTION	CHG. NO.	APP'D	DATE
C	ADD 3095-5000 TO DEVICES	656973	M.L.S.	11/03/93
AA	ADD 3095C	RTC1003705	G.H.	4/17/98
AB	ADD 2055	RTC1004254	L.M.E.	6/9/98

CSA INTRINSIC SAFETY APPROVALS

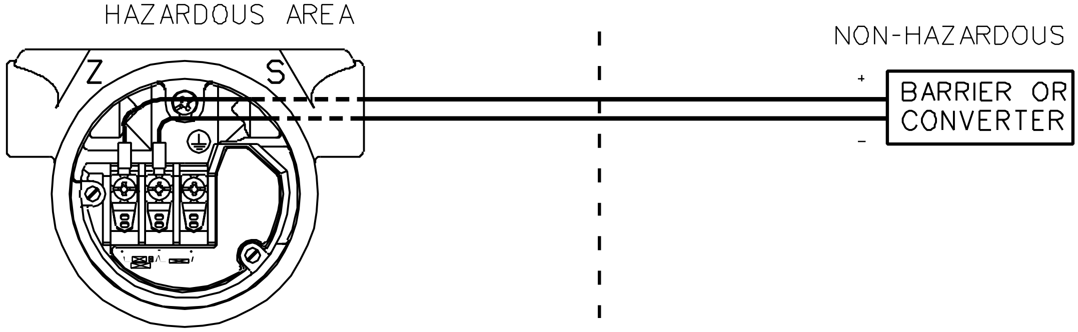
CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE

HAZARDOUS AREA

NON-HAZARDOUS AREA



ROSEMOUNT
MODELS INCLUDED
[WITH OR WITHOUT T1
(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	CONTRACT NO.	ROSEMOUNT® MEASUREMENT FISHER-ROSEMOUNT — ROSEMOUNT INC. 12001 TECHNOLOGY DRIVE EDEN PRAIRIE, MN 55344 USA
-TOLERANCE- .X ± .1 [2.5] .XX ± .02 [0.5] .XXX ± .010 [0.25] FRACTIONS ± 1/32 ANGLES ± 2°	DR. Myles Lee Miller 3/19/93	TITLE INDEX OF I.S. CSA FOR 3095/2055
	CHK'D	
	APP'D. Kevin Voegele 4/8/93	
		SIZE A · FSCM NO · DWG NO. 03095-1021
DO NOT SCALE PRINT	APP'D. GOVT.	SCALE N/A · WT. ——— · SHEET 1 OF 4

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB		RTC1004254		

DEVICE	PARAMETERS	APPROVED FOR CLASS I, DIV.1
CSA APPROVED SAFETY BARRIER	30 V OR LESS 330 OHMS OR MORE 28 V OR LESS 300 OHMS OR MORE 25 V OR LESS 200 OHMS OR MORE 22 V OR LESS 180 OHMS OR MORE	GROUPS A, B, C, D
FOXBORO CONVERTER 2A1-12V-CGB, 2AI-13V-CGB, 2AS-131-CGB, 3A2-12D-CGB, 3A2-13D-CGB, 3AD-131-CGB, 3A4-12D-CGB, 2AS-121-CGB, 3F4-12DA		GROUPS B, C, D
CSA APPROVED SAFETY BARRIER	30 V OR LESS 150 OHMS OR MORE	GROUPS C, D
ROSEMOUNT 03095-5000-1012 03095-5000-2002	19 V OR LESS 200 OHMS OR MORE	GROUPS A, B, C, D

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DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03095-1021
ISSUED	SCALE N/A	WT. ———	SHEET 2 OF 4

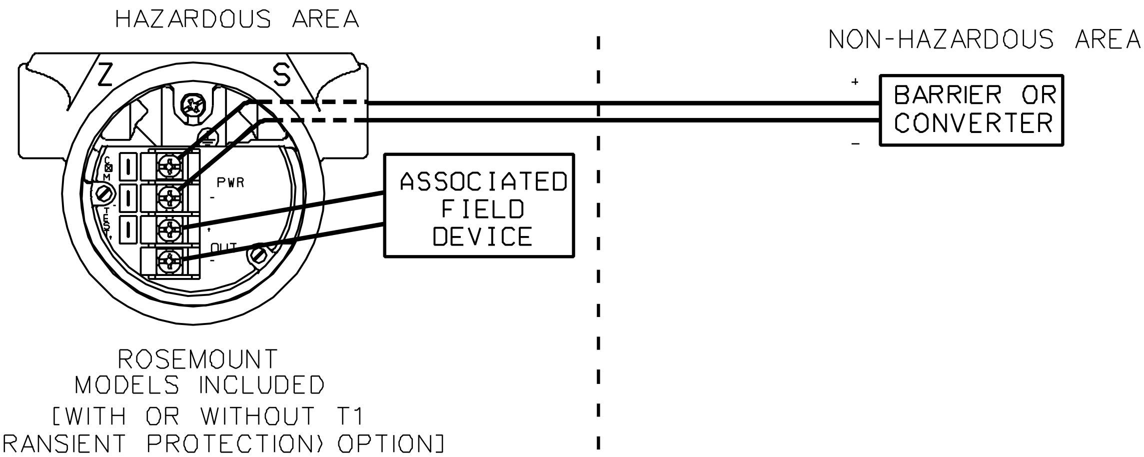
REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB		RTC1004254		

CSA INTRINSIC SAFETY APPROVALS

CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE



ROSEMOUNT
MODELS INCLUDED
[WITH OR WITHOUT T1
(TRANSIENT PROTECTION) OPTION]

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.

ROSEMOUNT INC.
12001 TECHNOLOGY DRIVE
EDEN PRAIRIE, MN 55344 USA

CAD Maintained, (MICROSTATION).

DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03095-1021	
ISSUED	SCALE N/A	WT. ————	SHEET 3 OF 4	

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB		RTC1004254		

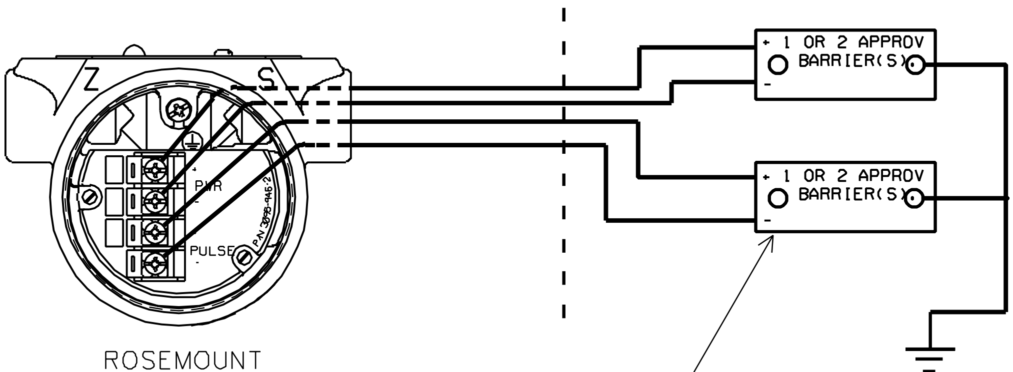
CSA INTRINSIC SAFETY APPROVALS

CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE

*INTRINSICALLY SAFE OUTPUT PARAMETERS (SEE PAGE 2)



ROSEMOUNT
MODELS INCLUDED
[WITH OR WITHOUT T1
(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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DR. Jon T Steffens	SIZE A	FSCM NO	DWG NO. 03095-1021
ISSUED	SCALE N/A	WT. ————	SHEET 4 OF 4

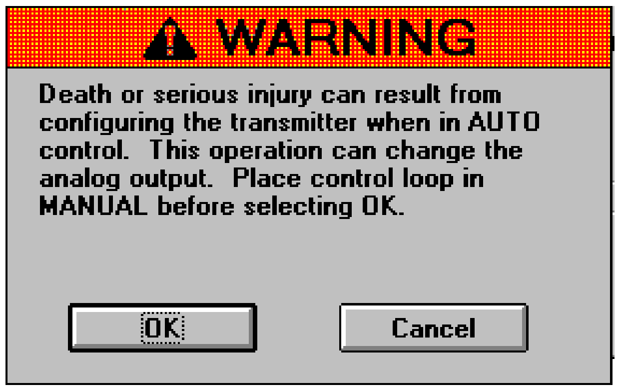
Appendix C

EA Error Message Summary

This appendix identifies errors messages that might occur while using the Model 3095 MV Engineering Assistant Software.

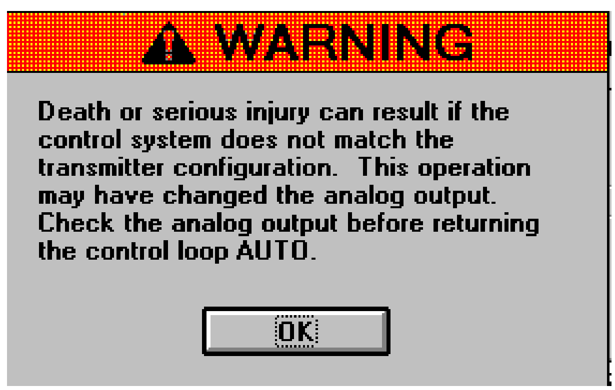
WARNING MESSAGES

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



3095-0400

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



3095-0401

ERROR MESSAGES

TABLE C-1. 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. 2. See Table 5-2.
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 5-4.
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	

Appendix D

Critical Alarms for Previous Software Revisions

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+	URL + (10%URL) (For example, URL+ = 250 + (0.10 × 250) = 275
LRL–	LRL – (10%LRL) (For example, LRL– = –250 –[0.10 × (250)] = –275

ALARMS AND ERROR CONDITIONS FOR REVISIONS 8, 9, AND 10

The Model 3095 MV provides both analog and digital alarms. If an alarm or error condition exists in the Model 3095 MV, it will be displayed during the EA communication with the transmitter and on the LCD meter. 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 Model 3095 MV alarms, and indicate an error that prevents accurate sensor or flow measurements. The analog output and the digital output respond as indicated in Table D-1.

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 D-2 identifies actions to the analog output and digital output during these conditions. Blank table cells indicate no action for that condition. Table D-3 identifies recommended corrective action, and also identifies affects on the flow calculation during these conditions.

TABLE D-1. Critical Alarms.

Alarm text as displayed in Diagnostics, Error Info	Analog Output	Digital Output	Corrective Action
Output Board EEPROM Not Initialized [1] **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 5-12. 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 5-12. 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 5-12. Contact your Field Service Center.
RAM Failure			Issue a master reset to the transmitter as described on page 4-54.
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 5-12.
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 5-12.
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 (*page 4-54*) 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 D-2. 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 D-3. 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 5-12.
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 5-12.
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 E-2 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 5-12.
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 D-4. Model 3095 MV 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 inH$_2$0 < DP $\leq$ low-flow cutoff(3)	Unreliable flow output	Unreliable flow output		0
DP ≤ -2 inH$_2$0	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 inH$_2$0, 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 Model 3095 MV electronics board.

Critical alarms are the highest priority Model 3095 MV 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 D-5.

TABLE D-5. Critical Alarms.

Alarm text as displayed in Diagnostics, Error Info	Analog Output	Digital Output	Corrective Action
Output Board EEPROM Not Initialized (1) **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 5-10. 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 5-10. 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 (page 4-54) 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 D-6 identifies actions to the analog output and digital output during these conditions. Blank table cells indicate no action for that condition. Table D-7 identifies recommended corrective action, and also identifies affects on the flow calculation during these conditions.

TABLE D-6. 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 D-7. 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 5-12.
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 5-12.
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 5-12.
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 D-8. 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 in$H_2$0 < DP $\leq$ 1 in$H_2$0	Unreliable flow output	Unreliable flow output		0
DP $\leq$ -2 in$H_2$0	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 E Compatibility Issues

OVERVIEW

When retrofitting parts to the Model 3095 MV, it is important to understand the compatibility issues involved. Appendix E describes compatibility issues among the major Model 3095 MV components:

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

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

REVISION LEVEL INDICATORS

The first thing to do is determine the revision level of your Model 3095 MV transmitter electronics board and sensor module. Revision levels can be determined with the Engineering Assistant (EA) software or the Model 275 HART Communicator.

To determine revision levels with the EA Software:

From the Diagnostics pull down menu, select Device Info, then Identification Info...

To determine revision levels with the HART Communicator:

1 Device Setup–3 Basic Setup–4 Device Info–9 Revisions.

Electronics Board

Table E-1 lists the electronics board revisions, the serial number, and the approximate shipment start date to help you determine which revision you have.

TABLE E-1. Electronics Board Revisions.

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

Sensor Module

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

TABLE E-2. Sensor Module Software Revisions.

Sensor Module Revision	Transmitter Serial Number	Shipment Start Date	Process Temp. Range
149	>28,600	11/98	–300 to 1500 °F (–184 to 815 °C)
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)

SENSOR LIMITS

Table E-3, Table E-3, and Table E-4 identify Model 3095 MV sensor limits.

TABLE E-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 inH_20 at 68 °F	–250 inH_20 at 68 °F	250 inH_20 at 68 °F	275 inH_20 at 68 °F
DP Range 3	–1100 inH_20 at 68 °F	–1000 inH_20 at 68 °F	1000 inH_20 at 68 °F	1100 inH_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	–0.15 psig	0 psig	800 psig	880 psig
GP Range D	–0.15 psig	0 psig	3,626 psig	3,988 psig
PT (5)	– 330 °F (–201 °C)	–300 °F (–185 °C)	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).

TABLE E-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 inH_20 at 68 °F	–250 inH_20 at 68 °F	250 inH_20 at 68 °F	275 inH_20 at 68 °F
DP Range 3	–913 inH_20 at 68 °F	–830 inH_20 at 68 °F	830 inH_20 at 68 °F	913 inH_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	–0.15 psig	0 psig	800 psig	880 psig
GP Range D	–0.15 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 E-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 inH_20 at 68 °F	–250 inH_20 at 68 °F	250 inH_20 at 68 °F	275 inH_20 at 68 °F
DP Range 3	–913 inH_20 at 68 °F	–830 inH_20 at 68 °F	830 inH_20 at 68 °F	913 inH_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 E-6 lists electronics compatibility issues between the electronics board, the sensor module, and the LCD meter.

TABLE E-6. Electronics Compatibility Table.

Electronics Board Revision	Sensor Module			LCD Meter
	Rev. 142(a)	Rev. 142(b)	Rev. 149	
Electronics Board Rev. 4 and 5	Compatible	Compatible	Not Compatible	Not Compatible
Electronics Board Rev. 8, 9, and 10	Compatible	Compatible	Not Compatible	Not Compatible
Electronics Board Rev. 12 and 13	Compatible	Compatible	Compatible	Compatible

HARDWARE COMPATIBILITY

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

TABLE E-7. Hardware Compatibility Issues.

Housing	Terminal Block		Electronics Board		Sensor Module		LCD Meter
	New	Old	New (Rev. 12 and 13)	Old (Rev 10 and below)	New	Old	
New Housing	Compatible	Not Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Old Housing	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible

COMMUNICATION COMPATIBILITY

Table E-8 lists EA software revisions.

EA Software

TABLE E-8. EA Software.

EA Rev.	Effectivity Date	Features
Rev. 3.5	11/97	• Lowest recommended revision of EA software. Contact your Field Service Center to upgrade older revisions of the EA software. • Verifies Range Values so range values are not overwritten if new flow configuration is sent to the transmitter.
Rev. 4.0	11/98	• Required for LCD meter and Totalizer setup. • Special Units setup for Flow and Flow Total • Supports configurable DP Low Flow Cutoff • Supports Extended Process Temperature and Range 1 DP • Supports Annubar® Diamond II+/ Mass Probar® • Includes On-Line manual

HART Communicator Model 275

Table E-9 lists Model 275 HART Communicator revisions.

TABLE E-9. HART Communicator Revisions.

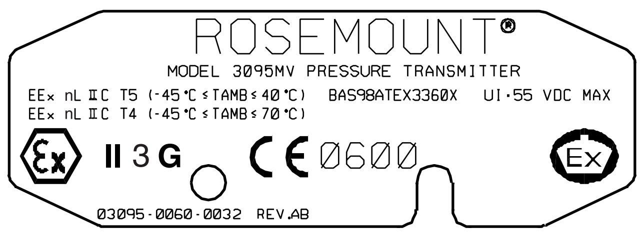
HART Rev.	Effectivity Date	Features
Field Device Rev. 1, DD Rev. 5	10/95	• Initial Model 3095 MV DD release
Field Device Rev. 1, DD Rev. 7	9/97	• Recognizes Gauge Pressure as a Field Device Variable • Compatible with Back-up Process Temperature Mode • Will not communicate with new Rev. 12 electronics board (11/98) if "Flow Total" is selected as a process variable
Field Device Rev. 2, DD Rev. 1	12/98	• Required for LCD meter and Totalizer setup • Special Units setup for Flow and Flow Total • Supports configurable DP Low Flow Cutoff • Supports Extended Process Temperature and Range 1 DP • Supports Annubar® Diamond II+/ Mass Probar®

Appendix F

European ATEX Directive Information

CENELEC/BASEEFA Type N

Rosemount Model 3095MV Multivariable Mass Flow Transmitters that have the following label 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.



3095-006E05A

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 England
  - Rosemount Germany
  - Rosemount Singapore

CE 0600

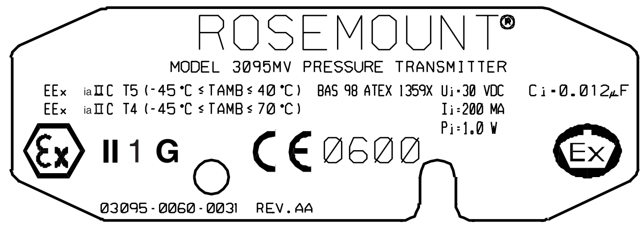
- Complete model number (see Section 6 Specifications and Reference Data).
- The serial number of the device
- Year of construction
- Marking for explosion protection: Ex II 3 G
  - EEx nL IIC T5 (–45 °C ≤ T_{amb} ≤ 40 °C)
  - EEx nL IIC T4 (–45 °C ≤ T_{amb} ≤ 70 °C)
  - Ui = 55 Vdc Max
  - BASEEFA certificate number: BAS 98 ATEX 3360X

SPECIAL CONDITIONS FOR SAFE USE (X):

Model 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.

CENELEC/BASEEFA Intrinsic Safety

Rosemount Model 3095MV Multivariable Mass Flow Transmitters that have the following label 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.



3095-0060F05A

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 England
  - Rosemount Germany
  - Rosemount Singapore

CE 0600

- Complete model number (see Section 6 Specifications and Reference Data)
- The serial number of the device
- Year of construction
- Marking for explosion protection: Ex 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

SPECIAL CONDITIONS FOR SAFE USE (X):

Model 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.

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