**Reference Manual**
00809-0100-4801, Rev CB
January 2007

# Rosemount 3051S Series
# Scalable Pressure, Flow, and Level Solutions


ROSEMOUNT®

www.rosemount.com

EMERSON™
Process Management

# Rosemount 3051S Series

# Scalable Pressure, Flow, and Level Solutions

**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.

For technical assistance, contacts are listed below:

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

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

Asia Pacific- 65 777 8211

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

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

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

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

**⚠CAUTION**

The products described in this document are NOT designed for nuclear-qualified applications. Using non-nuclear qualified products in applications that require nuclear-qualified hardware or products may cause inaccurate readings.

For information on Rosemount nuclear-qualified products, contact your local Rosemount Sales Representative.

*Rosemount 3051S Pressure Transmitters may be protected by one or more of the following U.S. Patent Nos. 4,370,890; 4,466,290; 4,612,812; 4,791,352; 4,798,089; 4,818,994; 4,833,922; 4,866,435; 4,926,340; 4,988,990; and 5,028,746. Mexico Patentado No. 154,961. May depend on model. Other foreign patents issued and pending.*

# Table of Contents

## SECTION 6 Safety Instrumented Systems



## SECTION 7 Advanced HART Diagnostics



## APPENDIX A Specifications and Reference Data

## APPENDIX B
## Product Certifications

# Section 1 Introduction



## USING THIS MANUAL

The sections in this manual provides information on installing, operating, and maintaining the Rosemount 3051S pressure transmitter with HART® protocol. The sections are organized as follows:

- **Section 2: Installation** contains mechanical and electrical installation instructions, and field upgrade options.
- **Section 3: Configuration** provides instruction on commissioning and operating 3051S transmitters. Information on software functions, configuration parameters, and online variables is also included.
- **Section 4: Operation and Maintenance** contains operation and maintenance techniques.
- **Section 5: Troubleshooting** provides troubleshooting techniques for the most common operating problems.
- **Section 6: Safety Instrumented Systems** contains identification, commissioning, maintenance, and operations information for the 3051S SIS Safety Transmitter.
- **Section 7: Advanced HART Diagnostics** contains procedures for installation, configuration, and operation of the 3051S HART Diagnostics option.
- **Appendix A: Specifications and Reference Data** supplies reference and specification data, as well as ordering information.
- **Appendix B: Product Certifications** contains intrinsic safety approval information, European ATEX directive information, and approval drawings.

For Rosemount 3051S with FOUNDATION fieldbus, see Manual 00809-0200-4801.

## MODELS COVERED

The following 3051S pressure transmitters and the Rosemount 300S Housing Kit are covered in this manual.

### Rosemount 3051S Coplanar™ Pressure Transmitter

| Performance Class | Measurement Type | | |
|---|---|---|---|
| | Differential | Gage | Absolute |
| Ultra | X | X | X |
| Ultra for Flow | X | – | – |
| Classic | X | X | X |

### Rosemount 3051S In-Line Pressure Transmitter

| Performance Class | Measurement Type | | |
|---|---|---|---|
| | Differential | Gage | Absolute |
| Ultra | – | X | X |
| Classic | – | X | X |

### Rosemount 3051S Liquid Level Pressure Transmitter

| Performance Class | Measurement Type | | |
|---|---|---|---|
| | Differential | Gage | Absolute |
| Classic | X | X | X |

### Rosemount 3051S SIS Safety Certified Transmitter

| Performance Class | Measurement Type | | |
|---|---|---|---|
| | Differential | Gage | Absolute |
| Classic | X | X | X |

### Rosemount 3051S HART Diagnostics Transmitter

| Performance Class | Measurement Type | | |
|---|---|---|---|
| | Differential | Gage | Absolute |
| Ultra | X | X | X |
| Ultra for Flow | X | – | – |
| Classic | X | X | X |

### Rosemount 300S Scalable Housing Kits

Kits are available for all models of 3051S pressure transmitters.

## SERVICE SUPPORT

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

Within the United States, call the Emerson Process Management Instrument and Valves 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 process material to which the product was last exposed.

**⚠CAUTION**

Individuals who handle products exposed to a hazardous substance can avoid injury if they are informed of 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.

Emerson Process Management Instrument and Valves Response Center representatives will explain the additional information and procedures necessary to return goods exposed to hazardous substances.

# Section 2 Installation



## OVERVIEW

The information in this section covers installation considerations for HART protocol. A Quick Installation Guide for HART protocol (document number 00825-0100-4801) is shipped with every transmitter to describe basic installation, wiring, and startup procedures. Dimensional drawings for each Rosemount 3051S variation and mounting configuration are included in Appendix A: Specifications and Reference Data.

Instructions for performing configuration functions are given for HART Communicator version 1.8 and AMS version 7.0, with the exception of Section 7 Advanced HART Diagnostics. For convenience, HART Communicator fast key sequences are labeled “Fast Keys” for each software function below the appropriate headings.

## SAFETY MESSAGES

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operation. Information that raises potential safety issues is indicated with a warning symbol ( ⚠ ). Refer to the following safety messages before performing an operation preceded by this symbol.

### Warnings

**⚠WARNING**

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

- Do not remove the transmitter covers in explosive environments when the circuit is live.
- Fully engage both transmitter covers to meet explosion-proof requirements.
- Before connecting a communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- Verify that the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.

**⚠WARNING**

**Electrical shock can result in death or serious injury.**

- Avoid contact with the leads and terminals.

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

- Install and tighten all four flange bolts before applying pressure.
- Do not attempt to loosen or remove flange bolts while the transmitter is in service.

**Replacement equipment or spare parts not approved by Rosemount Inc. for use as spare parts could reduce the pressure retaining capabilities of the transmitter and may render the instrument dangerous.**

- Use only bolts supplied or sold by Rosemount Inc. as spare parts.

**Improper assembly of manifolds to traditional flange can damage SuperModule™ Platform.**

- For safe assembly of manifold to traditional flange, bolts must break back plane of flange web (i.e., bolt hole) but must not contact module housing.

**Upper and lower unit labeling must match exactly to maintain hazardous location approvals.**

- When upgrading, it is imperative that approval codes match between the SuperModule and the electronics housing.

## CONSIDERATIONS

### General

Measurement performance depends upon proper installation of the transmitter and impulse piping. Mount the transmitter close to the process and use minimum piping to achieve best performance. Also, consider the need for easy access, personnel safety, practical field calibration, and a suitable transmitter environment. Install the transmitter to minimize vibration, shock, and temperature fluctuation.

For a Rosemount 3051S transmitter assembled to a Rosemount 753R Web-Based Monitoring indicator, detailed 753R installation instructions can be found in the 753R Manual 00809-0100-4379.

**IMPORTANT**
Install the enclosed pipe plug (found in the box) in the unused conduit opening. For straight threads, a minimum of 6 threads must be engaged. For tapered threads, install the plug wrench-tight.

For material compatibility considerations, see document number 00816-0100-3045 on www.rosemount.com.

### Mechanical

**NOTE**
For steam service or for applications with process temperatures greater than the limits of the transmitter, do not blow down impulse piping through the transmitter. Flush lines with the blocking valves closed and refill lines with water before resuming measurement.

**NOTE**
When the transmitter is mounted on its side, position the Coplanar flange to ensure proper venting or draining. Mount the flange as shown in Figure 2-3 on page 2-10, keeping drain/vent connections on the bottom for gas service and on the top for liquid service.

## Draft Range

### Installation

For the 3051S_CD0 draft range pressure transmitter, it is best to mount the transmitter with the isolators parallel to the ground. Installing the transmitter in this way reduces oil mounting effect and provides for optimal temperature performance.

Be sure the transmitter is securely mounted. Tilting of the transmitter may cause a zero shift in the transmitter output.

### Reducing Process Noise

There are two recommended methods of reducing process noise: output damping and, in gage applications, reference side filtering.

### Output Damping

The output damping is factory set to 3.2 seconds as a default. If the transmitter output is still noisy, increase the damping time. If faster response is needed, decrease the damping time. Damping adjustment information is available on Damping on page 3-11.

### Reference Side Filtering

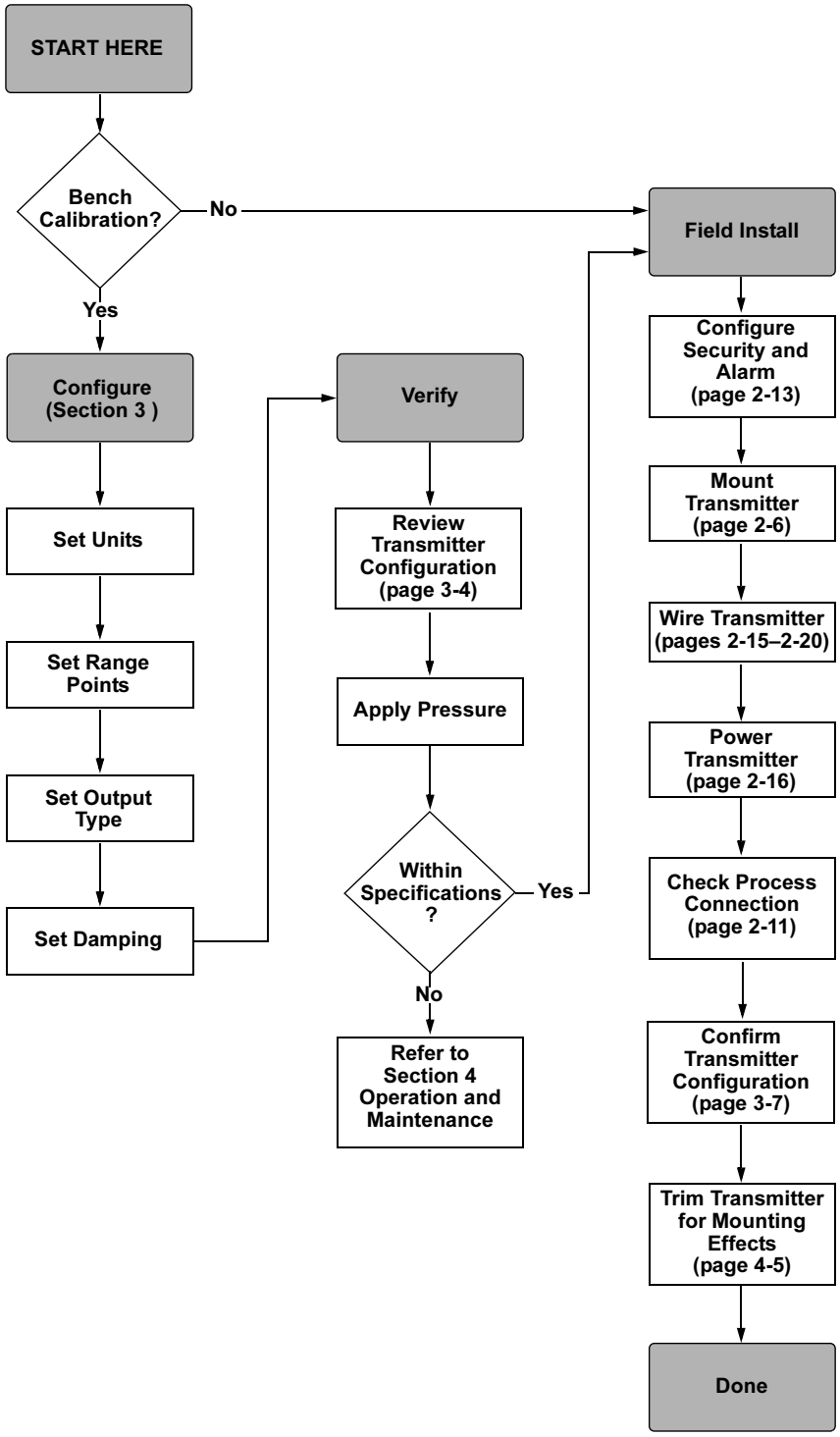
In gage applications it is important to minimize fluctuations in atmospheric pressure to which the low side isolator is exposed. One method of reducing fluctuations in atmospheric pressure is to attach a length of tubing to the reference side of the transmitter to act as a pressure buffer.

Another method is to plumb the reference side to a chamber that has a small vent to atmosphere. If multiple draft transmitters are being used in an application, the reference side of each device can be plumbed to a chamber to achieve a common gage reference.

## Environmental

Access requirements and cover installation on page 2-5 can help optimize transmitter performance. Mount the transmitter to minimize ambient temperature changes, vibration, mechanical shock, and to avoid external contact with corrosive materials. Appendix A: Specifications and Reference Data lists temperature operating limits.

Figure 2-1. HART Installation Flowchart



## INSTALLATION PROCEDURES

For dimensional drawing information refer to Appendix A: Specifications and Reference Data on page A-16.

### Process Flange Orientation

Mount the process flanges with sufficient clearance for process connections. For safety reasons, place the drain/vent valves so the process fluid is directed away from possible human contact when the vents are used. In addition, consider the need for a testing or calibration input.

### Housing Rotation

See “Consider Housing Rotation” on page 2-12.

### Terminal Side of Electronics Housing

Mount the transmitter so the terminal side is accessible. Clearance of 0.75 in. (19 mm) is required for cover removal. Use a conduit plug in the unused conduit opening.

### Circuit Side of Electronics Housing

Provide 0.75 in. (19 mm) of clearance for units with out an LCD display. Three inches of clearance is required for cover removal if a meter is installed.

### Cover Installation

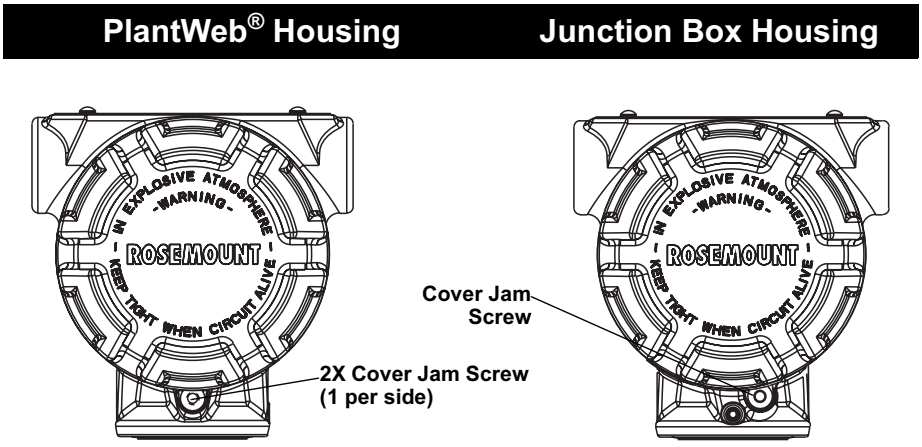
Always ensure a proper seal by installing the electronics housing cover(s) so that metal contacts metal. Use Rosemount O-rings.

### Cover Jam Screw

For transmitter housings shipped with a cover jam screw, as shown in Figure 2-2, the screw should be properly installed once the transmitter has been wired and powered up. The cover jam screw is intended to disallow the removal of the transmitter cover in flameproof environments without the use of tooling. Follow these steps to install the cover jam screw:

1. Verify that the cover jam screw is completely threaded into the housing.
2. Install the transmitter housing cover and verify that the cover is tight against the housing.
3. Using an M4 hex wrench, loosen the jam screw until it contacts the transmitter cover.
4. Turn the jam screw an additional 1/2 turn counterclockwise to secure the cover. (Note: Application of excessive torque may strip the threads.)
5. Verify that the cover cannot be removed.

Figure 2-2. Cover Jam Screw




## Mount the Transmitter

### Mounting Brackets

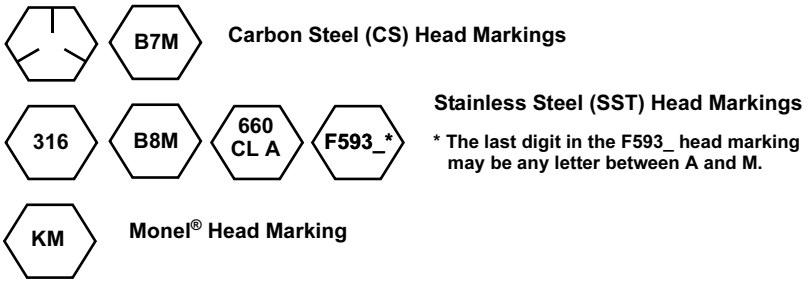
Facilitate mounting transmitter to a 2-in. pipe, or to a panel. The B4 Bracket (SST) option is standard for use with the Coplanar and In-Line process connections. “Coplanar Flange Mounting Configurations” on page A-18 shows bracket dimensions and mounting configurations for the B4 option.

Options B1–B3 and B7–B9 are sturdy, epoxy/polyester-painted brackets designed for use with the traditional flange. The B1–B3 brackets have carbon steel bolts, while the B7–B9 brackets have stainless steel bolts. The BA and BC brackets and bolts are stainless steel. The B1/B7/BA and B3/B9/BC style brackets support 2-inch pipe-mount installations, and the B2/B8 style brackets support panel mounting.

**NOTE**
Verify transmitter zero point after installation. To reset zero point, refer to “Sensor Trim Overview” on page 4-5.

### Flange Bolts

The 3051S can be shipped with a Coplanar flange or a Traditional flange installed with four 1.75-inch flange bolts. Mounting bolts and bolting configurations for the Coplanar and Traditional flanges can be found on page 2-8. Stainless steel bolts supplied by Emerson Process Management are coated with a lubricant to ease installation. Carbon steel bolts do not require lubrication. No additional lubricant should be applied when installing either type of bolt. Bolts supplied by Emerson Process Management are identified by their head markings:



**Bolt Installation**

⚠ Only use bolts supplied with the Rosemount 3051S or sold by Emerson Process Management as spare parts. When installing the transmitter to one of the optional mounting brackets, torque the bolts to 125 in-lb. (0,9 N-m). Use the following bolt installation procedure:

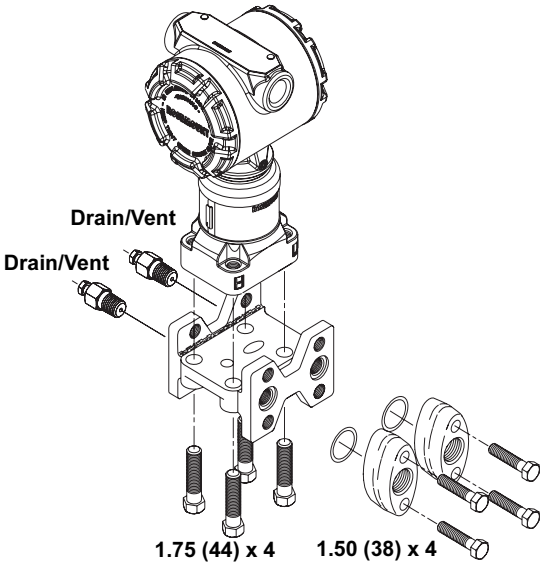
1. Finger-tighten the bolts.
2. Torque the bolts to the initial torque value using a crossing pattern.
3. Torque the bolts to the final torque value using the same crossing pattern.

Torque values for the flange and manifold adapter bolts are as follows:

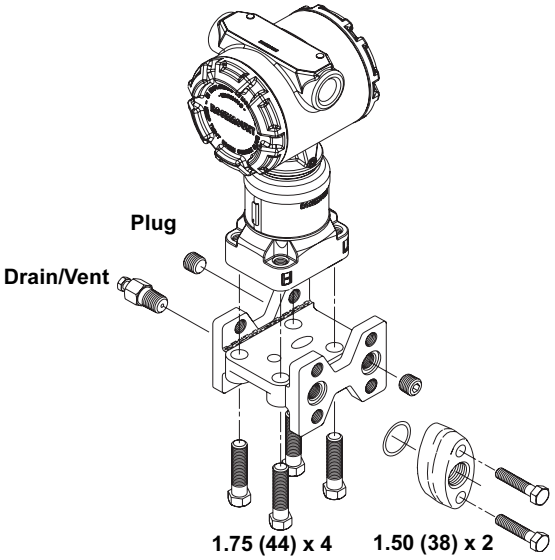
Table 2-1. Bolt Installation Torque Values

| Bolt Material | Initial Torque Value | Final Torque Value |
|---|---|---|
| CS-ASTM-A445 Standard | 300 in.-lb (34 N-m) | 650 in.-lb (73 N-m) |
| 316 SST—Option L4 | 150 in.-lb (17 N-m) | 300 in.-lb (34 N-m) |
| ASTM-A-193-B7M—Option L5 | 300 in.-lb (34 N-m) | 650 in.-lb (73 N-m) |
| *Monel*®—Option L6 | 300 in.-lb (34 N-m) | 650 in.-lb (73 N-m) |
| ASTM-A-453-660—Option L7 | 150 in.-lb (17 N-m) | 300 in.-lb (34 N-m) |
| ASTM-A-193-B8M—Option L8 | 150 in.-lb (17 N-m) | 300 in.-lb (34 N-m) |

**DIFFERENTIAL TRANSMITTER**

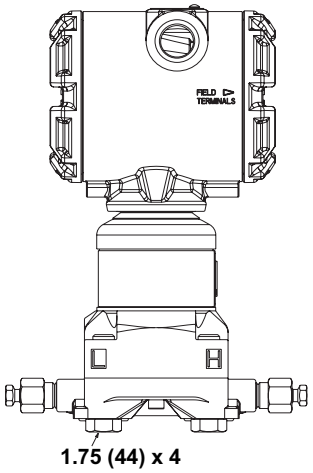



**GAGE/ABSOLUTE TRANSMITTER**

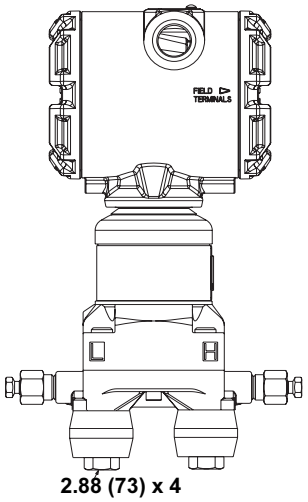



**NOTE**
Dimensions are in inches (millimeters).

**Transmitter with Flange Bolts**




**Transmitter with Flange Adapters and Flange/ Adapter Bolts**




| Description | Qty | Size in in. (mm) |
|---|---|---|
| **Differential Pressure** | | |
| Flange Bolts | 4 | 1.75 (44) |
| Adapter Bolts | 4 | 1.50 (38)(1) |
| Flange/ Adapter Bolts | 4 | 2.88 (73) |
| **Gage/Absolute Pressure(2)** | | |
| Flange Bolts | 4 | 1.75 (44) |
| Adapter Bolts | 2 | 1.50 (38)(1) |
| Flange/ Adapter Bolts | 2 | 2.88(73) |

*(1) DIN-compliant traditional flange requires 1.75 in. (44 mm) length adapter bolts.*
*(2) Rosemount 3051S In-line transmitters are direct mount and do not require bolts for process connection.*

### Impulse Piping

The piping between the process and the transmitter must accurately transfer the pressure to obtain accurate measurements. There are five possible sources of error: pressure transfer, leaks, friction loss (particularly if purging is used), trapped gas in a liquid line, liquid in a gas line, density variations between the legs, and plugged impulse piping.

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

- Keep impulse piping as short as possible.
- For liquid service, slope the impulse piping at least 1 inch per foot (8 cm per m) upward from the transmitter toward the process connection.
- For gas service, slope the impulse piping at least 1 inch per foot (8 cm per m) downward from the transmitter toward the process connection.
- 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 blockage.
- Vent all gas from liquid piping legs.
- When using a sealing fluid, fill both piping legs to the same level.
- When purging, 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 SuperModule 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.

### Optional Advanced HART Diagnostics Electronics

The ASP™ Diagnostics Suite in the 3051S can detect abnormal process conditions by using statistical process monitoring to help detect plugged impulse lines.

The Advanced HART Diagnostics Electronics can be ordered using option code DA1 in the transmitter model number or as a spare part (p/n 03151-9070-0001) to retrofit existing 3051S transmitters in the field.

See Section 7 of this manual for more information.

### Mounting Requirements

Impulse piping configurations depend on specific measurement conditions. Refer to Figure 2-3 for examples of the following mounting configurations:

#### Liquid Flow Measurement

- Place taps to the side of the line to prevent sediment deposits on the process isolators.
- Mount the transmitter beside or below the taps so gases vent into the process line.
- Mount drain/vent valve upward to allow gases to vent.

#### Gas Flow Measurement

- Place taps in the top or side of the line.
- Mount the transmitter beside or above the taps so to drain liquid into the process line.

#### Steam Flow Measurement

- Place taps to the side of the line.
- Mount the transmitter below the taps to ensure that impulse piping will remain filled with condensate.
- In steam service above 250 °F (121 °C), fill impulse lines with water to prevent steam from contacting the transmitter directly and to ensure accurate measurement start-up.

**NOTE**
For steam or other elevated temperature services, it is important that temperatures at the process connection do not exceed the transmitter's process temperature limits. See "Process Temperature Limits" on page A-11 for details.

Figure 2-3. Coplanar Installation Examples

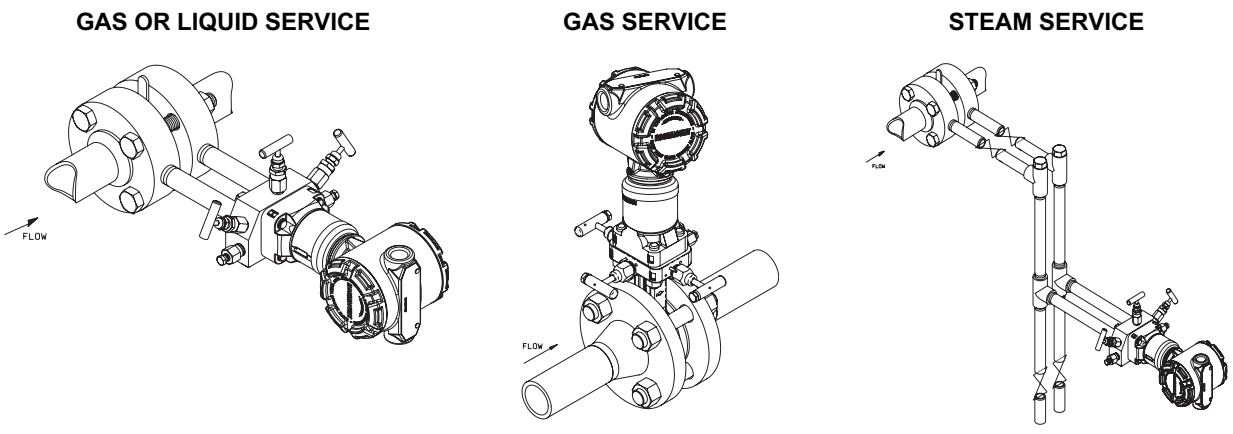
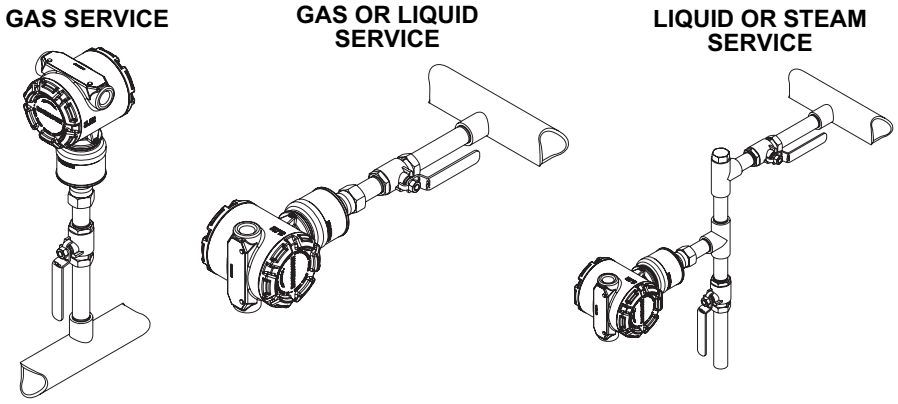


Figure 2-4. In-Line Installation Examples




## Process Connections

3051S transmitter flange process connection size is 1/4–18 NPT. Flange adapters with 1/2–14 NPT connections are available as the D2 option. 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-valve or five-valve manifold. Rotate one or both of the flange adapters to attain connection centers of 2 inches (51 mm), 2 1/8 inches (54 mm), or 2 1/4 inches (57 mm).

⚠ Install and tighten all four flange bolts before applying pressure to avoid leakage. When properly installed, the flange bolts will protrude through the top of the SuperModule housing. Do not attempt to loosen or remove the flange bolts while the transmitter is in service.

To install adapters to a Coplanar flange, perform the following procedure:

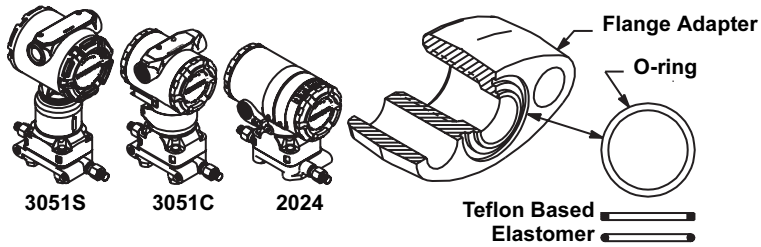
1. Remove the flange bolts.
2. Leaving the flange in place, move the adapters into position with the O-ring installed.
3. Clamp the adapters and the Coplanar flange to the transmitter module using the longer of the bolts supplied.
4. Tighten the bolts. Refer to Table 2-1 on page 2-7 for torque specifications.

**⚠WARNING**

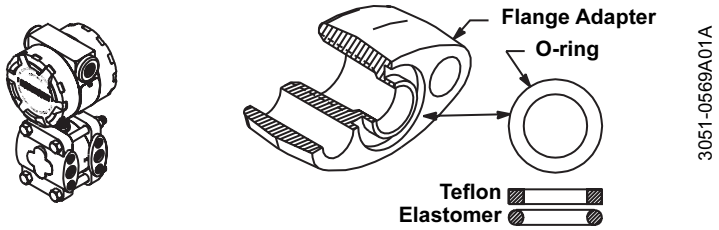
Failure to install proper flange adapter O-rings can cause process leaks, which can result in death or serious injury.

The two flange adapters are distinguished by unique O-ring grooves. Only use the O-ring that is designed for its specific flange adapter, as shown below.

**ROSEMOUNT 3051S/ 3051/3001/3095/2024**




**ROSEMOUNT 1151**



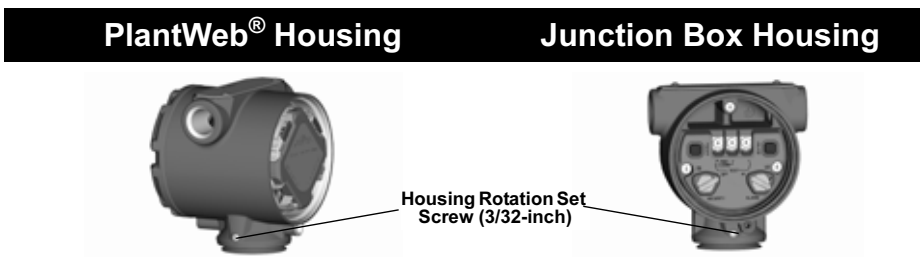

Refer to the Spare Parts list in Appendix A: Specifications and Reference Data for the correct part numbers of the flange adapters and O-rings designed for 3051S transmitters.

Whenever you remove flanges or adapters, visually inspect the Teflon® O-rings. Replace them if there are any signs of damage, such as nicks or cuts. If you replace the O-rings, re-torque the flange bolts after installation to compensate for cold flow. Refer to the process sensor body reassembly procedure in Section 5 Troubleshooting on page 5-6.

## Consider Housing Rotation

The housing can be rotated to improve field access to wiring or to better view the optional LCD display. Perform the following procedure:

Figure 2-5. Housings



1. Loosen the housing rotation set screw.
2. First rotate the housing clockwise to the desired location. If the desired location cannot be achieved due to thread limit, rotate the housing counter clockwise to the desired location (up to 360° from thread limit).
3. Retighten the housing rotation set screw.

In addition to housing rotation, the optional LCD display can be rotated in 90-degree increments by squeezing the two tabs, pulling out, rotating and snapping back into place.

**NOTE**
If LCD pins are inadvertently removed from the interface board, carefully re-insert the pins before snapping the LCD display back into place.

## Configure Security and Alarm

**NOTE**
If alarm and security adjustments are not installed, the transmitter will operate normally with the default alarm condition alarm *high* and the security *off*.

### Configure Security (Write Protect)

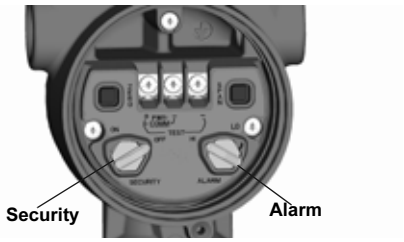
Changes can be prevented to the transmitter configuration data with the write protection PlantWeb housing switches and Junction Box housing jumpers. Security is controlled by the security (write protect) switch/jumper located on the interface assembly or terminal block. Position the switch/jumper in the “ON” position to prevent accidental or deliberate change of configuration data.

If the transmitter write protection switch/jumper is in the “ON” position, the transmitter will not accept any “writes” to its memory. Configuration changes, such as digital trim and reranging, cannot take place when the transmitter security is on.

**To reposition the switches/jumpers, follow the procedure described below.**

1. Do not remove the transmitter covers in explosive atmospheres when the circuit is live. If the transmitter is live, set the loop to manual and remove power.
2. ⚠ Remove the electronics compartment cover, opposite the field terminal side on the PlantWeb housing or the terminal block cover on the Junction Box housing. Do not remove the transmitter covers in explosive atmospheres when the circuit is live.
3. Follow the procedure in Figure 2-6 to reposition the switches/jumpers as desired for the specific housing compartment.
4. ⚠ Re-install the transmitter cover. Transmitter covers must be fully engaged to meet explosion-proof requirements.

Figure 2-6. Switch and jumper configuration (option D1)

| PlantWeb Housing Switches | Junction Box Housing Jumpers |
|---|---|
|  |  |
| Slide the security and alarm switches into the preferred position by using a small screwdriver.<br><br>(An LCD display or an adjustment module must be in place to activate the switches.) | Pull the pins out and rotate 90° into desired position to set the security and alarm. |

**HART Communicator**

| Fast Keys | 1, 3, 4, 5 |
|---|---|

**Usage Note**
The HART Communicator can be used to configure the security on and off. Otherwise, if the transmitter contains the D1 option, the switch/jumper will override software write protect. To disable the zero and span buttons (local keys), for transmitters with the D1 option, follow the “Local Keys Control” on page 2-14.

**AMS**

Right click on the device and select “Device Configuration”, then “Config Write Protect” from the menu.

1. Enter write protect setting, click **Next**.
2. Click **Next** to acknowledge setting has changed. If hardware adjustments are activated, click **Next** to acknowledge the “Switch option detected, function disabled, write protect unchanged” screen. If the hardware adjustments are activated, the write protect will not configure.
3. Click **Finish** to acknowledge the method is complete.

**Local Keys Control**

Local Keys control can be configured to enable or disable the use of the local zero and span buttons.

**HART Communicator**

| Fast Keys | 1, 4, 4, 1 |
|---|---|

1. Enter the fast key sequence “Local Keys Control” to bring up the “Field device info” screen.
2. Scroll down to Local Keys on the menu and use the right arrow key to configure Enable or Disable.

**AMS**

Right click on the device and select “Configure” from the menu.

1. In the “Device” tab, use the “Local keys” drop down menu to select Enable or Disable and click **Apply**.
2. After carefully reading the warning provided, select **yes**.

**Configure Alarm Direction**

The transmitter alarm direction is set by repositioning the PlantWeb housing switch or Junction Box housing jumper. Position the switch/ jumper in the HI position for fail high and in the LO position for fail low. See “Failure Mode Alarm and Saturation” on page 3-12 for more information.

**HART Communicator**

| Fast Keys | 1, 4, 2, 7, 6 |
|---|---|

**Usage Note**
The HART Communicator can be used to configure the alarm direction to High (HI) or Low (LO). Otherwise, if the transmitter contains the D1 option, the switch/jumper on the transmitter will override the HART Communicator.

**AMS**

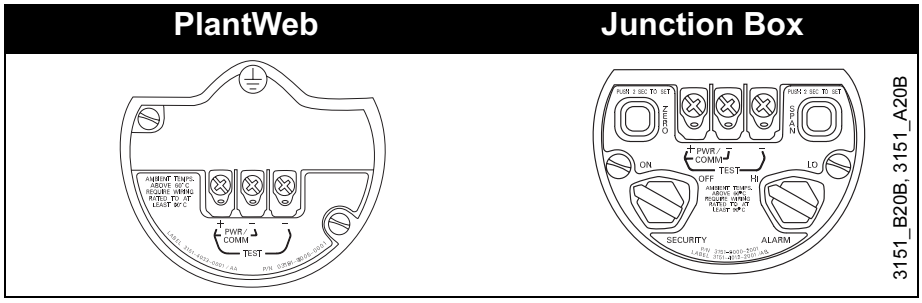
Right click on the device and select “Device Configuration,” then “Alarm/Saturation Levels,” then “Alarm Direction” from the menu.

1. Enter desired alarm direction, click **Next**.
2. Click **Next** to acknowledge setting has changed. If hardware adjustments are activated, click **Next** to acknowledge the “Switch option detected, function disabled, alarm direction unchanged” screen. If the hardware adjustments are activated, the write protect will not configure.
3. Click **Finish** to acknowledge the method is complete.

## Connect Wiring and Power Up

Use twisted pairs to yield best results. To ensure proper communication, use 24 AWG to 14 AWG wire, and do not exceed 5000 feet (1 500 meters).

Figure 2-7. HART Terminal Blocks




To make connections, perform the following procedure:

1. Remove the housing cover on terminal compartment side. Do not remove the cover in explosive atmospheres when the circuit is live. Signal wiring supplies all power to the transmitter.
2. Connect the positive lead to the terminal marked (+) and the negative lead to the terminal marked (pwr/comm –). Avoid contact with leads and terminals. Do not connect powered signal wiring to the test terminals. Power could damage the test diode.
3. Plug and seal the unused conduit connection on the transmitter housing to avoid moisture accumulation in the terminal side. Install wiring with a drip loop. Arrange the drip loop so the bottom is lower than the conduit connections and the transmitter housing.

**Surges/Transients**

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

**Optional Transient Protection Terminal Block**

The transient protection terminal block can be ordered as an installed option (Option Code T1 in the transmitter model number) or as a spare part to retrofit existing 3051S transmitters in the field. For a complete listing of spare part numbers for transient protection terminal blocks, refer to page A-38. A lightning bolt symbol on a terminal block identifies it as having transient protection.

### Signal Wiring Grounding

Do not run signal wiring in conduit or open trays with power wiring, or near heavy electrical equipment. Ground the signal wiring at any one point on the signal loop, or leave it ungrounded. The negative terminal of the power supply is a recommended grounding point.

### Power Supply 4–20 mA Transmitters

The dc power supply should provide power with less than two percent ripple. Total resistance load is the sum of resistance from 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.

See “Load Limitations” on page A-7.

**NOTE**
A minimum loop resistance of 250 ohms is required to communicate with a HART Communicator. If a single power supply is used to power more than one 3051S transmitter, the power supply used, and circuitry common to the transmitters, should not have more than 20 ohms of impedance at 1200 Hz.

**Electrical Considerations**

Proper electrical installation is necessary to prevent errors due to improper grounding and electrical noise. For Junction Box housing, shielded signal wiring should be used in high EMI/RFI environments.

## Remote Display Wiring and Power Up

The Remote Mount Display and Interface system consists of a local transmitter and a remote mount LCD display assembly. The local 3051S transmitter assembly includes a Junction Box housing with a three position terminal block integrally mounted to a SuperModule. The remote mount LCD display assembly consists of a dual compartment PlantWeb housing with a seven position terminal block. See Figure 2-8 on page 2-18 for complete wiring instructions. The following is a list of necessary information specific to the Remote Mount Display system:

- Each terminal block is unique for the remote display system.
- A 316 SST housing adapter is permanently secured to the remote mount LCD display PlantWeb housing providing an external ground and a means for field mounting with the provided mounting bracket.
- A cable is required for wiring between the transmitter and remote mount LCD display. The cable length is limited to 100 ft.
- 50 ft. (option M8) or 100 ft. (option M9) cable is provided for wiring between the transmitter and remote mount LCD display. Option M7 does not include cable; see recommended specifications below:

**Cable type:** Recommend Belden 3084A DeviceNet cable or Belden 123084A Armored DeviceNet cable. Other comparable cable may be used as long as it has independent dual twisted shielded pair wires with an outer shield. The Power wires must be 22 AWG minimum and the CAN communication wires must be 24 AWG minimum.

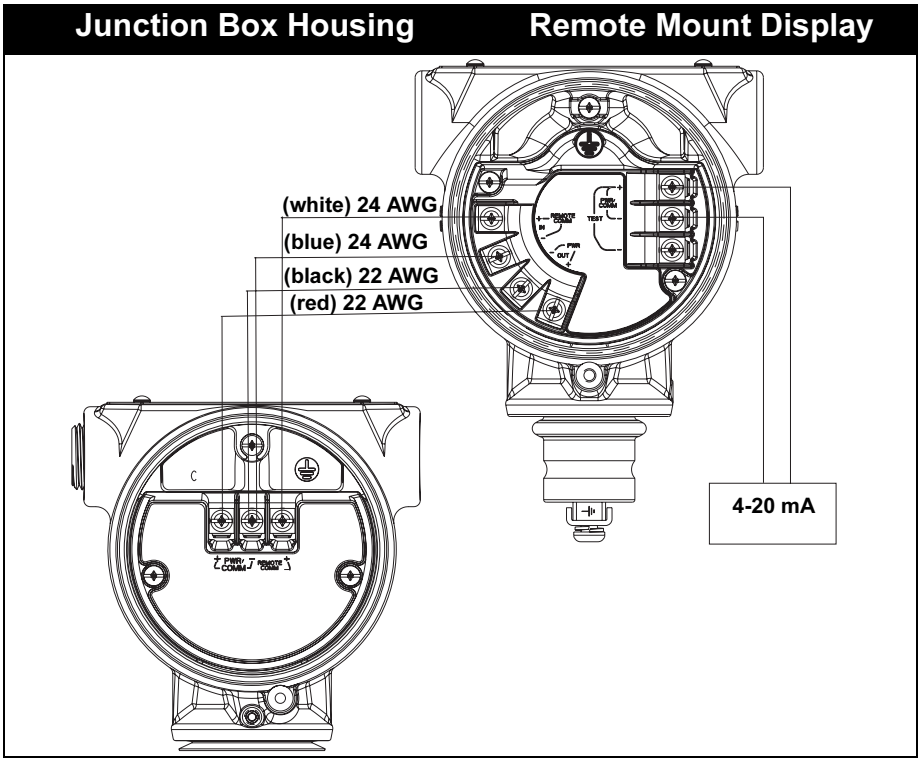
**Cable length:** Up to 100 feet depending upon cable capacitance.

**Cable capacitance:** The capacitance from the CAN communications line to the CAN return line as wired must be less than 5000 picofarads total. This allows up to 50 picofarads per foot for a 100 foot cable.

**Intrinsic Safety Consideration:** The transmitter assembly with remote display has been approved with Belden 3084A DeviceNet cable. Alternate cable may be used as long as the transmitter with remote display and cable is configured according to the installation control drawing or certificate. Refer to appropriate approval certificate or control drawing in Appendix B for remote cable IS requirements.

**IMPORTANT**
Do not apply power to the remote communications terminal. Follow wiring instructions carefully to prevent damage to system components.

Figure 2-8. Remote Mount Display wiring diagram



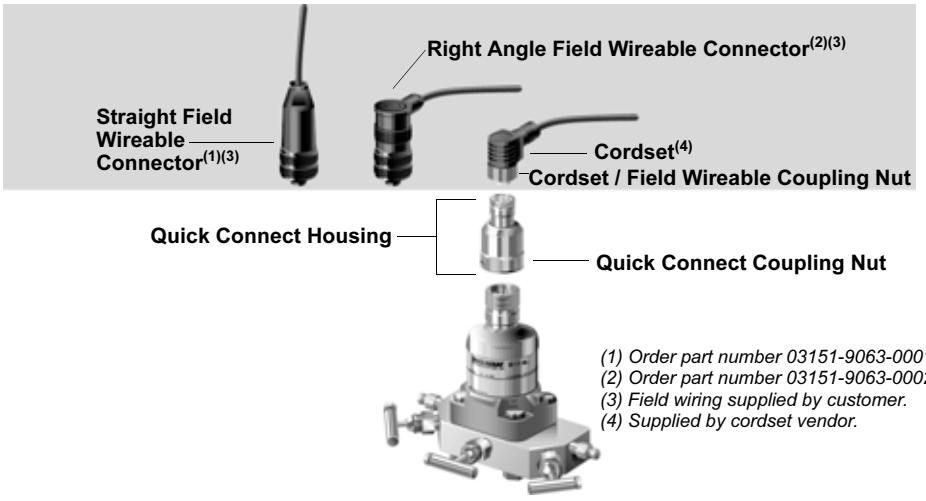

**NOTE**
Wire colors provided above are per Belden 3084A DeviceNet cable. Wire color may vary depending on cable selected.

Belden 3084A DeviceNet cable includes a ground shield. This shield must be connected to earth ground at either the SuperModule or the Remote Display, but not both.

## Quick Connect Wiring

As standard, the 3051S Quick Connect arrives properly assembled to the SuperModule and is ready for installation. Cordsets and Field Wireable Connectors (in shaded area) are sold separately.

Figure 2-9. Rosemount 3051S Quick Connect Exploded View

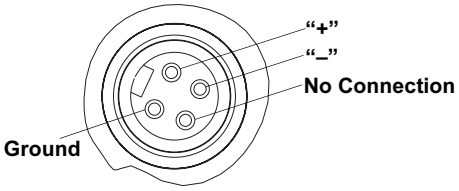



**IMPORTANT**
If Quick Connect is ordered as a 300S spare housing or is removed from the SuperModule, follow the instructions below for proper assembly prior to field wiring.

1. Place the Quick Connect onto the SuperModule. To ensure proper pin alignment, remove coupling nut prior to installing quick connect onto SuperModule.
2. Place coupling nut over quick connect and wrench tighten to a maximum of 300 in-lb. (34 N-m).
3. Tighten the set screw using a $^{3}/_{32}$-in hex wrench.
4. Install Cordset/ Field Wireable Connectors onto the Quick Connect. Do not over tighten.

Figure 2-10. Quick Connect Housing Pin-Out

For other wiring details, refer to pin-out drawing and the cordset manufacturer's installation instructions.




## Conduit Electrical Connector Wiring (Option GE or GM)

For 3051S transmitters with conduit electrical connectors GE or GM, refer to the cordset manufacturer's installation instructions for wiring details. For FM Intrinsically Safe, non-incendive or FM FISCO Intrinsically Safe hazardous locations, install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66.) See Appendix B, page B-20.

## Grounding

### Transmitter Case

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

- **Internal Ground Connection**: The Internal Ground Connection screw is inside the terminal side of the electronics housing. The screw is identified by a ground symbol (⏚), and is standard on all 3051S transmitters.
- **External Ground Assembly**: This assembly is included with the optional transient protection terminal block (Option Code T1), and it is included with ATEX Flameproof Certification (Option Code E1), ATEX Intrinsically Safe Certification (Option Code I1), and ATEX Type n Certification (Option Code N1). The External Ground Assembly can also be ordered with the transmitter (Option Code D4), or as a spare part (03151-9060-0001).

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

## INSTALLING THE LCD DISPLAY

Transmitters ordered with the LCD display will be shipped with the display installed. The LCD display requires a PlantWeb housing. Installing the display on an existing 3051S transmitter requires a small instrument screwdriver and the display kit.

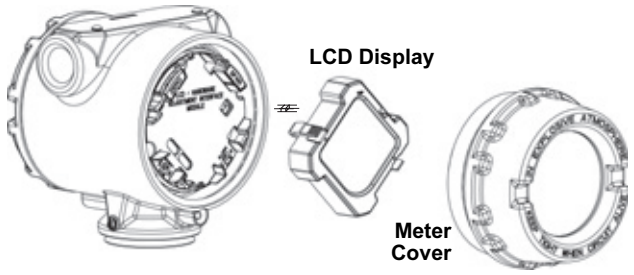
In addition to housing rotation, the optional LCD display can be rotated in 90-degree increments by squeezing the two tabs, pulling out, rotating and snapping back into place.

If LCD pins are inadvertently removed from the interface board, carefully re-insert the pins before snapping the LCD display back into place.

Use the following procedure and Figure 2-11 to install the LCD display:

1. **IF** the transmitter is installed in a loop, **THEN** secure the loop and disconnect power.
2. ⚠ Remove the transmitter cover opposite the field terminal side. Do not remove the instrument covers in explosive environments when the circuit is live.
3. Remove Hardware Adjustment Module if installed. Engage the four-pin connector into the LCD display and snap into place.
4. Install the meter cover and tighten to insure metal to metal contact.

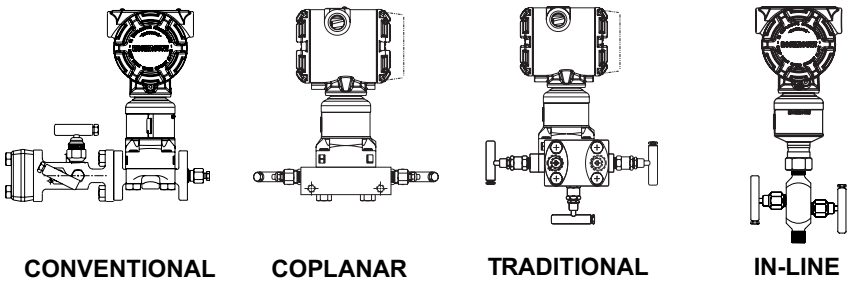
Figure 2-11. Optional LCD Display




## ROSEMOUNT 305, 306 AND 304 MANIFOLDS

The Rosemount 305 is available in two designs: Traditional and Coplanar. The traditional 305 Integral Manifold can be mounted to most primary elements with mounting adapters in the market today. The Rosemount 306 In-Line Manifold is used with In-line transmitters to provide block-and-bleed valve capabilities of up to 10000 psi (690 bar). The Rosemount 304 comes in two basic styles: traditional (flange x flange and flange x pipe) and wafer. The 304 traditional manifold comes in 2, 3, and 5-valve configurations. The 304 wafer manifold comes in 3 and 5 valve configurations.

Figure 2-12. Integral Manifold Designs




### Rosemount 305 Integral Manifold Installation Procedure

To install a 305 Integral Manifold to a 3051S transmitter:

⚠ 1. Inspect the Teflon SuperModule O-rings. If the O-rings are undamaged, reusing them is recommended. If the O-rings are damaged (if they have nicks or cuts, for example), replace them with new O-rings.

**IMPORTANT**
If replacing the O-rings, be careful not to scratch or deface the O-ring grooves or the surface of the isolating diaphragm when removing the damaged O-rings.

2. Install the Integral Manifold on the SuperModule. Use the four manifold bolts for alignment. Finger tighten the bolts, then tighten the bolts incrementally in a cross pattern to final torque value. See “Flange Bolts” on page 2-6 for complete bolt installation information and torque values. When fully tightened, the bolts should extend through the top of the module housing.
3. If the Teflon SuperModule O-rings have been replaced, the flange bolts should be re-tightened after installation to compensate for cold flow of the O-rings.
4. If applicable, install flange adapters on the process end of the manifold using the 1.75-in. flange bolts supplied with the transmitter.

**NOTE**
Always perform a zero trim on the transmitter/manifold assembly after installation to eliminate mounting effects. See Section 4 Operation and Maintenance, “Zero Trim” on page 4-6.

## Rosemount 306 In-Line Manifold Installation Procedure

The 306 Manifold is for use only with a 3051S In-line transmitter.

⚠ Assemble the 306 Manifold to the 3051S In-line transmitter with a thread sealant.

1. Place transmitter into holding fixture.
2. Apply appropriate thread paste or tape to threaded instrument end of the manifold.
3. Count total threads on the manifold before starting assembly.
4. Start turning the manifold by hand into the process connection on the transmitter.

**NOTE**
If using thread tape, be sure the thread tape does not strip when the manifold assembly is started.

5. Wrench tighten manifold into process connection. (Note: Minimum torque value is 425 in-lbs)
6. Count how many threads are still showing. (Note: Minimum engagement is 3 revolutions)
7. Subtract the number of threads showing (after tightening) from the total threads to calculate the revolutions engaged. Further tighten until a minimum of 3 rotations is achieved.
8. For block and bleed manifold, verify the bleed screw is installed and tightened. For two-valve manifold, verify the vent plug is installed and tightened.
9. Leak-check assembly to maximum pressure range of transmitter.

## Rosemount 304 Conventional Manifold Installation Procedure

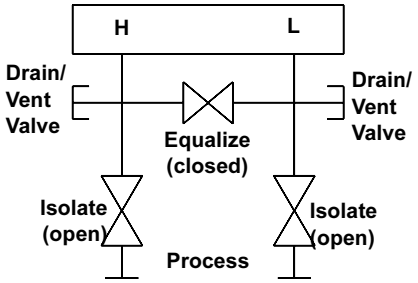
To install a 304 Conventional Manifold to a 3051S transmitter:

1. Align the Conventional Manifold with the transmitter flange. Use the four manifold bolts for alignment.
2. Finger tighten the bolts, then tighten the bolts incrementally in a cross pattern to final torque value. See “Flange Bolts” on page 2-6 for complete bolt installation information and torque values. When fully tightened, the bolts should extend through the top of the module housing plane of flange web (i.e. bolt hole) but must not contact module housing.
3. If applicable, install flange adapters on the process end of the manifold using the 1.75-in. flange bolts supplied with the transmitter.

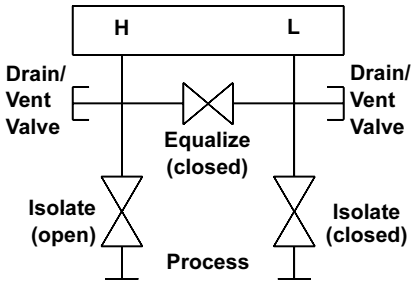
## Manifold Operation

Three-valve configuration shown.

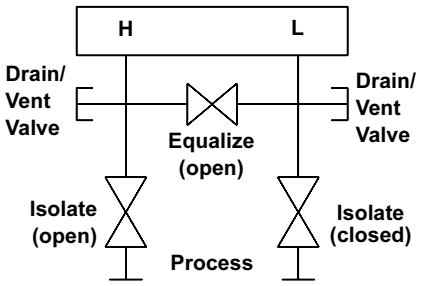
In normal operation the two block valves between the process and instrument ports will be open and the equalizing valve(s) will be closed.



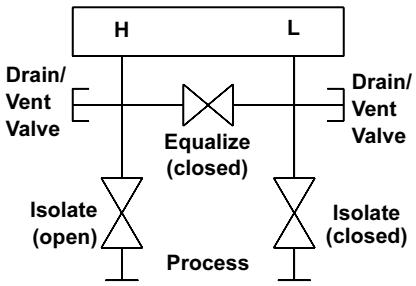

To zero the 3051S, close the block valve to the low pressure (downstream side) of the transmitter first.



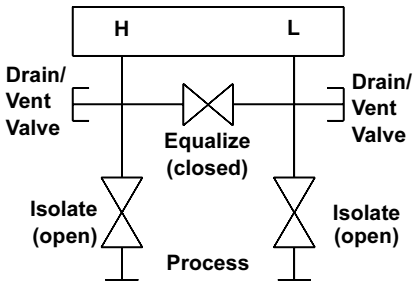

Next, open the center (equalize) valve(s) to equalize the pressure on both sides of the transmitter.



The manifold valves are now in the proper configuration for zeroing the transmitter. To return the transmitter to service, close the equalizing valve(s) first.




Next, open the block valve on the low pressure side of the transmitter.



# Section 3 Configuration



## OVERVIEW

This section contains information on commissioning and tasks that should be performed on the bench prior to installation.

Instructions for performing configuration functions are given for HART Communicator version 1.8 and AMS version 7.0. For convenience, HART Communicator fast key sequences are labeled “Fast Keys” for each software function below the appropriate headings.

**Example Software Function**

| Fast Keys | 1, 2, 3, etc. |
|---|---|

## SAFETY MESSAGES

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

### Warnings

**⚠WARNING**

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

- Do not remove the transmitter covers in explosive environments when the circuit is live.
- Transmitter covers must be fully engaged to meet explosionproof requirements.
- Before connecting a communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or nonincendive field wiring practices.

**Electrical shock can result in death or serious injury.**

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

## COMMISSIONING ON THE BENCH WITH HART

Commissioning consists of testing the transmitter and verifying transmitter configuration data. 3051S transmitters can be commissioned either before or after installation. Commissioning the transmitter on the bench before installation using a 375 Field Communicator or AMS ensures that all transmitter components are in working order.

⚠ To commission on the bench, required equipment includes a power supply, a milliamp meter, and a HART Communicator or AMS. Wire equipment as shown in Figure 3-1 and Figure 3-2. Verify transmitter terminal voltage is between 10.5 - 42.4 Vdc. To ensure successful communication, a resistance of at least 250 ohms must be present between the HART Communicator loop connection and the power supply. Connect the HART Communicator leads to the terminals labeled “COMM” on the terminal block. (Connecting across the “TEST” terminals will prevent successful communication.)

Set all transmitter hardware adjustments during commissioning to avoid exposing the transmitter electronics to the plant environment after installation. Refer to “Configure Security and Alarm” on page 2-13.

When using a HART Communicator, any configuration changes made must be sent to the transmitter by using the “Send” key (F2). AMS configuration changes are implemented when the “Apply” button is clicked.

### Setting the Loop to Manual

Whenever sending or requesting data that would disrupt the loop or change the output of the transmitter, set the process application loop to manual. The HART Communicator or AMS will prompt you to set the loop to manual when necessary. Acknowledging this prompt does not set the loop to manual. The prompt is only a reminder; set the loop to manual as a separate operation.

## Wiring Diagrams

### Bench Hook-up

Connect the bench equipment as shown in Figures 3-1 and 3-2, and turn on the HART Communicator by pressing the ON/OFF key or log into AMS. The HART Communicator or AMS will search for a HART-compatible device and indicate when the connection is made. If the HART Communicator or AMS fail to connect, it indicates that no device was found. If this occurs, refer to Section 5: Troubleshooting.

### Field Hook-up

Figures 3-1 and 3-2 illustrate wiring loops for a field hook-up with a HART Communicator or AMS. The HART Communicator or AMS may be connected at “COMM” on the transmitter terminal block, across the load resistor, or at any termination point in the signal loop. Signal point may be grounded at any point or left ungrounded.

Figure 3-1. PlantWeb Wiring (4–20 mA)

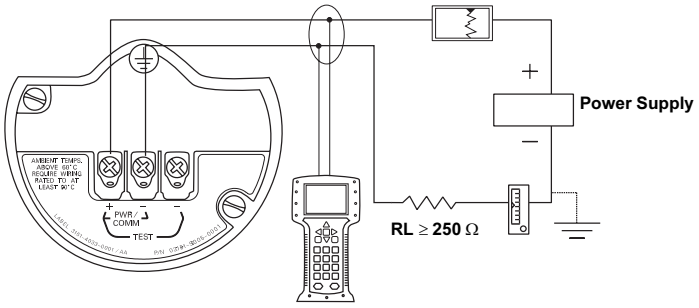
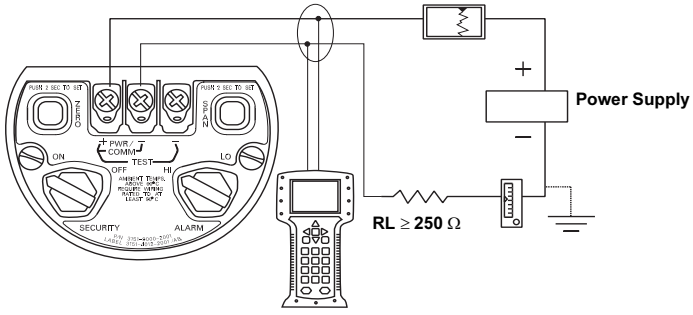



Figure 3-2. Junction Box Wiring (4–20 mA)



## REVIEW CONFIGURATION DATA

**NOTE**
Information and procedures in this section that make use of HART Communicator fast key sequences and AMS assume that the transmitter and communication equipment are connected, powered, and operating correctly.

The following is a list of factory configurations. These can be reviewed by using the HART Communicator or AMS.

### HART Communicator v1.8

Enter the fast key sequence to view the configuration data.

| Fast Keys | 1, 5 |
|---|---|

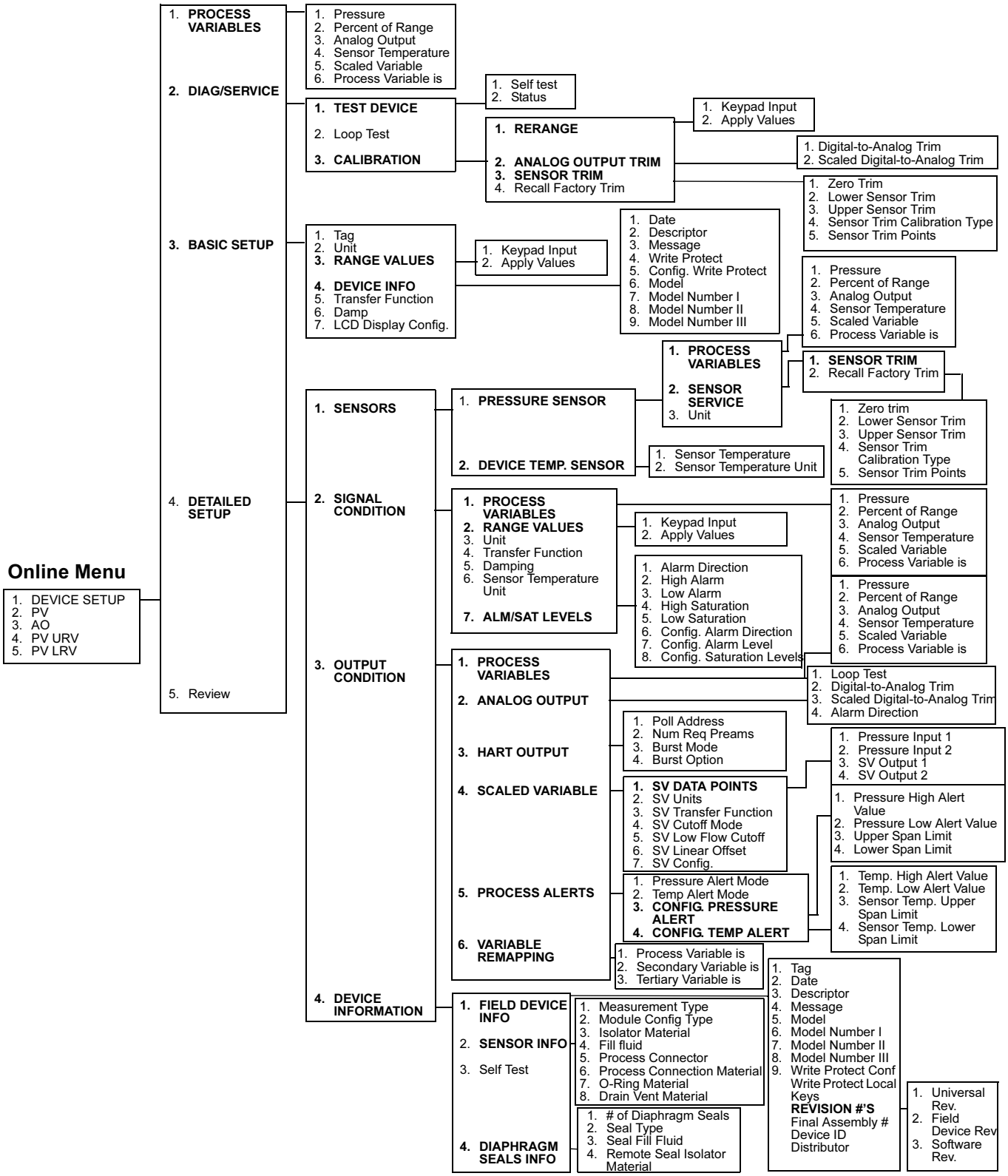
| | |
|---|---|
| Manufacturer “Rosemount” | O-Ring material |
| Transmitter model | Drain/Vent material |
| Measurement type | Number of diaphragm seals |
| Module configuration type | Seal type |
| Range | Remote seal isolator material |
| PV Unit | Seal fill fluid |
| PV Lower Sensor Limit (LSL) | Tag |
| PV Upper Sensor Limit (USL) | Date |
| PV Lower Range Value (LRV) | Descriptor |
| PV Upper Range Value (URV) | Message |
| PV minimum span | Write protect |
| Lower sensor trim point | Meter type |
| Upper sensor trim point | Local keys |
| Sensor trim calibration type | Universal revision |
| Transfer function | Field device revision |
| Damping | Software revision |
| Alarm direction | Hardware revision |
| High Alarm (Value) | Physical signal code |
| Low Alarm (Value) | Final assembly number |
| High saturation | Device ID |
| Low saturation | Burst mode |
| Alarm/Saturation type | Burst option |
| Sensor S/N | Poll address |
| Isolator material | Number req preams |
| Fill fluid | Multisensor device |
| Process connector | Command #39, EEProm Control required |
| Process connector material | Distributor |

### AMS v7.0

Right click on the device and select “Configure” from the menu. Select the tabs to review the transmitter configuration data.

## HART COMMUNICATOR (Version 1.8)

### Menu Tree



## Fast Key Sequence

The following menu indicates fast key sequences for common functions. A check (√) indicates the basic configuration parameters. At minimum, these parameters should be verified as part of the configuration and startup procedure.

| | Function | HART Fast Key Sequence |
|---|---|---|
| | Alarm Level Configuration | 1, 4, 2, 7, 7 |
| | Alarm and Saturation Levels | 1, 4, 2, 7 |
| | Analog Output Alarm Direction | 1, 4, 2, 7, 6 |
| | Analog Output Trim | 1, 2, 3, 2 |
| | Burst Mode On/Off | 1, 4, 3, 3, 3 |
| | Burst Options | 1, 4, 3, 3, 4 |
| √ | Damping | 1, 3, 6 |
| | Date | 1, 3, 4, 1 |
| | Descriptor | 1, 3, 4, 2 |
| | Digital To Analog Trim (4-20 mA Output) | 1, 2, 3, 2, 1 |
| | Field Device Information | 1, 4, 4, 1 |
| | LCD Display Configuration | 1, 3, 7 |
| | Loop Test | 1, 2, 2 |
| | Lower Sensor Trim | 1, 2, 3, 3, 2 |
| | Message | 1, 3, 4, 3 |
| | Number of Requested Preambles | 1, 4, 3, 3, 2 |
| | Pressure Alert Configuration | 1, 4, 3, 5, 3 |
| | Poll Address | 1, 4, 3, 3, 1 |
| | Poll a Multidropped Transmitter | Left Arrow, 3, 1, 1 |
| | Re-mapping | 1, 4, 3, 6 |
| | Rerange- Keypad Input | 1, 2, 3, 1, 1 |
| | Saturation Level Configuration | 1, 4, 2, 7, 8 |
| | Scaled D/A Trim (4–20 mA Output) | 1, 2, 3, 2, 2 |
| | Scaled Variable Configuration | 1, 4, 3, 4, 7 |
| | Self Test (Transmitter) | 1, 2, 1, 1 |
| | Sensor Information | 1, 4, 4, 2 |
| | Sensor Temperature | 1, 1, 4 |
| | Sensor Trim | 1, 2, 3, 3 |
| | Sensor Trim Points | 1, 2, 3, 3, 5 |
| | Status | 1, 2, 1, 2 |
| √ | Tag | 1, 3, 1 |
| | Temperature Alert Configuration | 1, 4, 3, 5, 4 |
| √ | Transfer Function (Setting Output Type) | 1, 3, 5 |
| | Transmitter Security (Write Protect) | 1, 3, 4, 5 |
| √ | Units (Process Variable) | 1, 3, 2 |
| | Upper Sensor Trim | 1, 2, 3, 3, 3 |
| | Zero Trim | 1, 2, 3, 3, 1 |

## CHECK OUTPUT

Before performing other transmitter on-line operations, review the digital output parameters to ensure that the transmitter is operating properly and is configured to the appropriate process variables.

### Process Variables

| Fast Keys | 1, 1 |
|---|---|

The process variables for the 3051S provide transmitter output, and are continuously updated. The pressure reading in both engineering units and percent of range will continue to track with pressures outside of the defined range from the lower to the upper range limit of the SuperModule.

**HART Communicator v1.8**

The process variable menu displays the following process variables:

- Pressure
- Percent of range
- Analog output
- Sensor temperature
- Scaled Variable (SV)
- Primary Variable (PV)

**NOTE**
Regardless of the range points, the 3051S will measure and report all readings within the digital limits of the sensor. For example, if the 4 and 20 mA points are set to 0 and 10 in$H_2O$, and the transmitter detects a pressure of 25 in$H_2O$, it digitally outputs the 25 in$H_2O$ reading and a 250% of span reading. However, there may be up to ±5.0% error associated with output outside of the range points.

**AMS v7.0**

Right click on the device and select “Process Variables...” from the menu.The process variable screen displays the following process variables:

- Pressure
- Percent of range
- Analog output
- Sensor temperature
- Scaled Variable (SV)
- Primary Variable (PV)

### Sensor Temperature

| Fast Keys | 1, 1, 4 |
|---|---|

The 3051S contains a temperature sensor near the pressure sensor in the SuperModule. When reading this temperature, keep in mind the sensor is not a process temperature reading.

**HART Communicator v1.8**

Enter the fast key sequence “Sensor Temperature” to view the sensor temperature reading.

**AMS v7.0**

Right click on the device and select “Process Variables...” from the menu. “Snsr Temp” is the sensor temperature reading.

## BASIC SETUP

### Set Process Variable Units

| Fast Keys | 1, 3, 2 |
|---|---|

The PV Unit command sets the process variable units to allow you to monitor your process using the appropriate units of measure.

**HART Communicator v1.8**

Enter the fast key sequence “Set Process Variable Units.” Select from the following engineering units:

- $inH_2O$
- inHg
- $ftH_2O$
- $mmH_2O$
- mmHg
- psi
- bar
- mbar
- $g/cm^2$
- $kg/cm^2$
- Pa
- kPa
- torr
- atm
- MPa
- $inH_2O$ at 4 °C
- $mmH_2O$ at 4 °C

**AMS v7.0**

Right click on the device and select “Configure” from the menu. In the Basic Setup tab, use “Unit” drop down menu to select units.

### Set Output (Transfer function)

| Fast Keys | 1, 3, 5 |
|---|---|

The 3051S has two output settings: Linear and Square Root. Activate the square root output option to make analog output proportional to flow. As input approaches zero, the 3051S automatically switches to linear output in order to ensure a more smooth, stable output near zero (see Figure 3-3).

From 0 to 0.6 percent of the ranged pressure input, the slope of the curve is unity (y = x). This allows accurate calibration near zero. Greater slopes would cause large changes in output (for small changes at input). From 0.6 percent to 0.8 percent, curve slope equals 42 (y = 42x) to achieve continuous transition from linear to square root at the transition point.

**NOTE**
If Scaled Variable is mapped as the primary variable and square root mode is desired, select Square Root during Scaled Variable Configuration or as part of the set output configuration. Avoid duplication of Square Root configuration.

**HART Communicator v1.8**

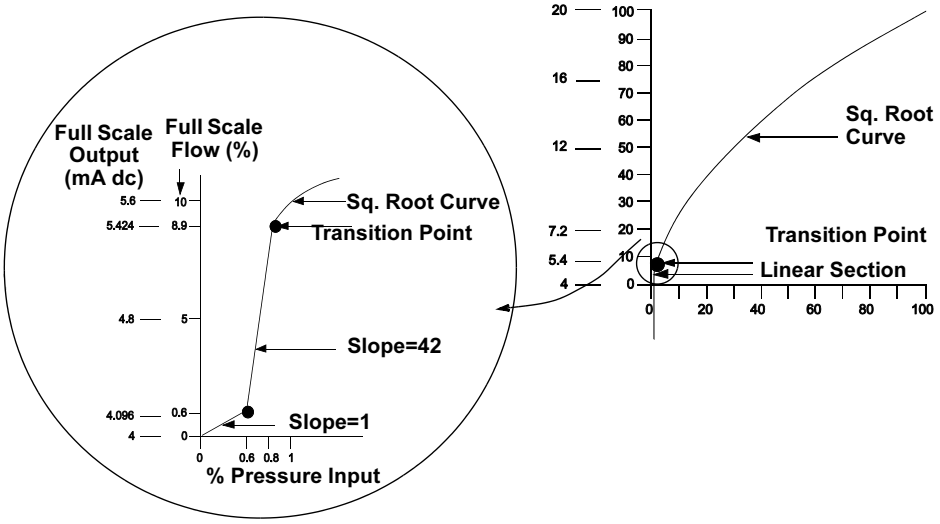
Enter the fast key sequence “Set Output (Transfer function).”

**AMS v7.0**

Right click on the device and select “Configure” from the menu.

1. In the Basic Setup tab, use “Xfer fnctn” drop down menu to select output, click **Apply**.
2. After carefully reading the warning provided, select **yes**.

Figure 3-3. Square Root Output Transition Point




**NOTE**
For a flow turndown of greater than 10:1 it is not recommended to perform a square root extraction in the transmitter. Instead, perform the square root extraction in the system.

## Rerange

The Range Values command sets the 4 and 20 mA points (lower and upper range values). In practice, you may reset the transmitter range values as often as necessary to reflect changing process conditions. Changing the lower or upper range point results in similar changes to the span. For a complete listing of Range & Sensor limits, refer to the “Range & Sensor Limits” table on page A-6.

**NOTE**
Transmitters are shipped from Rosemount Inc. fully calibrated per request or by the factory default of full scale (span = upper range limit.)

Select from one of the methods below to rerange the transmitter. Each method is unique; examine all options closely before deciding which method works best for your process.

- Rerange with a HART Communicator only.
- Rerange with a pressure input source and a HART Communicator.
- Rerange with a pressure input source and the local zero and span buttons (option D1).
- Rerange with AMS only.
- Rerange with a pressure input source and AMS.

**NOTE**
If the transmitter security jumper/switch is **ON,** adjustments to the zero and span will not be able to be made. Refer to “Configure Security and Alarm” on page 2-13 for security information.

**Rerange with a HART Communicator v1.8 Only**

| Fast Keys | 1, 2, 3, 1, 1 |
|---|---|

The easiest and most popular way to rerange is to use the HART Communicator only. This method changes the values of the analog 4 and 20 mA points independently without a pressure input.

From the **HOME** screen, enter the fast key sequence “Rerange with a Communicator Only.”

1. At “Keypad Input” select 1 and use the keypad to enter lower range value.
2. From “Keypad Input” select 2 and use the keypad to enter upper range value.

**Rerange with a Pressure Input Source and HART Communicator v1.8**

| Fast Keys | 1, 2, 3, 1, 2 |
|---|---|

Reranging using the HART Communicator and a pressure source or process pressure is a way of reranging the transmitter when specific 4 and 20 mA points are unknown.

**NOTE**
The span is maintained when the 4 mA point is set. The span changes when the 20 mA point is set. If the lower range point is set to a value that causes the upper range point to exceed the sensor limit, the upper range point is automatically set to the sensor limit, and the span is adjusted accordingly.

1. From the **HOME** screen, enter the fast key sequence “Rerange with a Pressure Input Source and a HART Communicator” to configure lower and upper range values and follow the on-line instructions.

**Rerange with a Pressure Input Source and the Local Zero and Span buttons (option D1)**

Reranging using the local zero and span adjustments and a pressure source is a way of reranging the transmitter.

1. Using a pressure source with an accuracy three to ten times the desired calibrated accuracy, apply a pressure equivalent to the lower range value to the high side of the transmitter.
2. Push and hold the zero adjustment button for at least two seconds but no longer than ten seconds.
3. Apply a pressure equivalent to the upper range value to the high side of the transmitter.
4. Push and hold the span adjustment button for at least two seconds but no longer than ten seconds.

| PlantWeb | Junction Box |
|---|---|
|  |  |

**Rerange with AMS v7.0 only**

Right click on the device and select “Configure” from the menu. In the Basic Setup tab, locate the Analog Output box and perform the following procedure:

1. Enter the lower range value (LRV) and the upper range value (URV) in the fields provided. Click **Apply**.
2. After carefully reading the warning provided, select **yes**.

**Rerange with a Pressure Input Source and AMS v7.0**

Right click on the device, select “Calibrate”, then “Apply values” from the menu.

1. Select **Next** after the control loop is set to manual.
2. From the “Apply Values” menu, follow the on-line instructions to configure lower and upper range values.
3. Select **Exit** to leave the “Apply Values” screen.
4. Select **Next** to acknowledge the loop can be returned to automatic control.
5. Select **Finish** to acknowledge the method is complete.

## Damping

| Fast Keys | 1, 3, 6 |
|---|---|

The Damp command introduces a delay in processing which increases the response time of the transmitter; smoothing variations in output readings caused by rapid input changes. Determine the appropriate damp setting based on the necessary response time, signal stability, and other requirements of the loop dynamics of your system. The damping value of your device is user selectable from 0 to 60 seconds. The current damping value can be determined by executing the HART Communicator fast keys or going to "Configure" in AMS.

**HART Communicator v1.8**

Enter the fast key sequence “Damping.”

**AMS v7.0**

Right click on the device and select “Configure” from the menu.

1. In the “Basic Setup” tab, enter the damping value in the “Damp” field, click **Apply**.
2. After carefully reading the warning provided, select **yes**.

## LCD DISPLAY

The LCD display connects directly to the interface/electronics board which maintains direct access to the signal terminals. The display indicates output and abbreviated diagnostic messages. A display cover is provided to accommodate the display.

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

**LCD Display Configuration with HART Communicator v1.8**

| Fast Keys | 1, 3, 7 |
|---|---|

The factory default LCD display setting is engineering units. The Meter Options command allows customization of the LCD display to suit application requirements. The LCD display will alternate between the selected items (up to four may be chosen):

- Pressure (Engineering Units)
- Percent of Range
- Scaled Variable
- Temperature

**AMS v7.0**

Right click on the device and select “Configure” from the menu.

1. In the “LCD” tab, select the desired options to suit your application needs, click **Apply**.
2. After carefully reading the warning provided, select **yes**.

## DETAILED SETUP

### Failure Mode Alarm and Saturation

3051S transmitters automatically and continuously perform self-diagnostic routines. If the self-diagnostic routines detect a failure, the transmitter drives the output to configured alarm values. The transmitter will also drive the output to configured saturation values if the applied pressure goes outside the 4-20 mA range values.

The transmitter will drive its output low or high based on the position of the failure mode alarm jumper, see “Configure Security and Alarm” on page 2-13.

**NOTE**
The failure mode alarm direction can also be configured using the HART Communicator or AMS.

3051S transmitters have three configurable options for failure mode alarm and saturation levels:

- Rosemount (Standard), see Table 3-1.
- NAMUR, see Table 3-2.
- Custom, see Table 3-3.

Table 3-1. Rosemount (Standard) Alarm and Saturation Values

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

Table 3-2. NAMUR-Compliant Alarm and Saturation Values

| Level | 4–20 mA Saturation | 4–20 mA Alarm |
|---|---|---|
| Low | 3.8 mA | ≤ 3.6 mA |
| High | 20.5 mA | ≥ 22.5 mA |

Table 3-3. Custom Alarm and Saturation Values

| Level | 4–20 mA Saturation | 4–20 mA Alarm |
|---|---|---|
| Low | 3.7 mA — 3.9 mA | 3.6 mA — 3.8 mA |
| High | 20.1 mA — 21.5 mA | 20.2 mA — 23.0 mA |

Failure mode alarm and saturation levels can be configured using a HART Communicator or AMS, see “Alarm and Saturation Level Configuration” on page 3-13. Per Table 3-3, custom alarm and saturation levels can be configured between 3.6 mA and 3.9 mA for low values and between 20.1 mA and 23 mA for high values. The following limitations exist for custom levels:

- Low alarm level must be less than the low saturation level
- High alarm level must be higher than the high saturation level
- High saturation level must not exceed 21.5 mA
- Alarm and saturation levels must be separated by at least 0.1 mA

The HART Communicator or AMS will provide an error message if a configuration rule is violated.

## Alarm and Saturation Level Configuration

| Fast Keys | 1, 4, 2, 7 |
|---|---|

To configure alarm and saturation levels with a HART Communicator or AMS perform the following procedure:

**HART Communicator v1.8**

1. From the **HOME** screen, follow the fast key sequence.
2. Select 7, **Config. Alarm Level** to configure alarm levels.
3. Select **OK** after setting the control loop to manual.
4. Select **OK** to acknowledge current settings.
5. Select desired setting, if “OTHER” is selected enter HI and LO custom values.
6. Select **OK** to acknowledge the loop can be returned to automatic control.
7. Select 8, **Config. Sat. Levels** to configure saturation levels.
8. Repeat steps 3-6 to configure saturation levels.

**AMS v7.0**

Right click on the device, select “Device Configuration”, then select “Alarm/Saturation Levels,” then “Alarm Levels” from the menu.

1. Click **Next** after setting the control loop to manual.
2. Click **Next** after acknowledging the current alarm levels.
3. Select the desired alarm settings: NAMUR, Rosemount, Other
4. If “Other” is selected, enter desired “HI Value” and “LO Value” custom values.
5. Click **Next** to acknowledge new alarm levels.
6. Select **Next** to acknowledge the loop can be returned to automatic control.
7. Select **Finish** to acknowledge the method is complete.
8. Right click on the device, select “Device Configuration,” then select “Alarm/Saturation Levels,” then “Saturation Levels” from the menu.
9. Repeat steps 2 - 8 to configure saturation levels.

## Alarm and Saturation Levels for Burst Mode

Transmitters set to burst mode handle saturation and alarm conditions differently.

**Alarm Conditions:**

- Analog output switches to alarm value
- Primary variable is burst with a status bit set
- Percent of range follows primary variable
- Temperature is burst with a status bit set

**Saturation:**

- Analog output switches to saturation value
- Primary variable is burst normally
- Temperature is burst normally

## Alarm and Saturation Values for Multidrop Mode

Transmitters set to multidrop mode handle saturation and alarm conditions differently.

**Alarm Conditions:**

- Primary variable is sent with a status bit set
- Percent of range follows primary variable
- Temperature is sent with a status bit set

**Saturation:**

- Primary variable is sent normally
- Temperature is sent normally

## Alarm Level Verification

The transmitter alarm level should be verified before returning the transmitter to service if the following changes are made:

- Replacement of electronics board, SuperModule, or LCD display
- Alarm and saturation level configuration

This feature is also useful in testing the reaction of the control system to a transmitter in an alarm state. To verify the transmitter alarm values, perform a loop test and set the transmitter output to the alarm value (see Table 3-1, Table 3-2, and Table 3-3 on page 3-13, and “Loop Test” on page 3-21).

## Process Alerts

| Fast Keys | 1, 4, 3, 5 |
|---|---|

Process alerts allow the user to configure the transmitter to output a HART message when the configured data point is exceeded. Process alerts can be set for pressure, temperature, or both. A process alert will be transmitted continuously if the pressure or temperature set points are exceeded and the alert mode is **ON**. An alert will be displayed on a HART Communicator, AMS status screen or in the error section of the LCD display. The alert will reset once the value returns within range.

**NOTE**
HI alert value must be higher than the LO alert value. Both alert values must be within the pressure or temperature sensor limits.

**HART Communicator v1.8**

To configure the process alerts with a HART Communicator, perform the following procedure:

1. From the **HOME** screen, follow the fast key sequence “Process Alerts.”
2. Select 3, “Config Press Alerts” to configure the pressure alert.
   Select 4, “Config Temp Alerts” to configure the temperature alerts.
3. Use the right arrow key to configure the HI and LO alert values.
4. Use the left arrow to move back to the process alert menu.
   Select 1, “Press Alert Mode” to turn on the pressure alert mode.
   Select 2, “Temp Alert Mode” to turn on the temperature alert mode.

**AMS v7.0**

Right click on the device and select “Configure” from the menu.

1. In the “Analog Output” tab, locate the “Configuration Pressure Alerts” box, enter “Press Hi Alert Val” and “Press Lo Alert Val” to configure the pressure alerts.
2. Configure “Press Alert Mode” to “ON” or “OFF” using the drop down menu.
3. In the “Configuration Temperature Alerts” box, enter “Temp Hi Alert Val” and “Temp Lo Alert Val” to configure the temperature alerts.
4. Configure “Temp Alert Mode” to “ON” or “OFF” using the drop down menu and click **Apply**.
5. After carefully reading the warning provided, select **yes**.

## Scaled Variable Configuration

| Fast Keys | 1, 4, 3, 4, 7 |
|---|---|

The scaled variable configuration allows the user to create a relationship/conversion between the pressure reading and custom units.

The scaled variable configuration defines the following items:

- Scaled variable units - Custom units to be displayed.
- Scaled data options - Defines the transfer function for the application
  a. Linear
  b. Square root
- Pressure value position 1 - Lower known value point (possible 4 mA point) with consideration of linear offset.
- Scaled variable value position 1 - Custom unit equivalent to the lower known value point (The lower known value point may or may not be the 4 mA point.)
- Pressure value position 2 - Upper known value point (possible 20 mA point)
- Scaled variable value position 2 - Custom unit equivalent to the upper known value point (possible 20 mA point)
- Linear offset - The value required to zero out pressures effecting the desired pressure reading.
- Low flow cutoff - Point at which output is driven to zero to prevent problems caused by process noise.

**NOTE**
If Scaled Variable is mapped as the primary variable and square root mode is desired, select Square Root during Scaled Variable Configuration or as part of the set output configuration. Avoid duplication of Square Root configuration.

### HART Communicator v1.8

To configure the scaled variable with a HART Communicator, perform the following procedure:

1. From the **HOME** screen follow the fast key sequence “Scaled Variable Configuration.”
2. Select **OK** after the control loop is set to manual.
3. Enter the scaled variable units.
   a. Units can be up to five characters long and include A — Z, 0 — 9, -, /,%, and *. Default unit is DEFLT.
   b. The first character is always an asterisk (*), which identifies the units displayed are scaled variable units.
4. Select scaled data options
   a. Select linear if the relationship between PV and scaled variable units are linear. Linear prompts for two data points.
   b. Select square root if the relationship between PV and scaled variable is square root (flow applications). Square root will prompt for one data point.

5. Enter pressure value position 1. Pressure values must be within the range of the transmitter.
   a. (If performing a **Linear Function**) Enter the lower known value point considering any linear offset.
   b. (If performing a **Square Root Function**) Select **OK** to acknowledge pressure value is set to zero.
6. Enter scaled variable position 1.
   a. (If performing a **Linear Function**) Enter the lower known value point; this value must be no longer than seven digits.
   b. (If performing a **Square Root Function**) Select **OK** to acknowledge scaled variable value is set to zero.
7. Enter pressure value position 2. Pressure values must be within the range of the transmitter.
   a. Enter the upper known value point.
8. Enter scaled variable position 2.
   a. (If performing a **Linear Function**) Enter custom unit equivalent to the upper known value point; this value must be no longer than seven digits.
   b. (If performing a **Square Root Function**) Enter custom unit equivalent to the value in step 7; this value must be no longer than seven digits. Skip to step 10.
9. Enter linear offset (If performing a **Linear Function**). Skip to step 11.
10. Enter Low Flow cutoff mode (If performing a **Square Root Function**)
    a. Select **OFF** if a low flow cutoff value is not desired.
    b. Select **ON** if a low flow cutoff value is desired and enter this value on the next screen.
11. Select **OK** to acknowledge that the loop can be returned to automatic control.

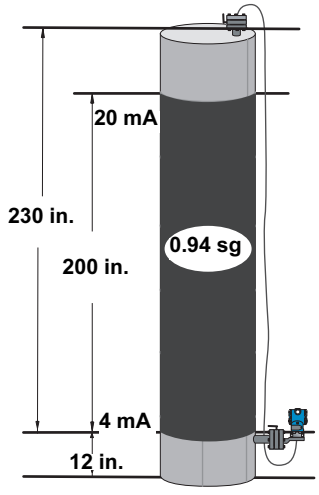
**AMS v7.0**

Right click on the device and select “Device Configuration” then select “SV Config” from the menu.

1. Click **Next** after setting the control loop to manual.
2. Enter desired scaled variable units in “Enter SV units” box and click **Next**.
3. Select scaled data options: Linear or Square Root and click **Next**. If square root is selected skip to Step 9.
4. Enter pressure value position 1 and click **Next**.
5. Enter scaled variable position 1 and click **Next**.
6. Enter pressure value position 2 and click **Next**.
7. Enter scaled variable position 2 and click **Next**.
8. Enter linear offset and click **Next**. Skip to Step 15.
9. Select **Next** to acknowledge that “Pressure value for position 1 is set to zero.
10. Select **Next** to acknowledged that “Square root value for position 1 is set to zero.
11. Enter pressure value for position 2 and click **Next**.
12. Enter square root value for position 2 and click **Next**.
13. Enter low flow cutoff mode: Off or On. If off is selected skip to Step 15.
14. Enter low flow cutoff value and click **Next**.
15. Select **Next** to acknowledge that the loop can be returned to automatic control.
16. Select **Finish** to acknowledge the method is complete.

**DP Level Example**

Figure 3-4. Example tank




A differential transmitter is used in a level application where the span is 188 in$H_2O$ (200 in. * 0.94 sg). Once installed on an empty tank and taps vented, the process variable reading is -209.4 in$H_2O$. The process variable reading is the head pressure created by fill fluid in the capillary. Based on Figure 3-4, the Scaled Variable configuration would be as follows:

| | |
|---|---|
| Scaled Variable units: | inches |
| Scaled data options: | linear |
| Pressure value position 1: | 0 in$H_2O$ (0 mbar) |
| Scaled Variable position 1: | 12 in. (305 mm) |
| Pressure value position 2: | 188 in$H_2O$ (0.47 bar) |
| Scaled Variable position 2: | 212 in.(5385 mm) |
| Linear offset: | -209.4 in$H_2O$ (-0.52 bar) |

**DP Flow Example**
A differential transmitter is used in conjunction with an orifice plate in a flow application where the differential pressure at full scale flow is 125 inH2O. In this particular application, the flow rate at full scale flow is 20,000 gallons of water per hour. Low flow cutoff is not required in this application. Based on this information, the Scaled Variable configuration would be as follows:

| | |
|---|---|
| Scaled Variable units: | gal/h |
| Scaled data options: | square root |
| Pressure value position 2: | 125 inH2O (311 mbar) |
| Scaled Variable position 2: | 20,000 gal/h (75,708 lt/hr) |
| Low Flow Cutoff: | 0 (OFF) |

**NOTE**
Pressure value position 1 and Scaled Variable position 1 are always set to zero for a flow application. No configuration is required.

## Re-mapping

| Fast Keys | 1, 4, 3, 6 |
|---|---|

The re-mapping function allows the transmitter primary, secondary, and tertiary variables to be configured as desired. Default configuration for transmitter variables is as shown below:

Primary variable (PV) = Pressure
Secondary variable (SV) = Temperature
Tertiary variable (TV) = Scaled Variable

**NOTE**
Variable assigned as the primary variable drives the 4-20 mA analog output.

The scaled variable can be remapped as the primary variable if desired.

**HART Communicator v1.8**

From the **HOME** screen, enter the fast key sequence “Re-mapping.”

1. Select **OK** after the control loop is set to manual (see “Setting the Loop to Manual” on page 3-2).
2. Choose desired primary variable and select **Enter**.
3. Choose desired secondary variable and select **Enter**.
4. Select **OK** to acknowledge the tertiary variable setting.
5. Select **OK** to acknowledge that the loop can be returned to automatic control.

**AMS v7.0**

Right click on the device and select “Configure”.

1. In “Basic Setup” tab, locate “Variable Mapping” box.
2. Choose desired primary variable.
3. Choose desired secondary variable.
4. Choose desired tertiary variable.
5. Click **Apply** and then select **Next** to acknowledge the loop can be returned to automatic control.
6. Select **Finish** to acknowledge the method is complete.

## Sensor Temperature Unit

| Fast Keys | 1, 4, 1, 2, 2 |
|---|---|

The Sensor Temperature Unit command selects between Celsius and Fahrenheit units for the sensor temperature. The sensor temperature output is accessible via HART only.

**HART Communicator v1.8**

Enter the fast key sequence “Sensor Temperature Unit.”

**AMS v7.0**

Right click on the device and select “Configure” from the menu.

1. In the “Process Input” tab, use the drop down menu “Snsr temp unit” to select F (Farenheit) or C (Celsius). Click **Apply**.
2. Click **Next** to acknowledge send warning.
3. Select **Finish** to acknowledge the method is complete.
4. After carefully reading the warning, select **yes**.

## DIAGNOSTICS AND SERVICE

Diagnostics and service functions listed below are primarily for use after field installation. The Transmitter Test feature is designed to verify that the transmitter is operating properly, and can be performed either on the bench or in the field. The Loop Test feature is designed to verify proper loop wiring and transmitter output, and should only be performed after you install the transmitter.

## Transmitter Test

| Fast Keys | 1, 2, 1, 1 |
|---|---|

The Transmitter Test command initiates a more extensive diagnostics routine than that performed continuously by the transmitter. The test routine can quickly identify potential electronics problems. If the test detects a problem, messages to indicate the source of the problem are displayed on the HART Communicator screen.

**HART Communicator v1.8**

Enter the fast key sequence “Transmitter Test.”

**AMS v7.0**

Right click on the device and select “Diagnostics and Test,” then “Self test” from the menu.

1. Click **Next** to acknowledge test results.
2. Select **Finish** to acknowledge the method is complete.

## Loop Test

| Fast Keys | 1, 2, 2 |
|---|---|

The Loop Test command verifies the output of the transmitter, the integrity of the loop, and the operations of any recorders or similar devices installed in the loop.

**HART Communicator v1.8**

To initiate a loop test, perform the following procedure:

1. Connect a reference meter to the transmitter by either connecting the meter to the test terminals on the terminal block, or shunting transmitter power through the meter at some point in the loop.
2. From the **HOME** screen, enter the fast key sequence “Loop Test” to verify the output of the transmitter.
3. Select **OK** after the control loop is set to manual (see “Setting the Loop to Manual” on page 3-2).
4. Select a discrete milliamp level for the transmitter to output. At the **CHOOSE ANALOG OUTPUT** prompt select 1: 4mA, select 2: 20mA, or select 3: “Other” to manually input a value.
   a. If you are performing a loop test to verify the output of a transmitter, enter a value between 4 and 20 mA.
   b. If you are performing a loop test to verify alarm levels, enter the milliamp value representing an alarm state (see Table 3-1, Table 3-2, and Table 3-3 on page 3-13).
5. Check the reference meter installed in the test loop to verify that it displays the commanded output value.
   a. If the values match, the transmitter and the loop are configured and functioning properly.
   b. If the values do not match, the current meter may be attached to the wrong loop there may be a fault in the wiring, the transmitter may require an output trim, or the reference meter may be malfunctioning.

After completing the test procedure, the display returns to the loop test screen to choose another output value or to end loop testing.

**AMS v7.0**

Right click on the device and select “Diagnostics and Test,” then “Loop test” from the menu.

1. Connect a reference meter to the transmitter by either connecting the meter to the test terminals on the terminal block, or shunting transmitter power through the meter at some point in the loop.
2. Click **Next** after setting the control loop to manual.
3. Select desired analog output level. Click **Next**.
4. Click **Next** to acknowledge output being set to desired level.

5. Check the reference meter installed in the test loop to verify that it displays the commanded output value.
   a. If the values match, the transmitter and the loop are configured and functioning properly.
   b. If the values do not match, the current meter may be attached to the wrong loop there may be a fault in the wiring, the transmitter may require an output trim, or the reference meter may be malfunctioning.

After completing the test procedure, the display returns to the loop test screen to choose another output value or to end loop testing.

6. Select **End** and click **Next** to end loop testing.
7. Select **Next** to acknowledge the loop can be returned to automatic control.
8. Select **Finish** to acknowledge the method is complete.

## ADVANCED FUNCTIONS FOR HART PROTOCOL

### Saving, Recalling, and Cloning Configuration Data

| Fast Keys | left arrow, 1, 2 |
|---|---|

Use the cloning feature of the HART Communicator or the AMS “User Configuration” feature to configure several 3051S transmitters similarly. Cloning involves configuring a transmitter, saving the configuration data, then sending a copy of the data to a separate transmitter. Several possible procedures exist when saving, recalling, and cloning configuration data. For complete instructions refer to the HART Communicator manual (publication no. 00809-0100-4276) or AMS on-line guides. One common method is as follows:

**HART Communicator v1.8**

1. Confirm and apply configuration changes to the first transmitter.

**NOTE**
If transmitter configuration has not been modified, “SAVE” option in step 2 will be disabled

2. Save the configuration data:
   a. Select “SAVE” from the bottom of the HART Communicator screen.
   b. Choose to save your configuration in either the “Internal Flash” (default) or the “Configuration EM” (Configuration Expansion Module).
   c. Enter the name for this configuration file. The default name is the transmitter tag number.
   d. Select “SAVE”.
3. Power the receiving transmitter and connect with HART Communicator.
4. Access the HART Application menu by pressing the LEFT ARROW from the HOME/ONLINE screen.

5. Locate the saved transmitter configuration file.
   a. Select “Offline”
   b. Select “Saved Configuration”
   c. Select either “Internal Flash Contents” or “Configuration EM Contents” depending on where the configuration was stored per step 2b.
6. Use the DOWN ARROW to scroll through the list of configurations in the memory module, and use the RIGHT ARROW to select and retrieve the desired configuration.
7. Select “Send” to transfer the configuration to the receiving transmitter.
8. Select “OK” after the control loop is set to manual.
9. After the configuration has been sent, select “OK” to acknowledge that the loop can be returned to automatic control.

When finished, the HART Communicator informs you of the status. Repeat steps 3 through 9 to configure another transmitter.

**NOTE**
The transmitter receiving cloned data must have the same software version (or later) as the original transmitter.

**AMS v7.0 creating a Reusable Copy**

To create a reusable copy of a configuration perform the following procedure:

1. Completely configure the first transmitter.
2. Select View then User Configuration View from the menu bar (or click the toolbar button).
3. In the User Configuration window, right click and select New from the context menu.
4. In the New window, select a device from the list of templates shown, and click **OK**.
5. The template is copied into the User Configurations window, with the tag name highlighted; rename it as appropriate and press **Enter**.

**NOTE**
A device icon can also be copied by dragging and dropping a device template or any other device icon from AMS Explorer or Device Connection View into the User Configurations window.

The “Compare Configurations” window appears, showing the Current values of the copied device on one side and mostly blank fields on the other (User Configuration) side.

6. Transfer values from the current configuration to the user configuration as appropriate or enter values by typing them into the available fields.
7. Click Apply to apply the values, or click **OK** to apply the values and close the window.

**AMS v7.0 Applying a User Configuration**

Any amount of user configurations can be created for the application. They can also be saved, and applied to connected devices or to devices in the Device List or Plant Database.

**NOTE**
When using AMS Revision 6.0 or later, the device to which the user configuration is applied must be the same model type as the one created in the user configuration. When using AMS Revision 5.0 or earlier, the same model type and revision number are required.

To apply a user configuration perform the following procedure:

1. Select the desired user configuration in the User Configurations window.
2. Drag the icon onto a like device in AMS Explorer or Device Connection View. The Compare Configurations window opens, showing the parameters of the target device on one side and the parameters of the user configuration on the other.
3. Transfer parameters from the user configuration to the target device as desired, Click **OK** to apply the configuration and close the window.

## Burst Mode

| Fast Keys | 1, 4, 3, 3, 3 |
|---|---|

When configured for burst mode, the 3051S provides faster digital communication 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 the analog signal. Because the 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 dynamic data (pressure and temperature in engineering units, pressure in percent of range, and/or analog output), and does not affect the way other transmitter data is accessed.

Access to information other than dynamic transmitter data is obtained through the normal poll/response method of HART communication. A HART Communicator, AMS or the control system may request any of the information that is normally available while the transmitter is in burst mode. Between each message sent by the transmitter, a short pause allows the HART Communicator, AMS or a 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.

**HART Communicator v1.8**

To configure the transmitter for burst mode, perform the following step:

1. From the HOME screen, enter the fast key sequence “Burst Mode.”

**AMS v7.0**
Right click on the device and select “Configure” from the menu.

1. In the “HART” tab, use the drop down menu to select “Burst Mode ON or OFF.” For “Burst option” select the desired properties from the drop down menu. Burst options are as follows:
   - PV
   - % range/current
   - Process vars/crnt
   - Process variables
2. After selecting options click **Apply**.
3. After carefully reading the warning provided, select **yes**.

## MULTIDROP COMMUNICATION

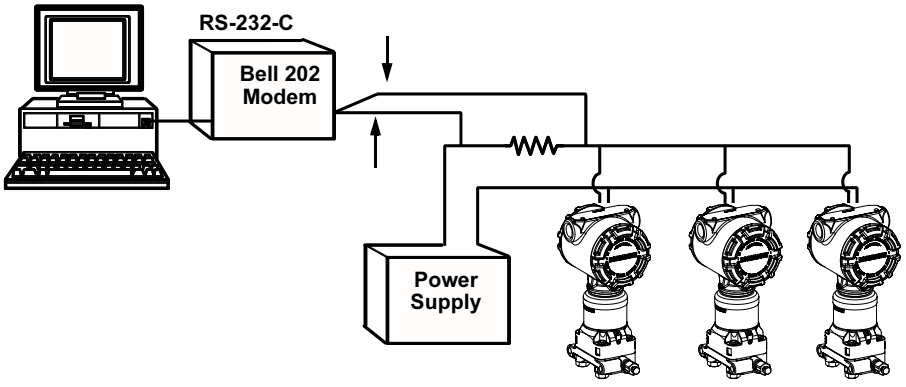
Multidropping transmitters refers to the connection of several transmitters to a single communications transmission line. Communication between the host and the transmitters takes place digitally with the analog output of the transmitters deactivated. With smart communications protocol, up to fifteen transmitters can be connected on a single twisted pair of wires, or over leased phone lines.

Multidrop installation requires consideration of the update rate necessary from each transmitter, the combination of transmitter models, and the length of the transmission line. Communication with transmitters can be accomplished with Bell 202 modems and a host implementing HART protocol. Each transmitter is identified by a unique address (1–15) and responds to the commands defined in the HART protocol. HART Communicators and AMS can test, configure, and format a multidropped transmitter the same way as a transmitter in a standard point-to-point installation.

Figure 3-5 shows a typical multidrop network. This figure is not intended as an installation diagram.

**NOTE**
A transmitter in multidrop mode has the analog output fixed at 4 mA. If a meter is installed to a transmitter in multidrop mode, it will alternate the display between “current fixed” and the specified meter output(s).

Figure 3-5. Typical Multidrop Network



The 3051S is set to address zero (0) at the factory, which allows operation in the standard point-to-point manner with a 4–20 mA output signal. To activate multidrop communication, the transmitter address must be changed to a number from 1 to 15. This change deactivates the 4–20 mA analog output, sending it to 4 mA. It also disables the failure mode alarm signal, which is controlled by the upscale/downscale switch/jumper position. Failure signals in multidropped transmitters are communicated through HART messages.

## Changing a Transmitter Address

| Fast Keys | 1, 4, 3, 3, 1 |
|---|---|

To activate multidrop communication, the transmitter poll address must be assigned a number from 1 to 15, and each transmitter in a multidropped loop must have a unique poll address.

**HART Communicator v1.8**

1. From the **HOME** screen, enter the fast key sequence “Changing a Transmitter Address.”

**AMS v7.0**

Right click on the device and select “Configure” from the menu.

1. In the “HART” tab, in “ID” box, enter poll address located in the “Poll addr” box, click **Apply**.
2. After carefully reading the warning provided, select **yes**.

## Communicating with a Multidropped Transmitter

| Fast Keys | Left arrow, 3, 1, 1 |
|---|---|

**HART Communicator v1.8**

To communicate with a multidropped transmitter, configure the HART Communicator to poll for a non-zero address.

1. From the **HOME** screen, enter the fast key sequence “Communicating with a Multidropped Transmitter.”
2. On the polling menu, scroll down and select “Digital Poll.” In this mode, the HART Communicator automatically polls for devices at addresses 0-15 upon start up.

**AMS v7.0**

Click on the HART modem icon and select “Scan All Devices.”

## Polling a Multidropped Transmitter

| Fast Keys | Left arrow, 3, 1 |
|---|---|

Polling a multidropped loop determines the model, address, and number of transmitters on the given loop.

**HART Communicator v1.8**

1. From the **HOME** screen, enter the fast key sequence “Polling a Multidropped Transmitter.”

**AMS v7.0**

Click on the HART modem icon and select “Scan All Devices.”

# Section 4 Operation and Maintenance



## OVERVIEW

This section contains information on commissioning and operating 3051S Pressure Transmitters. Tasks that should be performed on the bench prior to installation are explained in this section.

Instructions for performing configuration functions are given for HART Communicator version 1.8 and AMS version 7.0. For convenience, HART Communicator fast key sequences are labeled “Fast Keys” for each software function below the appropriate headings.

## CALIBRATION FOR HART PROTOCOL

Calibrating a 3051S transmitter may include the following procedures:

- Rerange: Sets the 4 and 20 mA points at required pressures.
- Sensor Trim: Adjusts the position of the factory sensor characterization curve to optimize performance over a specified pressure range, or to adjust for mounting effects.
- Analog Output Trim: Adjusts the analog output to match the plant standard or the control loop.

The 3051S SuperModule uses a microprocessor that contains information about the sensor’s specific characteristics in response to pressure and temperature inputs. A smart transmitter compensates for these sensor variations. The process of generating the sensor performance profile is called factory sensor characterization. Factory sensor characterization also provides the ability to readjust the 4 and 20 mA points without applying pressure to the transmitter.

Trim and rerange functions also differ. Reranging sets analog output to the selected upper and lower range points and can be done with or without an applied pressure. Reranging does not change the factory sensor characterization curve stored in the microprocessor. Sensor trimming requires an accurate pressure input and adds additional compensation that adjusts the position of the factory sensor characterization curve to optimize performance over a specific pressure range.

**NOTE**
Sensor trimming adjusts the position of the factory sensor characterization curve. It is possible to degrade performance of the transmitter if the trim is done improperly or with inaccurate equipment.

Table 4-1. Recommended Calibration Tasks

| Transmitter | Bench Calibration Tasks | Field Calibration Tasks |
|---|---|---|
| 3051S_ CD<br>3051S_ CG<br>3051S_ L<br>3051S_TG, Range 1-4 | 1. Set output configuration parameters:<br>a. Set the range points.<br>b. Set the output units.<br>c. Set the output type.<br>d. Set the damping value.<br>2. *Optional*: Perform a sensor trim. (Accurate pressure source required)<br>3. *Optional*: Perform an analog output trim. (Accurate multimeter required) | 1. Reconfigure parameters if necessary.<br>2. Zero trim the transmitter to compensate for mounting effects or static pressure effects. |
| 3051S_ CA<br>3051S_ TA<br>3051S_ TG, Range 5 | 1. Set output configuration parameters:<br>a. Set the range points.<br>b. Set the output units.<br>c. Set the output type.<br>d. Set the damping value.<br>2. *Optional*: Perform a sensor trim if equipment available (accurate absolute pressure source required), otherwise perform the low trim value section of the sensor trim procedure.<br>3. *Optional*: Perform an analog output trim (Accurate multimeter required) | 1. Reconfigure parameters if necessary.<br>2. Perform low trim value section of the sensor trim procedure to correct for mounting position effects. |

**NOTE:**
A HART communicator is required for all sensor and output trim procedures.

Rosemount 3051S_C Range 4 and Range 5 transmitters require a special calibration procedure when used in differential pressure applications under high static line pressure (see “Compensating for Line Pressure” on page 4-10).

Rosemount 3051S_TG Range 5 transmitters use an absolute sensor that requires an accurate absolute pressure source to perform the optional sensor trim.

## Calibration Overview

Complete calibration of the 3051S pressure transmitter involves the following tasks:

**Configure the analog output parameters**

- Set Process Variable Units (page 3-8)
- Set Output Type (page 3-8)
- Rerange (page 3-9)
- Set Damping (page 3-11)

**Calibrate the sensor**

- Sensor Trim (page 4-6)
- Zero Trim (page 4-6)

**Calibrate the 4–20 mA output**

- 4–20 mA Output Trim (page 4-8); or
- 4–20 mA Output Trim Using Other Scale (page 4-9)

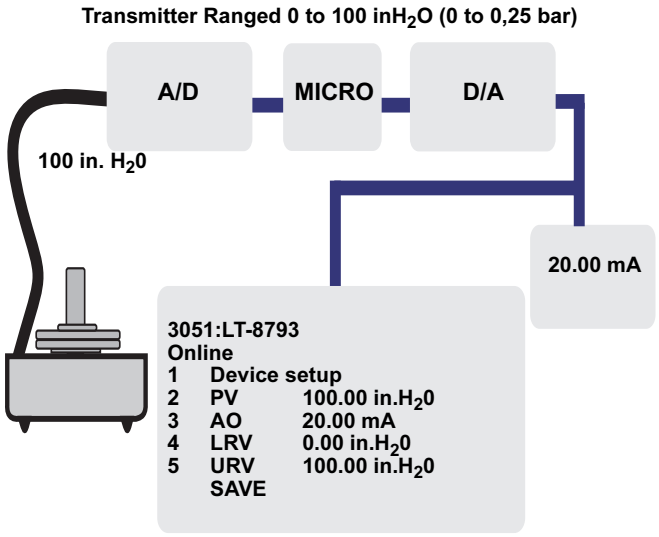
Figure 4-1 on page 4-3 illustrates 3051S transmitter data flow. Data flow can be summarized in four major steps:

1. A change in pressure is measured by a change in the sensor output (Sensor Signal).
2. The sensor signal is converted to a digital format that is understood by the microprocessor (Analog-to-Digital Signal Conversion).
3. Corrections are performed in the microprocessor to obtain a digital representation of the process input (Digital PV).
4. The Digital PV is converted to an analog value (Digital-to-Analog Signal Conversion).

Figure 4-1 also identifies the approximate transmitter location for each calibration task. Data flows from left to right, and a parameter change affects all values to the right of the changed parameter.

Not all calibration procedures should be performed for each 3051S transmitter. Some procedures are appropriate for bench calibration, but should not be performed during field calibration. Table 4-1 identifies the recommended calibration procedures for each type of 3051S transmitter for bench or field calibration.

Figure 4-1. Transmitter Data Flow with Calibration Options




**NOTE**
**Value on communicator screen PV line should equal the input pressure.**
**Value on communicator screen AO line should equal the output device reading.**

## Determining Calibration Frequency

Calibration frequency can vary greatly depending on the application, performance requirements, and process conditions. Use the following procedure to determine calibration frequency that meets the needs of your application.

1. Determine the performance required for your application.
2. Determine the operating conditions.
3. Calculate the Total Probable Error (TPE).
4. Calculate the stability per month.
5. Calculate the calibration frequency.

### Sample Calculation

Step 1: Determine the performance required for your application.

Required Performance: 0.30% of span

Step 2: Determine the operating conditions.

| | |
|---|---|
| Transmitter: | 3051S_CD, Range 2A [URL=250 in$H_2O$(623 mbar)], classic performance |
| Calibrated Span: | 150 in$H_2O$ (374 mbar) |
| Ambient Temperature Change: | ± 50 °F (28 °C) |
| Line Pressure: | 500 psig (34,5 bar) |

Step 3: Calculate total probable error (TPE).

$$TPE = \sqrt{(ReferenceAccuracy)^2 + (TemperatureEffect)^2 + (StaticPressureEffect)^2} = 0.112\% \text{ of span}$$

Where:

Reference Accuracy = ± 0.055% of span

Ambient Temperature Effect =

$$\pm\left(\frac{0.0125 \times URL}{Span} + 0.0625\right) \text{per } 50\ ^\circ F = \pm 0.0833\% \text{ of span}$$

Span Static Pressure Effect[1] =

0.1% reading per 1000 psi (69 bar) = ±0.05% of span at maximum span

*(1) Zero static pressure effect removed by zero trimming at line pressure.*

Step 4: Calculate the stability per month.

$$Stability = \pm\left[\frac{(0.125 \times URL)}{Span}\right]\% \text{ of span for 5 years} = \pm 0.0035\% \text{ of span per month}$$

Step 5: Calculate calibration frequency.

$$\text{Cal. Freq.} = \frac{(\text{Req. Performance} - TPE)}{\text{Stability per Month}} = \frac{(0.3\% - 0.112\%)}{0.0035\%} = 54 \text{ months}$$

## Choosing a Trim Procedure

To decide which trim procedure to use, you must first determine whether the analog-to-digital section or the digital-to-analog section of the transmitter electronics needs trimming. Refer to Figure 4-1 and perform the following procedure:

1. Connect a pressure source, a HART Communicator or AMS, and a digital readout device to the transmitter.
2. Establish communication between the transmitter and the HART Communicator.
3. Apply pressure equal to the upper range point pressure.
4. Compare the applied pressure to the pressure process variable value on the Process Variables menu on the HART Communicator or the Process Variables screen in AMS. For instructions on how to access process variables, see page 3-7 of Section 3: Configuration.
   a. If the pressure reading does not match the applied pressure (with high-accuracy test equipment), perform a sensor trim. See “Sensor Trim Overview” on page 4-5 to determine which trim to perform.
5. Compare the Analog Output (AO) line, on the HART Communicator or AMS, to the digital readout device.
   a. If the AO reading does not match the digital readout device (with high-accuracy test equipment), perform an analog output trim. See “Analog Output Trim” on page 4-7.

## Sensor Trim Overview

Trim the sensor using either sensor or zero trim functions. Trim functions vary in complexity and are application-dependent. Both trim functions alter the transmitter’s interpretation of the input signal.

Zero trim is a single-point offset adjustment. It is useful for compensating for mounting position effects and is most effective when performed with the transmitter installed in its final mounting position. Since this correction maintains the slope of the characterization curve, it should not be used in place of a sensor trim over the full sensor range.

When performing a zero trim with a manifold, refer to Manifold Operation on page 2-23.

**NOTE**
Do not perform a zero trim on 3051S Absolute pressure transmitters. Zero trim is zero based, and absolute pressure transmitters reference absolute zero. To correct mounting position effects on a 3051S Absolute Pressure Transmitter, perform a low trim within the sensor trim function. The low trim function provides an offset correction similar to the zero trim function, but it does not require zero-based input.

Sensor trim is a two-point sensor calibration where two end-point pressures are applied, and all output is linearized between them. Always adjust the low trim value first to establish the correct offset. Adjustment of the high trim value provides a slope correction to the characterization curve based on the low trim value. The trim values allow you to optimize performance over your specified measuring range at the calibration temperature.

## Zero Trim

| Fast Keys | 1, 2, 3, 3, 1 |
|---|---|

**NOTE**
The transmitter must be within three percent of true zero (zero-based) in order to calibrate with zero trim function.

### HART Communicator

Calibrate the sensor with a HART Communicator using the zero trim function as follows:

1. Vent the transmitter and attach a HART Communicator to the measurement loop.
2. From the **HOME** screen, follow the fast key sequence “Zero Trim.”
3. Follow the commands provided by the HART Communicator to complete the zero trim adjustment.

### AMS

Right click on the device and select “Calibrate,” then “Zero trim” from the menu.

1. Click **Next** after setting the control loop to manual.
2. Click **Next** to acknowledge warning.
3. Click **Next** after applying appropriate pressure to sensor.
4. Select **Next** to acknowledge the loop can be returned to automatic control.
5. Select **Finish** to acknowledge the method is complete.

## Sensor Trim

| Fast Keys | 1, 2, 3, 3 |
|---|---|

**NOTE**
Use a pressure input source that is at least three times more accurate than the transmitter, and allow the input pressure to stabilize for ten seconds before entering any values.

### HART Communicator

To calibrate the sensor with a HART Communicator using the sensor trim function, perform the following procedure:

1. Assemble and power the entire calibration system including a transmitter, HART Communicator, power supply, pressure input source, and readout device.
2. From the **HOME** screen, enter the fast key sequence under “Sensor Trim.”
3. Select 2: Lower sensor trim. The lower sensor trim value should be the sensor trim point that is closest to zero.

**NOTE**
Select pressure input values so that lower and upper values are equal to or outside the 4 and 20 mA points. Do not attempt to obtain reverse output by reversing the high and low points. This can be done by going to “Rerange” on page 3-9 of Section 3: Configuration. The transmitter allows approximately five percent deviation.

4. Follow the commands provided by the HART Communicator to complete the adjustment of the lower value.
5. Repeat the procedure for the upper value, replacing 2: Lower sensor trim with 3: Upper sensor trim in Step 3.

**AMS**

Right click on the device and select “Calibrate,” then “Sensor trim” from the menu.

1. Select “Lower sensor trim.” The lower sensor trim value should be the sensor trim point that is closest to zero.
2. Click **Next** after setting the control loop to manual.
3. Click **Next** after applying appropriate pressure to sensor.
4. Select **Next** to acknowledge the loop can be returned to automatic control.
5. Select **Finish** to acknowledge the method is complete.
6. Right click on the device and select “Calibrate,” select “Sensor trim” from the menu.
7. Select “Upper sensor trim” and repeat steps 2-5.

## Recall Factory Trim—Sensor Trim

| Fast Keys | 1, 2, 3, 4, 1 |
|---|---|

The Recall Factory Trim—Sensor Trim command allows the restoration of the as-shipped factory settings of the sensor trim. This command can be useful for recovering from an inadvertent zero trim of an absolute pressure unit or inaccurate pressure source.

**HART Communicator**

Enter the fast key sequence “Recall Factory Trim—Sensor Trim.”

**AMS**

Right click on the device and select “Calibrate,” then “Recall Factory Trim” from the menu.

1. Click **Next** after setting the control loop to manual.
2. Select “Sensor trim” under “Trim to recall” and click **Next**.
3. Click **Next** to acknowledge restoration of trim values is complete.
4. Select **Next** to acknowledge the loop can be returned to automatic control.
5. Select **Finish** to acknowledge the method is complete.

## Analog Output Trim

The Analog Output Trim commands allow you to adjust the transmitter’s current output at the 4 and 20 mA points to match the plant standards. This command adjusts the digital to analog signal conversion (see Figure 4-1 on page 4-3).

## Digital-to-Analog Trim

| Fast Keys | 1, 2, 3, 2, 1 |
|---|---|

### HART Communicator

To perform a digital-to-analog trim with a HART Communicator, perform the following procedure.

1. From the **HOME** screen, enter the fast key sequence “Digital-to-Analog Trim.” Select **OK** after setting the control loop to manual, see “Setting the Loop to Manual” on page 3-2.
2. Connect an accurate reference milliamp meter to the transmitter at the **CONNECT REFERENCE METER** prompt. Connect the positive lead to the positive terminal and the negative lead to the test terminal in the transmitter terminal compartment, or shunt power through the reference meter at some point.
3. Select **OK** after connecting the reference meter.
4. Select **OK** at the **SETTING FLD DEV OUTPUT TO 4 MA** prompt. The transmitter outputs 4.0 mA.
5. Record the actual value from the reference meter, and enter it at the **ENTER METER VALUE** prompt. The HART Communicator prompts you to verify whether or not the output value equals the value on the reference meter.
6. Select 1: Yes, if the reference meter value equals the transmitter output value, or 2: No if it does not.
   a. If 1 is selected: Yes, proceed to Step 7.
   b. If 2 is selected: No, repeat Step 5.
7. Select **OK** at the **SETTING FLD DEV OUTPUT TO 20 MA** prompt, and repeat Steps 5 and 6 until the reference meter value equals the transmitter output value.
8. Select **OK** after the control loop is returned to automatic control.

### AMS

Right click on the device and select “Calibrate,” then “D/A Trim” from the menu.

1. Click **Next** after setting the control loop to manual.
2. Click **Next** after connecting the reference meter.
3. Click **Next** at the “Setting fld dev output to 4mA” screen.
4. Record the actual value from the reference meter, and enter it at the “Enter meter value” screen and click **Next**.
5. Select **Yes**, if the reference meter value equals the transmitter output value, or **No** if it does not. Click **Next**.
   a. If Yes is selected, proceed to Step 6.
   b. If No is selected, repeat Step 4.
6. Click **Next** at the “Setting fld dev output to 20mA” screen.
7. Repeat Step 4 - Step 5 until the reference meter equals the transmitter output value.
8. Select **Next** to acknowledge the loop can be returned to automatic control.
9. Select **Finish** to acknowledge the method is complete.

## Digital-to-Analog Trim Using Other Scale

| Fast Keys | 1, 2, 3, 2, 2 |
|---|---|

The Scaled D/A Trim command matches the 4 and 20 mA points to a user selectable reference scale other than 4 and 20 mA (for example, 1 to 5 volts if measuring across a 250 ohm load, or 0 to 100 percent if measuring from a Distributed Control System (DCS)). To perform a scaled D/A trim, connect an accurate reference meter to the transmitter and trim the output signal to scale, as outlined in the Output Trim procedure.

**NOTE**
Use a precision resistor for optimum accuracy. If you add a resistor to the loop, ensure that the power supply is sufficient to power the transmitter to a 20 mA output with additional loop resistance.

### HART Communicator

Enter the fast key sequence “Digital-to-Analog Trim Using Other Scale.”

### AMS

Right click on the device and select “Calibrate,” then “Scaled D/A trim” from the menu.

1. Click **Next** after setting the control loop to manual.
2. Select **Change** to change scale, click **Next**.
3. Enter Set scale-Lo output value, click **Next**.
4. Enter Set scale-Hi output value, click **Next**.
5. Click **Next** to proceed with Trim.
6. Click **Next** after connecting the reference meter.
7. Click **Next** at the “Setting fld dev output to 4 mA” screen.
8. Record the actual value from the reference meter, and enter it at the “Enter meter value” screen and click **Next**.
9. Select **Yes**, if the reference meter value equals the transmitter output value, or **No** if it does not. Click **Next**.
   a. If Yes is selected, proceed to Step 10.
   b. If No is selected, repeat Step 8.
10. Click **Next** at the “Setting fld dev output to 20mA” screen.
11. Repeat Step 8 - Step 9 until the reference meter equals the transmitter output value.
12. Select **Next** to acknowledge the loop can be returned to automatic control.
13. Select **Finish** to acknowledge the method is complete.

## Recall Factory Trim—Analog Output

| Fast Keys | 1, 2, 3, 4, 2 |
|---|---|

The Recall Factory Trim—Analog Output command allows the restoration of the as-shipped factory settings of the analog output trim. This command can be useful for recovering from an inadvertent trim, incorrect Plant Standard or faulty meter.

**HART Communicator**

Enter the fast key sequence “Recall Factory Trim—Analog Output.”

**AMS**

Right click on the device and select “Calibrate,” then “Recall Factory Trim” from the menu.

1. Click **Next** after setting the control loop to manual.
2. Select “Analog output trim” under “Trim to recall” and click **Next**.
3. Click **Next** to acknowledge restoration of trim values is complete.
4. Select **Next** to acknowledge the loop can be returned to automatic control.
5. Select **Finish** to acknowledge the method is complete.

## Compensating for Line Pressure

The Rosemount 3051S Range 4 and 5 pressure transmitters require a special calibration procedure when used in differential pressure applications. The purpose of this procedure is to optimize transmitter performance by reducing the effect of static line pressure in these applications. The 3051S differential pressure transmitters (Ranges 0, 1, 2, and 3) do not require this procedure because optimization occurs in the sensor.

Applying high static pressure to the 3051S Range 4 and Range 5 pressure transmitters causes a systematic shift in the output. This shift is linear with static pressure; correct it by performing the “Sensor Trim” procedure on page 4-6.

The following specifications show the static pressure effect for the 3051S Range 4 and Range 5 transmitters used in differential pressure applications:

**Zero Effect:**
± 0.1% of the upper range limit per 1000 psi (69 bar) for line pressures from 0 to 2000 psi (0 to 138 bar)

For line pressures above 2000 psi (138 bar), the zero effect error is ± 0.2% of the upper range limit plus an additional ± 0.2% of upper range limit error for each 1000 psi (69 bar) of line pressure above 2000 psi (138 bar).

Example: Line pressure is 3000 psi (207 bar). Zero effect error calculation:

± {0.2 + 0.2 x [3 kpsi - 2 kpsi]} = ± 0.4% of the upper range limit

**Span Effect:**
Correctable to ±0.2% of reading per 1000 psi (69 bar) for line pressures from 0 to 3626 psi (0 to 250 bar)

The systematic span shift caused by the application of static line pressure is -1.00% of reading per 1000 psi (69 bar) for Range 4 transmitters, and -1.25% of reading per 1000 psi (69 bar) for Range 5 transmitters.

Use the following example to compute corrected input values.

**Example**
A transmitter with model number 3051S_CD4 will be used in a differential pressure application where the static line pressure is 1200 psi (83 bar). The transmitter output is ranged with 4 mA at 500 in$H_2O$ (1,2 bar) and 20 mA at 1500 in$H_2O$ (3,7 bar).

To correct for systematic error caused by high static line pressure, first use the following formulas to determine corrected values for the low trim and high trim.

**LT = LRV + S x (LRV) x P**

| | | |
|---|---|---|
| Where: | LT = | Corrected Low Trim Value |
| | LRV = | Lower Range Value |
| | S = | –(Span shift per specification) |
| | P = | Static Line Pressure |

**HT = URV + S x (URV) x P**

| | | |
|---|---|---|
| Where: | HT = | Corrected High Trim Value |
| | URV = | Upper Range Value |
| | S = | –(Span shift per specification) |
| | P = | Static Line Pressure |

In this example:

| | |
|---|---|
| URV = | 1500 in$H_2O$ (3.74 bar) |
| LRV = | 500 in$H_2O$ (1.25 bar) |
| P = | 1200 psi (82.74 bar) |
| S = | ± 0.01/1000 |

To calculate the low trim (LT) value:

| | |
|---|---|
| LT = | 500 + (0.01/1000)(500)(1200) |
| LT = | 506 in$H_2O$ (1.26 bar) |

To calculate the high trim (HT) value:

| | |
|---|---|
| HT = | 1500 + (0.01/1000)(1500)(1200) |
| HT = | 1518 in$H_2O$ (3.78 bar) |

Complete a 3051S sensor trim and enter the corrected values for low trim (LT) and high trim (HT), refer to “Sensor Trim” on page 4-6.

Enter the corrected input values for low trim and high trim through the HART Communicator keypad after you apply the  value of pressure as the transmitter input.

**NOTE**
After sensor trimming 3051S Range 4 and 5 transmitters for high differential pressure applications, verify that the 4 and 20 mA points are at  values using the HART Communicator. For the example above, this would be 500 and 1500 respectively. The zero effect can be eliminated by doing a zero sensor trim at line pressure after installation without affecting the completed calibration.

## Diagnostic Messages

In addition to output, the LCD display displays abbreviated operation, error, and warning messages for troubleshooting. Messages appear according to their priority; normal operating messages appear last. To determine the cause of a message, use a HART Communicator or AMS to further interrogate the transmitter. A description of each LCD diagnostic message follows.

### Error Indicator

An error indicator message appears on the LCD display to warn of serious problems affecting the operation of the transmitter. The meter displays an error message until the error condition is corrected, “ERROR” appears at the bottom of the display, and analog output is driven to the specified alarm level. No other transmitter information is displayed during an alarm condition.

**FAIL MODULE**
The SuperModule is malfunctioning. Possible sources of problems include:

Pressure or temperature updates are not being received in the SuperModule.

A non-volatile memory fault that will affect transmitter operation has been detected in the module by the memory verification routine.

Some non-volatile memory faults are user-repairable. Use a HART Communicator or AMS to diagnose the error and determine if it is repairable. Any error message that ends in “Factory” is not repairable. In cases of non-user-repairable errors, replace the SuperModule. See “Disassembly Procedures” on page 5-3.

**FAIL CONFIG**
A memory fault has been detected in a location that could effect transmitter operation, and is user-accessible. To correct this problem, use a HART Communicator or AMS to interrogate and reconfigure the appropriate portion of the transmitter memory.

### Warnings

Warnings appear on the LCD display to alert you of user-repairable problems with the transmitter, or current transmitter operations. Warnings appear alternately with other transmitter information until the warning condition is corrected or the transmitter completes the operation that warrants the warning message.

**PV LIMIT**
The primary variable read by the transmitter is outside of the transmitter’s range.

**NONPV LIMIT**
A non-primary variable read by the transmitter is outside of the transmitter’s range.

**CURR SAT**
The primary variable read by the module is outside of the specified range, and the analog output has been driven to saturation levels.

**XMRT INFO**
A non-volatile memory fault has been detected in the transmitter memory by the memory verification routine. The memory fault is in a location containing transmitter information. To correct this problem, use a HART Communicator or AMS to interrogate and reconfigure the appropriate portion of the transmitter memory. This warning does not effect the transmitter operation.

**PRESS ALERT**
A HART alert when the pressure variable read by the transmitter is outside of the user set alert limits.

**TEMP ALERT**
A HART alert when the sensor temperature variable read by the transmitter is outside of the user set alert limits.

### Operation

Normal operation messages appear on the LCD display to confirm actions or inform you of transmitter status. Operation messages are displayed with other transmitter information, and warrant no action to correct or alter the transmitter settings.

**LOOP TEST**

A loop test is in progress. During a loop test or 4–20 mA trim, the analog output is set to a fixed value. The meter display alternates between the current selected in milliamps and “LOOP TEST.”

**ZERO PASS**
The zero value, set with the local zero adjustment button, has been accepted by the transmitter, and the output should change to 4 mA.

**ZERO FAIL**
The zero value, set with the local zero adjustment button, exceeds the maximum range down allowed for a particular range, or the pressure sensed by the transmitter exceeds the sensor limits.

**SPAN PASS**
The span value, set with the local span adjustment button, has been accepted by the transmitter, and the output should change to 20 mA.

**SPAN FAIL**
The span value, set with the local span adjustment button, exceeds the maximum range down allowed for a particular range, or the pressure sensed by the transmitter exceeds the sensor limits.

**KEYS DISABL**
This message appears during reranging with the integral zero and span buttons and indicates that the transmitter local zero and span adjustments have been disabled. The adjustments have been disabled by software commands from the HART Communicator or AMS. Keys are disabled when write protect jumper is “ON.” If alarm and security adjustments are not installed, the transmitter will operate normally with the default alarm condition alarm high and the security off.

**STUCK KEY**
The zero or span button is stuck in the depressed state or pushed too long.

## FIELD UPGRADES

### Labeling

⚠ Each housing and each SuperModule is labeled individually, so it is imperative that the approval codes on each label match exactly during upgrade. The label on the SuperModule reflects the replacement model code for reordering an assembled unit. The housing labeling will only reflect the approvals and communication protocol of the housing.

### Upgrading Electronics

The PlantWeb housing allows for electronics upgrades. Different electronics assemblies provide new functionality and are easily interchanged for upgrade. Keyed slots guide the assemblies into place, and assemblies are secured with two provided screws. If the transmitter you are intending to upgrade does not have a PlantWeb housing, refer to the spare parts section on page A-38 for ordering information.

The D1 option is available for local hardware adjustments. This option is available for both the PlantWeb and Junction Box housings. In order to use zero, span, alarm and security functions, replace the existing PlantWeb assembly with the Hardware Adjustment Interface Assembly (p/n 03151-9017-0001). Install the LCD display or hardware adjustment module to activate the hardware adjustments.

The DA1 option is available for Advanced HART Diagnostics. This option requires the use of the PlantWeb housing. In order to gain full access to the Advanced HART Diagnostic capabilities, simply add the 3051S HART Diagnostics Electronics assembly (p/n 03151-9070-0001). Before replacing the existing assembly with the new 3051S Diagnostics Electronics assembly, record the transmitter configuration. Transmitter configuration data must be reentered after adding the Advanced HART Diagnostics electronics assembly before putting the transmitter back into operation.

**Refer to “Disassembly Procedures” on page 5-3 for information on assembly.**

# Section 5 Troubleshooting



## OVERVIEW

Table 5-1 provides summarized maintenance and troubleshooting suggestions for the most common operating problems.

If you suspect malfunction despite the absence of any diagnostic messages on the HART Communicator display, follow the procedures described here to verify that transmitter hardware and process connections are in good working order. Always deal with the most likely checkpoints first.

## SAFETY MESSAGES

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

### Warnings (⚠)

**⚠WARNING**

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

- Do not remove the transmitter covers in explosive environments when the circuit is live.
- Transmitter covers must be fully engaged to meet explosion proof requirements.
- Before connecting a communicator in an explosive atmosphere, make sure that the instruments in the loop are installed according to intrinsically safe or nonincendive field wiring practices.

**Improper installation or repair of the SuperModule with high pressure option (P0) could result in death or serious injury.**

- For safe assembly, the high pressure SuperModule must be installed with ASTM A193 Class 2 Grade B8M Bolts and either a 305 manifold or a DIN-compliant traditional flange.

**Static electricity can damage sensitive components.**

- Observe safe handling precautions for static-sensitive components.

Table 5-1. Rosemount 3051S troubleshooting table

| Symptom | Corrective Actions |
|---|---|
| Transmitter milliamp reading is zero | Verify power is applied to signal terminals<br>Check power wires for reversed polarity<br>Verify terminal voltage is 10.5 to 42.4 V dc<br>Check for open diode across test terminal |
| Transmitter Not Communicating with HART Communicator | Verify the output is between 4 and 20 mA or saturation levels<br>Verify clean DC Power to transmitter (Max AC noise 0.2 volts peak to peak)<br>Check loop resistance, 250 Ω minimum (PS voltage -transmitter voltage/loop current)<br>Check if unit is addressed properly |
| Transmitter milliamp reading is low or high | Verify applied pressure<br>Verify 4 and 20 mA range points<br>Verify output is not in alarm condition<br>Verify if 4 – 20 mA output trim is required |
| Transmitter will not respond to changes in applied pressure | Check test equipment<br>Check impulse piping or manifold for blockage<br>Verify applied pressure is between the 4 and 20 mA set points<br>Verify output is not in alarm condition<br>Verify transmitter is not in Loop Test mode |
| Digital Pressure Variable reading is low or high | Check test equipment (verify accuracy)<br>Check impulse piping for blockage or low fill in wet leg<br>Verify transmitter is calibrated properly<br>Verify pressure calculations for application |
| Digital Pressure Variable reading is erratic | Check application for faulty equipment in pressure line<br>Verify transmitter is not reacting directly to equipment turning on/off<br>Verify damping is set properly for application |
| Milliamp reading is erratic | Verify power source to transmitter has adequate voltage and current<br>Check for external electrical interference<br>Verify transmitter is properly grounded<br>Verify shield for twisted pair is only grounded at one end |
| Transmitter output is normal but LCD is off<br>Diagnostics indicates an LCD problem | Replace LCD |

## DISASSEMBLY PROCEDURES

⚠ Do not remove the instrument cover in explosive atmospheres when the circuit is live.

### Remove from Service

Be aware of the following:

- Follow all plant safety rules and procedures.
- Isolate and vent the process from the transmitter before removing the transmitter from service.
- Remove all electrical leads and conduit.
- Detach the process flange by removing the four flange bolts and two alignment screws that secure it.
- Do not scratch, puncture, or depress the isolating diaphragms.
- Clean isolating diaphragms with a soft rag and a mild cleaning solution, and rinse with clear water.
- Whenever you remove 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 not damaged, reuse them.

The 3051S transmitter is attached to the process connection by four bolts and two cap screws. Remove the bolts and separate the transmitter from the process connection. Leave the process connection in place and ready for re-installation.

The 3051S in-line transmitter is attached to the process by a single hex nut process connection. Loosen the hex nut to separate the transmitter from the process.

### Remove Terminal Block

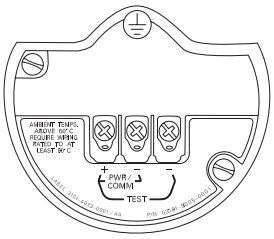
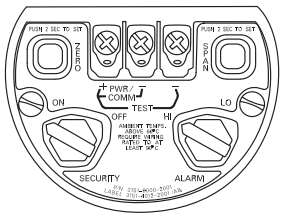
Electrical connections are located on the terminal block in the compartment labelled “FIELD TERMINALS.”

#### PlantWeb Housing

Loosen the two small screws located at the 10 o'clock and 4 o'clock positions, and pull the entire terminal block out.

#### Junction Box Housing

Loosen the two small screws located at the 8 o'clock and 4 o'clock positions, and pull the entire terminal block out. This procedure will expose the SuperModule connector, see Figure 5-1.

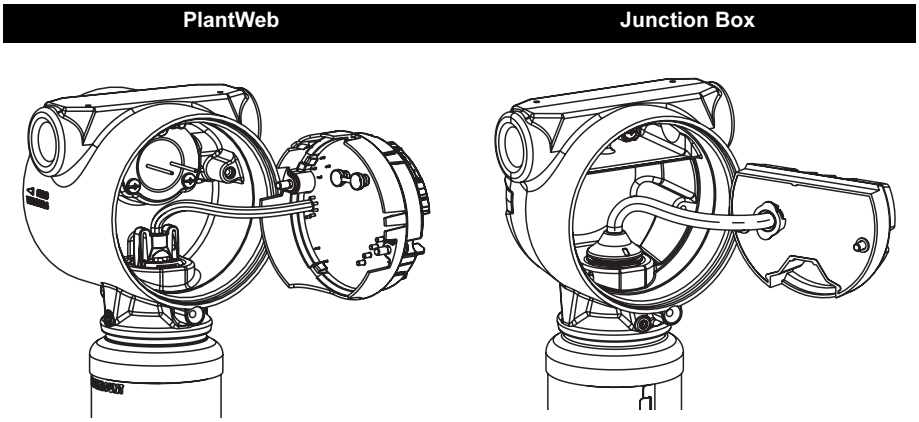
| PlantWeb | Junction Box |
|---|---|
|  |  |

## Remove Interface Assembly

The Standard Interface Assembly, Adjustment Interface Assembly, Safety Certified Electronics Assembly (with yellow casing), or HART Diagnostics Electronics Assembly (black casing with white label) is located in the compartment opposite the terminal side in the PlantWeb housing. To remove the assembly, perform the following procedure.

1. Remove the housing cover opposite the field terminal side.
2. Remove the LCD Display or Adjustment Module, if applicable. To do this, hold in the two clips and pull outward. This will provide better access to the two screws located on the Standard Interface Assembly, Adjustment Interface Assembly, Safety Certified Electronics Assembly, or HART Diagnostics Electronics Assembly.
3. Loosen the two small screws located on the assembly in the 8 o'clock and 2 o'clock positions.
4. Pull out the assembly to expose and locate the SuperModule connector, see Figure 5-1.
5. Grasp the SuperModule connector and pull upwards (avoid pulling wires). Housing rotation may be required to access locking tabs. (PlantWeb housing only)

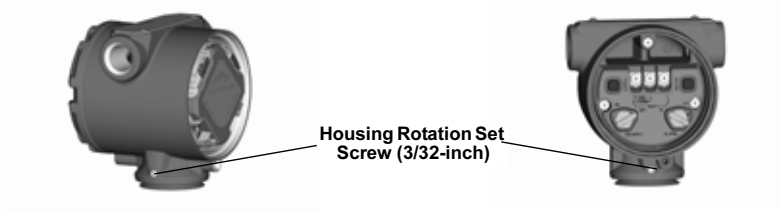
Figure 5-1. SuperModule connector view




## Remove the SuperModule from the Housing

**IMPORTANT**
To prevent damage to the SuperModule cable, disconnect it from the PlantWeb assembly or Junction Box terminal block before you remove the SuperModule from the housing.

1. Loosen the housing rotation set screw with a $^{3}/_{32}$-inch hex wrench, then rotate back one full turn.
2. Unscrew the housing from the SuperModule.



## REASSEMBLY PROCEDURES

**IMPORTANT**
The V-Seal must be installed at the bottom of the housing.

### Attach the SuperModule to the PlantWeb or Junction Box Housing

1. Apply a light coat of low temperature silicon grease to the SuperModule threads and o-ring.
2. ⚠ Thread the housing completely onto the SuperModule. The housing must be no more than one full turn from flush with the SuperModule to comply with explosion-proof requirements.
3. Tighten the housing rotation set screw using a $^{3}/_{32}$-inch hex wrench.

### Install Interface Assembly in the PlantWeb Housing

1. Apply a light coat of low temperature silicon grease to the SuperModule connector.
2. Insert the SuperModule connector into the top of the SuperModule.
3. Gently slide the assembly into the housing, making sure the pins from the PlantWeb housing properly engage the receptacles on the assembly.
4. Tighten the captive mounting screws.
5. ⚠ Attach the PlantWeb housing cover and tighten so that metal contacts metal to meet explosion-proof requirements.

### Install the Terminal Block

#### PlantWeb Housing

1. Gently slide the terminal block into the housing, making sure the pins from the PlantWeb housing properly engage the receptacles on the terminal block.
2. Tighten the captive screws on the terminal block.
3. ⚠ Attach the PlantWeb housing cover and tighten so that metal contacts metal to meet explosion-proof requirements.

#### Junction Box Housing

1. Apply a light coat of low temperature silicon grease to the SuperModule connector.
2. Insert the SuperModule connector into the top of the SuperModule.
3. Push the terminal block into the housing and hold for screw position alignment.
4. Tighten the captive mounting screws.
5. ⚠ Attach the Junction Box housing cover and tighten so that metal contacts metal to meet explosion-proof requirements.

**NOTE**
If the installation uses a manifold, see “Rosemount 305, 306 and 304 Manifolds” on page 2-21.

## Reassemble the Process Flange

⚠ 1. Inspect the SuperModule Teflon O-rings. If the O-rings are undamaged, reusing them is recommended. If the O-rings are damaged (if they have nicks or cuts, for example), replace them with new O-rings.

**NOTE**
If replacing the O-rings, be careful not to scratch or deface the O-ring grooves or the surface of the isolating diaphragm when removing the damaged O-rings.

2. Install the process flange on the SuperModule. To hold the process flange in place, install the two alignment screws to finger tight (screws are not pressure retaining). Do not overtighten; this will affect module-to-flange alignment.
3. Install the appropriate flange bolts.
   a. If the installation requires a 1/4–18 NPT connection(s), use four 1.75-in. flange bolts. Go to **step d**.
   b. If the installation requires a 1/2–14 NPT connection(s), use four 2.88-in. process flange/adapter bolts. For gage pressure configurations, use two 2.88-in. bolts and two 1.75-in. bolts. Go to **step c**.
   c. Hold the flange adapters and adapter o-rings in place while finger-tightening the bolts. Go to **step e**.
   d. Finger tighten the bolts.
   e. Tighten the bolts to the initial torque value using a crossed pattern. See Table 5-2 for appropriate torque values.
   f. Tighten the bolts to the final torque value using a crossed pattern. See Table 5-2 for appropriate torque values. When fully tightened, the bolts should extend through the top of the module housing.
   g. If the installation uses a conventional manifold, then install flange adapters on the process end of the manifold using the 1.75-in. flange bolts supplied with the transmitter.

Table 5-2. Bolt Installation Torque Values

| Bolt Material | Initial Torque Value | Final Torque Value |
|---|---|---|
| CS-ASTM-A445 Standard | 300 in-lb. (34 N-m) | 650 in-lb. (73 N-m) |
| 316 SST—Option L4 | 150 in-lb. (17 N-m) | 300 in-lb. (34 N-m) |
| ASTM-A-193-B7M—Option L5 | 300 in-lb. (34 N-m) | 650 in-lb. (73 N-m) |
| *Monel*®—Option L6 | 300 in-lb. (34 N-m) | 650 in-lb. (73 N-m) |
| ASTM-A-453-660—Option L7 | 150 in-lb. (17 N-m) | 300 in-lb. (34 N-m) |
| ASTM-A-193-B8M—Option L8 | 150 in-lb. (17 N-m) | 300 in-lb. (34 N-m) |

4. If you replaced the Teflon SuperModule o-rings, re-torque the flange bolts after installation to compensate for cold flow.
5. Install the drain/vent valve.
   a. Apply sealing tape to the threads on the seat. Starting at the base of the valve with the threaded end pointing toward the installer, apply two clockwise turns of sealing tape.
   b. Take care to place the opening on the valve so that process fluid will drain toward the ground and away from human contact when the valve is opened.
   c. Tighten the drain/vent valve to 250 in-lb. (28.25 N-m).

**NOTE**
After replacing o-rings on Range 1 transmitters and re-installing the process flange, expose the transmitter to a temperature of 185 °F (85 °C) for two hours. Then re-tighten the flange bolts in a cross pattern, and again expose the transmitter to a temperature of 185 °F (85 °C) for two hours before calibration.

# Section 6 Safety Instrumented Systems



## SAFETY MESSAGES

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

### Warnings

**⚠WARNING**

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

- Do not remove the transmitter covers in explosive environments when the circuit is live.
- Transmitter covers must be fully engaged to meet explosion-proof requirements.
- Before connecting a communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or nonincendive field wiring practices.

**⚠WARNING**

**Electrical shock can result in death or serious injury.**

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

## CERTIFICATION

The 3051S safety certified pressure transmitter is certified to:
Low Demand; Type B
SIL 2 Capability for hardware (single use transmitter)
SIL 3 Capability for software (multiple use transmitter)

## 3051S SAFETY CERTIFIED IDENTIFICATION

All 3051S transmitters must be identified as safety certified before installing into SIS systems.

**NOTE**
There are two versions of safety certified 3051S pressure transmitters. For transmitters with a yellow SIS circuit board installed, please refer to Manual Supplement 00809-0700-4801.

To identify a safety certified 3051S:

1. Connect a HART host to the transmitter.
2. Check the software to verify that the software revision is 7 or higher.

**Fast Key Sequence - 1, 5**

| **Revision #'s** | |
|---|---|
| Fld Dev Rev | 7 |
| Software Rev | 7 |
| Hardware Rev | 16 |

3. Verify that option code QT is included in the transmitter model code.

## INSTALLATION

No special installation is required in addition to the standard installation practices outlined in this document. Always ensure a proper seal by installing the electronics housing cover(s) so that metal contacts metal if housing is used.

Environmental limits are available in the 3051S Product Data Sheet (document number 00813-0100-4801). This document can be found at *www.rosemount.com/safety/certtechdocumentation.htm.*

The loop should be designed so the terminal voltage does not drop below 10.5 Vdc when the transmitter output is 23.0 mA.

If hardware security switches are installed, the security switch should in the "ON" position during normal operation. See Figure 6-2, "Security and alarm configuration (option D1)" on page 6-4. If hardware security switches are not installed, security should be "ON" in the software to prevent accidental or deliberate change of configuration data during normal operation.

## COMMISSIONING

To commission the 3051S Safety Certified Transmitter, use the HART “Menu Tree” on page 3-5 and “Fast Key Sequence” on page 3-6.

**NOTE**
Transmitter output is not safety-rated during the following: configuration changes, multidrop, and loop test. Alternative means should be used to ensure process safety during transmitter configuration and maintenance activities.

For more information on the 375 Field Communicator see document 00809-0100-4276. AMS help can be found in the AMS on-line guides within the AMS system.

## Damping

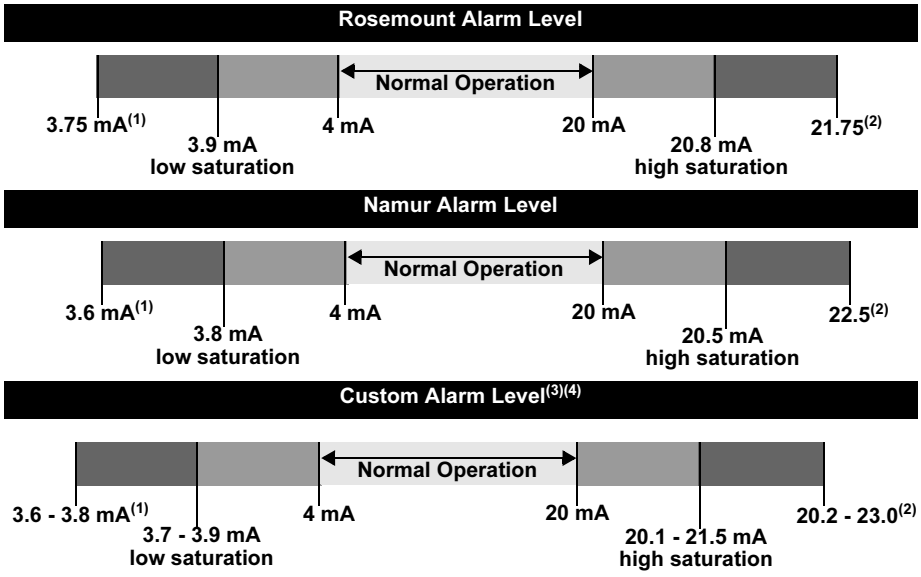
User-selected damping will affect the transmitters ability to respond to changes in the applied process. The *damping value* + *response time* should not exceed the loop requirements.

Fast Key Sequence - 1, 3, 6

## Alarm and Saturation Levels

DCS or safety logic solver should be configured to match transmitter configuration. Figure 6-1 identifies the three alarm levels available and their operation values.

Figure 6-1. Alarm Levels




*(1) Transmitter Failure, hardware or software alarm in LO position.*
*(2) Transmitter Failure, hardware or software alarm in HI position.*
*(3) High alarm must be at least 0.1 mA higher than the high saturation value.*
*(4) Low alarm must be at least 0.1 mA lower than the low saturation value.*

Setting the alarm values and direction varies whether the hardware switch option is installed. You can use a HART master or communicator to set the Alarm and Saturation values

**Switches installed**

1. If using a communicator, use the following fast key sequence to set the Alarm and Saturation values.
   Alarm Levels - Fast Key; 1, 4, 2, 7, 7
   Saturation Levels - Fast Key; 1, 4, 2, 7, 8
2. Manually set the direction for the Alarm to HI or LO using the ALARM switch as shown in Figure 6-2.

**Switches not installed**

3. If using a communicator, use the following fast key sequence to set the Alarm and Saturation values and the Alarm Direction:
   Alarm Levels - Fast Key; 1, 4, 2, 7, 7
   Saturation Levels - Fast Key; 1, 4, 2, 7, 8
   Alarm Direction Fast Key; 1, 4, 2, 7, 6

Figure 6-2. Security and alarm configuration (option D1)


## OPERATION AND MAINTENANCE

### Proof Test

The following proof tests are recommended.
Proof test results and corrective actions taken must be documented at *www.rosemount.com/safety/certtechdocumentation.htm (Report a Failure button)* in the event that an error is found in the safety functionality.

Use “Fast Key Sequence” on page 3-6 to perform a Loop Test, Analog Output Trim, or Sensor Trim.

***Proof Test 1***

Conducting an analog output Loop Test satisfies the proof test requirements and will detect more than 52% of DU failures not detected by the 3051S_C or 3051S_L automatic diagnostics, and more than 62% of DU failures not detected by the 3051S_T automatic diagnostics.

Required tools: HART host/communicator and mA meter.

1. On HART host/communicator enter the Fast Key Sequence 1, 2, 2.
2. Select “4 Other.”
3. Enter the milliampere value representing a high alarm state.
4. Check the reference meter to verify the mA output corresponds to the entered value.
5. Enter the milliampere value representing a low alarm state.
6. Check the reference meter to verify the mA output corresponds to the entered value.
7. Document the test results per your requirements.

***Proof Test 2***

This proof test, when combined with the Proof Test 1, will detect over 92% of DU failures not detected by the 3051S_C or 3051S_L automatic diagnostics, and over 95% of DU failures not detected by the 3051S_T automatic diagnostics.

Required tools: HART host/communicator and pressure calibration equipment.

1. Perform a minimum two point sensor calibration check using the 4-20mA range points as the calibration points.
2. Check the reference mA meter to verify the mA output corresponds to the pressure input value.
3. If necessary, use one of the “Trim” procedures on page 4-5.
4. Document the test results per your requirements.

**NOTE**
The user determines the proof test requirements for impulse piping.

## Inspection

**Visual Inspection**

Not required

**Special Tools**

Not required

**Product Repair**

The 3051S is repairable by major component replacement.

All failures detected by the transmitter diagnostics or by the proof-test must be reported. Feedback can be submitted electronically at *www.rosemount.com/safety/certtechdocumentation.htm (Report a Failure button)*.

## SPECIFICATIONS

The 3051S must be operated in accordance to the functional and performance specifications provided in the 3051S Product Data Sheet (document number 00813-0100-4801).

## Failure Rate Data

The FMEDA report includes failure rates and common cause Beta factor estimates.

The report is available at *www.rosemount.com/safety/certtechdocumentation.htm*.

## Product Life

50 years – based on worst case component wear-out mechanisms – not based on wear-out of process wetted materials

Report any safety related product information at *http://www.rosemount.com/safety/certtechdocumentation.htm*.

## SPARE PARTS

Additional spare parts are available in Appendix A: Specifications and Reference Data.

# Section 7 Advanced HART Diagnostics



## OVERVIEW

The 3051S Pressure Transmitter with Advanced HART Diagnostics is an extension of the Rosemount 3051S Scalable Pressure transmitter and takes full advantage of the architecture. The 3051S SuperModule™ Platform generates the pressure measurement. The Diagnostic Feature Board is mounted in the PlantWeb housing and plugs into the top of the SuperModule. The Diagnostics Feature Board communicates with the SuperModule and produces standard 4 – 20 mA and HART outputs while adding advanced diagnostic capability. The HART diagnostics are designated by the option code “DA1” in the model number. All options with the exception of the Foundation Fieldbus and Safety Instrumented Systems output codes, quick connect, and remote displays can be used with the Advanced HART Diagnostics Feature board.

The HART Diagnostic transmitter has four distinct diagnostic functions that can be used separately or in conjunction with each other to detect and alert users to conditions that were previously undetectable, or provide powerful troubleshooting tools.

1. Time Stamp – The HART Diagnostic Transmitter features an Operational Hours clock whose purpose is two-fold.
   a. Provides user the total number of operating hours of the transmitter.
   b. Provides an elapsed “Time Since” event indication or time stamping for all diagnostics.

   All time values are non-volatile and displayed in the following format: yy:ddd:hh:mm:ss (years:days:hours:minutes:seconds). The time stamping capability significantly enhances the user’s ability to troubleshoot measurement issues, particularly transient events that may be too fast to capture with DCS or PLC trending or historian capabilities.

2. Statistical Process Monitoring (SPM) – The 3051S HART Diagnostic Transmitter features patented SPM technology to detect changes in the process, process equipment or installation conditions of the transmitter. This is done by modeling the process' noise signature (using the statistical values of mean and standard deviation) under normal conditions and then comparing the baseline values to current values over time. If a significant change in the current values is detected, the transmitter can generate alerts or alarms, depending on configuration. The condition is time stamped and is also noted on the LCD. The statistical values are also available as secondary variables from the transmitter via HART if a user is interested in their own analysis or generating their own alarms or alerts.
3. Advanced Process Alerts – These alerts in the 3051S HART Diagnostics transmitter are similar to the Process Pressure and Sensor Temperature Alerts in the standard 3051S transmitter, with the addition of time stamping to document the start and elapsed time of the alert condition. Upon detection of a Process Alert condition, a HART "Alert" message is generated. The LCD will also indicate the condition.
4. Variable Logging – The 3051S HART diagnostic transmitter logs the following values: Minimum and Maximum Pressure, Minimum and Maximum Temperature, and total elapsed time in overpressure or over temperature conditions. Each of these are independently time stamped.

## HART DIAGNOSTIC USER INTERFACE

The Rosemount 3051S HART Diagnostic transmitter is available with the new Enhanced EDDL interface; DD revision 3051S HDT Dev. 1 Rev. 1 is required. The following screen shots are taken from Emerson Process Management's AMS™ Device Manager, version 7.6 or higher. Screens from other hosts that support Enhanced EDDL will look very similar. All diagnostic information and configuration can be found under the Diagnostic tab.

Figure 7-1. Diagnostics Entry Screen

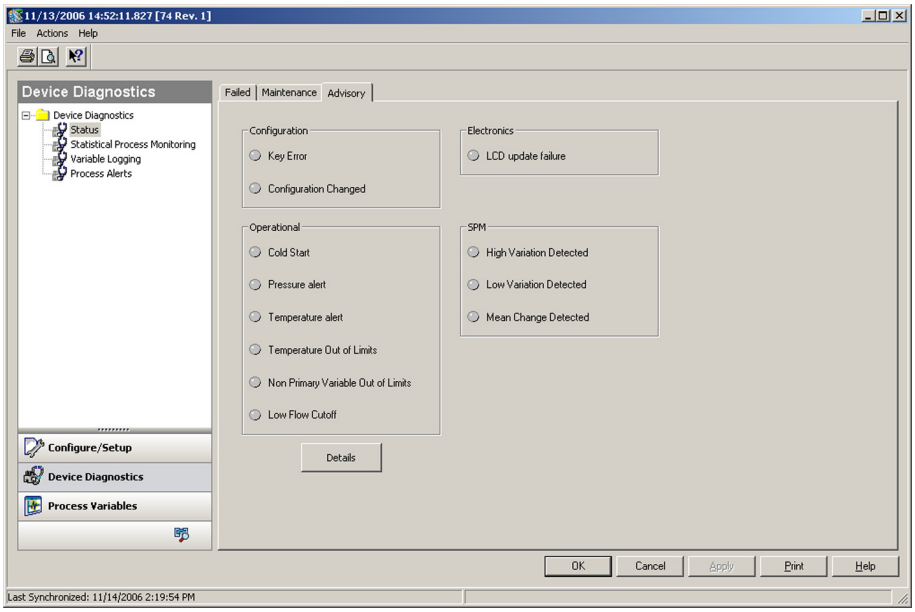



Figure 7-1 is the diagnostics entry screen. From this set of screens the transmitter's diagnostic condition can quickly be surmised. All diagnostic information from the transmitter has been categorized as either "Failed", "Maintenance", or "Advisory". The user can also easily select any of the three diagnostic functions, **Statistical Process Monitoring**, **Variable Logging**, and **Process Alerts**, to review, monitor, or configure**.**

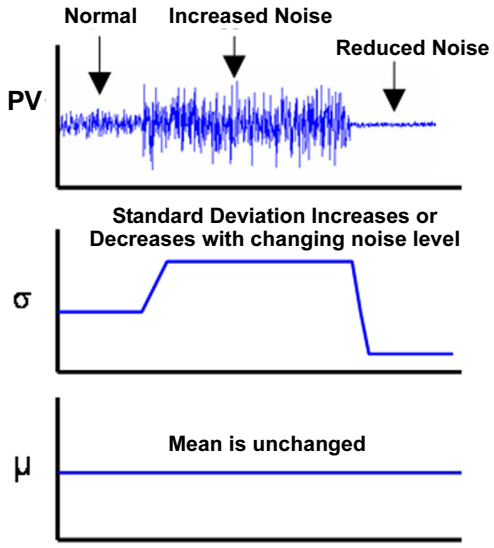
## STATISTICAL PROCESS MONITORING

### Introduction

Emerson Process Management has developed a unique technology, Statistical Process Monitoring, that provides a means for early detection of abnormal situations in a process environment. The technology is based on the premise that virtually all dynamic processes have a unique noise or variation signature when operating normally. Changes in these signatures may signal that a significant change will occur or has occurred in the process, process equipment, or transmitter installation. For example, the noise source may be equipment in the process such as a pump or agitator, the natural variation in the DP value caused by turbulent flow, or a combination of both.

The sensing of the unique signature begins with the combination of a high speed sensing device, such as the Rosemount 3051S Pressure Transmitter, with patented software resident in a Diagnostics Feature Board to compute statistical parameters that characterize and quantify the noise or variation. These statistical parameters are the mean and standard deviation of the input pressure. Filtering capability is provided to separate slow changes in the process due to setpoint changes from the process noise or variation of interest. Figure 7-2 shows an example of how the standard deviation value ($\sigma$) is affected by changes in noise level while the mean or average value ($\mu$) remains constant. The calculation of the statistical parameters within the device is accomplished on a parallel software path to the path used to filter and compute the primary output signal (such as the 4 - 20 mA output). The primary output is not affected in any way by this additional capability.

Figure 7-2. Changes in process noise or variability and affect on statistical parameters



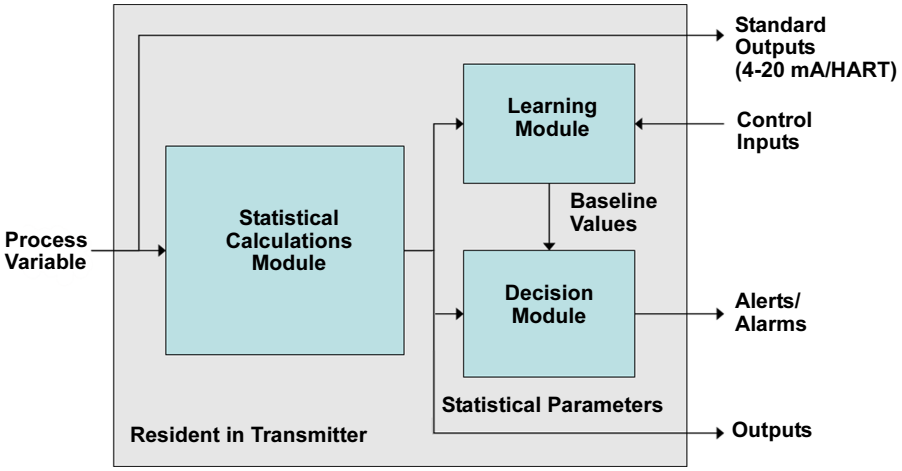

The device can provide the statistical information to the user in two ways. First, the statistical parameters can be made available to the host system directly via HART communication protocol or HART to other protocol converters. Once available, the system may make use of these statistical parameters to indicate or detect a change in process conditions. In the simplest example, the statistical values may be stored in the DCS historian. If a process upset or equipment problem occurs, these values can be examined to determine if changes in the values foreshadowed or indicated the process upset. The statistical values can then be made available to the operator directly, or made available to alarm or alert software.

Second, the device has internal software that can be used to baseline the process noise or signature via a learning process. Once the learning process is completed, the device itself can detect significant changes in the noise or variation, and communicate an alarm via the 4 – 20 mA output and/or alert via HART. Typical applications are detection of plugged impulse lines, change in fluid composition, or equipment related problems.

## Overview

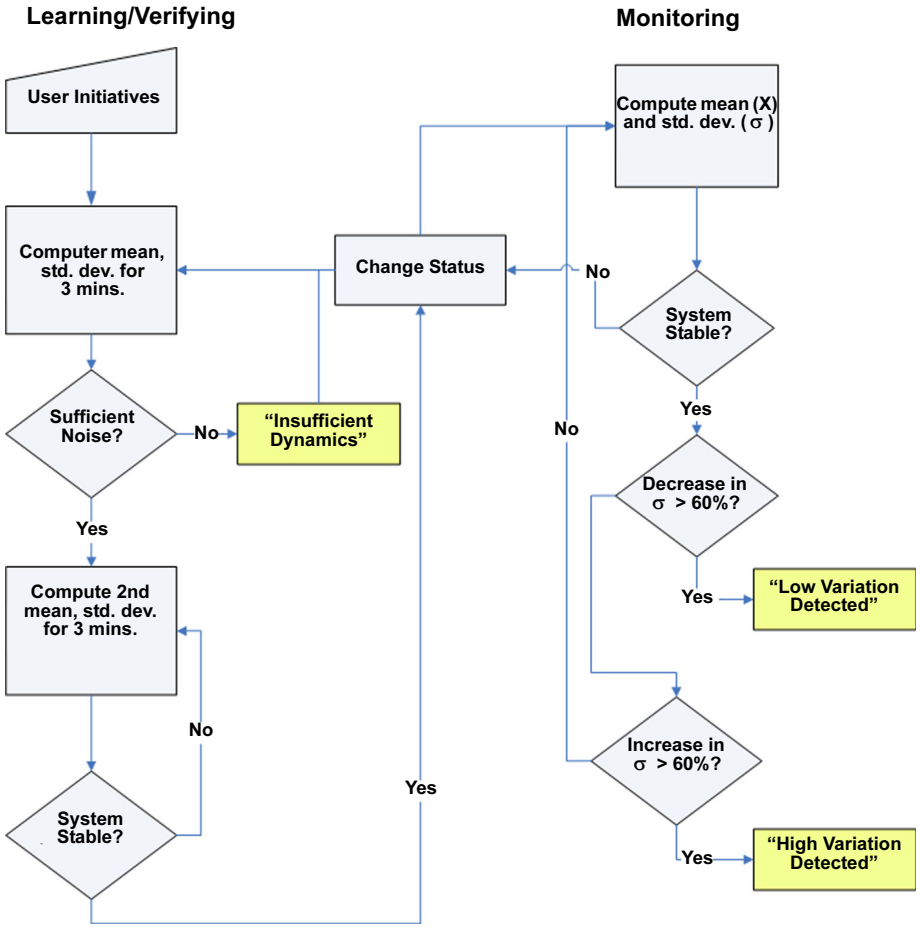
A block diagram of the Statistical Process Monitoring (SPM) diagnostic is shown in Figure 7-3. The pressure process variable is input to a module where basic high pass filtering is performed on the pressure signal. The mean (or average) is calculated on the unfiltered pressure signal, the standard deviation calculated from the filtered pressure signal. These statistical values are available via HART and handheld communication devices like the 375 Field Communicator or asset management software like Emerson Process Management's AMS™ Device Manager. The values can also be assigned as secondary variables from the device for 4-20 mA communication to the user through other devices like the Rosemount 333 HART Tri-loop (see page 7-24 for more information).

Figure 7-3. Block diagram of the Statistical Process Monitoring diagnostic resident in 3051S HART Diagnostics Transmitter




SPM also contains a learning module that establishes the baseline values for the process. Baseline values are established under user control at conditions considered normal for the process and installation. These baseline values are made available to a decision module that compares the baseline values to the most current values of the mean and standard deviation. Based on sensitivity settings and actions selected by the user via the control input, the diagnostic generates alarms, alerts, or takes other actions when a significant change is detected in either value.

Figure 7-4. Simplified SPM flowchart




Further detail of the operation of the SPM diagnostic is shown in the Figure 7-4 flowchart. This is a simplified version showing operation using the default values. While SPM continuously calculates the mean and standard deviation values, the learning and decision modules must be turned on to operate. Once enabled, SPM enters the learning/verification mode. The baseline mean and standard deviation are calculated over a period of time controlled by the user (Learning/Monitoring Period; default is 3 minutes). The status will be "Learning". A check is performed to make sure that the process has a sufficiently high noise or variability level (above the low level of internal noise inherent in the transmitter itself). If the level is too low, the diagnostic will continue to calculate baseline values until the criteria is satisfied (or turned off). A second set of values is calculated and compared to the original set to verify that the measured process is stable and repeatable. During this period, the status will change to "Verifying". If the process is stable, the diagnostic will use the last set of values as baseline values and move to "Monitoring" status. If the process is unstable, the diagnostic will continue to verify until stability is achieved. The stability criteria are also user defined.

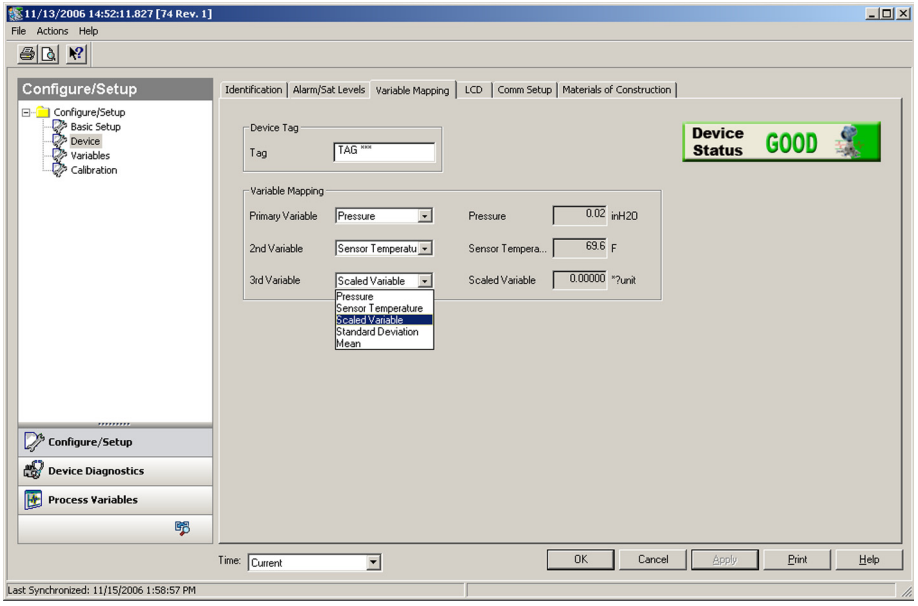
In the “Monitoring” mode, new mean and standard deviation values are continuously calculated, with new values available every second. The mean value is compared to the baseline mean value. If the mean has changed by a significant amount, the diagnostic can automatically return to the “Learning” mode. The diagnostic does this because a significant change in mean is likely due to a change in process operation and can result in a significant change in noise level (i.e. standard deviation) as well. If the mean has not changed, the standard deviation value is compared to the baseline value. If the standard deviation has changed significantly relative to the baseline, exceeding preset sensitivity settings, this may indicate a change has occurred in the process, equipment, or transmitter installation and an alert is generated via HART.

**NOTE**
The Statistical Process Monitoring diagnostic capability in the Rosemount 3051S HART Pressure Transmitter calculates and detects significant changes in statistical parameters derived from the input pressure signal. These statistical parameters relate to the variability of and the noise signals present in the pressure signal. It is difficult to predict specifically which noise sources may be present in a given pressure measurement application, the specific influence of those noise sources on the statistical parameters, and the expected changes in the noise sources at any time. Therefore, Rosemount cannot absolutely warrant or guarantee that Statistical Process Monitoring will accurately detect each specific condition under all circumstances.

## Assigning Statistical Values to Outputs

The mean and standard deviation values can be made available to other systems via HART communications or devices that convert HART variables to analog 4 – 20 mA outputs, such as Rosemount’s 333 Tri-Loop. Either value can be assigned to be a secondary or tertiary variable. This is accomplished on the **Variable Mapping** screen. See Figure 7-5.

Figure 7-5. Selection of statistical values as secondary variables.



## SPM Configuration

Figure 7-6. Main screen for Statistical Process Monitoring

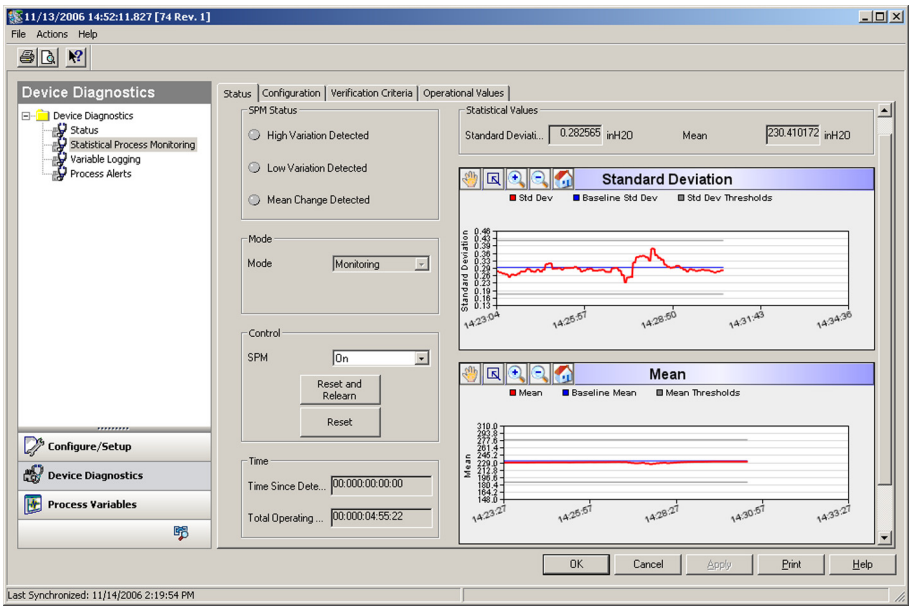


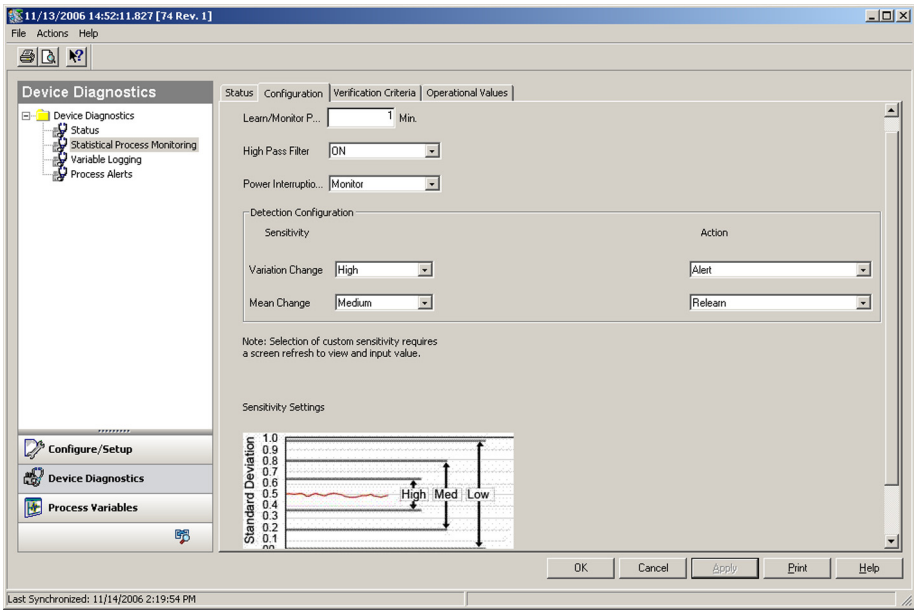

Figure 7-6 is the entry screen for the Statistical Process Monitoring diagnostic. This screen is the main screen for the SPM diagnostic results and status.

The process for correct operation of the SPM diagnostic is:

- Configure the diagnostic using the **Configuration** and **Verification Criteria** screens
- Enable the diagnostic on the **Status** screen

The configuration process starts with basic configuration on the **Configuration** screen, Figure 7-7. The configurable fields are:

Figure 7-7. SPM diagnostic configuration screen




**Learn/Monitor Period:**

This is the learning and monitoring time period that the SPM diagnostic uses to sample the pressure signal. The mean and standard deviation values determined during the learning period will become the Baseline values. Decreasing this period can speed up the set up time. Increasing this value will give a better baseline value for noisier processes, or if rapid changes in the process value result in significant increases in the standard deviation value, causing false trips of the “High Variation Detected” alert. The Learning/Monitoring Period is always in minutes. The default value is 3 minutes. The valid range is 1 to 60 minutes.

**High Pass Filter**

This filter is used to remove slow process changes so the diagnostic only focuses on the process noise. For the majority of applications, there is no reason to turn this off. The default value is “On”.

**Power Interruption**

This is used to direct what the diagnostic should do in the case of a power interruption or if the diagnostic is manually disabled and then enabled. The options are:

**Monitor**
When SPM restarts, the diagnostic enters the Monitoring Mode and uses the baseline values computed before the interruption.

**Relearn**
When SPM restarts, the diagnostic restarts in the Learning Mode and will recalculate new baseline values.

Default is “Monitor.”

### Detection Configuration

Sensitivity configuration contains two functions. The first function establishes the sensitivity/diagnostic trip values. The second determines what action the transmitter is to take if the diagnostic trips. Either of these can be changed at any time without interrupting the diagnostic.

Figure 7-8. Sensitivity Configuration


Figure 7-8 shows the default sensitivity configuration. High, medium, low and custom are the available choices, and are explained in more detail in Table 7-1 and Table 7-2.

Figure 7-9. Sensitivity set to Custom

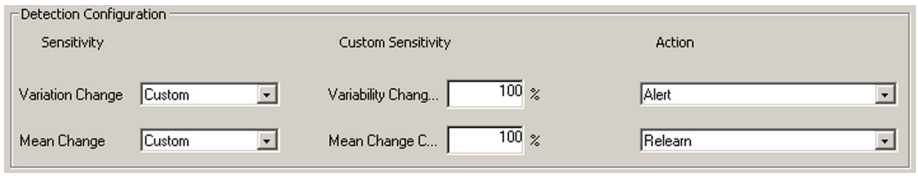



Figure 7-9 shows the “Custom Sensitivity” parameters if “Custom” is selected for Variable Change or Mean Change. The user must exit this screen and then return to this screen for these parameters to appear after “Custom” is selected.

Figure 7-10 illustrates how the sensitivity selection is displayed graphically on the **SPM Status** screen. Grey lines appear after the Learning/Verification process to indicate the trip levels. These values, along with the baseline and current mean and standard deviation values, are also available on the **Operational Values** screen.

Figure 7-10. **SPM Status** screen showing the sensitivity settings

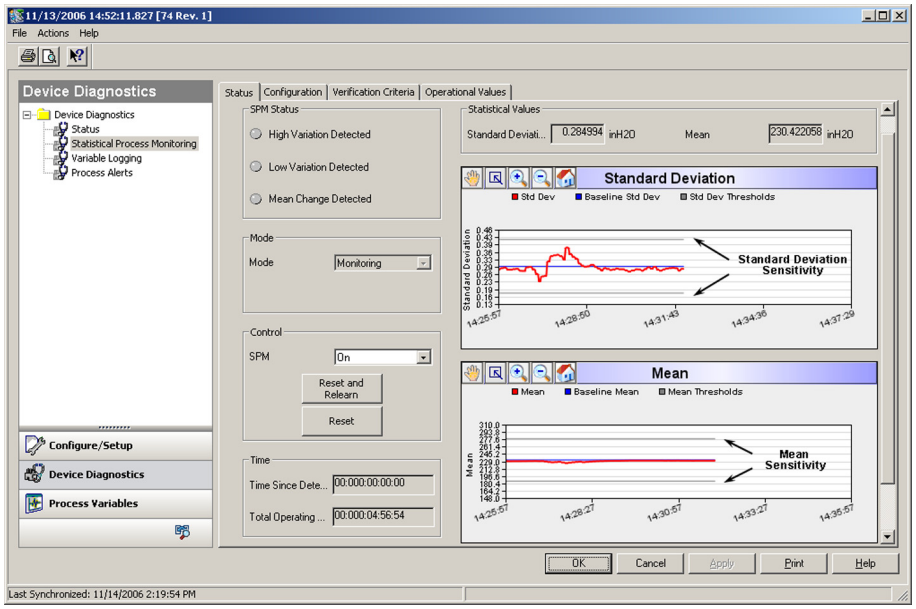



Table 7-1. Standard Deviation Sensitivity choices (regardless of transmitter type)

| | |
|---|---|
| Low | An 80% change from the baseline value will trip the diagnostic. |
| Medium(1) | A 60% change from the baseline value will trip the diagnostic. |
| High | A 40% change from the baseline will trip the diagnostic. |
| Custom | Adjustable from 1% to 10000%. |

*(1) Default.*

Table 7-2. Mean Sensitivity choices

| | DP | GP/AP |
|---|---|---|
| Low | 40% of baseline or 4% of span whichever is greater | 20% of span |
| Medium(1) | 20% of baseline or 2% of span whichever is greater | 10% of span |
| High | 10% of baseline or 1% of span whichever is greater | 5% of span |
| Custom | Adjustable from 1 to 10000% of value | Adjustable from 1 to 10000% of span |

*(1) Default.*

Figure 7-11. Sensitivity settings description

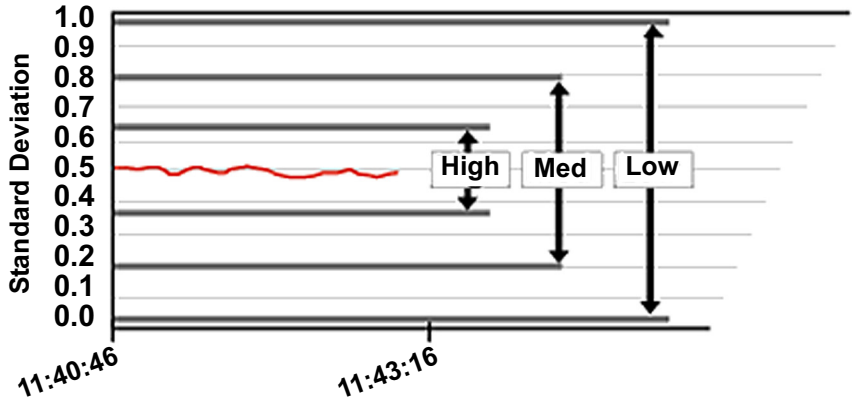



Figure 7-11 Illustrates how the sensitivity selection affects the diagnostic trip values.

The second configuration setting is the action the transmitter is to take if the diagnostic trips. The options are:

**None**
With this option selected, the transmitter provides no indication that any of the trip values were exceeded.

**Alert**
With this option selected, a diagnostic trip will only activate a HART Alert. The HART Diagnostic Alert will be displayed on any host that can communicate with the transmitter, a hand-held HART communicator, or on the LCD indicator if installed.

**Alarm**
With this option selected, a diagnostic trip will activate a HART Alert and will cause the mA output to go to the selected Failure Alarm level. The HART Diagnostic message will be displayed on any host that can communicate with the transmitter, a hand-held HART communicator, or on the LCD indicator if installed. See page 3-12 for configuration of alarm values.

**Relearn**
This option is available only for the MEAN. With this option selected, if a change in the mean exceeds the sensitivity settings, the SPM diagnostic automatically reverts back to the learn/verify process. This option is typically used if:

a. A mean change is normal or is of no interest
b. A change in the Mean causes a change in the Standard Deviation requiring a new Standard Deviation baseline for the diagnostic. This is common for flow applications.

The default is “Relearn”.

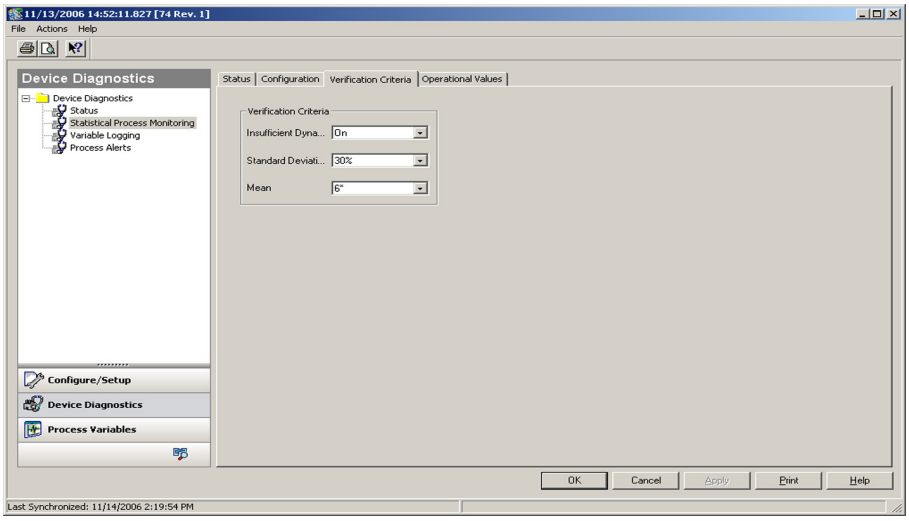
Table 7-3. SPM Diagnostic Configuration defaults

| Parameter | Default |
|---|---|
| Learning/Monitoring Period | 3 minutes |
| High Pass Filter | ON |
| Power Interruption | Monitor |
| Variation Change Sensitivity | Medium |
| Variation Change Action | Alert |
| Mean Change Sensitivity | Medium |
| Mean Change Action | Relearn |

### SPM Verification Criteria

The **Verification Criteria** screen lists the parameters the SPM diagnostic uses during the verification process to verify that the process has sufficient noise and is also stable and repeatable. Figure 7-12 shows the three parameters.

Figure 7-12. Verification criteria screen




### Insufficient Variation

The SPM diagnostic uses process noise to detect abnormal situations. Typically this check is on to insure there is sufficient noise for proper operation. In a normally quiet application where noise is the abnormal situation, this can be turned off. Default is ON.

Table 7-4. Insufficient Variation Selections

| Parameter | Definition |
|---|---|
| On | Perform insufficient variation check (default) |
| Off | Do not perform insufficient variation check |

### Standard Deviation and Mean Verification Criteria

The Standard Deviation and Mean configuration parameters define the maximum deviation from the original Baseline values derived during the Learning/Verification Mode. If these maximum values are exceeded, the diagnostic will not start/go to the Monitoring Mode, but will continue Verifying. It is best to keep these values to the minimum amount for the particular application. If the diagnostic will not leave the Verify Mode, these values should be increased. If the diagnostic remains in the verify mode at the highest level, the Learning/Monitoring period should be increased.

Table 7-5. Standard Deviation Verfication Criteria

| Parameter | Definition |
|---|---|
| None | Do not perform any standard deviation checks |
| 10% | Stay in the Verification Mode if the difference between the Learning Baseline Standard Deviation and the Verification pass is greater than 10% |
| 20%(1) | Stay in the Verification Mode if the difference between the Learning Baseline Standard Deviation and the Verification pass is greater than 20% |
| 30% | Stay in the Verification Mode if the difference between the Learning Baseline Standard Deviation and the Verification pass is greater than 30% |

*(1) Default.*

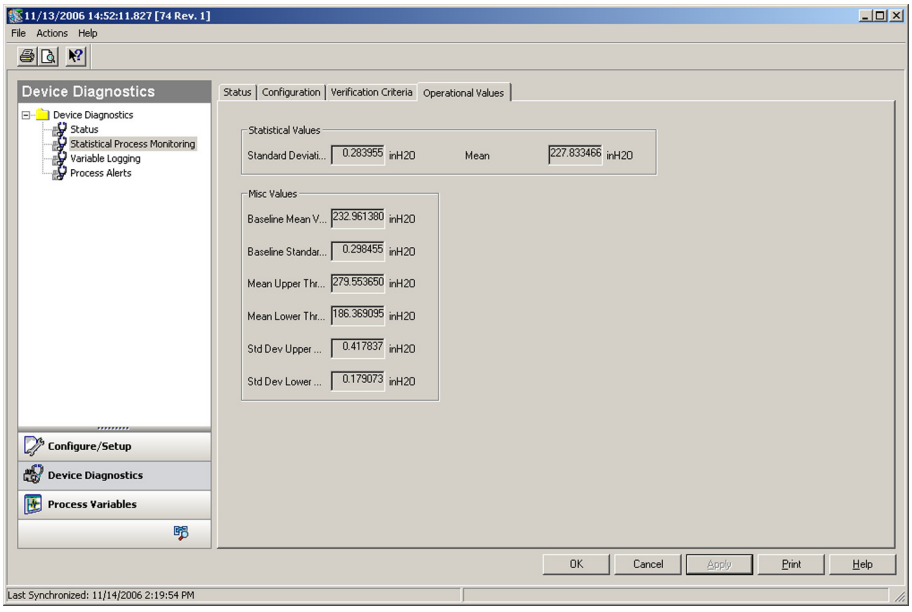
Table 7-6. Mean Verification Criteria

| Parameter | Definition |
|---|---|
| None | Do not perform any mean checks |
| 3 *(1) | Stay in the Verification Mode if the difference between the Learning Baseline Mean and the Verification pass Mean is greater than 3 times the Standard Deviation |
| 6 * | Stay in the Verification Mode if the difference between the Learning Baseline Mean and the Verification pass Mean is greater than 6 times the Standard Deviation |
| 2% | Stay in the Verification Mode if the difference between the Learning Baseline mean and the Verification pass mean is greater than 2% |

*(1) Default.*

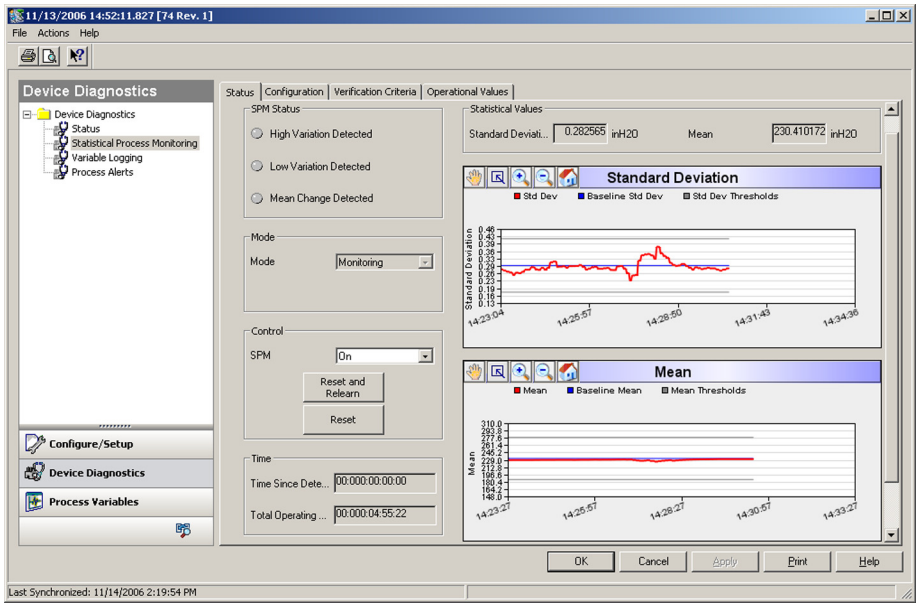
Figure 7-13. **Operational Values** Screen

The **Operational Values** screen contains the parameter values used in the SPM diagnostic in tabular form.




## SPM Operation

Figure 7-14. Turning on the SPM diagnostic



### Turning ON the SPM Diagnostic

The SPM diagnostic is enabled by selecting ON in the “Control” section shown on Figure 7-14. Upon selecting ON in the “Control” section, the diagnostic will automatically begin “Learning” with the following exception: if valid baseline values have been previously established and “Monitor” has been selected as the option for Power Interruption on the **Configuration** Screen, then the diagnostic will bypass Learning and begin Monitoring immediately. The diagnostic status will stay in the Learning mode for the Learning Period specified on the Configuration screen. After the learning period is complete, the Mode will change to Verifying and a blue line will appear on the charts indicating the learned baseline value. Upon completion of the Verify mode, the diagnostic will use the parameters selected on the Verification Criteria page to validate the baseline value. After the Verifying period the Mode will switch to Monitoring and grey lines that indicate the sensitivity setting will appear on the charts.

### Detection

If the SPM diagnostic detects a Standard Deviation or Mean change outside the threshold values, one of the indicators in the SPM Status box will illuminate red, indicating if there has been a mean change, an increase in noise or variability (High Variation Detected) or a decrease (Low Variation Detected), the transmitter will take the action as determined by the user in the configuration. The LCD will also indicate the diagnostic condition. The “Time Since Detection” clock in the Time box will start incrementing. The diagnostic condition is latched and the “Time Since Detection” clock will continue to increment until the diagnostic is reset or turned off.

### Interpreting Results

The SPM diagnostic can be used to detect installation, process and equipment changes, or problems. However, as the diagnostic is based on detecting changes in process noise or variability, there are many possible reasons or sources for the change in values and detection. Following are some possible causes and solutions if a diagnostic event is detected:

Table 7-7. Possible causes of SPM diagnostic events

| Diagnostic Condition | Potential Cause | Corrective Action |
|---|---|---|
| High Variation Detected | Plugged impulse line (DP only) | Follow facility procedure to check for and clear plugged impulse lines. Both lines must be checked as the SPM diagnostic cannot determine if the plug is on the high or low side. Conditions that lead to plugging on one side may lead to an eventual plug on the other side. |
| | Aeration or aeration increase (liquid flows) | a) If aeration is undesired, take necessary steps to eliminate aeration<br>b) If the measurement is DP Flow and aeration is not desired, move primary element to another location in the process piping to ensure it remains full (no air) under all conditions. |
| | Liquid present or amount of liquid increased (gas or steam flows) | If liquid is undesired, take necessary steps to eliminate liquid in gas or steam flow |
| | Solids present or solids level increased | If solids are undesired, take necessary steps to eliminate |
| | Control loop problem (valve stiction, controller issue, etc.) | Review loop for control problems |
| | Rapid change of process variable mean value | Rapid changes in the process variable can result in indication of high variation. If undesired, make sure SPM High Pass filter is turned ON (SPM, Operations screen). Increase the Learn/Monitor period (SPM, Operations screen; three minutes is default value, can increase to 60 minutes maximum) |
| | Process or equipment change or problem has resulted in an increase in the pressure noise level. | Check process equipment |
| Low Variation Detected | Plugged impulse line (DP/AP/GP) | Follow facility procedure to check for and clear plugged impulse lines. Both lines must be checked as the SPM diagnostic cannot determine if the plug is on the high or low side (DP devices only). Conditions that lead to plugging on one side may lead to an eventual plug on the other side. |
| | Aeration decrease | If decrease is normal, reset and relearn. If not, check process and equipment for change in operating conditions. |
| | Decrease of liquid content in gas or steam flow | If decrease is normal, reset and relearn. If not, check process and equipment for change in operating conditions. |
| | Decrease in solids content | If decrease is normal, reset and relearn. If not, check process and equipment for change in operating conditions. |
| | Reduction in variability in process | If decrease is normal, reset and relearn. If not, check process and equipment for change in operating conditions. For example, a stuck control valve can reduce variability. |
| Mean Change Detected | Significant process setpoint change | If change is normal, reset and relearn. Consider changing mean change detection to automatically relearn. If change is not expected, check process and equipment for change in operating conditions. |

### Resetting SPM

The two options for resetting the SPM diagnostic are:

**Reset**
When Reset is selected the system will ask for confirmation and then will clear the status indicators in the SPM and reset the “Time Since Detection” clock in the time section back to zero. This will clear any alarms or alerts that have been set, and clear any indications from the LCD, if attached.

**Reset and relearn**
Selecting this option will do all the Reset option does and the Learning/Verifying cycle will begin.

## Troubleshooting the SPM Diagnostic

Users are encouraged to pretest the SPM diagnostic if possible. For example, if the diagnostic is to be used to detect plugged impulse lines, and if root valves are present in the installation, the user should set up the diagnostic as described earlier, then alternately close the high then the low side root valve to simulate a plugged impulse line. Using the SPM status screen, the user can then note the changes to the standard deviation values under the closed conditions and adjust the sensitivity values as needed.

| SPM Diagnostic Issue | Action |
|---|---|
| SPM diagnostic status indicates insufficient variability and will not leave learning or verifying mode | Process has very low noise. Turn off insufficient variability check (Verification Criteria screen). SPM diagnostic will be unable to detect a significant decrease in noise level. |
| SPM diagnostic will not leave verifying mode | Process is unstable. Increase learning sensitivity checks (Verification Criteria screen). If this does not correct the issue, increase the learning verification period to match or exceed the cycle time of the instability of the process. If maximum time does not correct the problem, process is not a candidate for SPM diagnostic. Correct stability issue or turn off diagnostic. |
| SPM diagnostic does not detect a known condition | With the condition present, but the process operating, go to the SPM Status or Operational Values screen and note the current statistical values and compare to the baseline and threshold values. Adjust the sensitivity values until a trip of the diagnostic occurs. |
| SPM diagnostic indicates “High Variation Detected” when no diagnostic event has occurred | The most likely cause is a fast change in the value of the process variable. Direction of the change is not important. Increase the learning/monitoring period to better filter out increases in standard deviation. |

# VARIABLE LOGGING

## Overview

The 3051S HART Diagnostic transmitter's Variable Logging can be used in a number of ways. Figure 7-15 shows the **Pressure Event Logging** screen. Figure 7-16 shows the **Temperature Event Logging** screen. On both of these screens there are two basics sets of functionality. The first function is the logging and time-stamping of the minimum and maximum pressures and sensor temperatures. The second function is logging and time-stamping of over pressure or over temperature conditions, events that could have an effect on the life of the transmitter.

## Pressure Event Log

### Min Value

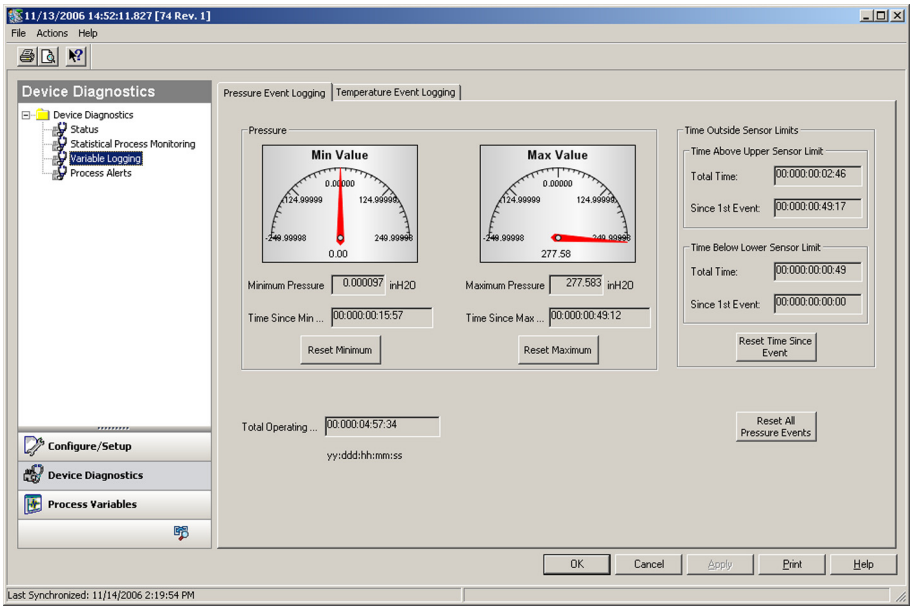
The meter indicates the lowest pressure the transmitter has measured since the last reset. The Time Since clock indicates the elapsed time since the minimum pressure was measured. Keep in mind that the lowest pressure does not necessarily mean a negative or vacuum pressure. The value given is either the most positive pressure put on the Low side or the most negative or vacuum pressure put on the High side of the transmitter in the case of a DP transmitter.

### Max Value

The meter indicates the highest pressure the transmitter has measured since the last reset. The Time Since clock indicates the elapsed time since the maximum pressure was measured. Keep in mind that the highest pressure does not necessarily mean a positive pressure. The value given is either the most positive pressure put on the High side or the most negative or vacuum pressure put on the Low side of the transmitter in the case of DP device.

Both the Min and Max values can be reset independently. A Reset will reset the Time Since clock and sets the pressure to the currently measured value.

Figure 7-15. Pressure event logging screen



Time Outside Sensor Limits gives the operator/maintenance personnel an indication of possible misapplication of the transmitter. The Lower and Upper operate the same. They both include a Time Since 1st Event and Total time.

**Time Since 1st Event**

The elapsed time since the first over-pressure was detected since the last reset. This time can be reset by selecting the Reset Time Since Event.

**Total Time**

This is the accumulated time the pressure sensor has been in an over-pressure condition. This elapsed total time is independent of the number of events or frequency; it is the total or sum time the transmitter was in this condition. These values are not resettable.

**Reset Time Since Event**

Selecting this reset will set the Since First Event for both Above Sensor limit and Below Sensor limit to zero.

**Reset All Sensor Events**

Selecting this will reset all values on this screen to zero with the exception of Total Operating time, the Total Time above the sensor limit and the Total Time below the sensor limit. These values are not resettable.

## Temperature Event Log

**Min Value**

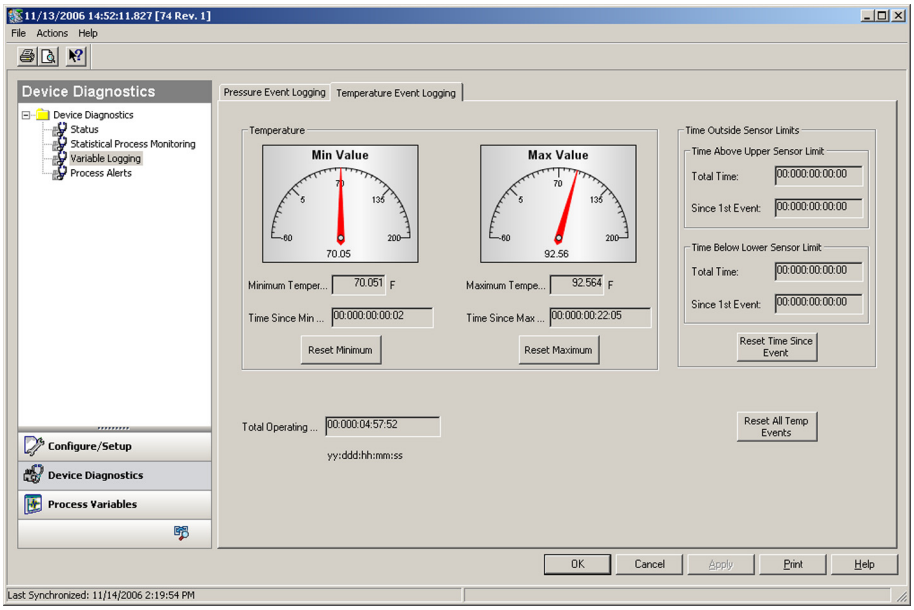
The meter indicates the lowest temperature the transmitter has measured since the last reset. The Time Since clock indicates the elapsed time since that temperature was measured.

**Max Value**

The meter indicates the highest temperature the transmitter has measured since the last reset. The Time Since clock indicates elapsed time since that temperature was measured.

Both the Min and Max values can be reset independently. Selecting the Reset will reset the Time Since clock and set the temperature to the currently measured value.

Figure 7-16. Temperature Event Logging screen




Time Outside Sensor Limits gives the operator/maintenance personnel an indication of possible misapplication of the transmitter. The Lower and Upper operate the same. They both include a Time Since 1st Event and Total time.

**Time Since 1st Event**

The elapsed time since the first over temperature condition was detected since the last reset. This time can be reset by selecting the Reset Time Since Event.

**Total Time**

The accumulated time the transmitter has been in an over temperature condition. This elapsed total time is independent of the number of events or frequency, it is the total or sum time it was in this condition.

**Reset Time Since Event**

Selecting this reset will set the Since First Event for both Above sensor limit and Below Sensor limit to zero.

**Reset All Sensor Events**

Selecting this will reset everything on this page to zero with the exception of Total Operating time and the Total Time above the sensor limit and the Total Time below the sensor limit. These values are not resettable.

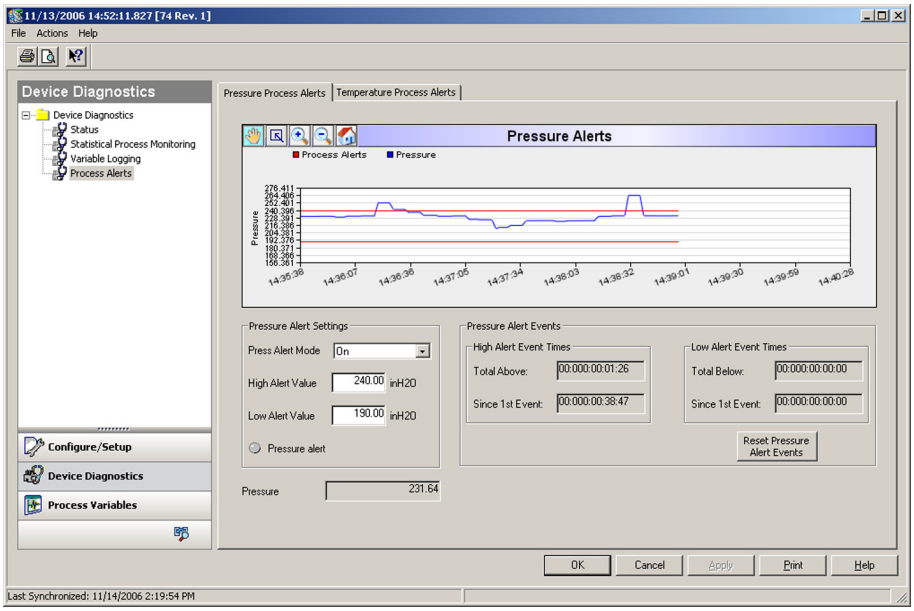
## ADVANCED PROCESS ALERTS

### Overview

The HART Diagnostic transmitter adds time stamping capability to the Process Alerts function in the standard 3051S. Figure 7-17 is the **Pressure Process Alert** screen. Figure 7-18 is the **Sensor Temperature Process Alert** screen. The functionality is identical.

Process alerts can be used in addition to alarms or alerts generated in the control system to indicate problems with the process or installation. For example, the temperature alert can be used to signal operators or maintenance personnel that heat tracing lines need to be turned on in the winter or turned off in the spring.

Figure 7-17. Process Pressure Alerts screen




### Pressure Alert Setting

This is the configuration section for the Pressure Process Alert. Selecting ON enables the diagnostic. The High Alert Value and the Low Alert Value are the trip values for the diagnostic. These values are represented on the graph by red lines. If the applied pressure goes above or below the Alert Values, the button next to Pressure alert will illuminate red, the LCD will indicate a Pressure Alert, and any HART communicator/master will indicate a Pressure Alert. An active alert will not affect the transmitter's 4 – 20 mA output.

### Total Above

This is the total time the transmitter's input pressure was above the High Alert value.

### Total Below

This is the total time the transmitter's input pressure was below the Low Alert Value.

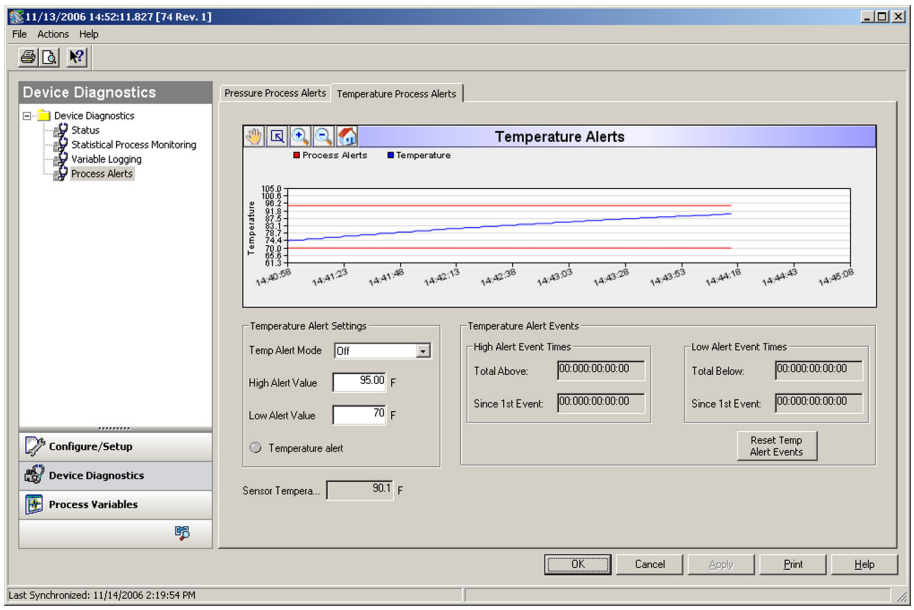
### Since Event

This is the elapsed time since the first Pressure Alert event. Subsequent events will increment the Total Above or Total Below values, but this value will remain unchanged.

### Reset Pressure Alert Events

Selecting this will reset all time stamp values to zero.

Figure 7-18. Temperature Process Alerts screen




### Temperature Alert Setting

This is the configuration section for the Temperature Process Alert. Selecting ON enables the diagnostic. The High Alert Value and the Low Alert Value are the trip values for the diagnostic. These values are represented on the graph by red lines. If the ambient temperature of the transmitter goes above or below the Alert Values, the button next to Temperature alert will illuminate red, the LCD will indicate a Temperature Alert, and any HART communicator/master will indicate a Temperature Alert. An active alert will not affect the transmitter's output.

### Total Above

This is the total time the transmitter's sensor temperature measurement was above the High Alert value.

### Total Below

This is the total time the transmitter's sensor temperature measurement was below the Low Alert Value.

### Since Event

This is the elapsed time since the first Temperature Alert event. Subsequent events will increment the Total Above or Total Below values, but this value will remain unchanged.

### Reset Temperature Alert Events

Selecting this will reset all time stamp values to zero.

# ROSEMOUNT 333 HART TRI-LOOP CONFIGURATION

## Overview

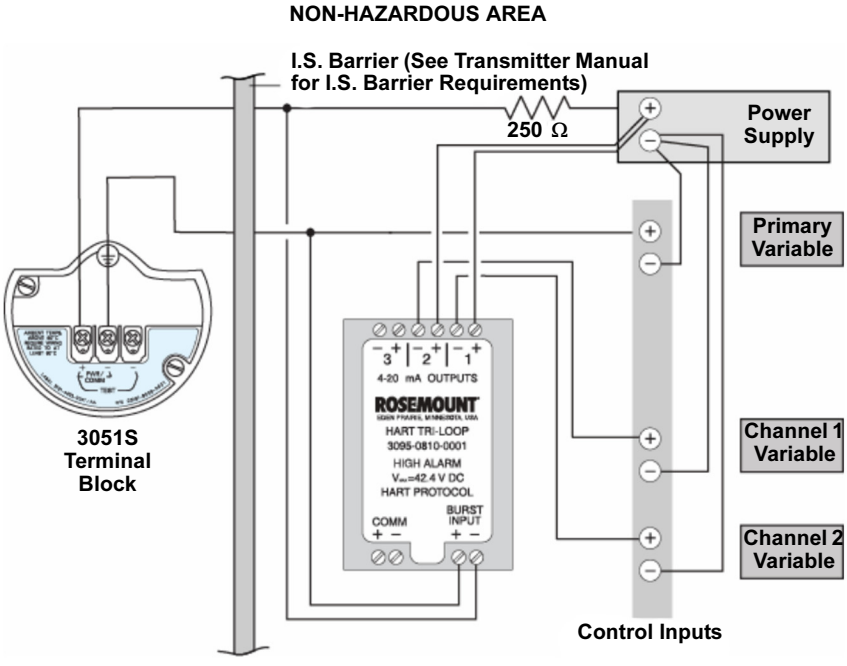
The Rosemount 333 HART Tri-Loop can be used in conjunction with the Rosemount 3051S with Advanced HART Diagnostics to acquire up to two more variables via 4-20mA analog signals. The additional two outputs are selected by the user and can include: Pressure, Temperature, Scaled Variable, Standard Deviation, or Mean.

## Installation and Commissioning

Below are the four major steps to commission the 3051S and Tri-Loop. Further detail on these steps can be found in the Tri-Loop Instruction manual.

1. Check the 3051S Variable assignments and remap as necessary to assign the two variables intended to be the Tri-Loop output for the Secondary (Second) and the Tertiary (Third) variables. Take note of the Secondary and Tertiary variable information including variable, variable name, and variable units as it will be necessary to duplicate this exactly in the Tri-Loop for proper operation.
2. Connect the 3051S to the 333 Tri-Loop. The 3051S 4-20mA output connects to the 333 Burst Input. See Figure 7-19.

Figure 7-19. Tri-Loop Wiring Diagram




3. Configure the Tri-Loop. The Channel configuration must be identical to the variables mapped in the 3051S. **Note**: The Tri Loop default address is 1. The HART host must be configured to Poll for the 333 in order to find the Tri-Loop.
4. Enable Burst mode in the 3051S. The Burst Mode must be ON and the Burst Option must be set to Process Vars/Crnt.

## OTHER INFORMATION

### Digital Trim with non-DD based communicators

The 3051S Pressure Transmitter with Advanced Diagnostics makes use of its Device Description to support an enhanced digital trim function. Use of a non-DD based host or communicator may require repeat trims to achieve maximum accuracy.

# Appendix A Specifications and Reference Data



## SPECIFICATIONS

### Performance Specifications

For zero-based spans, reference conditions, silicone oil fill, glass-filled TFE o-rings, SST materials, *Coplanar* flange (3051S_C) or 1/2 in.- 14 NPT (3051S_T) process connections, digital trim values set to equal range points.

#### Conformance to specification (±3σ (Sigma))

Technology leadership, advanced manufacturing techniques and statistical process control ensure specification conformance to ±3σ or better.

#### Reference Accuracy

| Models | Ultra[1] [2] | Classic[1] [2] | Ultra for Flow[1] [3] |
|---|---|---|---|
| **3051S_CD, CG** | | | |
| Ranges 2 - 4 | ±0.025% of span.<br>For spans less than 10:1,<br>$\pm\left[0.005 + 0.0035\left(\frac{URL}{span}\right)\right]$% of span | ±0.055% of span.<br>For spans less than 10:1,<br>$\pm\left[0.015 + 0.005\left(\frac{URL}{span}\right)\right]$% of span | ±0.04% of reading up to 8:1 DP turndown from URL;<br>±[0.04 + 0.0023 (URL/RDG[4])]% reading to 200:1 DP turndown from URL |
| Range 5 | ±0.05% of span.<br>For spans less than 10:1,<br>$\pm\left[0.005 + 0.0045\left(\frac{URL}{span}\right)\right]$% of span | ±0.065% of span.<br>For spans less than 10:1,<br>$\pm\left[0.015 + 0.005\left(\frac{URL}{span}\right)\right]$% of span | |
| Range 1 | ±0.09% of span.<br>For spans less than 15:1,<br>$\pm\left[0.015 + 0.005\left(\frac{URL}{span}\right)\right]$% of span | ±0.10% of span.<br>For spans less than 15:1,<br>$\pm\left[0.025 + 0.005\left(\frac{URL}{span}\right)\right]$% of span | |
| Range 0 | ±0.09% of span.<br>For spans less than 2:1 = ±0.045% of URL | ±0.10% of span.<br>For spans less than 2:1 = ±0.05% of URL | |

| Models | Ultra[1] [2] | Classic[1] [2] | Ultra for Flow[1] [3] |
|---|---|---|---|
| **3051S_T** | | | |
| Ranges 1 - 4 | ±0.025% of span.<br>For spans less than 10:1,<br>$\pm\left[0.004\left(\frac{URL}{span}\right)\right]$% of span | ±0.055% of span.<br>For spans less than 10:1,<br>$\pm\left[0.0065\left(\frac{URL}{span}\right)\right]$% of span | |
| Range 5 | ±0.04% of span.<br>For spans less than 10:1,<br>$\pm\left[0.004\left(\frac{URL}{span}\right)\right]$% of span | ±0.065% of span.<br>For spans less than 10:1,<br>$\pm\left[0.0065\left(\frac{URL}{span}\right)\right]$% of span | |
| **3051S_CA** | | | |
| Ranges 1 - 4 | ±0.025% of span.<br>For spans less than 10:1,<br>$\pm\left[0.004\left(\frac{URL}{span}\right)\right]$% of span | ±0.055% of span.<br>For spans less than 10:1,<br>$\pm\left[0.0065\left(\frac{URL}{span}\right)\right]$% of span | |
| Range 0 | ±0.075% of span.<br>For spans less than 5:1,<br>$\pm\left[0.025 + 0.01\left(\frac{URL}{span}\right)\right]$% of span | ±0.075% of span.<br>For spans less than 5:1,<br>$\pm\left[0.025 + 0.01\left(\frac{URL}{span}\right)\right]$% of span | |
| **3051S_L** | ±0.065% of span.<br>For spans less than 10:1,<br>$\pm\left[0.015 + 0.005\left(\frac{URL}{span}\right)\right]$% of span | ±0.065% of span.<br>For spans less than 10:1,<br>$\pm\left[0.015 + 0.005\left(\frac{URL}{span}\right)\right]$% of span | |

*(1) Stated reference accuracy equations include terminal based linearity, hysteresis, and repeatability.*
*(2) For FOUNDATION fieldbus transmitters, use calibrated range in place of span.*
*(3) Ultra for Flow applicable for CD Ranges 2-3 only. For calibrated spans from 1:1 to 2:1 of URL, add ±0.005% of span analog output error.*
*(4) RDG refers to transmitter reading.*

## Total Performance

| Models | Ultra[1] | Classic[1] | Ultra for Flow [1][2] |
|---|---|---|---|
| **3051S_** | | | |
| CD Ranges 2-3<br>CG Ranges 2-5<br>T Ranges 2-4<br>CA Ranges 2-4 | ±0.1% of span; for ±50°F (28°C) temperature changes; 0-100% relative humidity, up to 740 psi (51 bar) line pressure (CD only), from 1:1 to 5:1 rangedown. | ±0.15% of span; for ±50°F (28°C) temperature changes; 0-100% relative humidity, up to 740 psi (51 bar) line pressure (CD only), from 1:1 to 5:1 rangedown. | ±0.1% of reading; for ±50°F (28°C) temperature changes; 0-100% relative humidity, up to 740 psi (51 bar) line pressure, over 8:1 DP turndown from URL. |

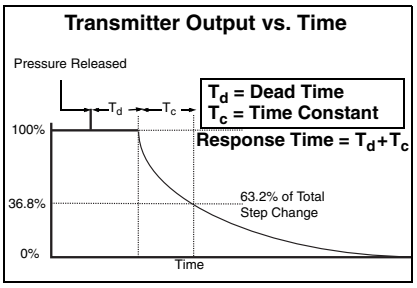
*(1) Total performance is based on combined errors of reference accuracy, ambient temperature effect, and line pressure effect.*
*(2) Ultra for Flow applicable for CD Ranges 2-3 only.*

## Long Term Stability

| Models | Ultra and Ultra for Flow | Classic |
|---|---|---|
| **3051S_** | | |
| CD Ranges 2 - 5<br>CG Ranges 2 - 5<br>T Ranges 1 - 5<br>and CA Ranges 1 - 4 | ±0.20% of URL for 10 years; for ±50°F (28°C) temperature changes, up to 1000 psi (68,9 bar) line pressure (CD only) | ±0.125% of URL for 5 years; for ±50°F (28°C) temperature changes, up to 1000 psi (68,9 bar) line pressure (CD only) |

## Dynamic Performance

| | 4 - 20 mA (HART®)[1] | Fieldbus protocol[2] | Typical Transmitter Response Time |
|---|---|---|---|
| **Total Response Time (Td + Tc)[3]:** | | | |
| 3051S_C, Ranges 2 - 5: | 100 milliseconds | 152 milliseconds | |
| Range 1: | 255 milliseconds | 307 milliseconds | |
| Range 0: | 700 milliseconds | 752 milliseconds | |
| 3051S_T: | 100 milliseconds | 152 milliseconds | |
| 3051S_L: | See *Instrument Toolkit*™. | See *Instrument Toolkit* | |
| **Dead Time (Td)[4]** | 45 milliseconds (nominal) | 97 milliseconds | |
| **Update Rate** | | | |
| 3051S | 22 times per second | 22 times per second | |




*(1) Dead time and update rate apply to all models and ranges; analog output only*
*(2) Transmitter fieldbus output only, segment macro-cycle not included.*
*(3) Nominal total response time at 75 °F (24 °C) reference conditions. For option code DA1, add 40 milliseconds () to 4-20 mA (HART®) total response time values.*
*(4) For option code DA1, dead time (Td) is 85 milliseconds (nominal).*

### Ambient Temperature Effect

| Models | Ultra | Classic | Ultra for Flow[1] |
|---|---|---|---|
| **3051S_CD, CG** | **per 50 °F (28 °C)** | **per 50 °F (28 °C)** | From –40 to 185 °F (–40 to 85 °C): ±0.13% reading up to 8:1 DP turndown from URL; ±[0.13 + 0.0187 (URL/RDG[2])]% reading to 100:1 DP turndown from URL |
| Range 2 - 5[3] | ± (0.009% URL + 0.025% span) from 1:1 to 10:1<br>± (0.018% URL + 0.08% span) from >10:1 to 200:1 | ± (0.0125% URL + 0.0625% span) from 1:1 to 5:1<br>± (0.025% URL + 0.125% span) from >5:1 to 100:1 | |
| Range 0 | ± (0.25% URL + 0.05% span) from 1:1 to 30:1 | ± (0.25% URL + 0.05% span) from 1:1 to 30:1 | |
| Range 1 | ± (0.1% URL + 0.25% span) from 1:1 to 50:1 | ± (0.1% URL + 0.25% span) from 1:1 to 50:1 | |
| **3051S_T** | | | |
| Ranges 2 - 4 | ± (0.009% URL + 0.025% span) from 1:1 to 10:1<br>± (0.018% URL + 0.08% span) from >10:1 to 200:1 | ± (0.0125% URL + 0.0625% span) from 1:1 to 5:1<br>± (0.025% URL + 0.125% span) from >5:1 to 100:1 | |
| Range 5 | ± (0.05% URL + 0.075% span) from 1:1 to 10:1 | ± (0.05% URL + 0.075% span) from 1:1 to 5:1 | |
| Range 1 | ± (0.0125% URL + 0.0625% span) from 1:1 to 5:1<br>± (0.025% URL + 0.125% span) from >5:1 to 200:1 | ± (0.0125% URL + 0.0625% span) from 1:1 to 5:1<br>± (0.025% URL + 0.125% span) from >5:1 to 100:1 | |
| **3051S_CA** | | | |
| Ranges 2 - 4 | ± (0.009% URL + 0.025% span) from 1:1 to 10:1<br>± (0.018% URL + 0.08% span) from >10:1 to 200:1 | ± (0.0125% URL + 0.0625% span) from 1:1 to 5:1<br>± (0.025% URL + 0.125% span) from >5:1 to 100:1 | |
| Range 0 | ± (0.1% URL + 0.25% span) from 1:1 to 30:1 | ± (0.1% URL + 0.25% span) from 1:1 to 30:1 | |
| Range 1 | ± (0.0125% URL + 0.0625% span) from 1:1 to 5:1<br>± (0.025% URL + 0.125% span) from >5:1 to 100:1 | ± (0.0125% URL + 0.0625% span) from 1:1 to 5:1<br>± (0.025% URL + 0.125% span) from >5:1 to 100:1 | |
| **3051S_L** | See *Instrument Toolkit*™. | See *Instrument Toolkit*. | |

*(1) Ultra for Flow applicable for CD Ranges 2-3 only.*
*(2) RDG refers to transmitter reading.*
*(3) Use Classic specification for 3051S_CD Range 5 Ultra.*

### Line Pressure Effect

For line pressures above 2000 psi (137,9 bar) and ranges 4-5, see the 3051S reference manual (document number 00809-0100-4801).

| Models | Ultra and Ultra for Flow | Classic |
|---|---|---|
| **3051S_CD** | **Zero Error** [1] | **Zero Error**[1] |
| Range 2 - 3 | ± 0.025% URL per 1000 psi (69 bar) | ± 0.05% URL per 1000 psi (69 bar) |
| Range 0 | ± 0.125% URL per 100 psi (6,89 bar) | ± 0.125% URL per 100 psi (6,89 bar) |
| Range 1 | ± 0.25% URL per 1000 psi (69 bar) | ± 0.25% URL per 1000 psi (69 bar) |
| | **Span Error** | **Span Error** |
| Range 2 -3 | ± 0.1% of reading per 1000 psi (69 bar) | ± 0.1% of reading per 1000 psi (69 bar) |
| Range 0 | ± 0.15% of reading per 100 psi (6,89 bar) | ± 0.15% of reading per 100 psi (6,89 bar) |
| Range 1 | ± 0.4% of reading per 1000 psi (69 bar) | ± 0.4% of reading per 1000 psi (69 bar) |

*(1) Zero error can be calibrated out*

### Mounting Position Effects

| Models | Ultra, Ultra for Flow, and Classic |
|---|---|
| 3051S_C | Zero shifts up to ±1.25 in$H_2O$ (3,11 mbar), which can be calibrated out; no span effect |
| 3051S_L | With liquid level diaphragm in vertical plane, zero shift of up to 1 in$H_2O$ (25,4 mm$H_2O$); with diaphragm in horizontal plane, zero shift of up to 5 in$H_2O$ (127 mm$H_2O$) plus extension length on extended units; all zero shifts can be calibrated out; no span effect |
| 3051S_T and 3051S_CA | Zero shifts to 2.5 inH2O (63,5 mmH20), which can be calibrated out; no span effect |

### Vibration Effect

Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.21mm displacement peak amplitude / 60-2000 Hz 3g).

Housing Style codes 1J, 1K, 1L, 2J
Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field with general application or pipeline with low vibration level (10-60 Hz 0.15mm displacement peak amplitude / 60-500 Hz 2g).

### Power Supply Effect

**All Models:**

Less than ±0.005% of calibrated span per volt

### Electromagnetic Compatibility (EMC)

**All Models:**

Meets all relevant requirements of IEC/EN 61326 and NAMUR NE-21.

### Transient Protection (Option T1)

**All Models:**

Meets IEEE C62.41, Category B

- 6 kV crest (0.5 μs - 100 kHz)
- 3 kV crest (8 × 20 microseconds)
- 6 kV crest (1.2 × 50 microseconds)

General Specifications:

- Response Time: < 1 nanosecond
- Peak Surge Current: 5000 amps to housing
- Peak Transient Voltage: 100 V dc
- Loop Impedance: < 25 ohms
- Applicable Standards: IEC61000-4-4, IEC61000-4-5

### NOTE:

Calibrations at 68 °F (20 °C) per ASME Z210.1 (ANSI)

# Functional Specifications

## Range and Sensor Limits

| Range | Minimum Span 3051S_ | | Range and Sensor Limits 3051S_ | | | |
|---|---|---|---|---|---|---|
| | | | | Lower (LRL) | | |
| | Ultra and Ultra for Flow[1] | Classic | Upper (URL) | 3051S_CD[2] | 3051S_CG, LG[3] | 3051S_LD[3] |
| 0 | 0.1 $inH_2O$ (0,25 mbar) | 0.1 $inH_2O$ (0,25 mbar) | 3.0 $inH_2O$ (7,5 mbar) | –3.0 $inH_2O$ (–7,5 mbar) | NA | NA |
| 1 | 0.5 $inH_2O$ (1,24 mbar) | 0.5 $inH_2O$ (1,24 mbar) | 25.0 $inH_2O$ (62,3 mbar) | –25.0 $inH_2O$ (–62,3 mbar) | –25.0 $inH_2O$ (–62,3 mbar) | –25.0 $inH_2O$ (–62,3 mbar) |
| 2 | 1.3 $inH_2O$ (3,11 mbar) | 2.5 $inH_2O$ (6,23 mbar) | 250.0 $inH_2O$ (0,62 bar) | –250.0 $inH_2O$ (–0,62 bar) | –250.0 $inH_2O$ (–0,62 bar) | –250.0 $inH_2O$ (–0,62 bar) |
| 3 | 5.0 $inH_2O$ (12,4 mbar) | 10.0 $inH_2O$ (24,9 mbar) | 1000.0 $inH_2O$ (2,49 bar) | –1000.0 $inH_2O$ (-2,49 bar) | –393.0 $inH_2O$ (–979 mbar) | –1000.0 $inH_2O$ (–2,49 bar) |
| 4 | 1.5 psi (103,4 mbar) | 3.0 psi (206,8 mbar) | 300.0 psi (20,7 bar) | –300.0 psi (–20,7 bar) | –14.2 psig (–979 mbar) | –300.0 psi (–20,7 bar) |
| 5 | 10.0 psi (689,5 mbar) | 20.0 psi (1,38 bar) | 2000.0 psi (137,9 bar) | – 2000.0 psi (–137,9 bar) | –14.2 psig (–979 mbar) | – 2000.0 psi (–137,9 bar) |

*(1) Ultra for Flow applicable for CD Ranges 2 – 3 only.*
*(2) Lower (LRL) is 0 $inH_2O$ (0 mbar) for Ultra for Flow.*
*(3) When specifying a 3051S_L Ultra, use Classic minimum span.*

| 3051S_T Range and Sensor Limits | | | | | |
|---|---|---|---|---|---|
| Range | Minimum Span | | Upper (URL) | Lower (LRL) (Abs.) | Lower[1] (LRL) (Gage) |
| | Ultra | Classic | | | |
| 1 | 0.3 psi (20,7 mbar) | 0.3 psi (20,7 mbar) | 30 psi (2,07 bar) | 0 psia (0 bar) | –14.7 psig (–1,01 bar) |
| 2 | 0.75 psi (51,7 mbar) | 1.5 psi (0,103 bar) | 150 psi (10,34 bar) | 0 psia (0 bar) | –14.7 psig (–1,01 bar) |
| 3 | 4 psi (275,8 mbar) | 8 psi (0,55 bar) | 800 psi (55,16 bar) | 0 psia (0 bar) | –14.7 psig (–1,01 bar) |
| 4 | 20 psi (1,38 bar) | 40 psi (2,76 bar) | 4000 psi (275,8 bar) | 0 psia (0 bar) | –14.7 psig (–1,01 bar) |
| 5 | 1000 psi (68,9 bar) | 2000 psi (137,9 bar) | 10000 psi (689,5 bar) | 0 psia (0 bar) | –14.7 psig (–1,01 bar) |

*(1) Assumes atmospheric pressure of 14.7 psig.*

| 3051S_CA, LA[1] Range and Sensor Limits | | | | |
|---|---|---|---|---|
| Range | Minimum Span | | Upper (URL) | Lower (LRL) |
| | Ultra | Classic | | |
| 0[2] | 0.167 psia (11,5 mbar) | 0.167 psia (11,5 mbar) | 5 psia (0,34 bar) | 0 psia (0 bar) |
| 1 | 0.3 psia (20,7 mbar) | 0.3 psia (20,7 mbar) | 30 psia (2,07 bar) | 0 psia (0 bar) |
| 2 | 0.75 psia (51,7 mbar) | 1.5 psia (0,103 bar) | 150 psia (10,34 bar) | 0 psia (0 bar) |
| 3 | 4 psia (275,8 mbar) | 8 psia (0,55 bar) | 800 psia (55,16 bar) | 0 psia (0 bar) |
| 4 | 20 psia (1,38 bar) | 40 psia (2,76 bar) | 4000 psia (275,8 bar) | 0 psia (0 bar) |

*(1) When specifying a 3051S_L Ultra, use Classic minimum span.*
*(2) Range 0 is not available for 3051S_LA.*

## Service

Liquid, gas, and vapor applications

## 4–20 mA/HART

**Zero and Span Adjustment**

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

**Output**

Two-wire 4–20 mA is user-selectable for linear or square root output. Digital process variable superimposed on 4–20 mA signal, available to any host that conforms to the HART protocol.

**Power Supply**

External power supply required.

Standard transmitter (4–20 mA): 10.5 to 42.4 V dc with no load

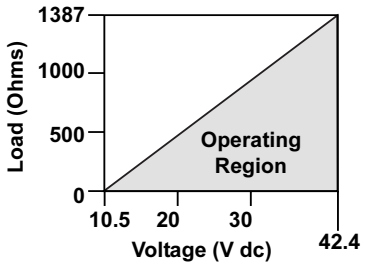
3051S HART Diagnostics transmitter: 12 to 42 Vdc with no load

**Load Limitations**

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

**Standard Transmitter**

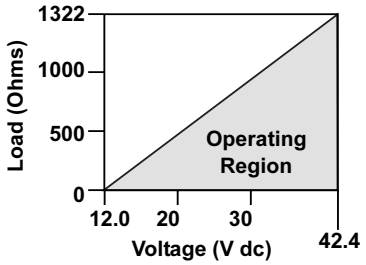
Maximum Loop Resistance = 43.5 * (Power Supply Voltage – 10.5)




*The HART communicator requires a minimum loop resistance of 250Ω for communication.*

**3051S HART Diagnostics Transmitter (option code DA1)**

Maximum Loop Resistance = 43.5 * (Power Supply Voltage – 12.0)




*The HART communicator requires a minimum loop resistance of 250Ω for communication.*

**ASP™ Diagnostics Suite for HART (Option Code DA1)**

The 3051S provides Abnormal Situation Prevention indication for a breakthrough in diagnostic capability. The New 3051S ASP™ Diagnostics Suite for HART includes Statistical Process Monitoring (SPM), variable logging with time stamp and advanced process alerts. The enhanced EDDL graphic display provides an intuitive and user-friendly interface to better visualize these diagnostics.

The integral SPM technology calculates the mean and standard deviation of the process variable 22 times per second and makes them available to the user. The 3051S uses these values and highly flexible configuration options for customization to detect many user-defined or application specific abnormal situations (e.g. detecting plugged impulse lines and fluid composition change). Variable logging with time stamp and advanced process alerts capture valuable process and sensor data to enable quick troubleshooting of application and installation issues.

## FOUNDATION fieldbus

### Power Supply

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

### Current Draw

17.5 mA for all configurations (including LCD display option)

### FOUNDATION fieldbus Parameters

| | |
|---|---|
| Schedule Entries | 14 (max.) |
| Links | 30 (max.) |
| Virtual Communications Relationships (VCR) | 20 (max.) |

### Standard Function Blocks

Resource Block

- Contains hardware, electronics, and diagnostic information.

Transducer Block

- Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD Block

- Configures the local display.

2 Analog Input Blocks

- Processes the measurements for input into other function blocks. The output value is in engineering or custom units and contains a status indicating measurement quality.

PID Block with Auto-tune

- Contains all logic to perform PID control in the field including cascade and feed forward. Auto-tune capability allows for superior tuning for optimized control performance.

### Backup Link Active Scheduler (LAS)

The transmitter can function as a Link Active Scheduler if the current link master device fails or is removed from the segment.

### Software Upgrade in the Field

Software for the 3051S with FOUNDATION fieldbus is easy to upgrade in the field using the FOUNDATION fieldbus Common Device Software Download procedure.

### PlantWeb Alerts

Enable the full power of the PlantWeb digital architecture by diagnosing instrumentation issues, communicating advisory, maintenance, and failure details, and recommending a solution.

### Advanced Control Function Block Suite (Option Code A01)

Input Selector Block

- Selects between inputs and generates an output using specific selection strategies such as minimum, maximum, midpoint, average, or first “good.”

Arithmetic Block

- Provides pre-defined application-based equations including flow with partial density compensation, electronic remote seals, hydrostatic tank gauging, ratio control and others.

Signal Characterizer Block

- Characterizes or approximates any function that defines an input/output relationship by configuring up to twenty X, Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates.

Integrator Bock

- Compares the integrated or accumulated value from one or two variables to pre-trip and trip limits and generates discrete output signals when the limits are reached. This block is useful for calculating total flow, total mass, or volume over time.

Output Splitter Block

- Splits the output of one PID or other control block so that the PID will control two valves or other actuators.

Control Selector Block

- Selects one of up to three inputs (highest, middle, or lowest) that are normally connected to the outputs of PID or other control function blocks.

| Block | Execution Time |
|---|---|
| Resource | - |
| Transducer | - |
| LCD Block | - |
| Analog Input 1, 2 | 20 milliseconds |
| PID with Auto-tune | 35 milliseconds |
| Input Selector | 20 milliseconds |
| Arithmetic | 20 milliseconds |
| Signal Characterizer | 20 milliseconds |
| Integrator | 20 milliseconds |
| Output Splitter | 20 milliseconds |
| Control Selector | 20 milliseconds |

**Fully Compensated Mass Flow Block (Option Code H01)**

Calculates fully compensated mass flow based on differential pressure with external process pressure and temperature measurements over the fieldbus segment. Configuration for the mass flow calculation is easily accomplished using the Rosemount Engineering Assistant.

**ASP™ Diagnostics Suite for FOUNDATION fieldbus (Option Code D01)**

The 3051S ASP™ Diagnostics Suite for FOUNDATION fieldbus provides Abnormal Situation Prevention indication and enhanced EDDL graphic displays for easy visual analysis.

The integral Statistical Process Monitoring (SPM) technology calculates the mean and standard deviation of the process variable 22 times per second and makes them available to the user. The 3051S uses these values and highly flexible configuration options for customization to detect many user-defined or application specific abnormal situations (e.g. detecting plugged impulse lines and fluid composition change).

## Overpressure Limits

Transmitters withstand the following limits without damage:

**3051S_CD, CG**

Range 0: 750 psi (51,7 bar)

Range 1: 2000 psig (137,9 bar)

Ranges 2–5: 3626 psig (250,0 bar)

4500 psig (310,3 bar) for option code P9

6092 psig (420 bar) for option code P0 (3051S2CD only)

**3051S_CA**

Range 0: 60 psia (4,13 bar)

Range 1: 750 psia (51,7 bar)

Range 2: 1500 psia (103,4 bar)

Range 3: 1600 psia (110,3 bar)

Range 4: 6000 psia (413,7 bar)

**3051S_TG, TA**

Range 1: 750 psi (51,7 bar)

Range 2: 1500 psi (103,4 bar)

Range 3: 1600 psi (110,3 bar)

Range 4: 6000 psi (413,7 bar)

Range 5: 15000 psi (1034,2 bar)

**3051S_LD, LG, LA**

Limit is flange rating or sensor rating, whichever is lower (see the table below).

| Standard | Type | CS Rating | SST Rating |
|---|---|---|---|
| ANSI/ASME | Class 150 | 285 psig | 275 psig |
| ANSI/ASME | Class 300 | 740 psig | 720 psig |
| ANSI/ASME | Class 600 | 1480 psig | 1440 psig |
| *At 100 °F (38 °C), the rating decreases with increasing temperature, per ANSI/ASME B16.5.* | | | |
| DIN | PN 10–40 | 40 bar | 40 bar |
| DIN | PN 10/16 | 16 bar | 16 bar |
| DIN | PN 25/40 | 40 bar | 40 bar |
| *At 248 °F (120 °C), the rating decreases with increasing temperature, per DIN 2401.* | | | |

## Static Pressure Limit

**3051S_CD Only**

Operates within specifications between static line pressures of 0.5 psia and 3626 psig;

4500 psig (310,3 bar) for option code P9

6092 psig (420 bar) for option code P0 (3051S2CD only)

Range 0: 0.5 psia to 750 psig (0,03 to 51,71 bar)

Range 1: 0.5 psia to 2000 psig (0,03 to137,90 bar)

## Burst Pressure Limits

*Coplanar* or traditional process flange

- 10000 psig (689,5 bar).

3051S_T:

- Ranges 1–4: 11000 psi (758,4 bar)
- Range 5: 26000 psig (1792,64 bar)

## Temperature Limits

**Ambient**

–40 to 185 °F (–40 to 85 °C)

With LCD display(1): –40 to 175 °F (–40 to 80 °C)

With option code P0: –4 to 185 °F (–20 to 85 °C)

*(1) LCD display may not be readable and LCD updates will be slower at temperatures below -4 °F (-20 °C).*

**Storage**

–50 to 230 °F (–46 to 110 °C)

With LCD display: –40 to 185 °F (–40 to 85 °C)

**Process Temperature Limits**

At atmospheric pressures and above.

| | |
|---|---|
| **3051S_C *Coplanar*** | |
| Silicone Fill Sensor[1] | |
| with *Coplanar* Flange | –40 to 250 °F (–40 to 121 °C)[2] |
| with Traditional Flange | –40 to 300 °F (–40 to 149 °C)[2][3] |
| with Level Flange | –40 to 300 °F (–40 to 149 °C)[2] |
| with 305 Integral Manifold | –40 to 300 °F (–40 to 149 °C)[2][3] |
| Inert Fill Sensor[1] | 0 to 185 °F (–18 to 85 °C)[4][5] |
| **3051S_T In-Line (Process Fill Fluid)** | |
| Silicone Fill Sensor[1] | –40 to 250 °F (–40 to 121 °C)[2] |
| Inert Fill Sensor[1] | –22 to 250 °F (–30 to 121 °C)[2] |
| **3051S_L Low-Side Temperature Limits** | |
| Silicone Fill Sensor[1] | –40 to 250 °F (–40 to 121 °C)[2] |
| Inert Fill Sensor[1] | 0 to 185 °F (–18 to 85 °C)[2] |
| **3051S_L High-Side Temperature Limits (Process Fill Fluid)** | |
| *Syltherm*® XLT | –102 to 302 °F (–75 to 150 °C) |
| D. C.® Silicone 704[6] | 32 to 500 °F (0 to 260 °C) |
| D. C. Silicone 200 | –49 to 401 °F (–45 to 205 °C) |
| Inert (Halocarbon) | –49 to 320 °F (–45 to 160 °C) |
| Glycerin and Water | 5 to 203 °F (–15 to 95 °C) |
| *Neobee M-20*® | 5 to 437 °F (–15 to 225 °C) |
| Propylene Glycol and Water | 5 to 203 °F (–15 to 95 °C) |

*(1) Process temperatures above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio.*
*(2) 220 °F (104 °C) limit in vacuum service; 130 °F (54 °C) for pressures below 0.5 psia.*
*(3) -20 °F (-29 °C) is the lower process temperature limit with option code P0.*
*(4) 160 °F (71 °C) limit in vacuum service.*
*(5) Not available for 3051S_CA.*
*(6) Upper limit of 600 °F (315 °C) is available with 1199 seal assemblies mounted away from the transmitter with the use of capillaries and up to 500 °F (260 °C) with direct mount extension.*

## Humidity Limits

0–100% relative humidity

## Turn-On Time

Performance within specifications less than 2 seconds (typical) after power is applied to the transmitter

## Volumetric Displacement

Less than 0.005 $in^3$ (0,08 $cm^3$)

## Damping

Analog output response to a step input change is user-selectable from 0 to 60 seconds for one time constant. This software damping is in addition to sensor module response time.

## Failure Mode Alarm

**HART 4-20mA (output option codes A)**

If self-diagnostics detect a gross transmitter failure, the analog signal will be driven offscale to alert the user. Rosemount standard (default), NAMUR, and custom alarm levels are available (see Table A-1 below).

High or low alarm signal is software-selectable or hardware-selectable via the optional switch (option D1).

Table A-1. Alarm Configuration

| | High Alarm | Low Alarm |
|---|---|---|
| Default | ≥ 21.75 mA | ≤ 3.75 mA |
| NAMUR compliant(1) | ≥ 22.5 mA | ≤ 3.6 mA |
| Custom levels(2) | 20.2 - 23.0 mA | 3.6 - 3.8 mA |

*(1) Analog output levels are compliant with NAMUR recommendation NE 43, see option codes C4 or C5.*
*(2) Low alarm must be 0.1 mA less than low saturation and high alarm must be 0.1 mA greater than high saturation.*

### 3051S Safety Certified Transmitter Failure Values

Safety accuracy: 2.0%(1)
Safety response time: 1.5 seconds

*(1) A 2% variation of the transmitter mA output is allowed before a safety trip. Trip values in the DCS or safety logic solver should be derated by 2%.*

## Physical Specifications

### Electrical Connections

1/2–14 NPT, G1/2, and M20 × 1.5 (CM20) conduit. HART interface connections fixed to terminal block for Output code A.

### Process Connections

**3051S_C**

1/4–18 NPT on 2 1/8-in. centers

1/2–14 NPT and RC 1/2 on 2-in.(50.8mm), 2 1/8-in. (54.0 mm), or 2 1/4-in. (57.2mm) centers (process adapters)

**3051S_T**

1/2–14 NPT female,
Non-Threaded instrument flange (available in SST for Range 1–4 transmitters only),
G1/2 A DIN 16288 Male (available in SST for Range 1–4 transmitters only), or
Autoclave type F-250-C (Pressure relieved 9/16–18 gland thread; 1/4 OD high pressure tube 60° cone; available in SST for Range 5 transmitters only).

**3051S_L**

High pressure side: 2-in.(50.8mm), 3-in. (72 mm), or 4-in. (102mm), ASME B 16.5 (ANSI) Class 150, 300 or 600 flange; 50, 80 or 100 mm, DIN 2501 PN 40 or 10/16 flange
Low pressure side: 1/4–18 NPT on flange, 1/2–14 NPT on process adapter

### Process-Wetted Parts

**Process Isolating Diaphragms**

| | 3051S_ | | | |
|---|---|---|---|---|
| Isolating Diaphragm Material | CD, CG | T | CA | L |
| 316L SST | • | • | • | See Below |
| *Hastelloy C-276* ® | • | • | • | |
| *Monel* 400 | • | | • | |
| Tantalum | • | | | |
| Gold-plated *Monel* 400 | • | | • | |
| Gold-plated 316L SST | • | | • | |

**Drain/Vent Valves**

316 SST, *Hastelloy* C-276, or *Monel* 400 material
(*Monel* is not available with 3051S_L).

**Process Flanges and Adapters**

Plated carbon steel,
CF-8M (Cast version of 316 SST, material per ASTM-A743), CW-12MW (Cast version of *Hastelloy* C-276, material per ASTM-A494),
M-30C (Cast version of *Monel* 400, material per ASTM-A494).

**Wetted O-rings**

Glass-filled TFE
(Graphite-filled TFE with Isolating Diaphragm code 6)

### 3051S_L Process Wetted Parts

#### Flanged Process Connection (Transmitter High Side)

**Process Diaphragms, Including Process Gasket Surface**

316L SST, *Hastelloy* C-276, or Tantalum

**Extension**

CF-3M (Cast version of 316L SST, material per ASTM-A743), or CW-12MW (Cast version of *Hastelloy* C, material ASTM A494); fits schedule 40 and 80 pipe

**Mounting Flange**

Zinc-cobalt plated CS or 316 SST

#### Reference Process Connection (Transmitter Low Side)

**Isolating Diaphragms**

316L SST or *Hastelloy* C-276

**Reference Flange and Adapter**

CF-3M (Cast version of 316L SST, material per ASTM-A743)

### Non-Wetted Parts

**Electronics Housing**

Low-copper aluminum or CF-3M (Cast version of 316L SST) NEMA 4X, IP 66, IP 68

***Coplanar* Sensor Module Housing**

CF-3M (Cast version of 316L SST)

**Bolts**

Plated carbon steel per ASTM A449, Type 1

Austenitic 316 SST

ASTM A 453, Class A, Grade 660

ASTM A 193, Grade B7M

ASTM A 193, Class 2, Grade B8M

*Monel*

**Sensor Module Fill Fluid**

Silicone or inert halocarbon (Inert is not available with 3051S_CA). In-Line series uses Fluorinert® FC-43.

**Process Fill Fluid (Liquid Level Only)**

3051S_L: *Syltherm* XLT, *D.C.* Silicone 704,
*D.C.* Silicone 200, inert, glycerin and water,
*Neobee M-20*, propylene glycol and water.

**Paint**

Polyurethane

**Cover O-rings**

Buna-N

### Shipping Weights for 3051S

Table A-2. *SuperModule* Platform weights

| ***SuperModule* Platform** | **Weight in lb. (kg)** |
|---|---|
| *Coplanar*[1] | 3.1 (1,4) |
| In-Line | 1.4 (0,6) |

*(1) Flange and bolts not included.*

Table A-3. Transmitter weights without options

| **Complete Transmitter[1]** | **Add Weight In lb (kg)** |
|---|---|
| 3051S_C with junction box housing | 6.9 (3,1) |
| 3051S_T with junction box housing | 3.3 (1,5) |
| 3051S_C with *PlantWeb* housing | 7.2 (3,3) |
| 3051S_T with *PlantWeb* housing | 3.6 (1,6) |

*(1) Fully functional transmitter with terminal block, covers, and SST flange.*

Table A-4. 3051S_L weights without options

| Flange | Flush lb. (kg) | 2-in. Ext. lb (kg) | 4-in. Ext. lb (kg) | 6-in. Ext. lb (kg) |
|---|---|---|---|---|
| 2-in., 150 | 12.5 (5,7) | — | — | — |
| 3-in., 150 | 17.5 (7,9) | 19.5 (8,8) | 20.5 (9,3) | 21.5 (9,8) |
| 4-in., 150 | 23.5 (10,7) | 26.5 (12,0) | 28.5 (12,9) | 30.5 (13,8) |
| 2-in., 300 | 17.5 (7,9) | — | — | — |
| 3-in., 300 | 22.5 (10,2) | 24.5 (11,1) | 25.5 (11,6) | 26.5 (12,0) |
| 4-in., 300 | 32.5 (14,7) | 35.5 (16,1) | 37.5 (17,0) | 39.5 (17,9) |
| 2-in., 600 | 15.3 (6,9) | — | — | — |
| 3-in., 600 | 25.2 (11,4) | 27.2 (12,3) | 28.2 (12,8) | 29.2 (13,2) |
| DN 50 / PN 40 | 13.8 (6,2) | — | — | — |
| DN 80 / PN 40 | 19.5 (8,8) | 21.5 (9,7) | 22.5 (10,2) | 23.5 (10,7) |
| DN 100 / PN 10/16 | 17.8 (8,1) | 19.8 (9,0) | 20.8 (9,5) | 21.8 (9,9) |
| DN 100 / PN 40 | 23.2 (10,5) | 25.2 (11,5) | 26.2 (11,9) | 27.2 (12,3) |

Table A-5. Transmitter option weights

| Option Code | Option | Add lb (kg) |
|---|---|---|
| 1J, 1K, 1L | SST *PlantWeb* housing | 3.4 (1,5) |
| 2J | SST Junction Box housing | 3.3 (1,5) |
| 7J | SST Quick Connect | 0.35 (0,16) |
| 2A, 2B, 2C | Aluminum Junction Box housing | 1.2 (0,5) |
| 1A, 1B, 1C | Aluminum *PlantWeb* housing | 1.2 (0,5) |
| M5 | LCD display for aluminum *PlantWeb* housing(1),<br>LCD display for SST *PlantWeb* housing(1) | 0.8 (0,4)<br>1.72 (0,8) |
| B4 | SST mounting bracket for *Coplanar* flange | 0.6 (0,3) |
| B1, B2, B3 | Mounting Bracket for Traditional flange | 2.3 (1,0) |
| B7, B8, B9 | Mounting Bracket for Traditional flange with SST bolts | 2.3 (1,0) |
| BA, BC | SST Bracket for Traditional flange | 2.3 (1,0) |
| F12, F22 | SST Traditional flange(2) | 3.3 (1,5) |
| F13, F23 | Traditional flange (*Hastelloy*) | 2.7 (1,2) |
| E12, E22 | SST *Coplanar* flange(2) | 1.9 (0,9) |
| F14, F24 | Traditional flange (*Monel*) | 2.6 (1,2) |
| F15, F25 | Traditional Flange (SST with *Hastelloy* D/V) | 2.5 (1,1) |
| G21 | Level flange—3 in., 150 | 10.8 (4,9) |
| G22 | Level flange—3 in., 300 | 14.3 (6,5) |
| G11 | Level flange—2 in., 150 | 10.7 (4,9) |
| G12 | Level flange—2 in., 300 | 14.0 (6,4) |
| G31 | DIN Level flange, SST, DN 50, PN 40 | 8.3 (3,8) |
| G41 | DIN Level flange, SST, DN 80, PN 40 | 13.7 (6,2) |

*(1) Includes LCD display connector board and display cover*
*(2) Includes mounting bolts*

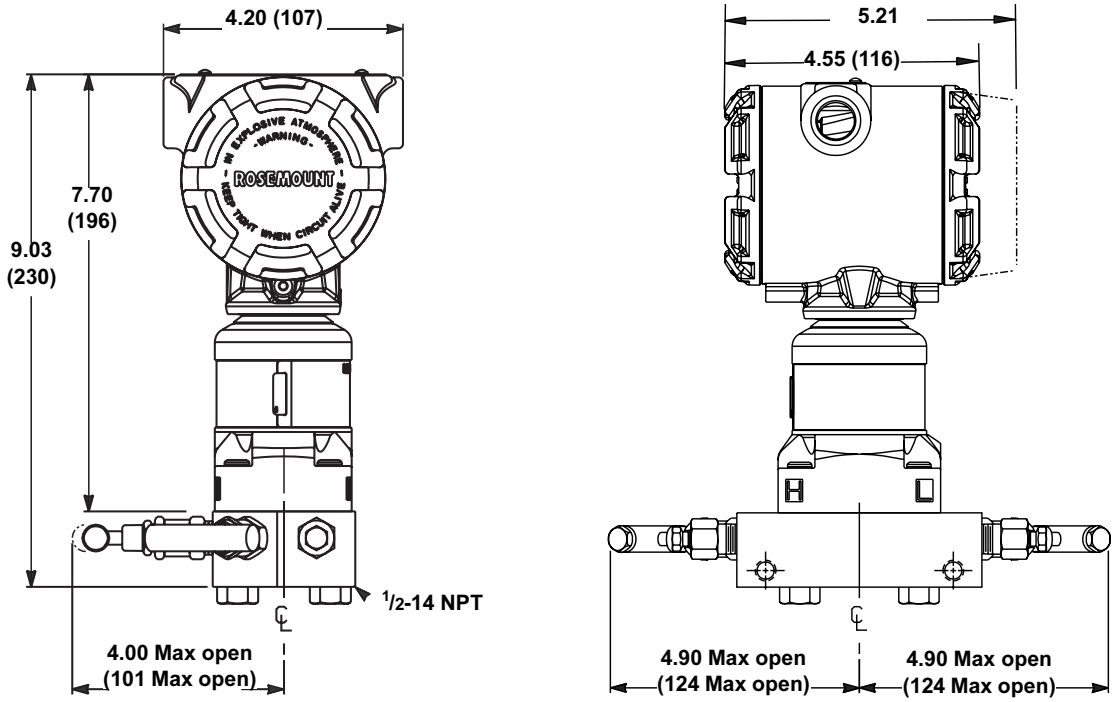
| Item | Weight In lb. (kg) |
|---|---|
| Aluminum standard cover | 0.4 (0,2) |
| SST standard cover | 1.26 (0,6) |
| Aluminum display cover | 0.7 (0,3) |
| SST display cover | 1.56 (0,7) |
| LCD display(1) | 0.1 (0,1) |
| Junction Box terminal block | 0.3 (0,1) |
| *PlantWeb* terminal block | 0.2 (0,1) |

*(1) Display only*

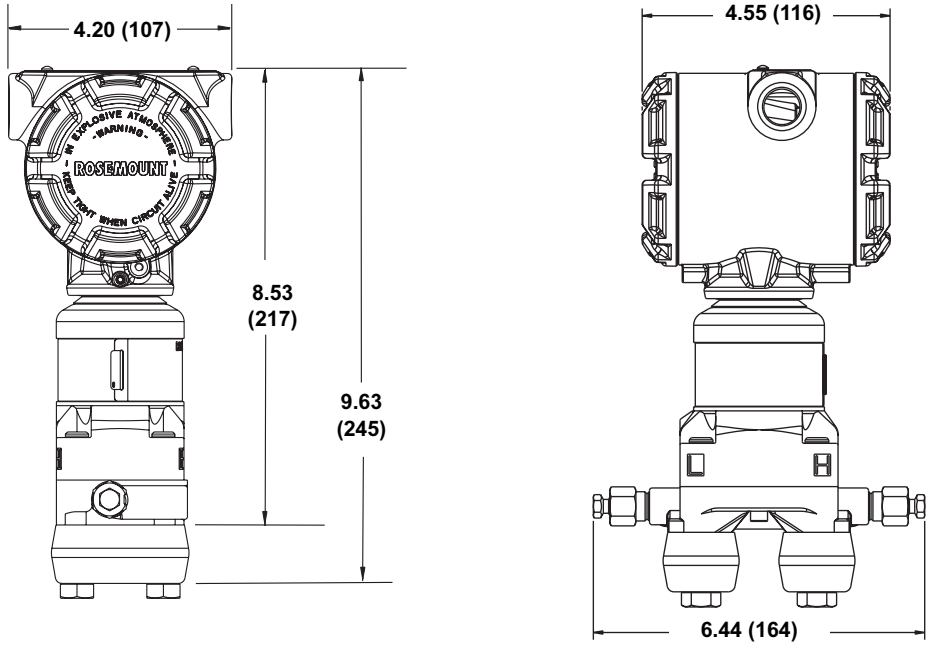
## DIMENSIONAL DRAWINGS

Dimensions are in inches (millimeters).
Process adapters (option D2) and Rosemount 305 integral manifolds must be ordered with the transmitter.

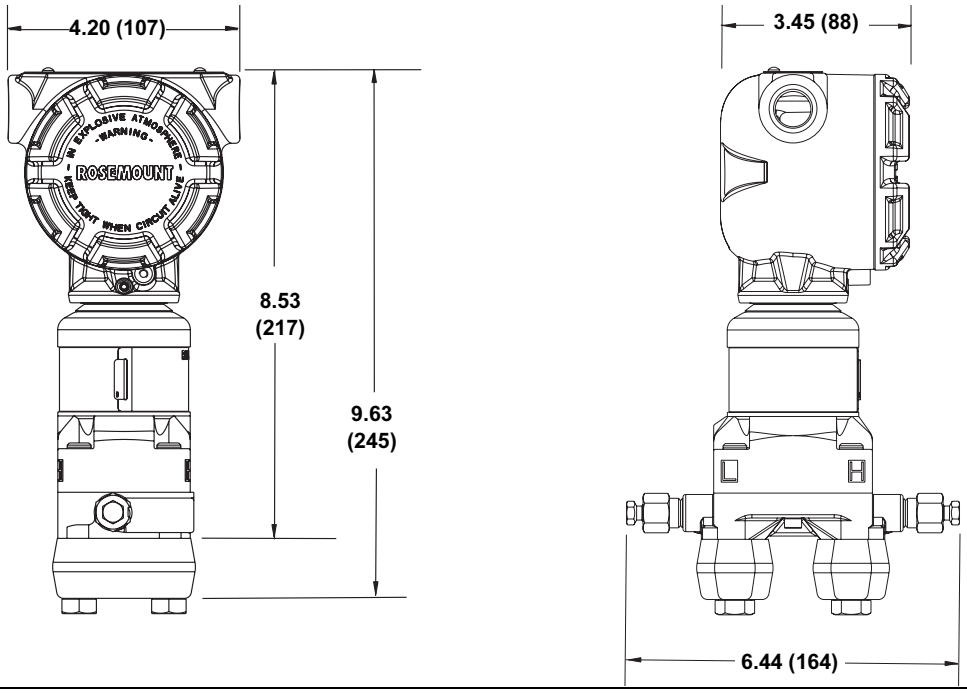
### *PlantWeb* Housing with *Coplanar SuperModule* Platform and 305 *Coplanar* Integral Manifold



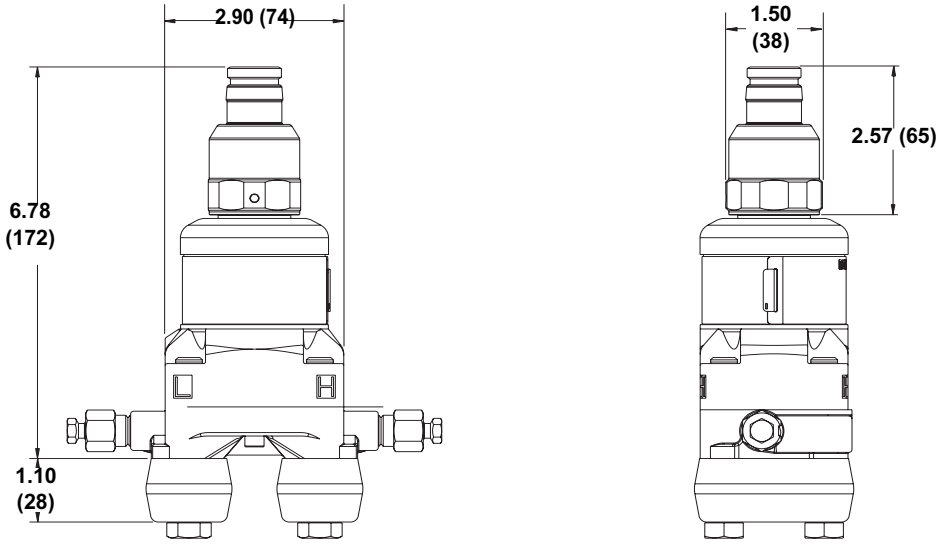

### *PlantWeb* Housing with *Coplanar SuperModule* Platform and *Coplanar* Flange



## Junction Box Housing with *Coplanar SuperModule* Platform and *Coplanar* Flange

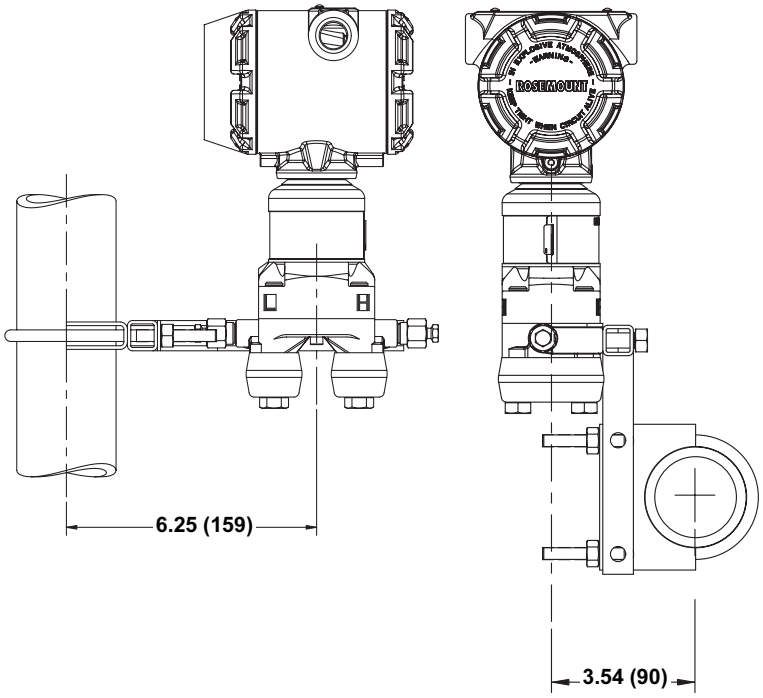



## Quick Connect with *Coplanar SuperModule* Platform and *Coplanar* Flange

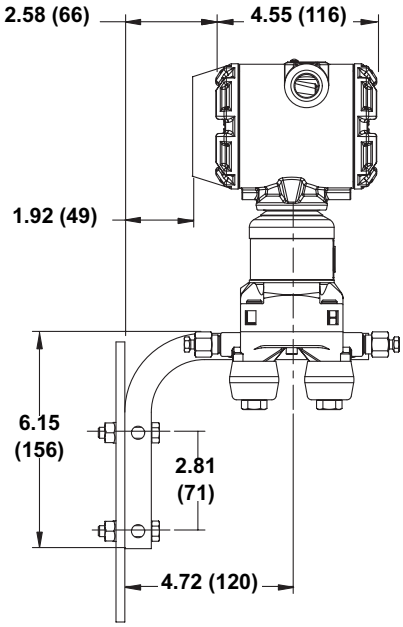


## *Coplanar* Flange Mounting Configurations

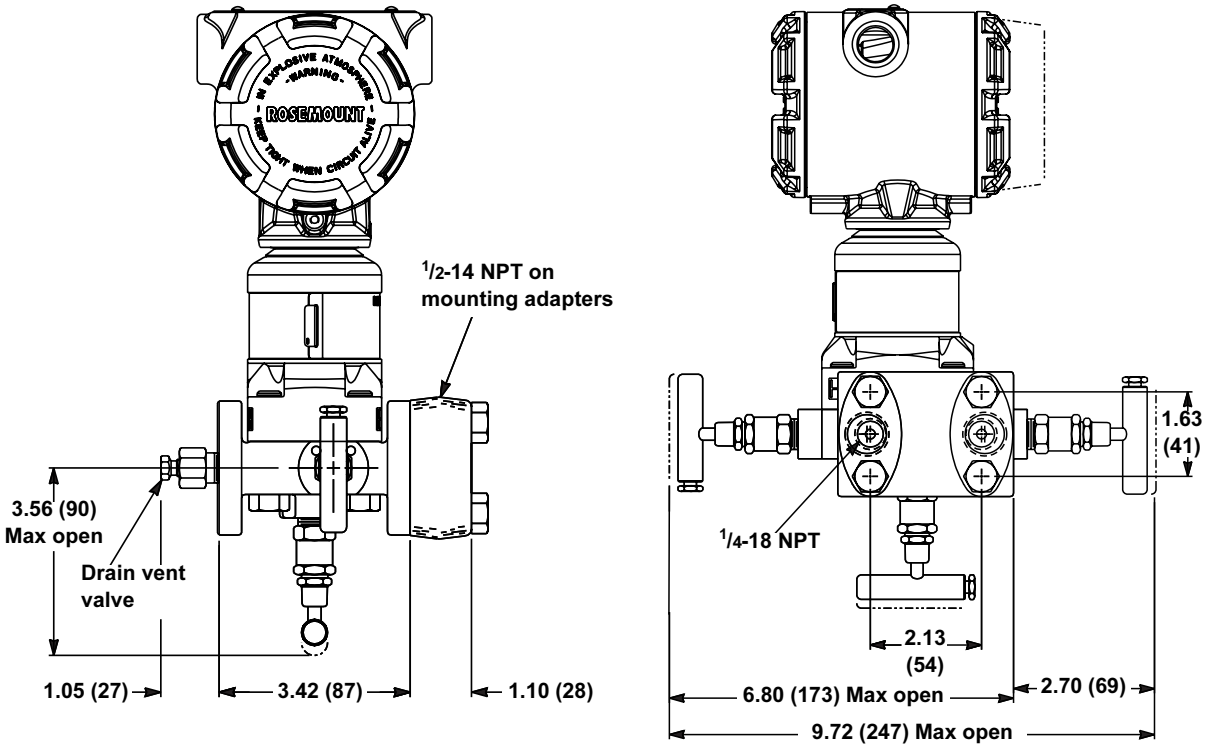
### Pipe Mount



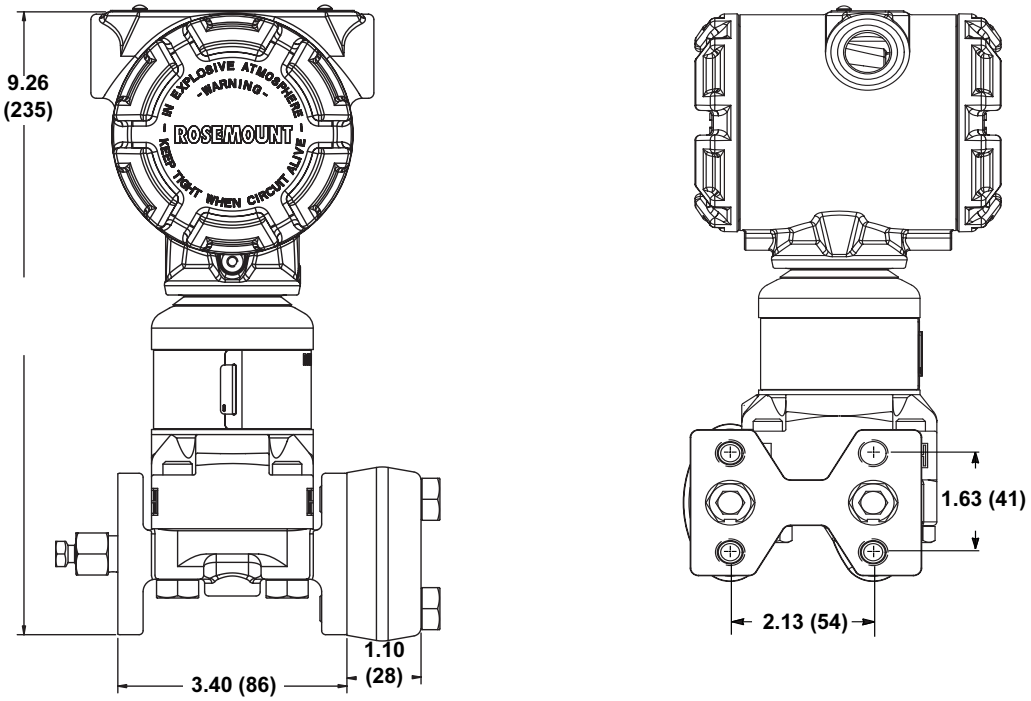

### Panel Mount



## *PlantWeb* Housing with *Coplanar SuperModule* Platform and 305 Traditional Integral Manifold

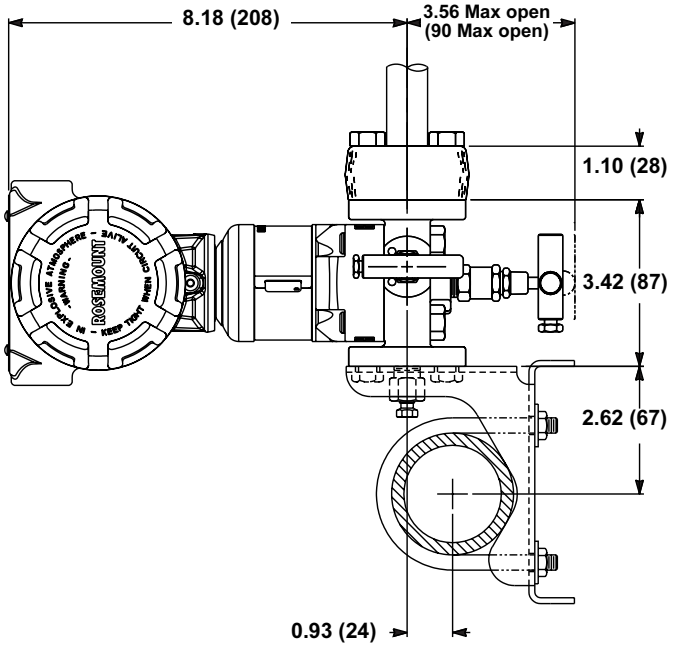


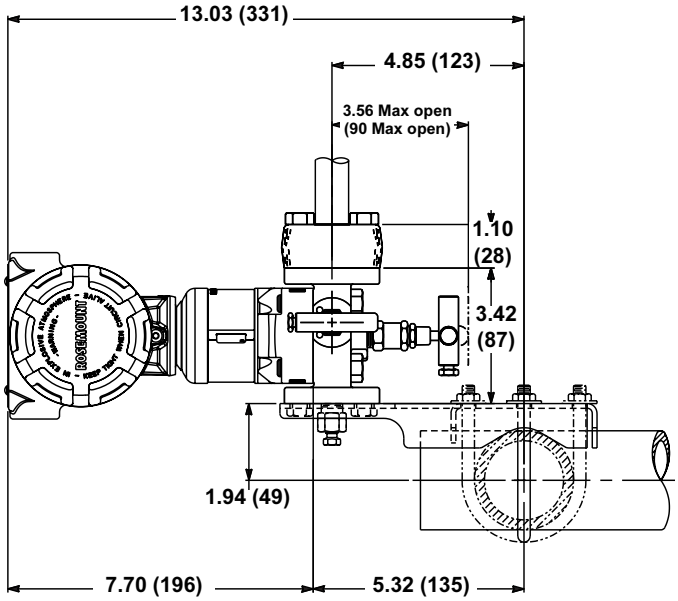

## *PlantWeb* Housing with *Coplanar SuperModule* Platform and Traditional Flange



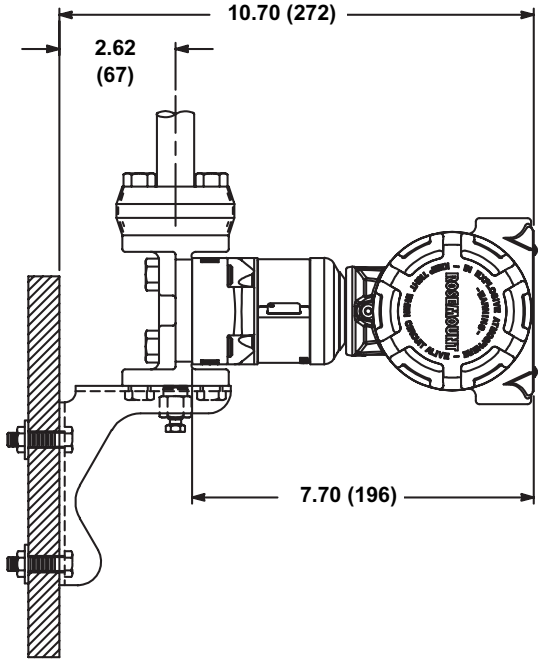
## Traditional Flange Mounting Configurations

### Pipe Mount 305 Integral Manifold



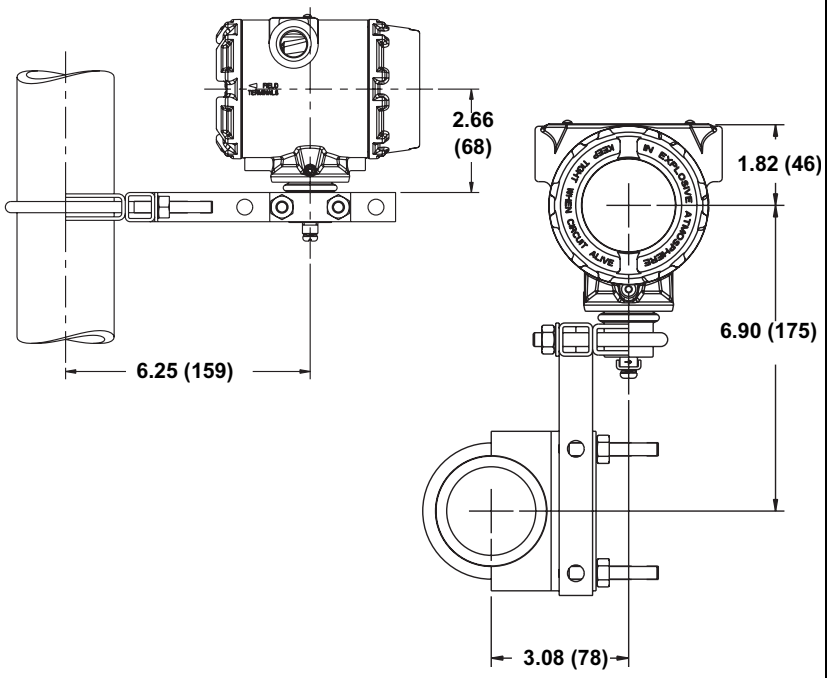




### Panel Mount

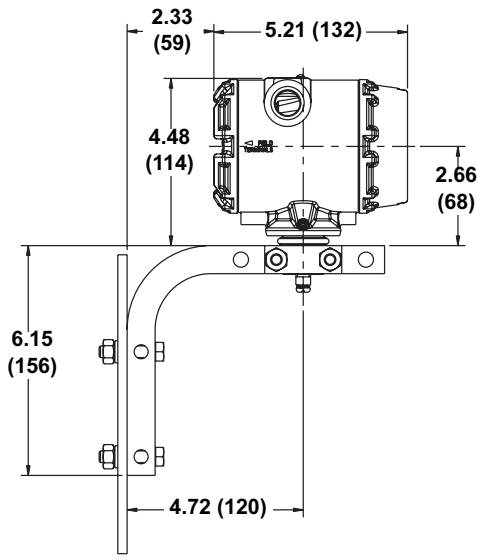


## Remote Mount LCD Display and Interface Mounting Configurations

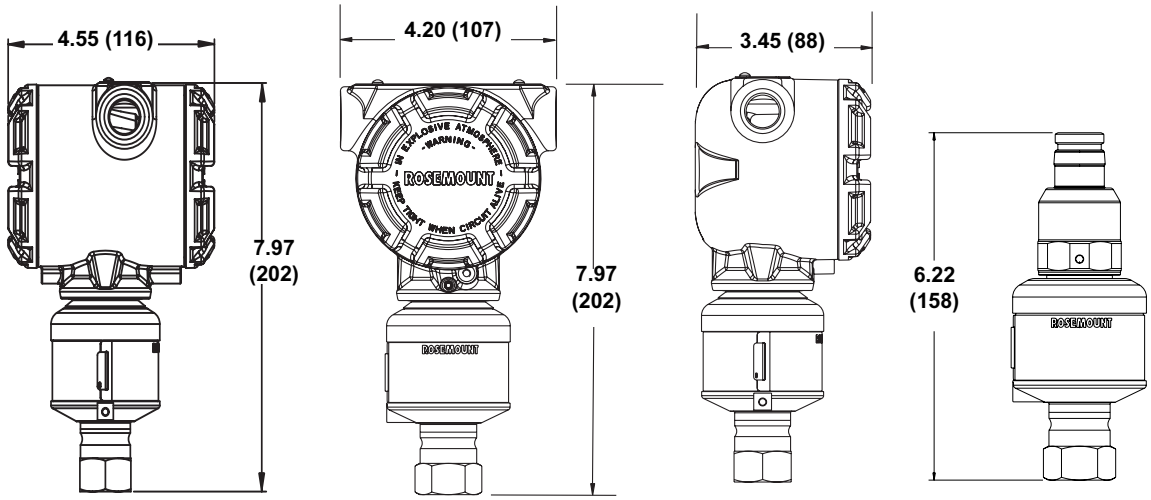
### Pipe Mount




### Panel Mount

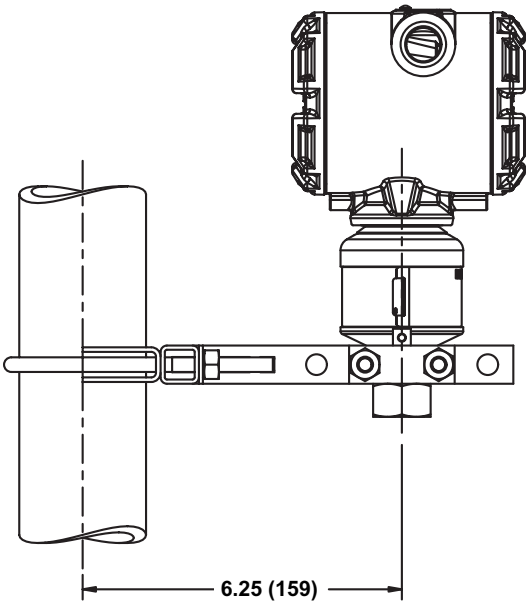


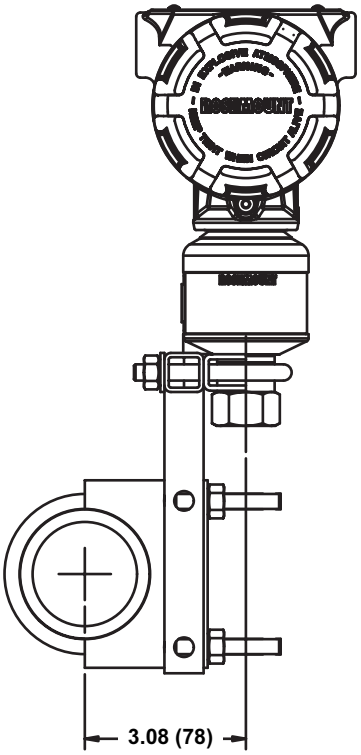

## *PlantWeb* Housing, Junction Box Housing, and Quick Connect with In-Line *SuperModule* Platform



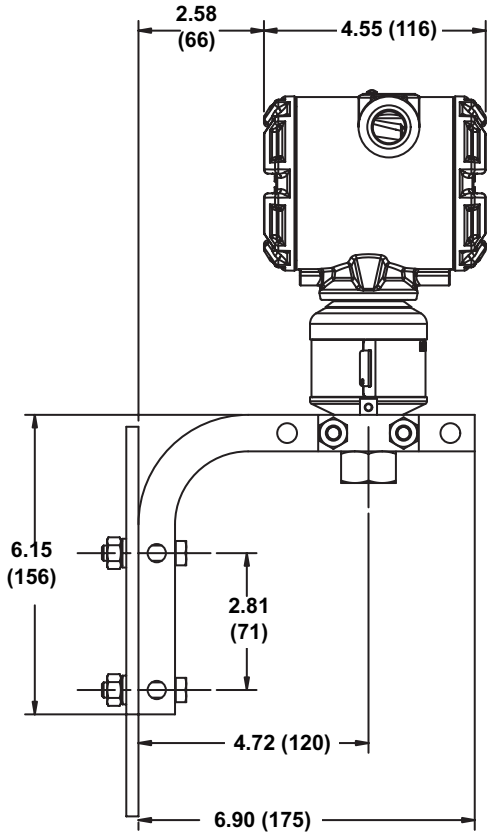
## In-line Mounting Configurations with Optional Mounting Bracket

### Pipe Mount



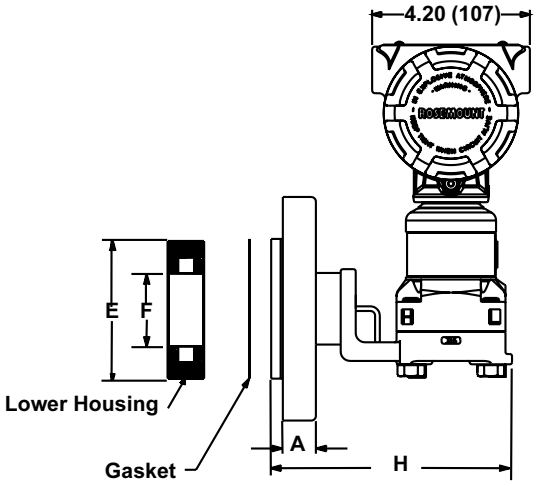




### Panel Mount

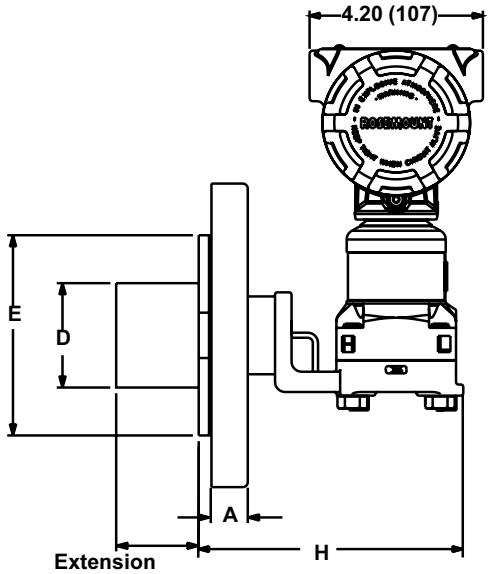


## 3051S_L Liquid Level

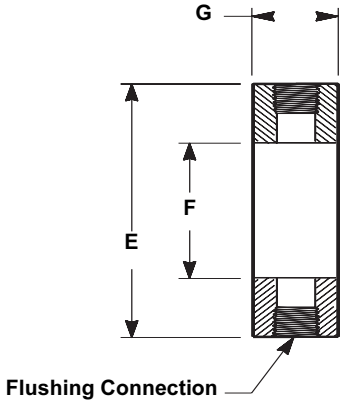
**Flush Flanged Configuration**



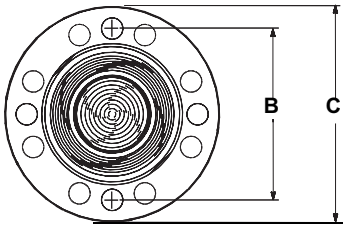

**Extended Flanged Configuration**




**Optional Flushing Connection Ring (Lower Housing)**




**Diaphragm Assembly and Mounting Flange**



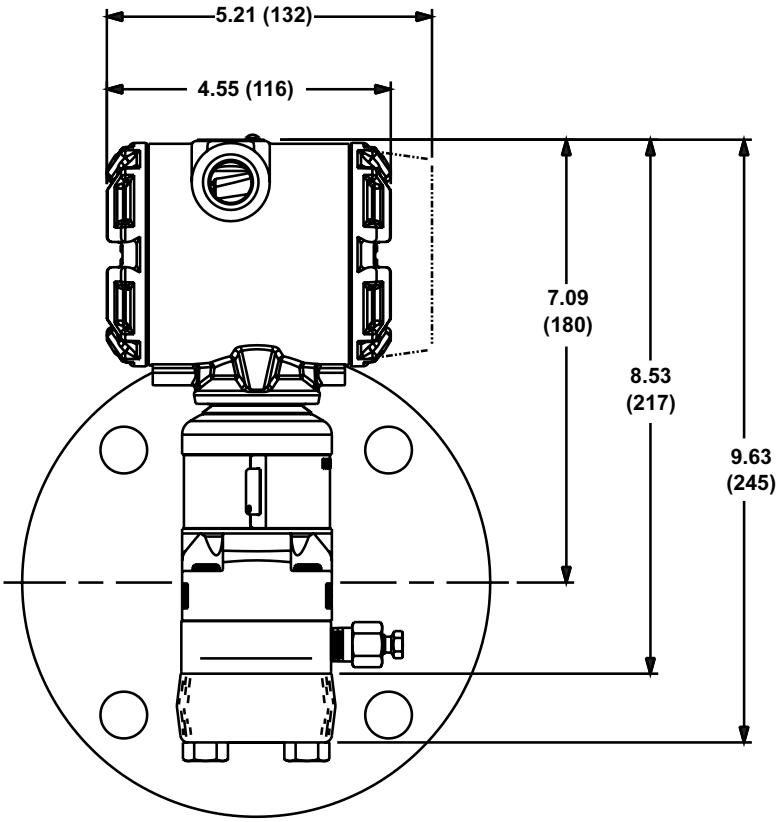



Table A-6. 3051S_L Dimensional Specifications

**Except where indicated, dimensions are in inches (millimeters).**

| Class | Pipe Size | Flange Thickness A | Bolt Circle Diameter B | Outside Diameter C | No. of Bolts | Bolt Hole Diameter | Extension Diameter(1) D | O.D. Gasket Surface E |
|---|---|---|---|---|---|---|---|---|
| ASME B16.5 (ANSI) 150 | 2 (51) | 0.69 (18) | 4.75 (121) | 6.0 (152) | 4 | 0.75 (19) | NA | 3.6 (92) |
| | 3 (76) | 0.88 (22) | 6.0 (152) | 7.5 (191) | 4 | 0.75 (19) | 2.58 (66) | 5.0 (127) |
| | 4 (102) | 0.88 (22) | 7.5 (191) | 9.0 (229) | 8 | 0.75 (19) | 3.5 (89) | 6.2 (158) |
| ASME B16.5 (ANSI) 300 | 2 (51) | 0.82 (21) | 5.0 (127) | 6.5 (165) | 8 | 0.75 (19) | NA | 3.6 (92) |
| | 3 (76) | 1.06 (27) | 6.62 (168) | 8.25 (210) | 8 | 0.88 (22) | 2.58 (66) | 5.0 (127) |
| | 4 (102) | 1.19 (30) | 7.88 (200) | 10.0 (254) | 8 | 0.88 (22) | 3.5 (89) | 6.2 (158) |
| ASME B16.5 (ANSI) 600 | 2 (51) | 1.00 (25) | 5.0 (127) | 6.5 (165) | 8 | 0.75 (19) | NA | 3.6 (92) |
| | 3 (76) | 1.25 (32) | 6.62 (168) | 8.25 (210) | 8 | 0.88 (22) | 2.58 (66) | 5.0 (127) |
| DIN 2501 PN 10–40 | DN 50 | 20 mm | 125 mm | 165 mm | 4 | 18 mm | NA | 4.0 (102) |
| DIN 2501 PN 25/40 | DN 80 | 24 mm | 160 mm | 200 mm | 8 | 18 mm | 65 mm | 5.4 (138) |
| | DN 100 | 24 mm | 190 mm | 235 mm | 8 | 22 mm | 89 mm | 6.2 (158) |
| DIN 2501 PN 10/16 | DN 100 | 20 mm | 180 mm | 220 mm | 8 | 18 mm | 89 mm | 6.2 (158) |

| Class | Pipe Size | Process Side F | Lower Housing G | | H |
|---|---|---|---|---|---|
| | | | 1/4 NPT | 1/2 NPT | |
| ASME B16.5 (ANSI) 150 | 2 (51) | 2.12 (54) | 0.97 (25) | 1.31 (33) | 6.66 (169) |
| | 3 (76) | 3.6 (91) | 0.97 (25) | 1.31 (33) | 6.66 (169) |
| | 4 (102) | 3.6 (91) | 0.97 (25) | 1.31 (33) | 6.66 (169) |
| ASME B16.5 (ANSI) 300 | 2 (51) | 2.12 (54) | 0.97 (25) | 1.31 (33) | 6.66 (169) |
| | 3 (76) | 3.6 (91) | 0.97 (25) | 1.31 (33) | 6.66 (169) |
| | 4 (102) | 3.6 (91) | 0.97 (25) | 1.31 (33) | 6.66 (169) |
| ASME B16.5 (ANSI) 600 | 2 (51) | 2.12 (54) | 0.97 (25) | 1.31 (33) | 8.66 (219) |
| | 3 (76) | 3.6 (91) | 0.97 (25) | 1.31 (33) | 8.66 (219) |
| DIN 2501 PN 10–40 | DN 50 | 2.4 (61) | 0.97 (25) | 1.31 (33) | 6.66 (169) |
| DIN 2501 PN 25/40 | DN 80 | 3.6 (91) | 0.97 (25) | 1.31 (33) | 6.66 (169) |
| | DN 100 | 3.6 (91) | 0.97 (25) | 1.31 (33) | 6.66 (169) |
| DIN 2501 PN 10/16 | DN 100 | 3.6 (91) | 0.97 (25) | 1.31 (33) | 6.66 (169) |

*(1) Tolerances are 0.040 (1,02), –0.020 (0,51).*

## ORDERING INFORMATION

### Rosemount 3051S Series *Coplanar*

| Model | Transmitter Type | | | |
|---|---|---|---|---|
| 3051S | Scalable pressure transmitter | | | |
| **Code** | **Performance Class** | | | |
| 1 | Ultra: 0.025% span accuracy, 200:1 rangedown, 10-year stability, limited 12-year warranty | | | |
| 3[1] | Ultra for Flow: 0.04% reading accuracy, 200:1 rangedown, 10-year stability, limited 12-year warranty | | | |
| 2 | Classic: 0.055% span accuracy, 100:1 rangedown, 5-year stability | | | |
| **Code** | **Connection Type** | | | |
| C | *Coplanar* | | | |
| **Code** | **Measurement Type[2]** | | | |
| D | Differential | | | |
| G | Gage | | | |
| A | Absolute | | | |
| **Code** | **Pressure Range** | | | |
| | **Differential** | **Gage** | **Absolute** | |
| 0A[3] | -3 to 3 in$H_2O$ (-7,47 to 7,47 mbar) | N/A | 0 to 5 psia (0 to 0,34 bar) | |
| 1A | -25 to 25 in$H_2O$ (-62,2 to 62,2 mbar) | -25 to 25 in$H_2O$ (-62,2 to 62,2 mbar) | 0 to 30 psia (0 to 2,06 bar) | |
| 2A | -250 to 250 in$H_2O$ (-623 to 623 mbar) | -250 to 250 in$H_2O$ (-623 to 623 mbar) | 0 to 150 psia (0 to 10,34 bar) | |
| 3A | -1000 to 1000 in$H_2O$ (-2,5 to 2,5 bar) | -393 to 1000 in$H_2O$ (-0,98 to 2,5 bar) | 0 to 800 psia (0 to 55,2 bar) | |
| 4A | -300 to 300 psi (-20,7 to 20,7 bar) | -14.2 to 300 psig (-0,98 to 21 bar) | 0 to 4000 psia (0 to 275,8 bar) | |
| 5A | -2000 to 2000 psi (-137,9 to 137,9 bar) | -14.2 to 2000 psig (-0,98 to 137,9 bar) | N/A | |
| **Code** | **Isolating Diaphragm** | | | |
| 2[4] | 316L SST | | | |
| 3[4] | *Hastelloy* C-276 | | | |
| 4 | *Monel* 400 | | | |
| 5[5] | Tantalum | | | |
| 6 | Gold-plated *Monel* 400<br>*Note: Includes graphite-filled TFE o-ring.* | | | |
| 7 | Gold-plated 316L SST | | | |

| Code | Process Connection[6] | Size | Material Type[7] | | |
|---|---|---|---|---|---|
| | | | **Flange Material** | **Drain Vent** | **Bolting** |
| 000 | None | | | | |
| A11 | Assemble to Rosemount 305 integral manifold | | | | |
| A12 | Assemble to 304 or AMF manifold and 316 SST traditional flange | | | | |
| B11[8] | Assemble to one Rosemount 1199 diaphragm seal | | | | |
| B12[8] | Assemble to two Rosemount 1199 diaphragm seals | | | | |
| C11 | Assemble to Rosemount 405 primary element | | | | |
| D11 | Assemble to Rosemount 1195 integral orifice and Rosemount 305 integral manifold | | | | |
| EA2 | Assemble to Rosemount *Annubar* Primary Element with *Coplanar* flange | | 316 SST | 316 SST | |
| EA3 | Assemble to Rosemount *Annubar* Primary Element with *Coplanar* flange | | *Hastelloy* C-276 | *Hastelloy* C-276 | |
| EA5 | Assemble to Rosemount *Annubar* Primary Element with *Coplanar* flange | | 316 SST | *Hastelloy* C-276 | |
| E11 | *Coplanar* flange | 1/4–18 NPT | CS | 316 SST | |
| E12 | *Coplanar* flange | 1/4–18 NPT | 316 SST | 316 SST | |
| E13[4] | *Coplanar* flange | 1/4–18 NPT | *Hastelloy* C-276 | *Hastelloy* C-276 | |
| E14 | *Coplanar* flange | 1/4–18 NPT | *Monel* 400 | *Monel* 400 | |
| E15[4] | *Coplanar* flange | 1/4–18 NPT | 316 SST | *Hastelloy* C-276 | |
| E16[4] | *Coplanar* flange | 1/4–18 NPT | CS | *Hastelloy* | |
| E21 | *Coplanar* flange | RC 1/4 | CS | 316 SST | |
| E22 | *Coplanar* flange | RC 1/4 | 316 SST | 316 SST | |
| E23[4] | *Coplanar* flange | RC 1/4 | *Hastelloy* C-276 | *Hastelloy* C-276 | |
| E24 | *Coplanar* flange | RC 1/4 | *Monel* 400 | *Monel* 400 | |
| E25[4] | *Coplanar* flange | RC 1/4 | 316 SST | *Hastelloy* C-276 | |
| E26[4] | *Coplanar* flange | RC 1/4 | CS | *Hastelloy* C-276 | |
| F12 | Traditional flange | 1/4–18 NPT | 316 SST | 316 SST | |
| F13[4] | Traditional flange | 1/4–18 NPT | *Hastelloy* C-276 | *Hastelloy* C-276 | |

| | | | | | |
|---|---|---|---|---|---|
| F14 | Traditional flange | 1/4–18 NPT | *Monel* 400 | *Monel* 400 | |
| | | | **Flange Material** | **Drain Vent** | **Bolting** |
| F15[4] | Traditional flange | 1/4–18 NPT | 316 SST | *Hastelloy* C-276 | |
| F22 | Traditional flange | RC 1/4 | 316 SST | 316 SST | |
| F23[4] | Traditional flange | RC 1/4 | *Hastelloy* C-276 | *Hastelloy* C-276 | |
| F24 | Traditional flange | RC 1/4 | *Monel* 400 | *Monel* 400 | |
| F25[4] | Traditional flange | RC 1/4 | 316 SST | *Hastelloy* C-276 | |
| F32 | Bottom vent traditional flange | 1/4–18 NPT | 316 SST | 316 SST | |
| F52 | DIN-compliant traditional flange | 1/4–18 NPT | 316 SST | 316 SST | 7/16-in. bolting |
| F62 | DIN-compliant traditional flange | 1/4–18 NPT | 316 SST | 316 SST | M10 bolting |
| F72 | DIN-compliant traditional flange | 1/4–18 NPT | 316 SST | 316 SST | M12 bolting |
| G11 | Vertical mount level flange | 2-in. ANSI class 150 | 316 SST | | |
| G12 | Vertical mount level flange | 2-in. ANSI class 300 | 316 SST | | |
| G14[4] | Vertical mount level flange | 2-in. ANSI class 150 | *Hastelloy* C-276 | | |
| G15[4] | Vertical mount level flange | 2-in. ANSI class 300 | *Hastelloy* C-276 | | |
| G21 | Vertical mount level flange | 3-in. ANSI class 150 | 316 SST | | |
| G22 | Vertical mount level flange | 3-in. ANSI class 300 | 316 SST | | |
| G24[4] | Vertical mount level flange | 3-in. ANSI class 150 | *Hastelloy* C-276 | | |
| G25[4] | Vertical mount level flange | 3-in. ANSI class 300 | *Hastelloy* C-276 | | |
| G31 | Vertical mount level flange | DIN- DN 50 PN 40 | 316 SST | | |
| G41 | Vertical mount level flange | DIN- DN 80 PN 40 | 316 SST | | |

| **Code** | **Output[9]** |
|---|---|
| A | 4–20 mA with digital signal based on HART protocol |
| F[10] | FOUNDATION fieldbus protocol |

| **Code** | **Housing Style** | **Material[7]** | **Conduit Entry Size** |
|---|---|---|---|
| 00 | None (*SuperModule* Platform only, no housing included) | | |
| 01[11] | Assemble to Rosemount 753R Web-Based Monitoring Indicator | | |
| 1A | *PlantWeb* housing | Aluminum | 1/2–14 NPT |
| 1B | *PlantWeb* housing | Aluminum | M20 x 1.5 (CM20) |
| 1C | *PlantWeb* housing | Aluminum | G1/2 |
| 1J | *PlantWeb* housing | 316L SST | 1/2–14 NPT |
| 1K | *PlantWeb* housing | 316L SST | M20 x 1.5 (CM20) |
| 1L | *PlantWeb* housing | 316L SST | G1/2 |
| 2A | Junction Box housing | Aluminum | 1/2–14 NPT |
| 2B | Junction Box housing | Aluminum | M20 x 1.5 (CM20) |
| 2C | Junction Box housing | Aluminum | G1/2 |
| 2J | Junction Box housing | 316L SST | 1/2–14 NPT |
| 2E | Junction Box Housing with output for remote display and interface | Aluminum | 1/2–14 NPT |
| 2F | Junction Box Housing with output for remote display and interface | Aluminum | M20 x 1.5 (CM20) |
| 2G | Junction Box Housing with output for remote display and interface | Aluminum | G1/2 |
| 2M | Junction Box Housing with output for remote display and interface | 316L SST | 1/2–14 NPT |
| 7J[12] | Quick Connect (A size Mini, 4-pin male termination) | 316L SST | |

| **Code** | **Options** |
|---|---|
| ***PlantWeb* Control Functionality** | |
| A01[13] | FOUNDATION fieldbus Advanced Control Function Block Suite |
| ***PlantWeb* Diagnostic Functionality** | |
| D01[13] | FOUNDATION fieldbus Diagnostics Suite |
| DA1[14] | HART Diagnostics Suite |
| ***PlantWeb* Enhanced Measurement Functionality** | |
| H01[13][15] | Fully Compensated Mass Flow Block |

| **Code** | **Options** |
|---|---|
| **Mounting Brackets[16]** | |
| B4 | *Coplanar* flange bracket, all SST, 2-in. pipe and panel |
| B1 | Traditional flange bracket, CS, 2-in. pipe |
| B2 | Traditional flange bracket, CS, panel |
| B3 | Traditional flange flat bracket, CS, 2-in. pipe |
| B7 | Traditional flange bracket, B1 with SST bolts |
| B8 | Traditional flange bracket, B2 with SST bolts |

| | |
|---|---|
| B9 | Traditional flange bracket, B3 with SST bolts |
| BA | Traditional flange bracket, B1, all SST |
| BC | Traditional flange bracket, B3, all SST |
| **Special Configuration (Software)** | |
| C1[17] | Custom software configuration<br>*Note: A Configuration Data Sheet must be completed, see 00806-0100-4801.* |
| C3 | Gage pressure calibration on Rosemount 3051S_CA4 only |
| C4 | NAMUR alarm and saturation levels, high alarm |
| C5[17] | NAMUR alarm and saturation levels, low alarm |
| C6[17] | Custom alarm and saturation signal levels, high alarm<br>*Note: Requires option code C1, custom software configuration. A Configuration Data Sheet must be completed, see 00806-0100-4801.* |
| C7[17] | Custom alarm and saturation signal levels, low alarm<br>*Note: Requires option code C1, custom software configuration. A Configuration Data Sheet must be completed, see 00806-0100-4801.* |
| C8[17] | Low alarm (standard Rosemount alarm and saturation levels) |
| **Special Configuration (Hardware)** | |
| D1[17] | Hardware adjustments (zero, span, alarm, security)<br>*Note: Not available with housing style codes 00, 01, 2E, 2F, 2G, 2M, 5A, or 7J.* |
| D2[16] | Process adapters 1/2-14 NPT |
| D4 | External ground screw assembly |
| D5[16] | Delete transmitter drain/vent valves (install plugs) |
| D7[16] | *Coplanar* flange without drain/vent ports |
| D8[16] | Ceramic drain/vent valves |
| D9[16] | RC 1/2 process adapters |
| **Product Certifications[18]** | |
| E1 | ATEX Flameproof |
| I1 | ATEX Intrinsically Safe |
| IA | ATEX FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only |
| N1 | ATEX Type n |
| K1 | ATEX Flameproof, Intrinsically Safe, Type n, Dust (combination of E1, I1, N1, and ND) |
| ND | ATEX Dust |
| E4 | JIS Flameproof |
| E5 | FM Explosion-proof |
| I5 | FM Intrinsically Safe, Non-Incendive |
| IE | FM FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only |
| K5 | FM Explosion-proof, Intrinsically Safe, Non-Incendive (combination of E5 and I5) |
| E6 | CSA Explosion-proof, Division 2 |
| I6 | CSA Intrinsically Safe |
| IF | CSA FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only |
| K6 | CSA Explosion-proof, Intrinsically Safe, Division 2 (combination of E6 and I6) |
| D3[19] | Measurement Canada Accuracy Approval |
| E7 | SAA Flameproof, Dust Ignition-proof |
| I7 | IECEx Intrinsically Safe |
| IG | IECEx FISCO Intrinsically Safe |
| N7 | IECEx Type n |
| K7 | SAA Flameproof, Dust Ignition-proof, IECEx Intrinsically Safe, and Type n (combination of E7, I7, and N7) |
| KA | ATEX and CSA Flameproof, Intrinsically Safe (combination of E1, I1, E6, and I6)<br>*Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M.* |
| KB | FM and CSA Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)<br>*Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M.* |
| KC | FM and ATEX Explosion-proof, Intrinsically Safe, Non-Incendive (combination of E5, E1, I5, and I1)<br>*Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M.* |
| KD | FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)<br>*Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M.* |
| DW[20] | NSF Drinking Water Approval |
| **Alternate Materials of Construction** | |
| L1 | Inert sensor fill fluid (differential and gage only)<br>*Note: Silicone fill fluid is standard.* |
| L2 | Graphite-filled *Teflon*® (PTFE) o-ring |
| L4[16] | Austenitic 316 SST bolts |

| | |
|---|---|
| L5[16] | ASTM A 193, Grade B7M bolts |
| L6[16] | *Monel* bolts |
| L7[16] | ASTM A 453, Class A, Grade 660 bolts |
| L8[16] | ASTM A 193, Class 2, Grade B8M bolts |
| **Digital Display[21]** | |
| M5 | *PlantWeb* LCD Display |
| M7[22] | Remote mount LCD display and interface, no cable; *PlantWeb* housing, SST bracket, requires 4-20 mA / HART output<br>*Note: Use Belden 3084A cable or equivalent. Contact an Emerson Process Management representative for additional information.* |
| M8[22] | Remote mount LCD display and interface, 50 ft. (15 m) cable; *PlantWeb* housing, SST bracket, requires 4-20 mA / HART output |
| M9[22] | Remote mount LCD display and interface, 100 ft. (31 m) cable; *PlantWeb* housing, SST bracket, requires 4-20 mA / HART output |
| **Special Procedures** | |
| P1 | Hydrostatic testing with certificate |
| P2[16] | Cleaning for special services |
| P3[16] | Cleaning for less than 1PPM chlorine/fluorine |
| P9 | 4500 psig (310 bar) static pressure limit (Rosemount 3051S_CD only) |
| P0[23] | 6092 psig (420 bar) static pressure limit (Rosemount 3051S2CD only) |
| **Special Certifications** | |
| Q4 | Calibration certificate |
| QP | Calibration certificate and tamper evident seal |
| Q8 | Material traceability certification per EN 10204 3.1.B |
| QS[24] | Prior-use certificate of FMEDA Data |
| QT[25] | Safety certified to IEC 61508 with certificate of FMEDA data |
| Q16 | Surface finish certification for sanitary remote seals |
| **Terminal Blocks** | |
| T1[26] | Transient terminal block |
| T2[27] | Terminal block with WAGO® spring clamp terminals |
| T3[27] | Transient terminal block with WAGO spring clamp terminals |
| **Conduit Electrical Connector** | |
| GE[28] | M12, 4-pin, Male Connector (*eurofast*®) |
| GM[28] | A size Mini, 4-pin, Male Connector (*minifast*®) |

**Typical Model Number: 3051S1CD 2A 2 E12 A 1A DA1 B4 M5**

*(1) Not available with Housing code 01. This option is only available with range codes 2A and 3A, 316L SST isolating diaphragm and silicone fill fluid.*
*(2) Performance Class code 3 is available with Measurement Type code D only.*
*(3) 3051S_CD0 is only available with traditional flange, 316 SST diaphragm material, silicone fill fluid, and Bolting option L4.*
*(4) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.*
*(5) Tantalum diaphragm material is only available for ranges 2A - 5A, differential and gage.*
*(6) Process connection option codes B12, C11, D11, EA2, EA3 and EA5 are only available on differential Measurement Type, code D.*
*(7) Material specified is cast as follows: CF-8M is the cast version of 316 SST, CF-3M is the cast version of 316L SST, CW-12MW is the cast version of Hastelloy C-276, M-30C is the cast version of Monel 400. For housing, material is aluminum with polyurethane paint.*
*(8) Consult an Emerson Process Management representative for performance specifications.*
*(9) For spare SuperModule Platforms, select output code A.*
*(10) Requires PlantWeb housing.*
*(11) Available with output code A only. Not available with approvals. See Rosemount 753R Product Data Sheet, 00813-0100-4379, to specify Web-Based Monitoring Indicator. Does not integrate into plant host systems.*
*(12) Available with output code A only. Available approvals are FM Intrinsically Safe, Non-Incendive (option code I5), ATEX Intrinsically Safe (option code I1), or IECEx Intrinsically Safe (option code I7). Contact an Emerson Process Management representative for additional information.*
*(13) Requires PlantWeb housing and output code F.*
*(14) Requires PlantWeb housing and output code A. Includes Hardware Adjustments as standard. Not available with option code QT.*
*(15) Requires Rosemount Engineering Assistant to configure.*
*(16) Not available with process connection option code A11.*
*(17) Not available with output code F or Housing code 01.*
*(18) Valid when SuperModule Platform and housing have equivalent approvals.*
*(19) Requires PlantWeb housing and Hardware Adjustments option code D1. Limited availability depending on transmitter type and range. Contact an Emerson Process Management representative for additional information.*
*(20) Requires 316L SST wetted materials, glass-filled TFE O-ring (standard), and Process Connection code E12 or F12.*
*(21) Not available with Housing code 01 or 7J.*
*(22) Not available with output code F, Housing code 01, option code DA1, or option code QT.*
*(23) Requires 316L SST or Hastelloy C-276 diaphragm material, assemble to Rosemount 305 integral manifold or DIN-compliant traditional flange process connection, and bolting option L8. Limited to Pressure Range (Differential), ranges 2A – 5A.*
*(24) Not available with Housing code 01.*
*(25) Not available with output code F. Not available with housing code 01 or 7J.*
*(26) Not available with Housing code 00, 01, 5A, or 7J.*
*(27) Available with output code A and PlantWeb housing only.*
*(28) Not available with Housing code 00, 01, 5A, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Non-Incendive approval (option code I5) or FM FISCO Intrinsically Safe approval (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).*

## Rosemount 3051S Series In-Line

| Model | Transmitter Type | | |
|---|---|---|---|
| 3051S | Scalable pressure transmitter | | |
| **Code** | **Performance Class** | | |
| 1 | Ultra: 0.025% span accuracy, 200:1 rangedown, 10-year stability, limited 12-year warranty | | |
| 2 | Classic: 0.055% span accuracy, 100:1 rangedown, 5-year stability | | |
| **Code** | **Device Type** | | |
| T | In-Line | | |
| **Code** | **Measurement Type** | | |
| G | Gage | | |
| A | Absolute | | |
| **Code** | **Pressure Range** | | |
| | **TG** | **TA** | |
| 1A | -14.7 to 30 psi (-1,0 to 2,1 bar) | 0 to 30 psia (2,1 bar) | |
| 2A | -14.7 to 150 psi (-1,0 to 10,3 bar) | 0 to 150 psia (10,3 bar) | |
| 3A | -14.7 to 800 psi (-1,0 to 55 bar) | 0 to 800 psia (55 bar) | |
| 4A | -14.7 to 4000 psi (-1,0 to 276 bar) | 0 to 4000 psia (276 bar) | |
| 5A | -14.7 to 10000 psi (-1,0 to 689 bar) | 0 to 10000 psia (689 bar) | |
| **Code** | **Isolating Diaphragm / Process Connection Material** | | |
| 2[(1)] | 316L SST | | |
| 3[(1)] | *Hastelloy* C-276 | | |
| **Code** | **Process Connection Style** | | |
| A11 | Assemble to Rosemount 306 integral manifold | | |
| B11[(2)] | Assemble to one Rosemount 1199 diaphragm seal | | |
| E11 | 1/2–14 NPT female | | |
| F11 | Non-threaded instrument-flange (I-flange) (Range 1-4 only) | | |
| G11 | G1/2 A DIN 16288 male (Range 1-4 only) | | |
| H11 | Coned and threaded, compatible with autoclave type F-250-C (Range 5A only) | | |
| **Code** | **Output[(3)]** | | |
| A | 4–20 mA with digital signal based on HART protocol | | |
| F[(4)] | FOUNDATION fieldbus protocol | | |
| **Code** | **Housing Style** | **Materials[(5)]** | **Conduit Entry Size** |
| 00 | None (*SuperModule* Platform only, no housing included) | | |
| 01[(6)] | Assemble to Rosemount 753R Web-Based Monitoring Indicator | | |
| 1A | *PlantWeb* housing | Aluminum | 1/2–14 NPT |
| 1B | *PlantWeb* housing | Aluminum | M20 x 1.5 (CM20) |
| 1C | *PlantWeb* housing | Aluminum | G1/2 |
| 1J | *PlantWeb* housing | 316L SST | 1/2–14 NPT |
| 1K | *PlantWeb* housing | 316L SST | M20 x 1.5 (CM20) |
| 1L | *PlantWeb* housing | 316L SST | G 1/2 |
| 2A | Junction Box housing | Aluminum | 1/2–14 NPT |
| 2B | Junction Box housing | Aluminum | M20 x 1.5 (CM20) |
| 2C | Junction Box housing | Aluminum | G 1/ 2 |
| 2J | Junction Box housing | 316L SST | 1/2–14 NPT |
| 2E | Junction Box housing with output for remote interface | Aluminum | 1/2–14 NPT |
| 2F | Junction Box housing with output for remote interface | Aluminum | M20 x 1.5 (CM20) |
| 2G | Junction Box housing with output for remote interface | Aluminum | G1/2 |
| 2M | Junction Box housing with output for remote interface | 316L SST | 1/2–14 NPT |
| 7J[(7)] | Quick Connect (A size Mini, 4-pin male termination) | 316L SST | |
| **Code** | **Options** | | |
| ***PlantWeb* Control Functionality** | | | |
| A01[(8)] | FOUNDATION fieldbus Advanced Control Function Block Suite | | |
| ***PlantWeb* Diagnostic Functionality** | | | |
| D01[(8)] | FOUNDATION fieldbus Diagnostics Suite | | |
| DA1[(9)] | HART Diagnostics Suite | | |

| | |
|---|---|
| ***PlantWeb* Enhanced Measurement Functionality** | |
| H01[8][10] | Fully Compensated Mass Flow Block |
| **Code** | **Options** |
| **Mounting Bracket** | |
| B4 | Bracket, all SST, 2-in. pipe and panel |
| **Special Configuration (Software)[11]** | |
| C1[11] | Custom software configuration<br>*Note: A Configuration Data Sheet must be completed, see 00806-0100-4801.* |
| C4[11] | NAMUR alarm and saturation values, high alarm |
| C5[11] | NAMUR alarm and saturation values, low alarm |
| C6[11] | Custom alarm and saturation signal levels, high alarm<br>*Note: Requires option code C1, custom software configuration. A Configuration Data Sheet must be completed, see 00806-0100-4801.* |
| C7[11] | Custom alarm and saturation signal levels, low alarm<br>*Note: Requires option code C1, custom software configuration. A Configuration Data Sheet must be completed, see 00806-0100-4801.* |
| C8[11] | Low alarm (Standard Rosemount alarm and saturation signal levels) |
| **Special Configuration (Hardware)** | |
| D1[11] | Hardware adjustments (zero, span, alarm, security)<br>*Note: Not available with Housing Style codes 00, 01, 2E, 2F, 2G, 2M, 5A, or 7J.* |
| D4 | External ground screw assembly |
| **Product Certifications[12]** | |
| E1 | ATEX Flameproof |
| I1 | ATEX Intrinsically Safe |
| IA | ATEX FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only |
| N1 | ATEX Type n |
| K1 | ATEX Flameproof, Intrinsically Safe, Type n, Dust (combination of E1, I1, N1, and ND) |
| ND | ATEX Dust |
| E4 | JIS Flameproof |
| E5 | FM Explosion-proof |
| I5 | FM Intrinsically Safe, Non-Incendive |
| IE | FM FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only |
| K5 | FM Explosion-proof, Intrinsically Safe, Non-Incendive (combination of E5 and I5) |
| E6 | CSA Explosion-proof, Division 2 |
| I6 | CSA Intrinsically Safe |
| IF | CSA FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only |
| K6 | CSA Explosion-proof, Intrinsically Safe, Division 2 (combination of E6 and I6) |
| D3[13] | Measurement Canada Accuracy Approval |
| E7 | SAA Flameproof, Dust Ignition-proof |
| I7 | IECEx Intrinsically Safe |
| IG | IECEx FISCO Intrinsically Safe |
| N7 | IECEx Type n |
| K7 | SAA Flameproof, Dust Ignition-proof, IECEx Intrinsically Safe, and Type n (combination of E7, I7, and N7) |
| KA | ATEX and CSA Flameproof, Intrinsically Safe (combination of E1, I1, E6, and I6)<br>*Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M.* |
| KB | FM and CSA Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)<br>*Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M.* |
| KC | FM and ATEX Explosion-proof, Intrinsically Safe, Non-Incendive (combination of E5, E1, I5, and I1)<br>*Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M.* |
| KD | FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)<br>*Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M.* |
| DW[14] | NSF Drinking Water Approval |
| **Alternate Materials of Construction** | |
| L1 | Inert sensor fill fluid *Note: Silicone fill fluid is standard.* |
| **Digital Display[15]** | |
| M5 | *PlantWeb* LCD Display |
| M7[16] | Remote mount LCD display and interface, no cable; *PlantWeb* housing, SST bracket, requires 4-20 mA / HART output<br>*Note: Use Belden 3084A cable or equivalent. Contact an Emerson Process Management representative for additional information.* |
| M8[16] | Remote mount LCD display and interface, 50 ft. (15 m) cable; *PlantWeb* housing, SST bracket, requires 4-20 mA / HART output |
| M9[16] | Remote mount LCD display and interface, 100 ft. (31 m) cable; *PlantWeb* housing, SST bracket, requires 4-20 mA / HART output |

| | |
|---|---|
| **Special Procedures** | |
| P1 | Hydrostatic testing with certificate |
| P2[17] | Cleaning for special services |
| P3[17] | Cleaning for less than 1 PPM chlorine/fluorine |
| **Special Certifications** | |
| Q4 | Calibration certificate |
| QP | Calibration certificate and tamper evident seal |
| Q8 | Material traceability certification per EN 10204 3.1.B |
| QS[18] | Prior-use certificate of FMEDA Data |
| QT[19] | Safety certified to IEC 61508 with certificate of FMEDA data |
| Q16 | Surface finish certification for sanitary remote seals |
| **Terminal Blocks** | |
| T1[20] | Transient terminal block |
| T2[21] | Terminal block with WAGO® spring clamp terminals |
| T3[21] | Transient terminal block with WAGO spring clamp terminals |
| **Conduit Electrical Connector** | |
| GE[22] | M12, 4-pin, Male Connector (*eurofast®*) |
| GM[22] | A size Mini, 4-pin, Male Connector (*minifast®*) |

**Typical Model Number: 3051S1TG 2A 2 E11 A 1A DA1 B4 M5**

*(1) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.*
*(2) Contact a Rosemount representative for performance specifications.*
*(3) For spare SuperModule Platforms, select output code A.*
*(4) Requires PlantWeb housing.*
*(5) Material specified is cast as follows: CF-3M is the cast version of 316L SST. For housing, material is aluminum with polyurethane paint.*
*(6) Available with output code A only. Not available with approvals. See Rosemount 753R Product Data Sheet, 00813-0100-4379, to specify Web-Based Monitoring Indicator. Does not integrate into plant host systems.*
*(7) Available with output code A only. Available approvals are FM Intrinsically Safe, Non-Incendive (option code I5), ATEX Intrinsically Safe (option code I1), or IECEx Intrinsically Safe (option code I7). Contact an Emerson Process Management representative for additional information.*
*(8) Requires PlantWeb housing and output code F.*
*(9) Requires PlantWeb housing and output code A. Includes Hardware Adjustments as standard. Not available with option code QT.*
*(10) Requires Rosemount Engineering Assistant to configure.*
*(11) Not available with output code F or Housing code 01.*
*(12) Valid when SuperModule Platform and housing have equivalent approvals.*
*(13) Requires PlantWeb housing and Hardware Adjustments option code D1. Limited availability depending on transmitter type and range. Contact an Emerson Process Management representative for additional information.*
*(14) Requires 316L SST wetted materials and Process Connection code E11 or G11.*
*(15) Not available with Housing code 01 and 7J.*
*(16) Not available with output code F, Housing code 01, option code DA1, or option code QT.*
*(17) Not available with process connection option code A11.*
*(18) Not available with Housing code 01.*
*(19) Not available with output code F. Not available with housing code 01 or 7J.*
*(20) Not available with Housing code 00, 01, 5A, or 7J.*
*(21) Available with output code A and PlantWeb housing only.*
*(22) Not available with Housing code 00, 01, 5A, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Non-Incendive approval (option code I5) or FM FISCO Intrinsically Safe approval (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).*

## Rosemount 3051S Series Liquid Level

**Select either FF diaphragm seal type (see "Flush Flanged Seal" on page A-33) or for EF diaphragm seal type (see "Extended Flanged Seal" on page A-34) and then finish this selection by choosing transmitter options.**

| Model | Transmitter Type | | |
|---|---|---|---|
| 3051S | Scalable pressure transmitter | | |
| **Code** | **Performance Class** | | |
| 1 | Ultra: 0.065% span accuracy, 100:1 rangedown, limited 12-year warranty | | |
| 2 | Classic: 0.065% span accuracy, 100:1 rangedown | | |
| **Code** | **Connection Type** | | |
| L | Level | | |
| **Code** | **Measurement Type** | | |
| D | Differential | | |
| G | Gage | | |
| A | Absolute | | |
| **Code** | **Pressure Range** | | |
| | **Differential (LD)** | **Gage (LG)** | **Absolute (LA)** |
| 1A | -25 to 25 in$H_2O$ (-62,2 to 62,2 mbar) | -25 to 25 in$H_2O$ (-62,2 to 62,2 mbar) | 0 to 30 psia (2,1 bar) |
| 2A | -250 to 250 in$H_2O$ (-623 to 623 mbar) | -250 to 250 in$H_2O$ (-623 to 623 mbar) | 0 to 150 psia (10 bar) |
| 3A | -1000 to 1000 in$H_2O$ (-2,5 to 2,5 bar) | -393 to 1000 in$H_2O$ (-0,98 to 2,5 bar) | 0 to 800 psia (55 bar) |
| 4A | -300 to 300 psi (-20,7 to 20,7 bar) | -14.2 to 300 psig (-0,98 to 21 bar) | 0 to 4000 psia (276 bar) |
| 5A | -2000 to 2000 psi (-137,9 to 137,9 bar) | -14.2 to 2000 psig (-0,98 to 137,9 bar) | N/A |
| **Code** | **Output(1)** | | |
| A | 4-20 mA with digital signal based on HART protocol | | |
| F(2) | FOUNDATION fieldbus protocol | | |
| **Code** | **Housing Style** | **Material(3)** | **Conduit Entry** |
| 00 | None (*SuperModule* Platform only, no housing included) | | |
| 01(4) | Assemble to Rosemount 753R Web-Based Monitoring Indicator | | |
| 1A | *PlantWeb* housing | Aluminum | 1/2–14 NPT |
| 1B | *PlantWeb* housing | Aluminum | M20 x 1.5 (CM20) |
| 1C | *PlantWeb* housing | Aluminum | G1/2 |
| 1J | *PlantWeb* housing | 316L SST | 1/2–14 NPT |
| 1K | *PlantWeb* housing | 316L SST | M20 x 1.5 (CM20) |
| 1L | *PlantWeb* housing | 316L SST | G1/2 |
| 2A | Junction Box housing | Aluminum | 1/2–14 NPT |
| 2B | Junction Box housing | Aluminum | M20 x 1.5 (CM20) |
| 2C | Junction Box housing | Aluminum | G1/2 |
| 2J | Junction Box housing | 316L SST | 1/2–14 NPT |
| 2E | Junction Box with output for remote interface | Aluminum | 1/2–14 NPT |
| 2F | Junction Box with output for remote interface | Aluminum | M20 x 1.5 (CM20) |
| 2G | Junction Box with output for remote interface | Aluminum | G1/2 |
| 2M | Junction Box with output for remote interface | 316L SST | 1/2–14 NPT |
| 7J(5) | Quick Connect (A size Mini, 4-pin male termination) | 316L SST | |
| **Code** | **Seal System Type** | | |
| 1 | Direct-mount diaphragm seal system | | |
| **Code** | **High Pressure Side Extension (between transmitter flange and seal)** | | |
| 0 | Direct-mount (No extension) | | |
| **Code** | **Low Pressure Side Connection (sensor module)** | | |
| 1 | One capillary connection remote diaphragm seal (see Rosemount 1199 ordering table for seal information) | | |
| 2 | 316L SST isolator / 316 SST transmitter flange | | |
| 3 | *Hastelloy* C-276 isolator / 316 SST transmitter flange | | |
| **Code** | **Capillary Length** | | |
| 0 | N/A | | |
| **Code** | **Diaphragm Seal Fill Fluid** | | |
| A | *Syltherm* XLT | | |
| C | D. C. Silicone 704 | | |
| D | D. C. Silicone 200 | | |
| H | Inert (Halocarbon) | | |
| G | Glycerine and Water | | |
| N | *Neobee M-20* | | |
| P | Propylene Glycol and Water | | |

**Next, select either Flush Flanged (FF) diaphragm seal (see page A-33) or Extended Flanged (EF) diaphragm seal (see page A-34).**

## Seal Options (page A-33—A-34)

### Flush Flanged Seal

| Code | Process Connection Style | |
|---|---|---|
| FF | Flush Flanged, Ra 125-250 gasket surface | |
| **Code** | **Diaphragm Seal Size (High Side)** | |
| G | 2-in./DN 50 | |
| 7 | 3-in. | |
| J | DN 80 | |
| 9 | 4-in./DN 100 | |
| **Code** | **Flange Rating (High Side)** | |
| 1 | Class 150 | |
| 2 | Class 300 | |
| 4 | Class 600 | |
| G | PN 40 | |
| E | PN 10/16; available with 4 in. DN 100 only | |
| **Code** | **Isolator Material** | **Flange Material (High Side)** |
| CA | 316L SST | CS |
| DA | 316L SST | 316 SST |
| CB | *Hastelloy* | CS |
| DB | *Hastelloy* | 316 SST |
| CC | Tantalum - seam welded(6) | CS |
| DC | Tantalum - seam welded(6) | 316 SST |
| **Code** | **Lower Housing Material (High Side)(7)** | |
| 0 | None | |
| A | 316 SST | |
| B | *Hastelloy* | |
| **Code** | **Flushing Connection Quantity and Size (Lower Housing, High Side)** | |
| 0 | None | |
| 1 | 1 (1/4-in.) | |
| 3 | 2 (1/4-in.) | |
| 7 | 1 (1/2-in.) | |
| 9 | 2 (1/2-in.) | |
| **Code** | **Seal Options: Gaskets** | |
| SJ | *Teflon*® (PTFE) gasket for lower housing | |
| SK | Gylon gasket for lower housing | |
| SN | *Grafoil*™ gasket for lower housing | |
| **Code** | **Other Options** | |
| ST(8) | Materials per NACE MR0175 | |

**Continue with transmitter options on page A-34**

*(1) For spare SuperModule Platforms, select output code A.*
*(2) Requires PlantWeb housing.*
*(3) Material specified is cast as follows: CF-3M is the cast version of 316L SST. For housing, material is aluminum with polyurethane paint.*
*(4) Available with output code A only. Not available with approvals. See Rosemount 753R Product Data Sheet, 00813-0100-4379, to specify Web-Based Monitoring Indicator. Does not integrate into plant host systems.*
*(5) Available with output code A only. Available approvals are FM Intrinsically Safe, Non-Incendive (option code I5), ATEX Intrinsically Safe (option code I1), or IECEx Intrinsically Safe (option code I7). Contact an Emerson Process Management representative for additional information.*
*(6) Not recommended for use with spiral wound metallic gaskets (see 1199 product data sheet, document 00813-0100-4016 for additional options).*
*(7) Standard gasket for lower housing consists of non-asbestos fiber.*
*(8) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.*

### Extended Flanged Seal

| Code | Process Connection Style | |
|---|---|---|
| EF | Extended flanged, Ra 125-250 gasket surface | |
| **Code** | **Diaphragm Seal Size (High Side)** | |
| 7 | 3-in./DN 80, 2.58-in. diaphragm | |
| 9 | 4-in./DN 100, 3.5-in. diaphragm | |
| **Code** | **Flange Rating (High Side)** | |
| 1 | Class 150 | |
| 2 | Class 300 | |
| 4 | Class 600 | |
| G | PN 40 | |
| E | PN 10/16; available with 4 in. DN 100 only | |
| **Code** | **Isolator Material and Extension Material** | **Flange Material (High Side)** |
| CA | 316L SST | CS |
| DA | 316L SST | 316 SST |
| CB | *Hastelloy* | CS |
| DB | *Hastelloy* | 316 SST |
| **Code** | **Extension Length (High Side, 1st Position)** | |
| 2 | 2-in./50 mm | |
| 4 | 4-in./100 mm | |
| 6 | 6-in./150 mm | |
| **Code** | **Extension Length (High Side, 2nd Position)** | |
| 0 | 0-in./0 mm | |

**Continue with transmitter options below**

## Transmitter Options continued from page A-32

(— = Not Applicable • = Applicable)

| Code | Options |
|---|---|
| ***PlantWeb*** **Control Functionality** | |
| A01[1] | FOUNDATION fieldbus Advanced Control Function Block Suite |
| ***PlantWeb*** **Diagnostic Functionality** | |
| D01[1] | FOUNDATION fieldbus Diagnostics Suite |
| DA1[2] | HART Diagnostics Suite |
| ***PlantWeb*** **Enhanced Measurement Functionality** | |
| H01[1][3] | Fully Compensated Mass Flow Block |
| **Code** | **Options** |
| **Special Configuration (Software)** | |
| C1[4] | Custom software configuration<br>*Note: A Configuration Data Sheet must be completed, see 00806-0100-4801.* |
| C3 | Gage pressure calibration on Rosemount 3051S_LA only |
| C4[4] | NAMUR alarm and saturation levels, high alarm |
| C5[4] | NAMUR alarm and saturation levels, low alarm |
| C6[4] | Custom alarm and saturation signal levels, high alarm<br>*Note: Requires option code C1, custom software configuration. A Configuration Data Sheet must be completed, see 00806-0100-4801.* |
| C7[4] | Custom alarm and saturation signal levels, low alarm<br>*Note: Requires option code C1, custom software configuration. A Configuration Data Sheet must be completed, see 00806-0100-4801.* |
| C8[4] | Low alarm (standard Rosemount alarm and saturation levels) |

| | | LD | LG | LA |
|---|---|---|---|---|
| **Special Configuration (hardware)** | | | | |
| D1 | Hardware adjustments (zero, span, alarm, security)<br>*Note: Not available with fieldbus protocol or Housing Style codes 00, 01, 2E, 2F, 2G, 2M, 5A, or 7J.* | • | • | • |
| D2 | 1/2-14 NPT process connections process adapters | • | — | — |
| D4 | External ground screw assembly | • | • | • |
| D5 | Delete transmitter drain/vent valves (install plugs) | • | — | — |
| D8 | Ceramic drain/vent valves | • | — | — |
| D9 | RC 1/2 process connections (process adapters) | • | — | — |
| **Product Certifications[5]** | | | | |
| E1 | ATEX Flameproof | | | |
| I1 | ATEX Intrinsically Safe | | | |
| IA | ATEX FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only | | | |
| N1 | ATEX Type n | | | |
| K1 | ATEX Flameproof, Intrinsically Safe, Type n, Dust (combination of E1, I1, N1, and ND) | | | |
| ND | ATEX Dust | | | |
| E4 | JIS Flameproof | | | |
| E5 | FM Explosion-proof | | | |
| I5 | FM Intrinsically Safe, Non-Incendive | | | |
| IE | FM FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only | | | |
| K5 | FM Explosion-proof, Intrinsically Safe, Non-Incendive (combination of E5 and I5) | | | |
| E6 | CSA Explosion-proof, Division 2 | | | |
| I6 | CSA Intrinsically Safe | | | |
| IF | CSA FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only | | | |
| K6 | CSA Explosion-proof, Intrinsically Safe, Division 2 (combination of E6 and I6) | | | |
| D3[6][7] | Measurement Canada Accuracy Approval | | | |
| E7 | SAA Flameproof, Dust Ignition-proof | | | |
| I7 | IECEx Intrinsically Safe | | | |
| IG | IECEx FISCO Intrinsically Safe | | | |
| N7 | IECEx Type n | | | |
| K7 | SAA Flameproof, Dust Ignition-proof, IECEx Intrinsically Safe, and Type n (combination of E7, I7, and N7) | | | |
| KA | ATEX and CSA Flameproof, Intrinsically Safe (combination of E1, I1, E6, and I6)<br>*Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M.* | | | |
| KB | FM and CSA Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)<br>*Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M.* | | | |
| KC | FM and ATEX Explosion-proof, Intrinsically Safe, Non-Incendive (combination of E5, E1, I5, and I1)<br>*Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M.* | | | |
| KD | FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)<br>*Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M.* | | | |
| **Alternate Materials of Construction** | | | | |
| L1 | Inert sensor fill fluid (differential and gage only)<br>*Note: Silicone fill fluid is standard.* | | | |
| L2 | Graphite-filled TFE o-ring | | | |
| L4 | Austenitic 316 SST bolts | | | |
| L5 | ASTM A 193, Grade B7M bolts | | | |
| L6 | *Monel* bolts | | | |
| L7 | ASTM A 453, Class A, Grade 660 bolts | | | |
| L8 | ASTM A 193, Class 2, Grade B8M bolts | | | |
| **Digital Display[8]** | | | | |
| M5 | *PlantWeb* LCD Display | | | |
| M7[9] | Remote mount LCD display and interface, no cable; *PlantWeb* housing, SST bracket, requires 4-20 mA / HART output<br>*Note: Use Belden 3084A cable or equivalent. Contact an Emerson Process Management representative for additional information.* | | | |
| M8[9] | Remote mount LCD display and interface, 50 ft. (15 m) cable; *PlantWeb* housing, SST bracket, requires 4-20 mA / HART output | | | |
| M9[9] | Remote mount LCD display and interface, 100 ft. (31 m) cable; *PlantWeb* housing, SST bracket, requires 4-20 mA / HART output | | | |
| **Special Procedures** | | | | |
| P1 | Hydrostatic testing with certificate | | | |
| P2 | Cleaning for special services | | | |
| P3 | Cleaning for less than 1PPM chlorine/fluorine | | | |
| **Special Certifications** | | | | |
| Q4 | Calibration certificate | | | |
| QP | Calibration certificate and tamper evident seal | | | |
| Q8 | Material traceability certification per EN 10204 3.1.B | | | |
| QS[10] | Prior-use certificate of FMEDA Data | | | |
| QT[11] | Safety certified to IEC 61508 with certificate of FMEDA data | | | |

| | |
|---|---|
| **Terminal blocks** | |
| T1[12] | Transient terminal block |
| T2[13] | Terminal block with WAGO® spring clamp terminals |
| T3[13] | Transient terminal block with WAGO spring clamp terminals |
| **Conduit Electrical Connector** | |
| GE[14] | M12, 4-pin, Male Connector (*eurofast*®) |
| GM[14] | A size Mini, 4-pin, Male Connector (*minifast*®) |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Typical Model Number for FF seal:** | **3051S2LD** | **2A** | **A** | **1A** | **1** | **0** | **2** | **0** | **D** | **FF** | **7** | **1** | **DA** | **0** | **0** |
| **Typical Model Number for EF seal:** | **3051S2LD** | **2A** | **A** | **1A** | **1** | **0** | **2** | **0** | **D** | **EF** | **7** | **1** | **DA** | **2** | **0** |

*(1) Requires PlantWeb housing and output code F.*
*(2) Requires PlantWeb housing and output code A. Includes Hardware Adjustments as standard. Not available with option code QT.*
*(3) Requires Rosemount Engineering Assistant to configure.*
*(4) Not available with output code F or Housing code 01.*
*(5) Valid when SuperModule Platform and housing have equivalent approvals.*
*(6) Requires PlantWeb Housing and Hardware Adjustments option code D1.*
*(7) Limited availability depending on transmitter type and range. Contact a sales representative for additional information.*
*(8) Not available with Housing Code 01 or 7J.*
*(9) Not available with output code F, Housing code 01, option code DA1, or option code QT.*
*(10) Not available with Housing Code 01.*
*(11) Not available with output code F. Not available with housing code 01 or 7J.*
*(12) Not available with Housing code 00, 01, 5A, or 7J.*
*(13) Available with output code A and PlantWeb housing only.*
*(14) Not available with Housing code 00, 01, 5A, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Non-Incendive approval (option code I5) or FM FISCO Intrinsically Safe approval (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).*

## Rosemount 300S Series Housing "Kit"

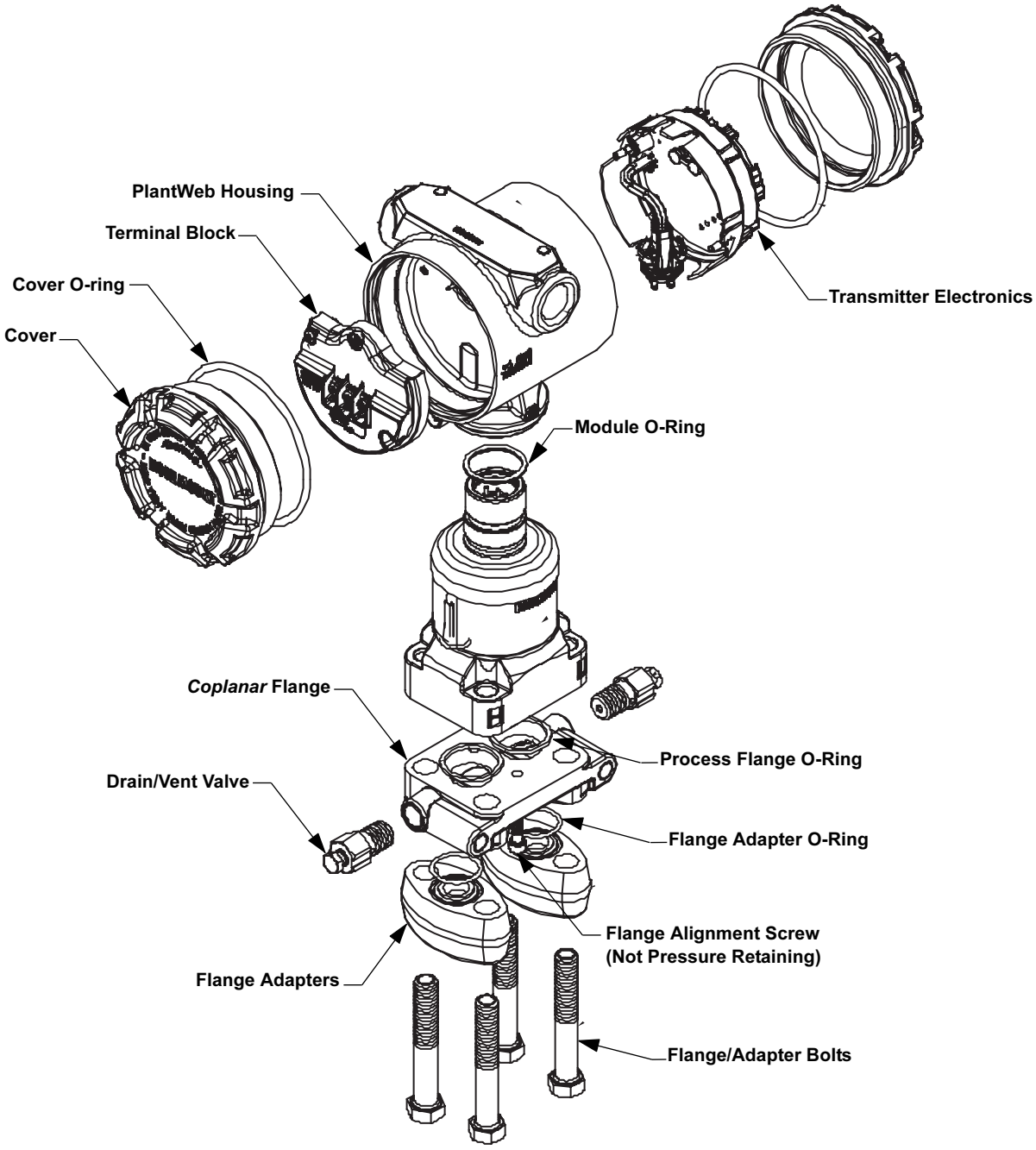
| Model | | | |
|---|---|---|---|
| 300S | Housing "Kit" for Rosemount 3051S Scalable Pressure Transmitter | | |
| **Code** | **Housing Style** | **Material[1]** | **Conduit Entry** |
| 1A | *PlantWeb* housing | Aluminum | 1/2–14 NPT |
| 1B | *PlantWeb* housing | Aluminum | M20 x 1.5 (CM20) |
| 1C | *PlantWeb* housing | Aluminum | G1/2 |
| 1J | *PlantWeb* housing | 316L SST | 1/2–14 NPT |
| 1K | *PlantWeb* housing | 316L SST | M20 x 1.5 (CM20) |
| 1L | *Plantweb* housing | 316L SST | G 1/2 |
| 2A | Junction Box housing | Aluminum | 1/2–14 NPT |
| 2B | Junction Box housing | Aluminum | M20 x 1.5 (CM20) |
| 2C | Junction Box housing | Aluminum | G1/2 |
| 2J | Junction Box housing | 316L SST | 1/2–14 NPT |
| 2E | Junction Box housing with output for remote interface | Aluminum | 1/2–14 NPT |
| 2F | Junction Box housing with output for remote interface | Aluminum | M20 x 1.5 (CM20) |
| 2G | Junction Box housing with output for remote interface | Aluminum | G1/2 |
| 2M | Junction Box housing with output for remote interface | 316L SST | 1/2–14 NPT |
| 3A | Remote mount display and interface housing | Aluminum | 1/2–14 NPT |
| 3B | Remote mount display and interface housing | Aluminum | M20 x 1.5 (CM20) |
| 3C | Remote mount display and interface housing | Aluminum | G1/2 |
| 3J | Remote mount display and interface housing | 316L SST | 1/2–14 NPT |
| 7J[2] | Quick Connect (A size Mini, 4-pin male termination) | 316L SST | |
| **Code** | **Output** | | |
| A | 4-20 mA with digital signal based on HART protocol | | |
| F[3] | FOUNDATION fieldbus protocol | | |
| **Code** | **Options** | | |
| ***PlantWeb* Control Functionality** | | | |
| A01[4] | FOUNDATION fieldbus Advanced Control Function Block Suite | | |
| ***PlantWeb* Diagnostic Functionality** | | | |
| D01[4] | FOUNDATION fieldbus Diagnostics Suite | | |
| DA1[5] | HART Diagnostics Suite | | |
| ***PlantWeb* Enhanced Measurement Functionality** | | | |
| H01[4][6] | Fully Compensated Mass Flow Block | | |
| **Special Configuration (Hardware)** | | | |
| D1[7] | Hardware adjustments (zero, span, alarm, security)<br>*Note: Not available with Housing Style codes 2E, 2F, 2G, 2M, 3A, 3B, 3C, 3J, or 7J.* | | |
| D4 | External ground screw assembly | | |
| **Product Certifications** | | | |
| E1 | ATEX Flameproof | | |
| I1 | ATEX Intrinsically Safe | | |
| IA | ATEX FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only | | |
| N1 | ATEX Type n | | |
| K1 | ATEX Flameproof, Intrinsically Safe, Type n, Dust (combination of E1, I1, N1, and ND) | | |
| ND | ATEX Dust | | |
| E5 | FM Explosion-proof | | |
| I5 | FM Intrinsically Safe, Non-Incendive | | |
| IE | FM FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only | | |
| K5 | FM Explosion-proof, Intrinsically Safe, Non-Incendive (combination of E5 and I5) | | |
| E6 | CSA Explosion-proof, Division 2 | | |
| I6 | CSA Intrinsically Safe | | |
| IF | CSA FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only | | |
| K6 | CSA Explosion-proof, Intrinsically Safe, Division 2 (combination of E6 and I6) | | |
| E7 | SAA Flameproof, Dust Ignition-proof | | |
| I7 | IECEx Intrinsically Safe | | |
| IG | IECEx FISCO Intrinsically Safe | | |
| N7 | IECEx Type n | | |
| K7 | SAA Flameproof, Dust Ignition-proof, IECEx Intrinsically Safe, and Type n (combination of E7, I7, and N7) | | |

| | |
|---|---|
| KA | ATEX and CSA Flameproof, Intrinsically Safe (combination of E1, I1, E6, and I6)<br>*Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M.* |
| KB | FM and CSA Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)<br>*Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M.* |
| KC | FM and ATEX Explosion-proof, Intrinsically Safe, Non-Incendive (combination of E5, E1, I5, and I1)<br>*Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M.* |
| KD | FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)<br>*Note: Only available on Housing Style codes 00, IA, IJ, 2A, 2J, 2E, or 2M.* |
| **Digital Display[8]** | |
| M5 | *PlantWeb* LCD Display |
| M7[9] | Remote mount LCD display and interface, no cable; *PlantWeb* housing, SST bracket, requires 4-20 mA / HART output<br>*Note: Use Belden 3084A cable or equivalent. Contact an Emerson Process Management representative for additional information.* |
| M8[9] | Remote mount LCD display and interface, 50 ft. (15 m) cable; SST bracket, requires 4-20 mA / HART output |
| M9[9] | Remote mount LCD display and interface, 100 ft. (31 m) cable; SST bracket, requires 4-20 mA / HART output |
| **Terminal Blocks** | |
| T1[10] | Transient terminal block |
| T2[11] | Terminal block with WAGO® spring clamp terminals |
| T3[11] | Transient terminal block with WAGO spring clamp terminals |
| **Conduit Electrical Connector** | |
| GE[12] | M12, 4-pin, Male Connector (*eurofast*®) |
| GM[12] | A size Mini, 4-pin, Male Connector (*minifast*®) |
| **Typical Model Number: 300S 1A A E5** | |

*(1) Material specified is cast as follows: CF-3M is the cast version of 316L SST. For housing, material is aluminum with polyurethane paint.*
*(2) Available with output code A only. Not available with approvals. Contact an Emerson Process Management representative for additional information.*
*(3) Requires PlantWeb housing.*
*(4) Requires PlantWeb housing and output code F.*
*(5) Requires PlantWeb housing and output code A. Includes Hardware Adjustments as standard.*
*(6) Requires Rosemount Engineering Assistant to configure.*
*(7) Not available with output code F.*
*(8) Not available with Housing code 7J.*
*(9) Not available with output code F, or option code DA1. Only available on Housing Style codes 3A, 3B, 3C, or 3J.*
*(10) Not available with Housing code 3A, 3B, 3C, 3J, or 7J.*
*(11) Available with output code A and PlantWeb housing only.*
*(12) Not available with Housing code 00, 01, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Non-Incendive approval (option code I5) or FM FISCO Intrinsically Safe approval (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).*

## EXPLODED VIEW DIAGRAM

The following drawing shows the name and location for commonly ordered spare parts.



## SPARE PARTS

| | |
|---|---|
| **See Rosemount 3051S_C, 3051S_T & 3051S_L ordering tables in Appendix A (A-25, A-29, and A-32 respectively) for ordering spare sensor modules.** | |
| - Typical Model Number 3051S1CD2A2000A00 | |
| **Electronics Board Assembly Hardware (PlantWeb® Housing)** | |
| **LCD/Housing Interface Assemblies for Hart Output** | |
| Standard Interface | 03151-9010-0001 |
| Hardware Adjustment Kit<br>Adjustment Interface<br>Adjustment Module | 03151-9015-0001 |
| Adjustment Interface | 03151-9017-0001 |
| Adjustment Module | 03151-9019-0001 |
| Remote Meter Interface | 03151-9023-0001 |
| **Fieldbus Output (Includes A01 and D01 PlantWeb Functionality)** | |
| FOUNDATION™ Fieldbus Upgrade Kit (Standard)<br>FOUNDATION Fieldbus Output Electronics<br>Standard Dual Compartment Terminal Block | 03151-9021-0021 |
| FOUNDATION Fieldbus Upgrade Kit (with Transient Protection)<br>FOUNDATION Fieldbus Output Electronics<br>Transient Dual Compartment Terminal Block | 03151-9021-0022 |
| FOUNDATION Fieldbus Upgrade Kit (FISCO)<br>FOUNDATION Fieldbus Output Electronics<br>FISCO Dual Compartment Terminal Block | 03151-9021-0023 |
| FOUNDATION Fieldbus Output Electronics | 03151-9020-0001 |
| **HART Advanced Diagnostics Electronics** | |
| HART Advanced Diagnostics Upgrade Kit | 03151-9070-0001 |
| **Miscellaneous** | |
| PlantWeb housing header cable o-ring (package of 12) | 03151-9011-0001 |
| **Electrical Housing, Terminal Blocks** | |
| **See Rosemount 300S Series Housing "Kit" in Appendix A, page A-37 for ordering spare housings.** | |
| - Typical Model Number 300S1AAE5 | |
| **PlantWeb Housing Terminal Block, HART (4-20 mA)** | |
| Standard Dual Compartment Terminal Block Assembly | 03151-9005-0001 |
| Transient Dual Compartment Terminal Block Assembly (Option T1) | 03151-9005-0002 |
| **PlantWeb Housing Terminal Block, Fieldbus** | |
| Standard Dual Compartment Terminal Block Assembly | 03151-9005-0021 |
| Transient Dual Compartment Terminal Block Assembly (Option T1) | 03151-9005-0022 |
| FISCO Dual Compartment Terminal Block Assembly | 03151-9005-0023 |
| **Junction Box Terminal Block, HART (4-20 mA)** | |
| Standard Junction Box Terminal Block Assembly | 03151-9000-1001 |
| Transient Junction Box Terminal Block Assembly (Option T1) | 03151-9000-1002 |
| **Junction Box Terminal Block, HART (4-20 mA) with Adjustment** | |
| Standard Junction Box Terminal Block Assembly, Switch | 03151-9000-2001 |
| Transient Junction Box Terminal Block Assembly, Switch (Option T1) | 03151-9000-2002 |
| Alarm/Security Jumper with O-ring | 03151-9001-0001 |
| **Remote Meter Terminal Blocks** | |
| PlantWeb Housing 7-Position Remote Communications Terminal Block Assembly | 03151-9006-0101 |
| Junction Box Remote Communications Standard Terminal Block Assembly | 03151-9000-1010 |

| | |
|---|---|
| Junction Box Remote Communications Transient Terminal Block Assembly | 03151-9000-1011 |
| **Covers** | |
| Aluminum Electronics Cover; Cover and O-ring | 03151-9030-0001 |
| 316L SST Electronics Cover; Cover and O-ring | 03151-9030-0002 |
| **Housing Miscellaneous** | |
| External Ground Screw Assembly (Option D4): Screw, clamp, washer | 03151-9060-0001 |
| Housing V-Seal for both PlantWeb and Junction Box housings | 03151-9061-0001 |
| **Flanges** | **Part Number** |
| Differential Coplanar Flange | |
| Nickel-plated Carbon Steel | 03151-9200-0025 |
| 316 SST | 03151-9200-0022 |
| Hastelloy C | 03151-9200-0023 |
| Monel | 03151-9200-0024 |
| Gage/Absolute Coplanar Flange | |
| Nickel-plated Carbon Steel | 03151-9200-1025 |
| 316 SST | 03151-9200-1022 |
| Hastelloy C | 03151-9200-1023 |
| Monel | 03151-9200-1024 |
| Coplanar Flange Alignment Screw (package of 12) | 03151-9202-0001 |
| Traditional Flange | |
| 316 SST | 03151-9203-0002 |
| Hastelloy C | 03151-9203-0003 |
| Monel | 03151-9203-0004 |
| Level Flange, Vertical Mount | |
| 2 in., Class 150, SST | 03151-9205-0221 |
| 2 in., Class 300, SST | 03151-9205-0222 |
| 3 in., Class 150, SST | 03151-9205-0231 |
| 3 in., Class 300, SST | 03151-9205-0232 |
| DIN, DN 50, PN 40 | 03151-9205-1002 |
| DIN, DN 80, PN 40 | 03151-9205-1012 |
| **Flange Adapter Kits (Each kit contains adapters, bolts, and o-ring for one DP transmitter or two GP/AP transmitters.)** | |
| **Differential Flange Adapter Kits** | |
| CS Bolts, Glass Filled Teflon O-Rings | |
| SST Adapters | 03031-1300-0002 |
| Hastelloy Adapters | 03031-1300-0003 |
| Monel Adapters | 03031-1300-0004 |
| Ni Plated CS Adapters | 03031-1300-0005 |
| SST Bolts, Glass Filled Teflon O-Rings | |
| SST Adapters | 03031-1300-0012 |
| Hastelloy Adapters | 03031-1300-0013 |
| Monel Adapters | 03031-1300-0014 |
| Ni Plated CS Adapters | 03031-1300-0015 |
| CS Bolts, Graphite TFE O-Rings | |
| SST Adapters | 03031-1300-0102 |
| Hastelloy Adapters | 03031-1300-0103 |
| Monel Adapters | 03031-1300-0104 |
| Ni Plated CS Adapters | 03031-1300-0105 |

| | |
|---|---|
| SST Bolts, Graphite TFE O-Rings | |
| SST Adapters | 03031-1300-0112 |
| Hastelloy Adapters | 03031-1300-0113 |
| Monel Adapters | 03031-1300-0114 |
| Ni Plated CS Adapters | 03031-1300-0115 |
| **Flange Adapter Union** | **Part Number** |
| Nickel-plated Carbon Steel | 03151-9259-0005 |
| 316 SST | 03151-9259-0002 |
| Hastelloy C | 03151-9259-0003 |
| Monel | 03151-9259-0004 |
| **Drain/Vent Valve Kits (each kit contains parts for one transmitter)** | **Part Number** |
| **Differential Drain/Vent Kits** | |
| 316 SST Valve Stem and Seat Kit | 03151-9268-0022 |
| Hastelloy C Valve Stem and Seat Kit | 03151-9268-0023 |
| Monel Valve Stem and Seat Kit | 03151-9268-0024 |
| 316 SST Ceramic Ball Drain/Vent Kit | 03151-9258-0122 |
| Hastelloy C Ceramic Ball Drain/Vent Kit | 03151-9268-0123 |
| Monel Ceramic Ball Drain/Vent Kit | 03151-9268-0124 |
| **Gage/Absolute Drain/Vent Kits** | |
| 316 SST Valve Stem and Seat Kit | 03151-9268-0012 |
| Hastelloy C Valve Stem and Seat Kit | 03151-9268-0013 |
| Monel Valve Stem and Seat Kit | 03151-9268-0014 |
| 316 SST Ceramic Ball Drain/Vent Kit | 03151-9268-0112 |
| Hastelloy C Ceramic Ball Drain/Vent Kit | 03151-9268-0113 |
| Monel Ceramic Ball Drain/Vent Kit | 03151-9268-0114 |
| **O-Ring Packages (package of 12)** | |
| Electronic Housing, Cover (Standard and Meter) | 03151-9040-0001 |
| Electronics Housing, Module | 03151-9041-0001 |
| Process Flange, Glass-filled Teflon® | 03151-9042-0001 |
| Process Flange, Graphite-filled Teflon | 03151-9042-0002 |
| Flange Adapter, Glass-filled Teflon | 03151-9043-0001 |
| Flange Adapter, Graphite-filled Teflon | 03151-9043-0002 |
| **Gland and Collar Kits** | |
| Gland and Collar Kits | 03151-9250-0001 |
| **Mounting Brackets** | |
| **Coplanar Flange Bracket Kit** | |
| B4 Bracket, SST, 2-in. pipe mount, SST bolts | 03151-9270-0001 |
| **In-line Bracket Kit** | |
| B4 Bracket, SST, 2-in. pipe mount, SST bolts | 03151-9270-0002 |
| **Traditional Flange Bracket Kits** | |
| B1 Bracket, 2-in. pipe mount, CS bolts | 03151-9272-0001 |
| B2 Bracket, panel mount, CS bolts | 03151-9272-0002 |
| B3 Flat Bracket for 2-in. pipe mount, CS bolts | 03151-9272-0003 |
| B7 (B1 style bracket with SST bolts) | 03151-9272-0007 |
| B8 (B2 style bracket with SST bolts) | 03151-9272-0008 |
| B9 (B3 style bracket with SST bolts) | 03151-9272-0009 |
| BA (SST B1 bracket with SST bolts) | 03151-9272-0011 |
| BC (SST B3 bracket with SST bolts) | 03151-9272-0013 |

| Bolt Kits | |
|---|---|
| **COPLANAR FLANGE** | |
| **Flange Bolt Kit {44 mm (1.75 in.)}** | |
| Carbon Steel (set of 4) | 03151-9280-0001 |
| 316 SST (set of 4) | 03151-9280-0002 |
| ANSI/ASTM-A-193-B7M (set of 4) | 03151-9280-0003 |
| Monel (set of 4) | 03151-9280-0004 |
| **Flange/Adapter Bolt Kit {73 mm (2.88 in.)}** | |
| Carbon Steel (set of 4) | 03151-9281-0001 |
| 316 SST (set of 4) | 03151-9281-0002 |
| ANSI/ASTM-A-193-B7M (set of 4) | 03151-9281-0003 |
| Monel (set of 4) | 03151-9281-0004 |
| **Manifold/Flange Kit {57 mm (2.25 in.)}** | |
| Carbon Steel (set of 4) | 03151-9282-0001 |
| 316 SST (set of 4) | 03151-9282-0002 |
| ANSI/ASTM-A-193-B7M (set of 4) | 03151-9282-0003 |
| Monel (set of 4) | 03151-9282-0004 |
| **TRADITIONAL FLANGE** | |
| **Differential Flange and Adapter Bolt Kit** | |
| Carbon Steel (set of 8) | 03151-9283-0001 |
| 316 SST (set of 8) | 03151-9283-0002 |
| ANSI/ASTM-A-193-B7M (set of 8) | 03151-9283-0003 |
| Monel (set of 8) | 03151-9283-0004 |
| **Gage/Absolute Flange and Adapter Bolt Kit** | |
| Carbon Steel (set of 6) | 03151-9283-1001 |
| 316 SST (set of 6) | 03151-9283-1002 |
| ANSI/ASTM-A-193-B7M (set of 6) | 03151-9283-1003 |
| Monel (set of 6) | 03151-9283-1004 |
| **Manifold/Traditional Flange Bolts** | |
| Carbon Steel | Use bolts supplied with manifold |
| 316 SST | Use bolts supplied with manifold |
| **LEVEL FLANGE, VERTICAL MOUNT** | |
| **Flange Bolt Kit (Each kit contains bolts for one transmitter)** | |
| Carbon Steel (set of 4) | 03151-9285-0001 |
| 316 SST (set of 4) | 03151-9285-0002 |

| Meters | Part Number |
|---|---|
| **Indicating Meter for Plantweb Aluminum Housing** | |
| Meter Kit: LCD assembly, 4-pin interconnection header and aluminum meter cover assembly | 03151-9193-0001 |
| Meter Only: LCD assembly, 4-pin interconnection header | 03151-9193-0002 |
| Cover Assembly Kit: aluminum meter cover assembly | 03151-9193-0003 |
| **Indicating Meter for Plantweb 316L SST Housing** | |
| Meter Kit: LCD assembly, 4-pin interconnection header, 316L SST meter cover assembly | 03151-9193-0004 |
| Meter Only: LCD assembly, 4-pin interconnection header | 03151-9193-0002 |
| Cover Assembly Kit: 316L SST meter cover assembly | 03151-9193-0005 |

# Appendix B Product Certifications



This section contains hazardous location certifications for 3051S HART protocol.

## Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China

## European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

*ATEX Directive (94/9/EC)*

Emerson Process Management complies with the ATEX Directive.

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

Models 3051S_CA4; 3051S_CD2, 3, 4, 5; *(also with P9 option)* Pressure Transmitters — QS Certificate of Assessment - EC No. PED-H-20, Module H Conformity Assessment

All other Model 3051S Pressure Transmitters — Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold — Sound Engineering Practice

Primary Elements, Flowmeter — See appropriate Primary Element QIG

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

All Models: EN 50081-1: 1992; EN 50082-2:1995; EN 61326-1:1997 + A1, A2, and A3 – Industrial

## Ordinary Location Certification for FM

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

## Hazardous Locations Certifications

### North American Certifications

*FM Approvals*

**E5** Explosion-proof for Class I, Division 1, Groups B, C, and D; dust-ignition proof for Class II and Class III, Division 1, Groups E, F, and G; hazardous locations; enclosure Type 4X, conduit seal not required when installed according to Rosemount drawing 03151-1003.

**I5/IE** Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1; Class I, Zone 0 AEx ia IIC when connected in accordance with Rosemount drawing 03151-1006; Non-incendive for Class I, Division 2, Groups A, B, C, and D Enclosure Type 4X
For entity parameters see control drawing 03151-1006.

*Canadian Standards Association (CSA)*

**E6** Explosion-proof for Class I, Division 1, Groups B, C, and D; Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G; suitable for Class I, Division 2, Groups A, B, C, and D, when installed per Rosemount drawing 03151-1013, CSA Enclosure Type 4X; conduit seal not required.

**I6/IF** Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawings 03151-1016;
For entity parameters see control drawing 03151-1016.

## European Certifications

**I1/IA** ATEX Intrinsic Safety
Certificate No.: BAS01ATEX1303X ⟨Ex⟩ II 1G
EEx ia IIC T5 ($T_a$ = -60 °C to 40 °C) -HART/Remote Display/Quick Connect/ HART Diagnostics
EEx ia IIC T4 ($T_a$ = -60 °C to 70 °C) -HART/Remote Display/Quick Connect/ HART Diagnostics
EEx ia IIC T4 ($T_a$ = -60 °C to 70 °C) -FOUNDATION fieldbus
EEx ia IIC T4 ($T_a$ = -60 °C to 40 °C) -FISCO
CE 1180

TABLE 1. Input Parameters

| Loop / Power | Groups |
|---|---|
| $U_i$ = 30 V | HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics |
| $U_i$ = 17.5 V | FISCO |
| $I_i$ = 300 mA | HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics |
| $I_i$ = 380 mA | FISCO |
| $P_i$ = 1.0 W | HART / Remote Display / Quick Connect / HART Diagnostics |
| $P_i$ = 1.3 W | FOUNDATION fieldbus |
| $P_i$ = 5.32 W | FISCO |
| $C_i$ = 30 nF | *SuperModule*™ Platform / Quick Connect |
| $C_i$ = 11.4 nF | HART / HART Diagnostics |
| $C_i$ = 0 | FOUNDATION fieldbus / Remote Display / FISCO |
| $L_i$ = 0 | HART / FOUNDATION fieldbus/ FISCO / Quick Connect / HART Diagnostics |
| $L_i$ = 60 µH | Remote Display |

**Special conditions for safe use (x)**

1. The apparatus, excluding the Types 3051 S-T and 3051 S-C (In-line and *Coplanar SuperModule* Platforms respectively), is not capable of withstanding the 500V test as defined in Clause 6.4.12 of EN 50020. This must be considered during installation.
2. The terminal pins of the Types 3051 S-T and 3051 S-C must be protected to IP20 minimum.

**N1** ATEX Type n
Certificate No.: BAS01ATEX3304X ⟨Ex⟩ II 3 G
EEx nL IIC T5 ($T_a$ = -40 °C TO 70 °C)
Ui = 45 Vdc max
IP66
CE

**Special conditions for safe use (x)**

The apparatus is not capable of withstanding the 500V insulation test required by Clause 9.1 of EN 50021: 1999. This must be taken into account when installing the apparatus.

**ND** ATEX Dust
Certificate No.: BAS01ATEX1374X ⟨Ex⟩ II 1 D
T105°C (-20 °C ≤ $T_{amb}$ ≤ 85 °C)
$V_{max}$ = 42.4 volts max
A = 24 mA
IP66
CE 1180

**Special conditions for safe use (x)**

1. The user must ensure that the maximum rated voltage and current (42.4 volts, 22 milliampere, DC) are not exceeded. All connections to other apparatus or associated apparatus shall have control over this voltage and current equivalent to a category “ib” circuit according to EN 50020.
2. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
3. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
4. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
5. The 3051S must be securely screwed in place to maintain the ingress protection of the enclosure. (The 3051S SuperModule must be properly assembled to the 3051S housing to maintain ingress protection.)

**E1** ATEX Flameproof
Certificate No.: KEMA00ATEX2143X ⟨Ex⟩ II 1/2 G
EEx d IIC T6 (-50 °C ≤ $T_{amb}$ ≤ 65 °C)
EEx d IIC T5 (-50 °C ≤ $T_{amb}$ ≤ 80 °C)
$V_{max}$ = 42.4V
CE 1180

**Special conditions for safe use (x)**

This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer’s instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime. The Model 3051S pressure transmitter must include a 300S housing integrally mounted to a 3051S Sensor module as per Rosemount drawing 03151-1023.

## Japanese Certifications

**E4** JIS Flameproof
Ex d IIC T6

| Certificate | Description |
|---|---|
| TC15682 | *Coplanar* with Junction Box Housing |
| TC15683 | *Coplanar* with *PlantWeb* Housing |
| TC15684 | *Coplanar* with *PlantWeb* Housing and LCD Display |
| TC15685 | In-Line SST with Junction Box Housing |
| TC15686 | In-Line *Hastelloy* with Junction Box Housing |
| TC15687 | In-Line SST with *PlantWeb* Housing |
| TC15688 | In-Line *Hastelloy* with *Plantweb* Housing |
| TC15689 | In-Line SST with *Plantweb* Housing and LCD Display |
| TC15690 | In-Line *Hastelloy* with *PlantWeb* Housing and LCD Display |
| TC17102 | Remote Display |

## Australian Certifications

**E7** SAA Explosion-proof and Dust Ignition-proof
Certification No.: AUS Ex 3798X
Ex d IIC T6 ($T_a$ = 60°C) IP66
DIP A21 TA T6 ($T_a$ = 60°C) IP66

**Special conditions for safe use (x)**

1. It is a condition of manufacture that each transmitter module shall be pressure tested in accordance with clause 4.3 of AS 2380.2 at minimum pressure of 1450 kPa. As the model 300S housing passed tests at 4 times the reference pressures (400 kPa for single and 3800 kPa for dual compartment housing) and are not of welded construction, they may be exempted from the routing pressure test of clause 4.3 of AS 2380.2.
2. It is a condition of manufacture that each transmitter module and housing combination shall be subjected to a routine high voltage test in accordance with clause 6.2 of AS 2380.1, with the following variation. The test voltage applied to each single or dual compartment housing shall not be less than 500 V, 47 to 62 Hz, for a period of not less than one minute, with a breakdown current of less than 5 mA.
3. It is a condition of safe use that each housing shall be connected to external circuits via suitable conduit or Standards Australia certified cable glands. Where only one entry is used for connection to external circuits, the unused entry shall be closed by means of the blanking plug supplied by the equipment manufacturer or by a suitable Standards Australia certified blanking plug.
4. It is a condition of safe use that a dielectric strength test shall be applied whenever the terminal block is changed or replaced in either the dual compartment or single compartment housings. The breakdown current shall be less than 5 mA, when 500 V, 47 to 62 Hz, is applied for one minute. **Note:** if tested with an optional T1 transient protector terminal block fitted, the protection will operate and hence there will be no current indicated.
5. It is a condition of safe use that each transmitter module shall be used with a Model 300S housing, in order to comply with flameproof requirements.
6. It is a condition of safe use that each model 300S housing fitted with a transmitter module shall be marked with the same certification marking code information. Should the housing be replaced after initial supply to another model 300S housing, the replacement housing shall have the same certification marking code information as the housing it replaces.

## IECEx Certifications

**I7/IG** IECEx Intrinsic Safety
Certificate No.: IECExBAS04.0017X
Ex ia IIC T5 ($T_a$ = -60 °C to 40 °C) -HART/Remote Display/Quick Connect/ HART Diagnostics
Ex ia IIC T4 ($T_a$ = -60 °C to 70 °C) -HART/Remote Display/Quick Connect/ HART Diagnostics
Ex ia IIC T4 ($T_a$ = -60 °C to 70 °C) -FOUNDATION fieldbus
Ex ia IIC T4 ($T_a$ = -60 °C to 40 °C) -FISCO
IP66

TABLE 2. Input Parameters

| Loop / Power | Groups |
|---|---|
| $U_i$ = 30 V | HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics |
| $U_i$ = 17.5 V | FISCO |
| $I_i$ = 300 mA | HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics |
| $I_i$ = 380 mA | FISCO |
| $P_i$ = 1.0 W | HART / Remote Display / Quick Connect / HART Diagnostics |
| $P_i$ = 1.3 W | FOUNDATION fieldbus |
| $P_i$ = 5.32 W | FISCO |
| $C_i$ = 30 nF | *SuperModule*™ Platform / Quick Connect |
| $C_i$ = 11.4 nF | HART / HART Diagnostics |
| $C_i$ = 0 | FOUNDATION fieldbus / Remote Display / FISCO / Quick Connect / HART Diagnostics |
| $L_i$ = 0 | HART / FOUNDATION fieldbus/ FISCO / Quick Connect / HART Diagnostics |
| $L_i$ = 60 µ H | Remote Display |

**Special conditions for safe use (x)**

1.The Models 3051S HART 4-20mA, 3051S fieldbus, 3051S Profibus and 3051S FISCO are not capable of withstanding the 500V test as defined in clause 6.4.12 of IEC 60079-11. This must be taken into account during installation.
2.The terminal pins of the Types 3051S-T and 3051S-C must be protected to IP20 minimum.

**N7** IECEx Type n
Certificate No.: IECExBAS04.0018X
Ex nC IIC T5 (Ta = -40 °C to 70 °C)
Ui = 45 Vdc MAX
IP66

**Special conditions for safe use (x)**

The apparatus is not capable of withstanding the 500 V insulation test required by Clause 8 of IEC 79-15: 1987.

## Combinations of Certifications

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

**K1** Combination of E1, I1, N1, and ND

**K5** Combination of E5 and I5

**K6** Combination of E6 and I6

**K7** Combination of E7, I7, and N7

**KA** Combination of E1, I1, E6, and I6

**KB** Combination of E5, I5, I6 and E6

**KC** Combination of E5, E1, I5 and I1

**KD** Combination of E5, I5, E6, I6, E1, and I1

## INSTALLATION DRAWINGS

### Factory Mutual (FM)

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| ZONE | REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| | AA | NEW RELEASE | RTC1009618 | P.C.S. | 9/11/00 |
| | AB | ADD 3051S_L AND TRADITIONAL HOUSING | RTC1015145 | B.L.H. | 4/7/03 |

NOTES:

1. WIRING METHOD SUITABLE FOR CLASS I, DIV I or CLASS I, ZONE I WITH ANY LENGTH.

2. TRANSMITTER MUST NOT BE CONNECTED TO EQUIPMENT GENERATING MORE THAN 250 VAC.

3. ALL CONDUIT THREADS TO BE ASSEMBLED WITH FIVE FULL THREADS MINIMUM.

4. COMPONENTS REQUIRED TO BE APPROVED MUST BE APPROVED FOR GAS GROUP APPROPRIATE TO AREA CLASSIFICATION.

5. 3051SC, 3051ST OR 3051SL SENSOR MODULE MUST BE INSTALLED WITH FM FLAMEPROOF / EXPLOSIONPROOF APPROVED 300S1, 300S2 OR 300S4 HOUSING ATTACHED TO MEET FLAMEPROOF / EXPLOSIONPROOF INSTALLATION REQUIREMENTS.

6. INSTALLATION TO BE IN ACCORDANCE WITH THE LATEST EDITION OF NATIONAL ELECTRICAL CODE (NFPA 70).

7. 300S1, 300S2 OR 300S4 HOUSING MUST BE INSTALLED WITH FM FLAMEPROOF / EXPLOSIONPROOF APPROVED 3051SC, 3051ST OR 3051SL SENSOR MODULE ATTACHED TO MEET FLAMEPROOF / EXPLOSIONPROOF INSTALLATION REQUIREMENTS.

8. UNUSED CONDUIT ENTRY MUST BE CLOSED WITH SUITABLE BLANKING ELEMENT.

CAD Maintained, (Pro/E)

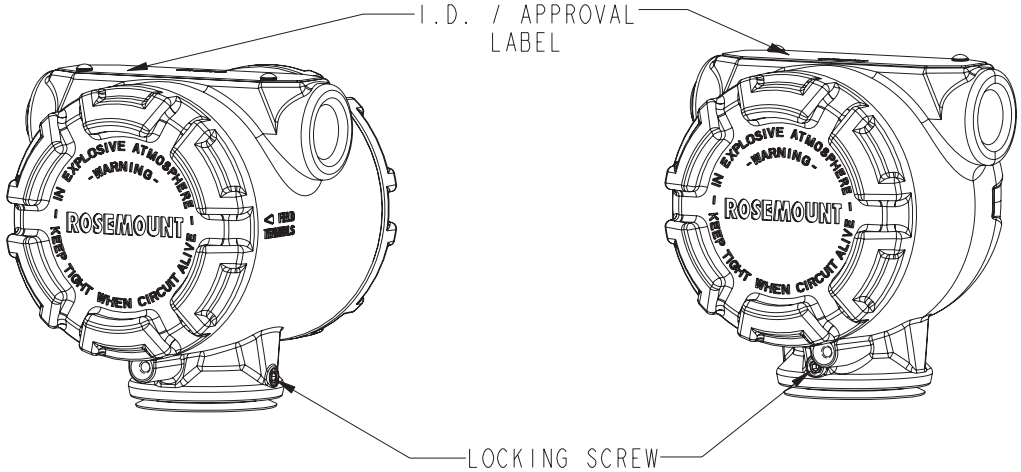
| | | | |
|---|---|---|---|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125<br>-TOLERANCES-<br>.X ± .1 [2,5]<br>.XX ± .02 [0,5]<br>.XXX ± .010 [0,25]<br>FRACTIONS ± 1/32 ANGLES ± 2°<br>DO NOT SCALE PRINT | CONTRACT NO.<br>DR. *Myles Lee Miller* 8/28/00<br>CHK'D . .<br>APP'D *Paul C. Sundet* 9/11/00<br>APP'D GOVT. | EMERSON. Process Management<br>ROSEMOUNT®<br>8200 Market Boulevard • Chanhassen, MN 55317 USA<br>TITLE MODEL 3051 / 300 EXPLOSIONPROOF / FLAMEPROOF INSTALLATION DRAWING, FM<br>SIZE A FSCM NO. DRAWING NO. 03151-1003<br>SCALE 1:4 WT. SHEET 1 OF 3 | Form Rev AC |

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| ZONE | REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| | AB | | | | |

# COMPONENT IDENTIFICATION

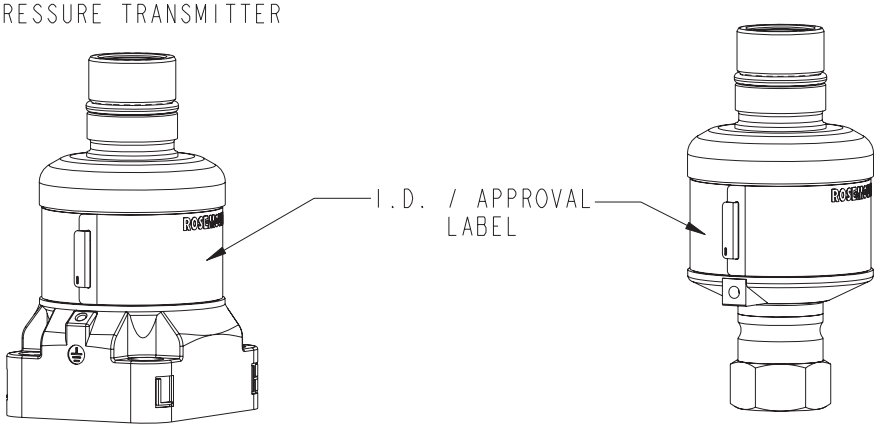
300S1____, PLANTWEB
300S4____, TRADITIONAL
(DUAL COMPARTMENT HOUSING)

300S2____
JUNCTION BOX HOUSING
(SINGLE COMPARTMENT)




305IS_C____
305IS_L____
SCALABLE COPLANAR
PRESSURE TRANSMITTER

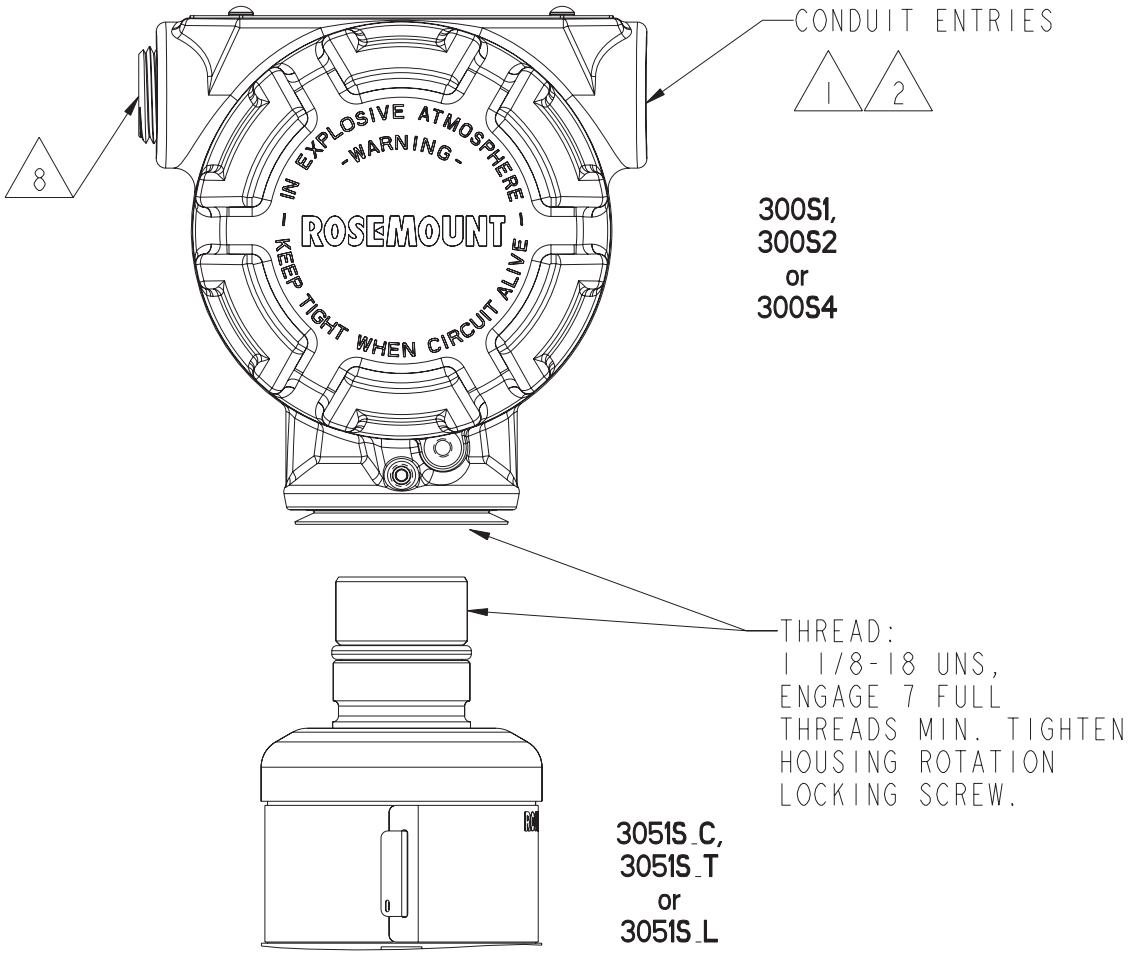
305IS_T____
SCALABLE IN-LINE
PRESSURE TRANSMITTER




| | | | | | |
|---|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | | CAD Maintained, (Pro/E) | |
| DR. *Myles Lee Miller* | 8/28/00 | SIZE A | FSCM NO | DWG NO. | 03151-1003 |
| ISSUED | | SCALE 1:2 | WT. | SHEET 2 | OF 3 |

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| ZONE | REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| | AB | | | | |

# HOUSING TO MODULE ASSEMBLY




| | | | | | |
|---|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | | CAD Maintained, (Pro/E) | |
| DR. *Myles Lee Miller* | 8/28/00 | SIZE A | FSCM NO | DWG NO. | 03151-1003 |
| ISSUED | | SCALE 1:4 | WT. | SHEET 3 | OF 3 |

| CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY | REVISIONS | | | | |
|---|---|---|---|---|---|
| | REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| | AJ | ADD UPDATE TO OUTPUT CODE B | RTC1017135 | B.L.H. | 3/12/04 |
| | AK | ADD NOTE 10, CHANGE BARRIER CURRENT LIMIT FOR OUTPUT CODE B | RTC1017241 | B.L.H. | 3/26/04 |
| | AL | ADD QUICK CONNECT | RTC1017568 | B.L.H. | 5/15/04 |
| | AM | ADD DIAGNOSTICS FEATURE BOARD | RTC1020856 | J.D.V. | 3/23/06 |

ENTITY APPROVALS FOR MODELS 3051S & 300S

OUTPUT CODE A & B (4-20 mA HART) I.S. SEE SHEETS 2-5
REMOTE DISPLAY (4-20 mA HART) I.S. SEE SHEET 6
OUTPUT CODE F/W (FIELDBUS/PROFIBUS) I.S. SEE SHEET 7
FISCO SEE SHEETS 8-9
ALL OUTPUT CODES NONINCENDIVE SEE SHEET 10

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.

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.

CAD MAINTAINED (MicroStation)

| | | |
|---|---|---|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125<br>-TOLERANCE-<br>.X ± .1 [2,5]<br>.XX ± .02 [0,5]<br>.XXX ± .010 [0,25]<br>FRACTIONS ± 1/32 ANGLES ± 2°<br>DO NOT SCALE PRINT | CONTRACT NO.<br>DR. Myles Lee Miller 2/23/01<br>CHK'D<br>APP'D. Paul C. Sundet 3/9/01<br>APP'D. GOVT. | EMERSON. Process Management<br>ROSEMOUNT®<br>8200 Market Boulevard • Chanhassen, MN 55317 USA<br>TITLE INDEX OF I.S. & NONINCENDIVE F.M. FOR 3051S<br>SIZE A FSCM NO DWG NO. 03151-1006<br>SCALE N/A WT. SHEET 1 OF 11 |

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AM | | | | |

## 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, Uo OR Vt) AND MAX. SHORT CIRCUIT CURRENT (Isc, Io, OR It) AND MAX. POWER Po(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, OR $U_i$), MAXIMUM SAFE INPUT CURRENT (Imax OR $I_i$), AND MAXIMUM SAFE INPUT POWER (Pmax OR $P_i$) OF THE INTRINSICALLY SAFE APPARATUS. IN ADDITION, THE APPROVED MAX. ALLOWABLE CONNECTED CAPACITANCE (Ca) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE CAPACITANCE AND THE UNPROTECTED INTERNAL CAPACITANCE ($C_i$) OF THE INTRINSICALLY SAFE APPARATUS, AND THE APPROVED MAX. ALLOWABLE CONNECTED INDUCTANCE (La) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE INDUCTANCE AND THE UNPROTECTED INTERNAL INDUCTANCE ($L_i$) OF THE INTRINSICALLY SAFE APPARATUS.

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

FOR OUTPUT CODE 'A' MODEL 3051S SUPERMODULE CLASS I, DIV. 1, GROUPS A, B, C AND D

| | |
|---|---|
| $U_i$ or $V_{MAX}$ = 30V | Uo, $V_T$ or $V_{OC}$ IS LESS THAN OR EQUAL TO 30V |
| $I_i$ or $I_{MAX}$ = 300mA | Io, $I_T$ or $I_{SC}$ IS LESS THAN OR EQUAL TO 300mA |
| $P_i$ or $P_{MAX}$ = 1.0 WATT | $(\frac{V_T X I_T}{4})$ or $(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1.0 WATT |
| $C_i$ = 38nF | $C_A$ IS GREATER THAN 38nF |
| $L_i$ = 0 | $L_A$ IS GREATER THAN 0 H |
| T4 (Ta=-50°C to +70°C) | T5 (Ta = -50°C to +40°C) |

FOR OUTPUT CODE 'A' MODEL 300S JUNCTION BOX,
300S PLANTWEB HOUSING, OR 3051S QUICK CONNECT CLASS I, DIV. 1, GROUPS A, B, C AND D

| | |
|---|---|
| $U_i$ or $V_{MAX}$ = 30V | Uo, $V_T$ or $V_{OC}$ IS LESS THAN OR EQUAL TO 30V |
| $I_i$ or $I_{MAX}$ = 300mA | Io, $I_T$ or $I_{SC}$ IS LESS THAN OR EQUAL TO 300mA |
| $P_i$ or $P_{MAX}$ = 1.0 WATT | $(\frac{V_T X I_T}{4})$ or $(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1.0 WATT |
| $C_i$ = 11.4nF | $C_A$ IS GREATER THAN 11.4nF |
| $L_i$ = 2.4 $\mu$H | $L_A$ IS GREATER THAN 2.4 $\mu$H |
| T4 (Ta=-50°C to +70°C) | |
| T5 (Ta=-50°C to +40°C) | |

FOR OUTPUT CODE 'A' WITH HART DIAGNOSTICS SUITE
AND MODEL 300S PLANTWEB HOUSING CLASS I, DIV. 1, GROUPS A, B, C AND D

| | |
|---|---|
| $U_i$ or $V_{MAX}$ = 30V | Uo, $V_T$ or $V_{OC}$ IS LESS THAN OR EQUAL TO 30V |
| $I_i$ or $I_{MAX}$ = 240mA | Io, $I_T$ or $I_{SC}$ IS LESS THAN OR EQUAL TO 240mA |
| $P_i$ or $P_{MAX}$ = 1.0 WATT | $(\frac{V_T X I_T}{4})$ or $(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1.0 WATT |
| $C_i$ = 11.4nF | $C_A$ IS GREATER THAN 11.4nF |
| $L_i$ = 0 | $L_A$ IS GREATER THAN 0 |
| T4 (Ta=-50°C to +70°C) | |
| T5 (Ta=-50°C to +40°C) | |

| | | | |
|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03151-1006 |
| ISSUED | SCALE N/A | WT. ——— | SHEET 2 OF 11 |

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AM | | | | |

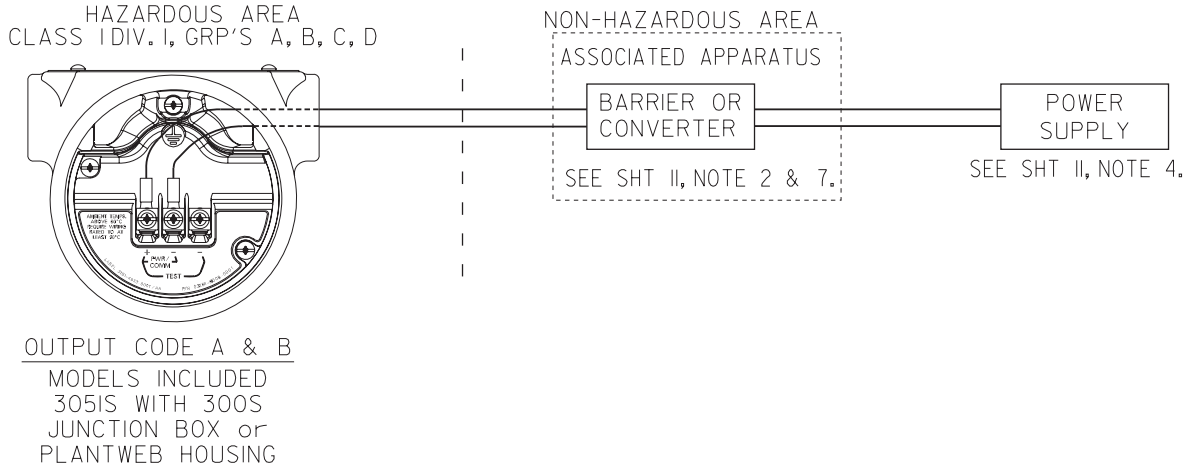
FOR OUTPUT CODE 'B' (SAFETY CERTIFIED) MODEL 300S CLASS I, DIV. 1, GROUPS A, B, C AND D

| | |
|---|---|
| $U_1$ or $V_{MAX}$ = 30V | $U_o$, $V_T$ or $V_{OC}$ IS LESS THAN OR EQUAL TO 30V |
| $I_1$ or $I_{MAX}$ = 240mA | $I_o$, $I_T$ or $I_{SC}$ IS LESS THAN OR EQUAL TO 240mA |
| $P_1$ or $P_{MAX}$ = 1.0 WATT | $(\frac{V_T \times I_T}{4})$ or $(\frac{V_{OC} \times I_{OS}}{4})$ IS LESS THAN OR EQUAL TO 1.0 WATT |
| $C_1$ = 11.4nF | $C_A$ IS GREATER THAN 11.4nF |
| $L_1$ = 570$\mu$H | $L_A$ IS GREATER THAN 570$\mu$H |
| T4 (Ta=-50°C to +70°C) | |
| T5 (Ta=-50°C to +40°C) | |

| | | | | |
|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) | |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03151-1006 | |
| ISSUED | SCALE N/A | WT. ——— | SHEET 3 OF 11 | |

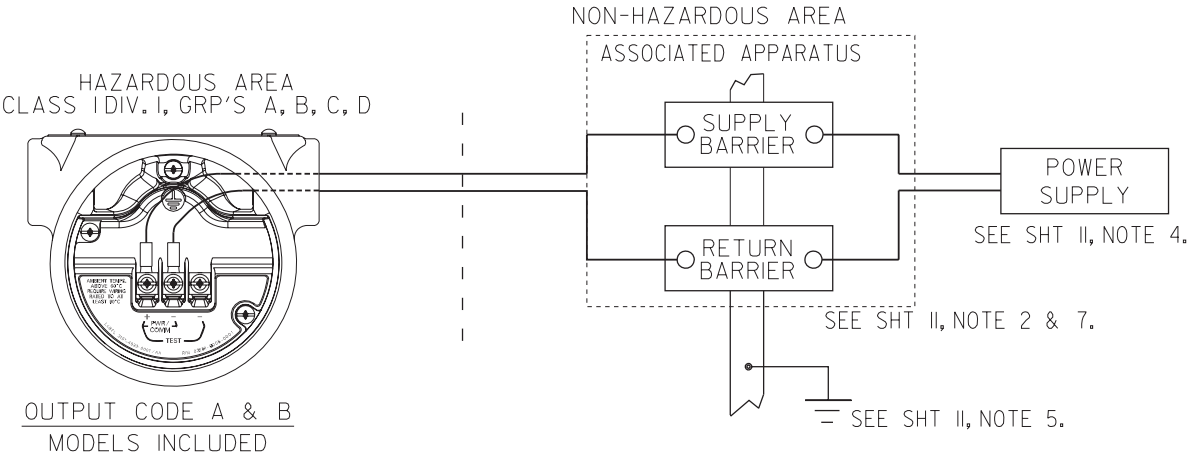
| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AM | | | | |

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




OUTPUT CODE A & B
MODELS INCLUDED
305IS WITH 300S
JUNCTION BOX or
PLANTWEB HOUSING

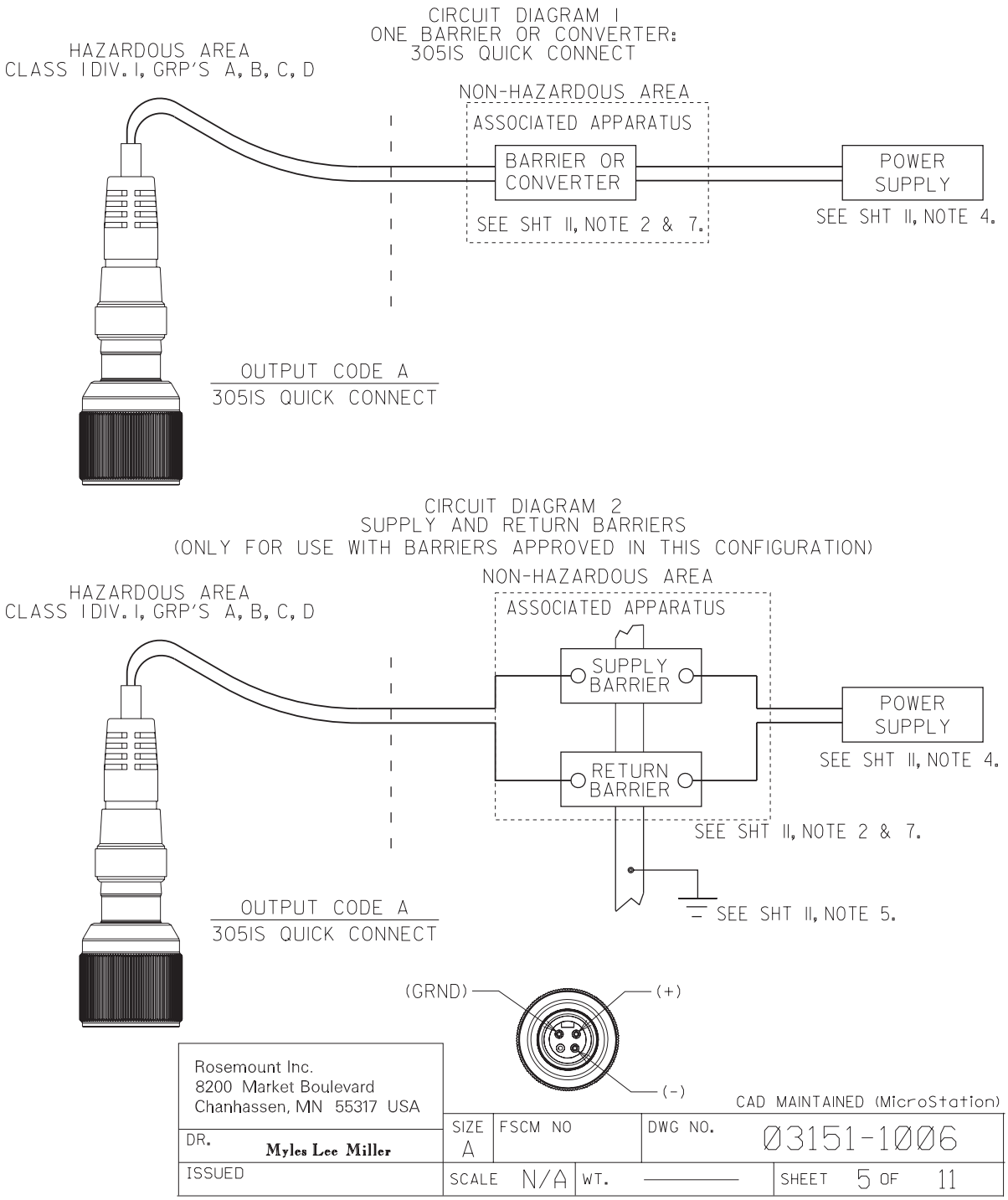
CIRCUIT DIAGRAM 2
SUPPLY AND RETURN BARRIERS
(ONLY FOR USE WITH BARRIERS APPROVED IN THIS CONFIGURATION)




OUTPUT CODE A & B
MODELS INCLUDED
305IS WITH 300S
JUNCTION BOX or
PLANTWEB HOUSING

| | | | | |
|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) | |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03151-1006 | |
| ISSUED | SCALE N/A | WT. ——— | SHEET 4 OF 11 | |

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AM | | | | |

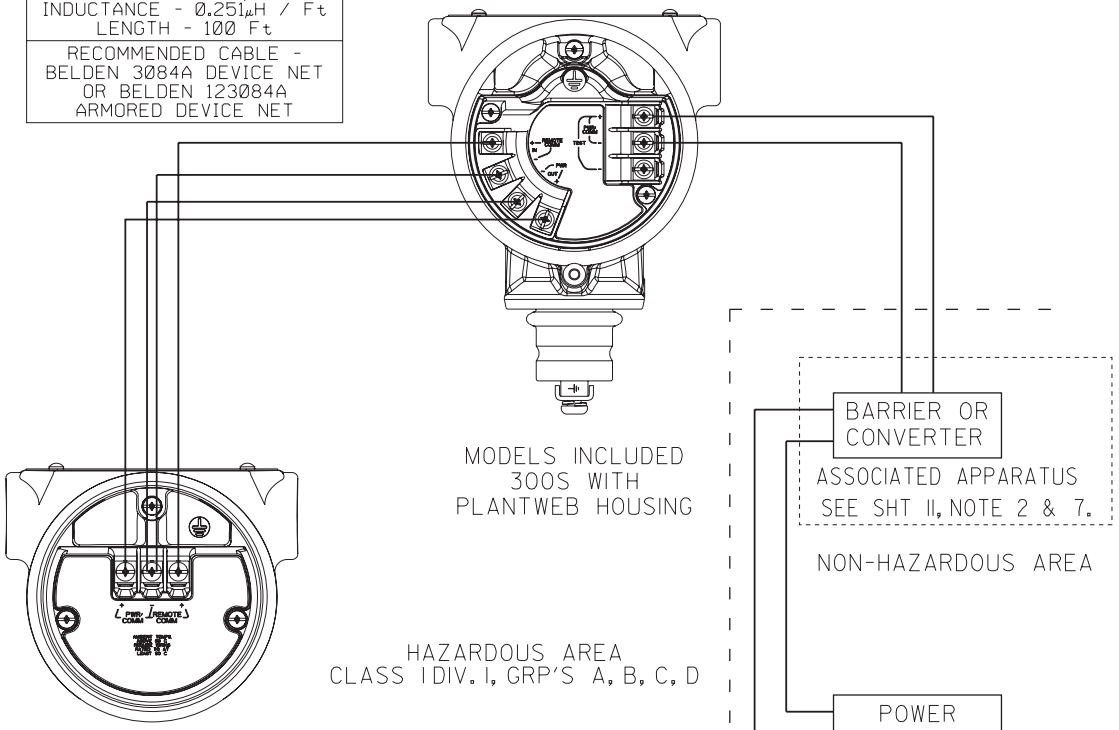


| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AM | | | | |

OUTPUT CODE A WITH M8 or M9 OPTION
CLASS I, DIV. 1, GROUPS A, B, C AND D

| |
|---|
| $U_1$ or $V_{MAX}$ = 30V |
| $I_1$ or $I_{MAX}$ = 300mA |
| $P_1$ or $P_{MAX}$ = 1.0 WATT |
| $C_1$ = 0 |
| $L_1$ = 58.2$\mu$H |
| T4 (Ta=-50°C to +70°C) |
| T5 (Ta=-50°C to +40°C) |

| MAXIMUM CABLE PARAMETERS |
|---|
| CAPACITANCE - 50 pf / Ft<br>INDUCTANCE - 0.251$\mu$H / Ft<br>LENGTH - 100 Ft |
| RECOMMENDED CABLE -<br>BELDEN 3084A DEVICE NET<br>OR BELDEN 123084A<br>ARMORED DEVICE NET |




REMOTE MOUNT METER

| | | | | |
|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) | |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03151-1006 | |
| ISSUED | SCALE N/A | WT. ——— | SHEET 6 OF 11 | |

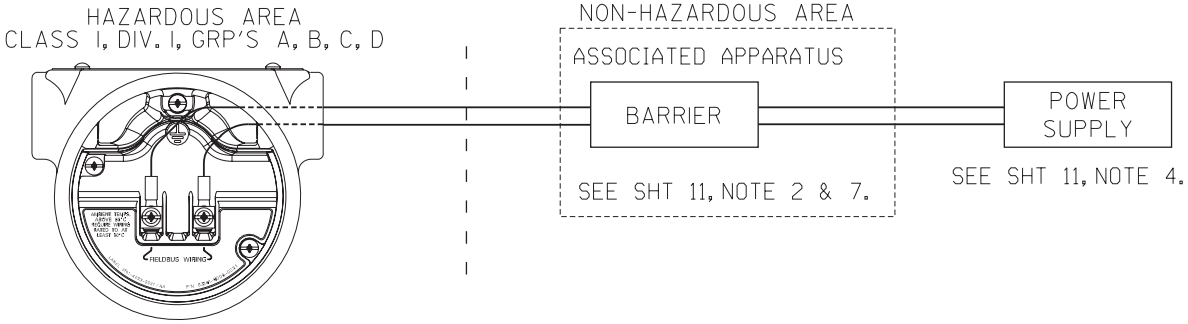
| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AM | | | | |

FOR OUTPUT CODE F or W (MODEL 300S)

CLASS I, DIV. 1, GROUPS A, B, C AND D

| | |
|---|---|
| $U_1$ or $V_{MAX}$ = 30V | $U_o$, $V_T$, OR $V_{OC}$ IS LESS THAN OR EQUAL TO 30V |
| $I_1$ OR $I_{MAX}$ = 300mA | $I_o$, $I_T$, OR $I_{SC}$ IS LESS THAN OR EQUAL TO 300mA |
| $P_1$ OR $P_{MAX}$ = 1.3 WATT | $P_1$ ($\frac{V_T \times I_T}{4}$) OR ($\frac{V_{OC} \times I_{SC}}{4}$) IS LESS THAN OR EQUAL TO 1.3 WATT |
| $C_I$ = 0 $\mu$f | $C_A$ IS GREATER THAN 0 $\mu$f |
| $L_I$ = 0 $\mu$H | $L_A$ IS GREATER THAN 0 $\mu$H |
| T4 ($T_a$ = -50°C TO +60°C) | |

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




OUTPUT CODE F or W

MODELS INCLUDED
305IS WITH 300S
PLANTWEB HOUSING

| | | | | |
|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) | |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03151-1006 | |
| ISSUED | SCALE N/A | WT. ——— | SHEET 7 OF 11 | |

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AM | | | | |

## FISCO CONCEPT

THE FISCO CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIALLY EXAMINED IN SUCH COMBINATION. THE CRITERIA FOR INTERCONNECTION IS THAT THE VOLTAGE ($U_i$ OR Vmax), THE CURRENT ($I_i$ OR Imax), AND THE POWER ($P_i$ or Pmax) WHICH AN INTRINSICALLY SAFE APPARATUS CAN RECEIVE AND REMAIN INTRINSICALLY SAFE CONSIDERING FAULTS, MUST BE EQUAL OR GREATER THAN VOLTAGE (Uo, Voc, OR Vt), THE CURRENT (Io, Isc, OR It) AND THE POWER (Po OR Pmax) LEVELS WHICH CAN BE DELIVERED BY THE ASSOCIATED APPARATUS, CONSIDERING FAULTS AND APPLICABLE FACTORS. IN ADDITION, THE MAXIMUM UNPROTECTED CAPACITANCE ($C_i$) AND THE INDUCTANCE ($L_i$) OF EACH APPARATUS (OTHER THAN THE TERMINATION) CONNECTED TO THE FIELDBUS MUST BE LESS THAN OR EQUAL TO 5 nF AND 10 µH RESPECTIVELY.

IN EACH SEGMENT ONLY ONE ACTIVE DEVICE, NORMALLY THE ASSOCIATED APPARATUS, IS ALLOWED TO PROVIDE THE NECESSARY ENERGY FOR THE FIELDBUS SYSTEM. THE VOLTAGE Uo (OR Voc OR Vt) OF THE ASSOCIATED APPARATUS IS LIMITED TO A RANGE OF 14V TO 24Vd.c. ALL OTHER EQUIPMENT CONNECTED TO THE BUS CABLE HAS TO BE PASSIVE, MEANING THAT THEY ARE NOT ALLOWED TO PROVIDE ENERGY TO THE SYSTEM, EXCEPT A LEAKAGE CURRENT OF 50uA FOR EACH CONNECTED DEVICE. SEPARATELY POWERED EQUIPMENT NEEDS GALVANIC ISOLATION TO ASSURE THAT THE INTRINSICALLY SAFE FIELDBUS CIRCUIT REMAINS PASSIVE.
THE CABLE USED TO INTERCONNECT DEVICES NEEDS TO HAVE THE PARAMETERS IN THE FOLLOWING RANGE:

| | |
|---|---|
| Loop Resistance R': | 15.....150 Ohm/km |
| Inductance per unit length L': | 0.4.....1 mH/km |
| Capacitance per unit length C': | 80.....200 nF |

C' = C' line/line + 0.5C' line/screen, if both lines are floating, or
C' = C' line/line + C' line/screen, if the screen is connected to one line

| | |
|---|---|
| Length of trunk cable: | less than or equal to 1000m |
| Length of spur cable: | less than or equal to 30m |
| Length of spur splice: | less than or equal to 1m |

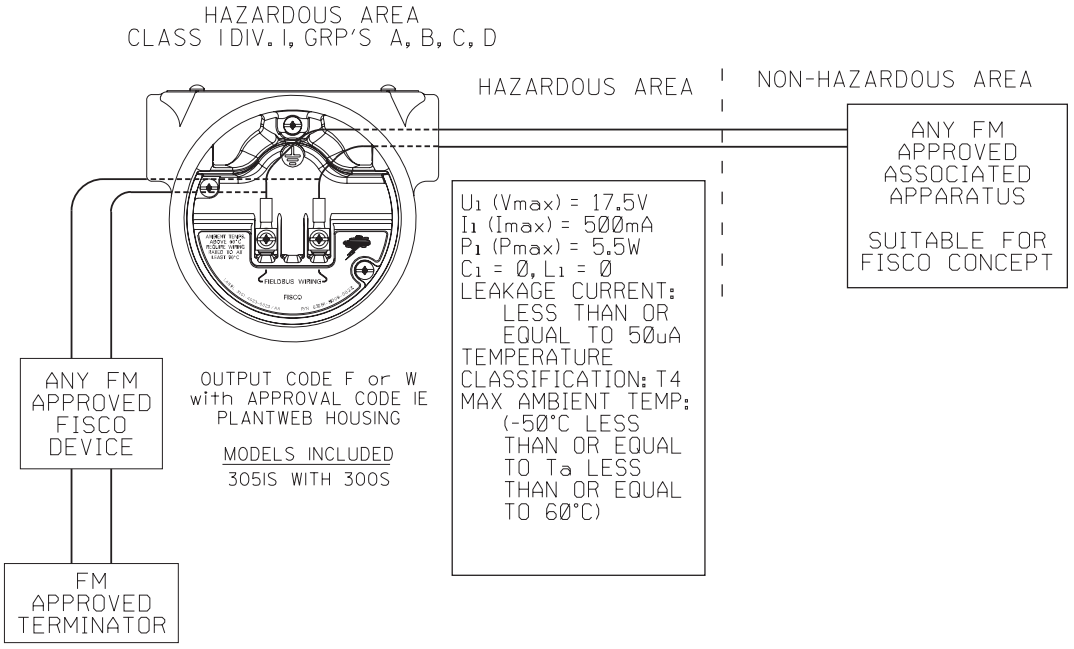
AT EACH END OF THE TRUNK CABLE AN APPROVED INFALLIBLE LINE TERMINATION WITH THE FOLLOWING PARAMETERS IS SUITABLE:

R = 90.....100Ohm  C = 0.....2.2uF

ONE OF THE ALLOWED TERMINATIONS MIGHT ALREADY BE INTEGRATED IN THE ASSOCIATED APPARATUS. THE NUMBER OF PASSIVE APPARATUS CONNECTED TO THE BUS SEGMENT IS NOT LIMITED DUE TO I. S. REASONS. IF THE ABOVE RULES ARE RESPECTED, UP TO A TOTAL LENGTH OF 1000 m (SUM OF TRUNK AND ALL SPUR CABLES) OF CABLE IS PERMITED.
THE INDUCTANCE AND THE CAPACITANCE OF THE CABLE WILL NOT IMPAIR THE INTRINSIC SAFETY OF THE INSTALLATION.

| | | | |
|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03151-1006 |
| ISSUED | SCALE N/A | WT. ——— | SHEET 8 OF 11 |

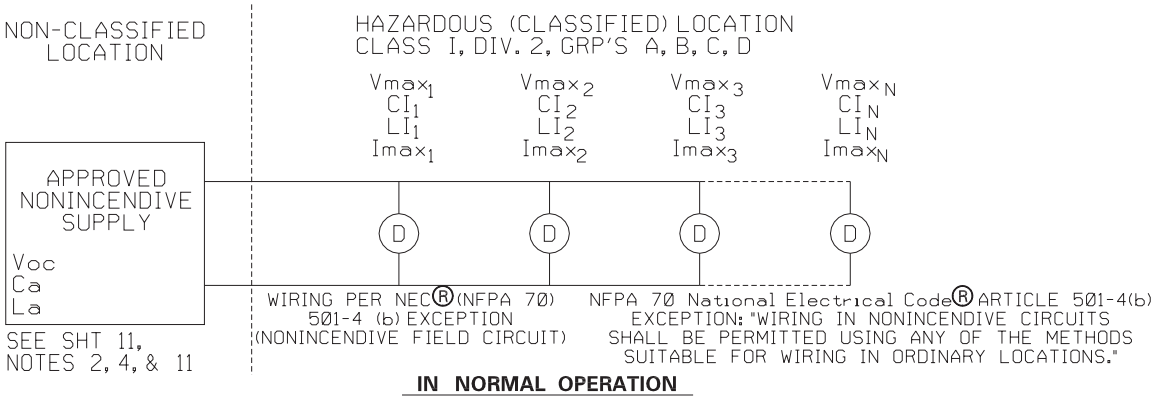
| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AM | | | | |




| | | | | |
|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) | |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. | Ø3151-1ØØ6 |
| ISSUED | SCALE N/A | WT. ——— | SHEET 9 OF 11 | |

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AM | | | | |

NONINCENDIVE FIELD CIRCUIT
CLASS I, DIV. 2 LOCATIONS




**IN NORMAL OPERATION**

**DEVICES CONTROL THROUGH-CURRENT**

| PARAMETERS (NON-INCENDIVE FIELD WIRING) | DEVICE | ROSEMOUNT 3051S/300S | | | | | |
|---|---|---|---|---|---|---|---|
| | | 3051S 4-20mA / HART | MODEL 300S REMOTE METER | 3051S QUICK CONNECT OR 300S OUTPUT CODE 'A' 4-20mA / HART | MODEL 300S HART DIAGNOSTICS OUTPUT CODE 'A' 4-20mA / HART | 300S OUTPUT CODE 'B' (SAFETY CERTIFIED) 4-20mA / HART | FIELDBUS (F or W) |
| Vmax | | 42.4v | 42.4v | 42.4v | 42.4v | 42.4v | 35v |
| Maximum normal operating current | | 22mA | 22mA | 22mA | 22mA | 22mA | 27mA |
| . | $C_1$ | 38nF | 0nF | 11.4nF | 11.4nF | 11.4nF | 0uF |
| . | $L_1$ | 0uH | 58.2μH | 2.4μH | 0uH | 570μH | 0uH |

.

.

$Imax_N >= Iq_N + Isignal_N$

ROSEMOUNT 3051 TRANSMITTERS ARE CURRENT CONTROLLERS ON INDIVIDUAL PARALLEL BRANCHES WITH RESPECT TO THE POWER SUPPLY. IN NONINCENDIVE INSTALLATIONS THE Imax FOR EACH TRANSMITTER IS NOT RELATED TO THE MAXIMUM CURRENT OF THE POWER SUPPLY (Isc) IN THE SAME MANNER AS FOR TRANSMITTER INSTALLED PER I.S. REQUIREMENTS, BECAUSE NONINCENDIVE REQUIREMENTS INCLUDE ONLY NORMAL OPERATING CONDITIONS.

Imax for an individual device = Iq + Isignal

Iq =Quiescent current through device (Maximum quiescent current for the device)

Isignal =Signaling current through device (Protocol may limit signaling to one device at a time)

REFERENCE: APPENDIX A7 (FM3611 1999)

Operating $Imax = Iq_1 + Iq_2 + ... + Iq_N + I_{signal\ max}$

$I_{signal\ max}$ = Max. of $(Isignal_1, Isignal_2, ...., Isignal_N)$

TEMP CODE: T5 (Ta = -50°C TO +40°C

| | | | | |
|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) | |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03151-1006 | |
| ISSUED | SCALE N/A | WT. ——— | SHEET 10 OF 11 | |

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AM | | | | |

NOTES:

1. NO REVISION TO THIS DRAWING WITHOUT PRIOR FACTORY MUTUAL APPROVAL.
2. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.
3. DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS.
4. CONTROL EQUIPMENT CONNECTED TO BARRIER MUST NOT USE OR GENERATE MORE THAN 250 Vrms or Vdc.
5. RESISTANCE BETWEEN INTRINSICALLY SAFE GROUND AND EARTH GROUND MUST BE LESS THAN 1 OHM.
6. INSTALLATION SHOULD BE IN ACCORDANCE WITH ANSI/ISA-RP12.6 "INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS (CLASSIFIED) LOCATIONS" AND THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70).
7. THE ASSOCIATED APPARATUS MUST BE FACTORY MUTUAL APPROVED.
8. WARNING - SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC AND NON-INCENDIVE SAFETY.
9. ASSOCIATED APPARATUS MUST MEET THE FOLLOWING PARAMETERS:
   Uo or Voc or Vt LESS THAN or EQUAL TO $U_i$ (Vmax)
   Io or Isc or It LESS THAN or EQUAL TO $I_i$ (Imax)
   Po or Pmax LESS THAN or EQUAL TO $P_i$ (Pmax)
   Ca IS GREATER THAN or EQUAL THE SUM OF ALL $C_i$'s PLUS Ccable
   La IS GREATER THAN or EQUAL THE SUM OF ALL $L_i$'s PLUS Lcable
10. WARNING - TO PREVENT IGNITION OF FLAMMABLE OR COMBUSTIBLE ATMOSPHERES, DISCONNECT POWER BEFORE SERVICING.

| | | | |
|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03151-1006 |
| ISSUED | SCALE N/A | WT. ——— | SHEET 11 OF 11 |

| CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY. | REVISIONS | | | | |
|---|---|---|---|---|---|
| | REV | DESCRIPTION | ECO NO. | APP'D | DATE |
| | AA | NEW RELEASE | RTC1022362 | B.L.H. | 9/1/06 |

NOTES:

1. USE TURCK CORDSETS AS SPECIFIED IN THIS DRAWING WITH GE / GM OPTION TO ENSURE OUTDOOR RATING (NEMA 4X or IP66).
2. LOK-FAST GUARD IS REQUIRED FOR CLASS I DIVISION 2 INSTALLATIONS.
3. (X)XXV 49-4.5IN/14.5 IS INSTALLED INTO 1/2-14 NPT CONDUIT ENTRY THREADS. (X)XXV 49-4.5IN/M20 IS INSTALLED INTO CM20 CONDUIT ENTRY THREADS.
4. eurofast® AND minifast® ARE REGISTERED TRADEMARKS OF TURCK INC.

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125

-TOLERANCES-
.X ± .1 [2,5]
.XX ± .02 [0,5]
.XXX ± .010 [0,25]

FRACTIONS ± 1/32 ANGLES ± 2°

DO NOT SCALE PRINT

EMERSON. Process Management

ROSEMOUNT®
8200 Market Boulevard Chanhassen, MN 55317 USA

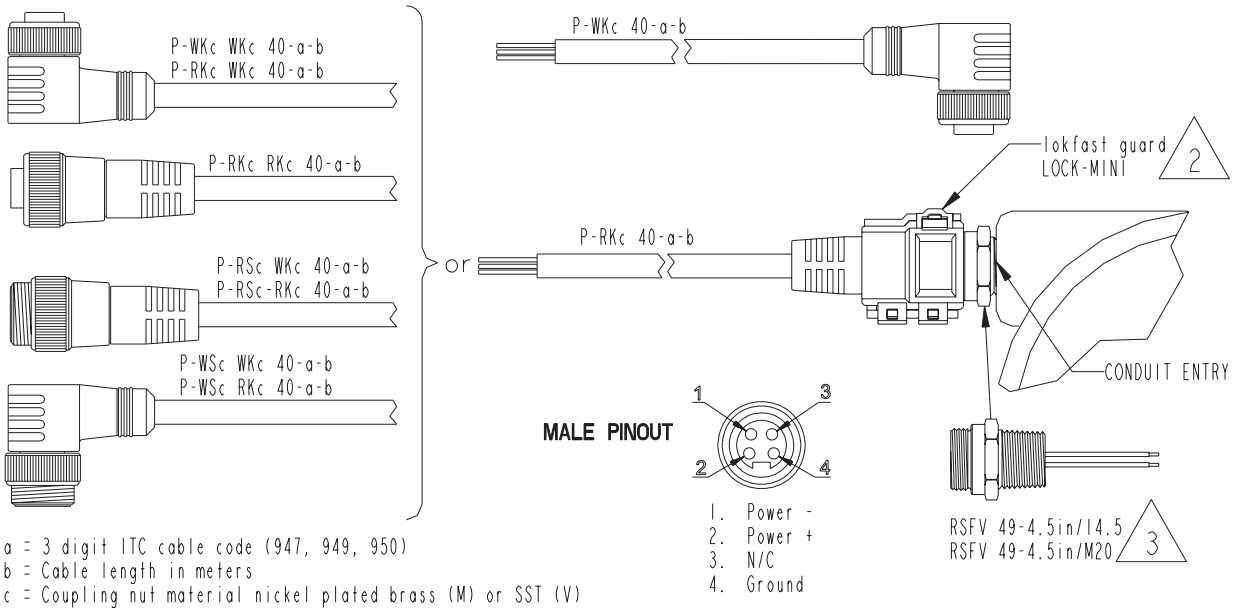
TITLE: GE / GM OPTION NEMA 4X INSTALLATION, FM

| | | | | | |
|---|---|---|---|---|---|
| DR. | Myles Lee Miller | 8/29/06 | SIZE A | DRAWING NO. 03151-1009 | REV AA |
| APP'D | Bryce Hagbom | 8/30/06 | | | |

CAD MAINTAINED, (PRO/E) SHEET 1 OF 3

Form Rev AA

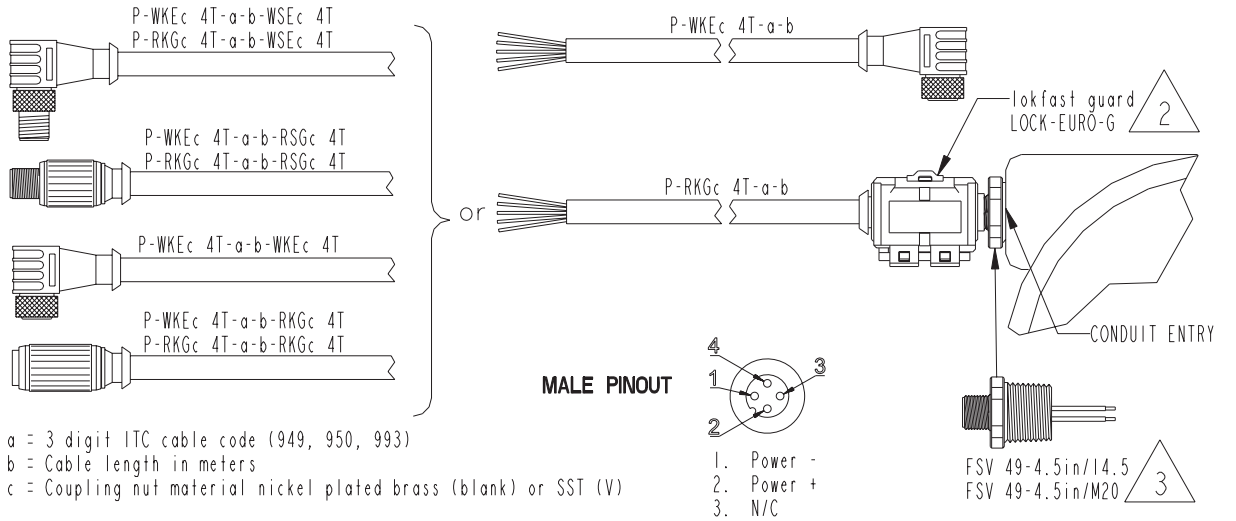
GM OPTION WITH 4 - 20 mA / HART OUTPUT
A-SIZE MINI (minifast®), 4-PIN CONNECTION




1. Power -
2. Power +
3. N/C
4. Ground

a = 3 digit ITC cable code (947, 949, 950)
b = Cable length in meters
c = Coupling nut material nickel plated brass (M) or SST (V)

GE OPTION WITH 4 - 20 mA / HART OUTPUT
M12 (eurofast®), 4-PIN CONNECTION



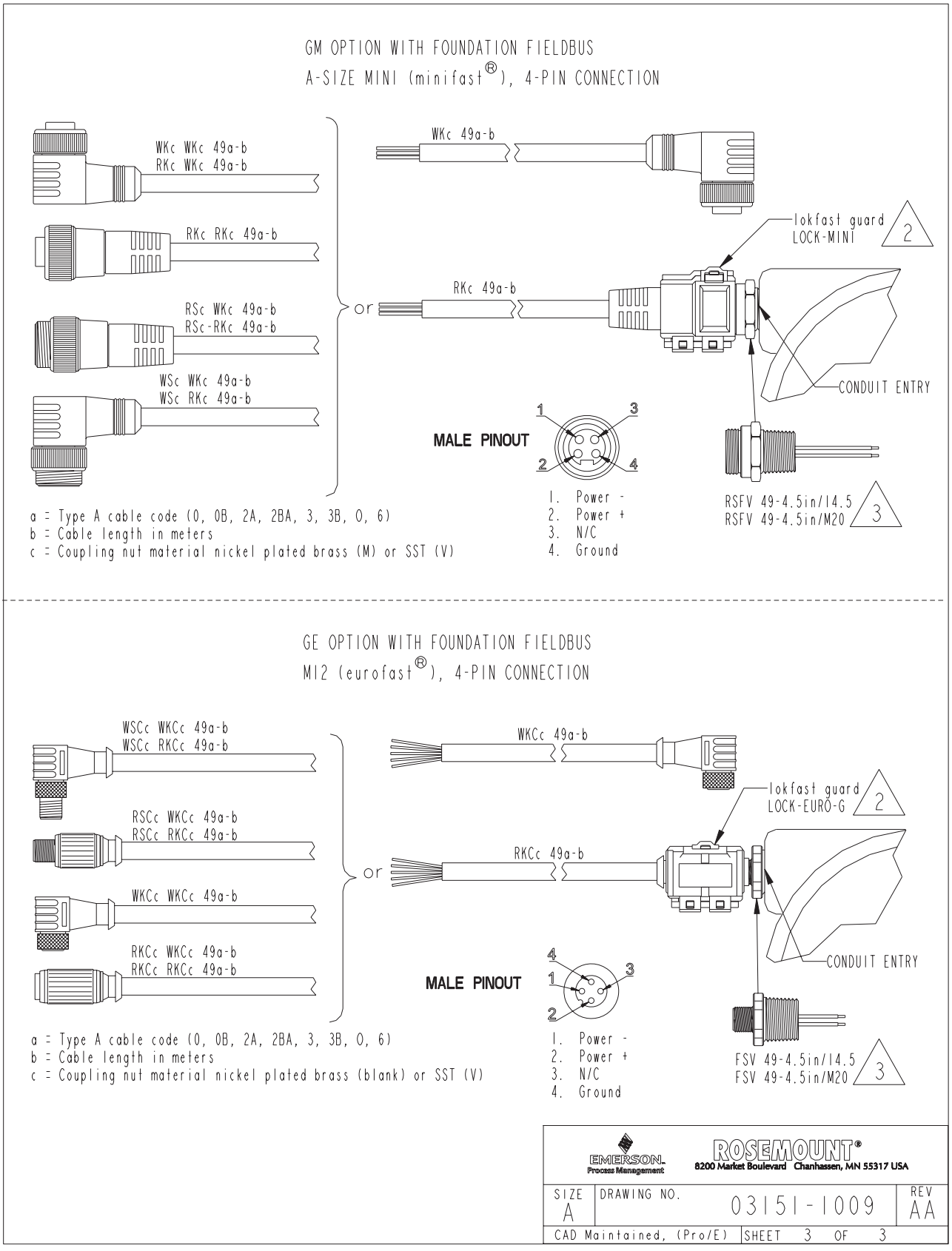

1. Power -
2. Power +
3. N/C
4. Ground

a = 3 digit ITC cable code (949, 950, 993)
b = Cable length in meters
c = Coupling nut material nickel plated brass (blank) or SST (V)

EMERSON. Process Management
ROSEMOUNT®
8200 Market Boulevard Chanhassen, MN 55317 USA

| SIZE | DRAWING NO. | REV |
|---|---|---|
| A | 03151-1009 | AA |
| CAD Maintained, (Pro/E) | SHEET 2 OF 3 | |

Form Rev AA


GM OPTION WITH FOUNDATION FIELDBUS
A-SIZE MINI (minifast®), 4-PIN CONNECTION
WKc WKc 49a-b
RKc WKc 49a-b
RKc RKc 49a-b
RSc WKc 49a-b
RSc-RKc 49a-b
WSc WKc 49a-b
WSc RKc 49a-b
or
WKc 49a-b
RKc 49a-b
lokfast guard
LOCK-MINI
2
CONDUIT ENTRY
MALE PINOUT
1
2
3
4
1. Power -
2. Power +
3. N/C
4. Ground
RSFV 49-4.5in/14.5
RSFV 49-4.5in/M20
3
a = Type A cable code (0, 0B, 2A, 2BA, 3, 3B, 0, 6)
b = Cable length in meters
c = Coupling nut material nickel plated brass (M) or SST (V)
GE OPTION WITH FOUNDATION FIELDBUS
MI2 (eurofast®), 4-PIN CONNECTION
WSCc WKCc 49a-b
WSCc RKCc 49a-b
RSCc WKCc 49a-b
RSCc RKCc 49a-b
WKCc WKCc 49a-b
RKCc WKCc 49a-b
RKCc RKCc 49a-b
or
WKCc 49a-b
RKCc 49a-b
lokfast guard
LOCK-EURO-G
2
CONDUIT ENTRY
MALE PINOUT
4
1
3
2
1. Power -
2. Power +
3. N/C
4. Ground
FSV 49-4.5in/14.5
FSV 49-4.5in/M20
3
a = Type A cable code (0, 0B, 2A, 2BA, 3, 3B, 0, 6)
b = Cable length in meters
c = Coupling nut material nickel plated brass (blank) or SST (V)
EMERSON. Process Management
ROSEMOUNT®
8200 Market Boulevard Chanhassen, MN 55317 USA
SIZE A
DRAWING NO. 03151-1009
REV AA
CAD Maintained, (Pro/E)
SHEET 3 OF 3
Form Rev AA

## Canadian Standards Association (CSA)

| CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY. | REVISIONS | | | | | |
|---|---|---|---|---|---|---|
| | ZONE | REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| | | AC | ADD 3051S_L AND TRADITIONAL HOUSING | RTC1015145 | P.C.S. | 4/7/03 |
| | | AD | ADD NOTE 9 | RTC1018745 | B.L.H. | 12/6/04 |

NOTES:

1. WIRING METHOD SUITABLE FOR CLASS I, DIV I WITH ANY LENGTH.

2. TRANSMITTER MUST NOT BE CONNECTED TO EQUIPMENT GENERATING MORE THAN 250 VAC.

3. ALL CONDUIT THREADS TO BE ASSEMBLED WITH FIVE FULL TAPERED THREADS MINIMUM.

4. COMPONENTS REQUIRED TO BE APPROVED MUST BE APPROVED FOR GAS GROUP APPROPRIATE TO AREA CLASSIFICATION.

5. 3051SC, 3051ST OR 3051SL SENSOR MODULE MUST BE INSTALLED WITH CSA FLAMEPROOF / EXPLOSIONPROOF APPROVED 300S1, 300S2 OR 300S4 HOUSING ATTACHED TO MEET FLAMEPROOF / EXPLOSIONPROOF INSTALLATION REQUIREMENTS. MINIMUM OF 7 FULL THREADS ENGAGED AND LOCKED IN PLACE. SEE PAGE 3.

6. INSTALLATION TO BE IN ACCORDANCE WITH THE LATEST EDITION OF CANADIAN ELECTRICAL CODE.

7. 300S1, 300S2 OR 300S4 HOUSING MUST BE INSTALLED WITH CSA FLAMEPROOF / EXPLOSIONPROOF APPROVED 3051SC, 3051ST OR 3051SL SENSOR MODULE ATTACHED TO MEET FLAMEPROOF / EXPLOSIONPROOF INSTALLATION REQUIREMENTS. MINIMUM OF 7 FULL THREADS ENGAGED AND LOCKED IN PLACE. SEE PAGE 3.

8. UNUSED CONDUIT ENTRY MUST BE CLOSED WITH SUITABLE BLANKING ELEMENT.

9. TEMPERATURE CODE T5, Tambient =-50°C to 85°C.

CAD Maintained, (Pro/E)

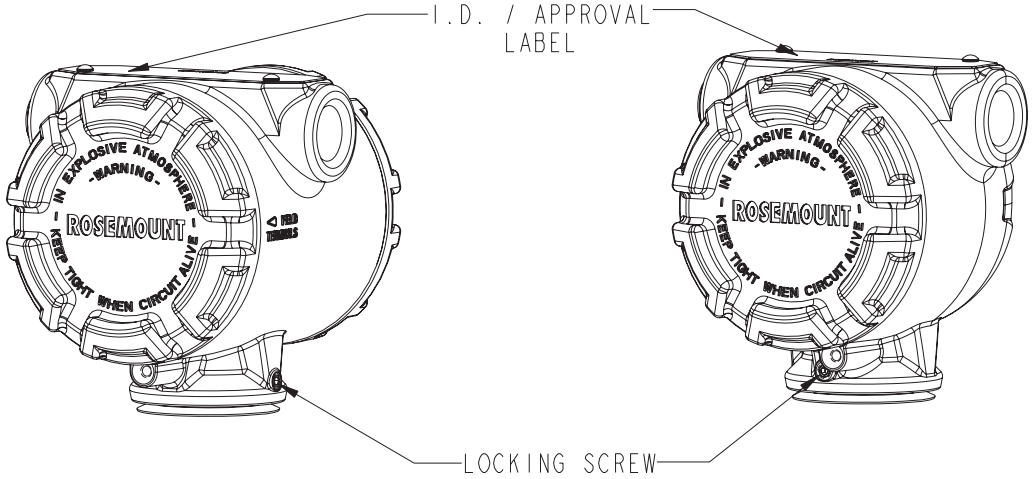
| | | | |
|---|---|---|---|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125 | CONTRACT NO. | EMERSON. Process Management | ROSEMOUNT® 8200 Market Boulevard • Chanhassen, MN 55317 USA |
| -TOLERANCES- .X ± .1 [2,5] .XX ± .02 [0,5] .XXX ± .010 [0,25] FRACTIONS ± 1/32 ANGLES ± 2° | DR. Myles Lee Miller 8/28/00 | TITLE | MODEL 3051 / 300 EXPLOSIONPROOF / FLAMEPROOF INSTALLATION DRAWING, CSA |
| | CHK'D . . | | |
| | APP'D Paul C. Sundet 10/19/00 | SIZE A | FSCM NO. DRAWING NO. 03151-1013 |
| DO NOT SCALE PRINT | APP'D GOVT. | SCALE 1:4 | WT. SHEET 1 OF 3 |

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| ZONE | REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| | AD | | | | |

# COMPONENT IDENTIFICATION

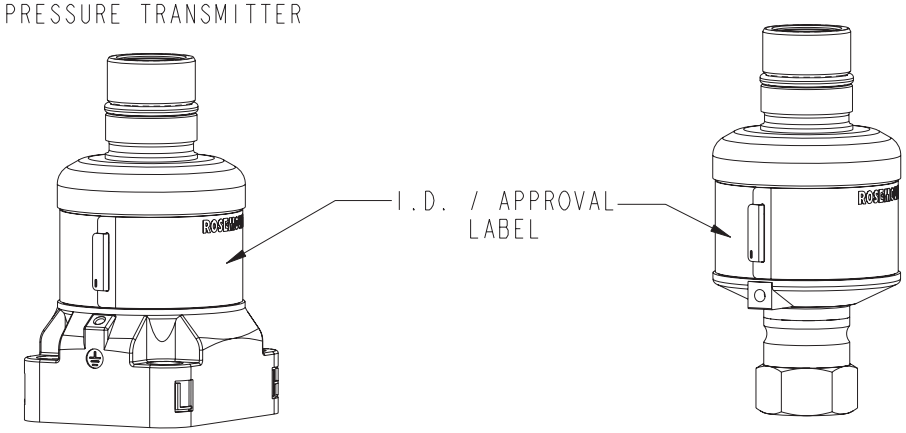
300S1____, PLANTWEB
300S4____, TRADITIONAL
(DUAL COMPARTMENT HOUSING)

300S2____
JUNCTION BOX HOUSING
(SINGLE COMPARTMENT)




305IS_C____
305IS_L____
SCALABLE COPLANAR
PRESSURE TRANSMITTER

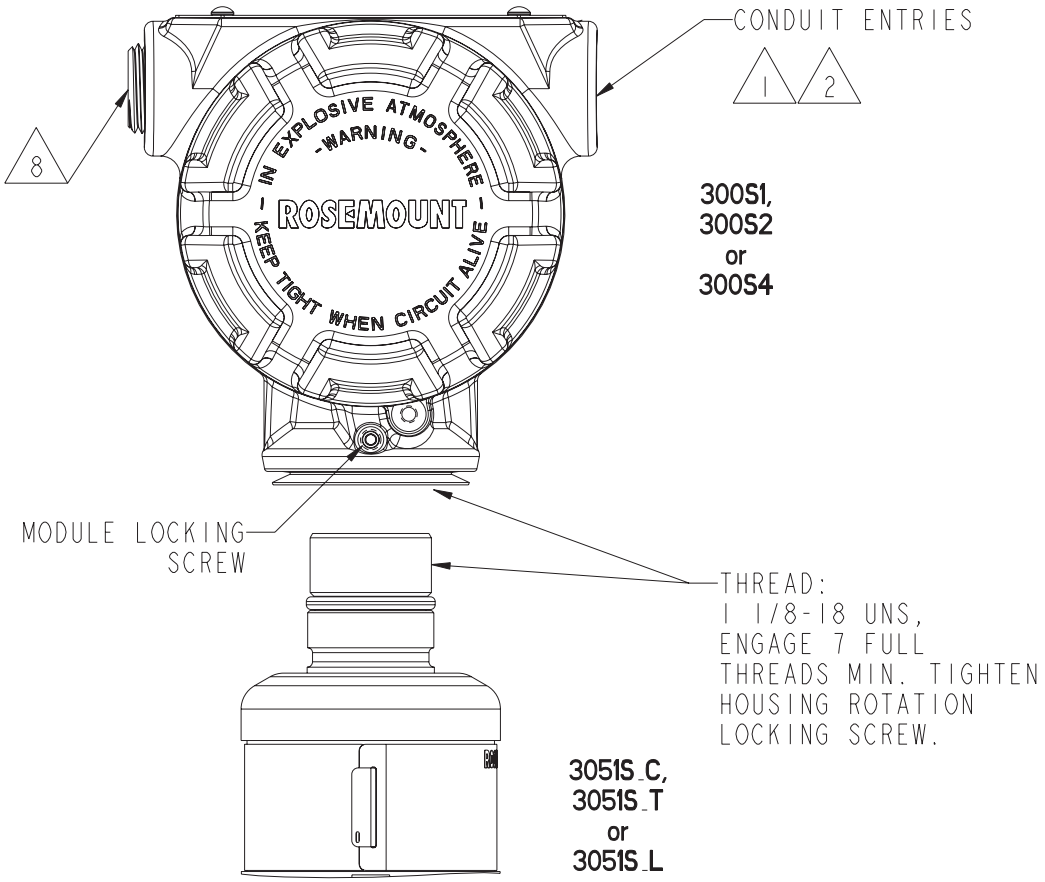
305IS_T____
SCALABLE IN-LINE
PRESSURE TRANSMITTER




| | | | | | |
|---|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | | CAD Maintained, (Pro/E) | |
| DR. *Myles Lee Miller* | 8/28/00 | SIZE A | FSCM NO | DWG NO. 03151-1013 | |
| ISSUED | | SCALE 1:2 | WT. | SHEET 2 OF 3 | |

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| ZONE | REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| | AD | | | | |

## HOUSING TO MODULE ASSEMBLY




| | | | | | |
|---|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | | CAD Maintained, (Pro/E) | |
| DR. *Myles Lee Miller* | 8/28/00 | SIZE A | FSCM NO | DWG NO. 03151-1013 | |
| ISSUED | | SCALE 1:4 | WT. | SHEET 3 OF 3 | |

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

REVISIONS

| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
|---|---|---|---|---|
| AF | CORRECTED $C_1$ for SM | RTC1016190 | S.R.T. | 10/20/03 |
| AG | ADD OUTPUT CODE B (SIS) | RTC1017150 | B.L.H. | 3/17/04 |
| AH | CHG 'IE' to 'IF' ON PG 9 | RTC1019914 | B.L.H. | 7/21/05 |
| AJ | ADD QUICK CONNECT | RTC1020189 | T.S. | 8/31/05 |
| AK | ADD DIAGNOSTICS FEATURE BOARD | RTC1020856 | J.D.V. | 3/23/06 |

APPROVALS FOR

OUTPUT CODES A,B,F,W I.S. ENTITY PARAMETERS SHEETS 2-3
OUTPUT CODES A,B (4-20 mA HART) I.S. SEE SHEETS 4-7
REMOTE METER (4-20 mA HART) I.S. SEE SHEET 6
OUTPUT CODE F/W (FIELDBUS) I.S. SEE SHEET 8
FISCO SEE SHEETS 9-10

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.

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION I.

AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION I.

CAD MAINTAINED (MicroStation)

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125

-TOLERANCE-
.X ± .1 [2,5]
.XX ± .02 [0,5]
.XXX ± .010 [0,25]
FRACTIONS ± 1/32
ANGLES ± 2°

DO NOT SCALE PRINT

CONTRACT NO.

DR. Myles Lee Miller 3/7/01
CHK'D
APP'D. Paul C. Sundet 8/6/01
APP'D. GOVT.

EMERSON. Process Management

ROSEMOUNT®
8200 Market Boulevard • Chanhassen, MN 55317 USA

TITLE INDEX OF I.S. CSA FOR 3051S

SIZE A | FSCM NO | DWG NO. 03151-1016

SCALE N/A | WT. ——— | SHEET 1 OF 10

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AK | | | | |

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) AND MAX. SHORT CIRCUIT CURRENT (Isc) AND MAX. POWER (Voc X Isc/4), FOR THE ASSOCIATED APPARATUS MUST BE LESS THAN OR EQUAL TO THE MAXIMUM SAFE INPUT VOLTAGE (Vmax), MAXIMUM SAFE INPUT CURRENT (Imax), AND MAXIMUM SAFE INPUT POWER (Pmax) OF THE INTRINSICALLY SAFE APPARATUS. IN ADDITION, THE APPROVED MAX. ALLOWABLE CONNECTED CAPACITANCE (Ca) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE CAPACITANCE AND THE UNPROTECTED INTERNAL CAPACITANCE ($C_i$) OF THE INTRINSICALLY SAFE APPARATUS, AND THE APPROVED MAX. ALLOWABLE CONNECTED INDUCTANCE (La) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE INDUCTANCE AND THE UNPROTECTED INTERNAL INDUCTANCE ($L_i$) OF THE INTRINSICALLY SAFE APPARATUS.

FOR OUTPUT CODE A MODEL 3051S
CLASS I, DIV. 1, GROUPS A, B, C AND D

| | |
|---|---|
| $V_{MAX}$ = 30V | $V_{OC}$ IS LESS THAN OR EQUAL TO 30V |
| $I_{MAX}$ = 300mA | $I_{SC}$ IS LESS THAN OR EQUAL TO 300mA |
| $C_i$ = 38nF | $C_A$ IS GREATER THAN 38nF + Ccable |
| $L_i$ = 0 | $L_A$ IS GREATER THAN 0 H + Lcable |

FOR OUTPUT CODE A WITH MODEL 300S JUNCTION BOX, 300S PLANTWEB HOUSING, OR 3051S QUICK CONNECT CLASS I, DIV. 1, GROUPS A, B, C AND D

| | |
|---|---|
| $V_{MAX}$ = 30V | $V_{OC}$ IS LESS THAN OR EQUAL TO 30V |
| $I_{MAX}$ = 300mA | $I_{SC}$ IS LESS THAN OR EQUAL TO 300mA |
| $C_i$ = 11.4nF | $C_A$ IS GREATER THAN 11.4nF + Ccable |
| $L_i$ = 2.4 $\mu$H | $L_A$ IS GREATER THAN 2.4 $\mu$H + Lcable |

FOR OUTPUT CODE A WITH REMOTE METER CONFIGURATION (OPTION CODES M8 or M9)
CLASS I, DIV. 1, GROUPS A, B, C AND D

| | |
|---|---|
| $V_{MAX}$ = 30V | $V_{OC}$ IS LESS THAN OR EQUAL TO 30V |
| $I_{MAX}$ = 300mA | $I_{SC}$ IS LESS THAN OR EQUAL TO 300mA |
| $C_i$ = 0nF | $C_A$ IS GREATER THAN Ccable |
| $L_i$ = 58.2$\mu$H | $L_A$ IS GREATER THAN 58.2$\mu$H + Lcable |

FOR OUTPUT CODE A WITH HART DIAGNOSTICS SUITE AND MODEL 300S PLANTWEB HOUSING
CLASS I, DIV. 1, GROUPS A, B, C AND D

| | |
|---|---|
| $V_{MAX}$ = 30V | $V_{OC}$ IS LESS THAN OR EQUAL TO 30V |
| $I_{MAX}$ = 300mA | $I_{SC}$ IS LESS THAN OR EQUAL TO 300mA |
| $C_i$ = 11.4nF | $C_A$ IS GREATER THAN 11.4nF + Ccable |
| $L_i$ = 0 | $L_A$ IS GREATER THAN 0 H + Lcable |

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

| | | | |
|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03151-1016 |
| ISSUED | SCALE N/A | WT. ——— | SHEET 2 OF 10 |

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AK | | | | |

FOR OUTPUT CODE B (SAFETY CERTIFIED SIS) WITH MODEL 300S PLANTWEB HOUSING
CLASS I, DIV. 1, GROUPS A, B, C AND D

| | |
|---|---|
| $V_{MAX}$ = 30V | $V_{OC}$ IS LESS THAN OR EQUAL TO 30V |
| $I_{MAX}$ = 300mA | $I_{SC}$ IS LESS THAN OR EQUAL TO 300mA |
| $C_1$ = 11.4nF | $C_A$ IS GREATER THAN 11.4nF + Ccable |
| $L_1$ = 570$\mu$H | $L_A$ IS GREATER THAN 570$\mu$H + Lcable |

FOR OUTPUT CODE F or W WITH MODEL 300S PLANTWEB HOUSING
CLASS I, DIV. 1, GROUPS A, B, C AND D

| | |
|---|---|
| $V_{MAX}$ = 30V | $V_{OC}$ IS LESS THAN OR EQUAL TO 30V |
| $I_{MAX}$ = 300mA | $I_{SC}$ IS LESS THAN OR EQUAL TO 300mA |
| $C_I$ = 0$\mu$f | $C_A$ IS GREATER THAN 0$\mu$f + Ccable |
| $L_I$ = 0$\mu$H | $L_A$ IS GREATER THAN 0$\mu$H + Lcable |

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

| | | | |
|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03151-1016 |
| ISSUED | SCALE N/A | WT. ——— | SHEET 3 OF 10 |

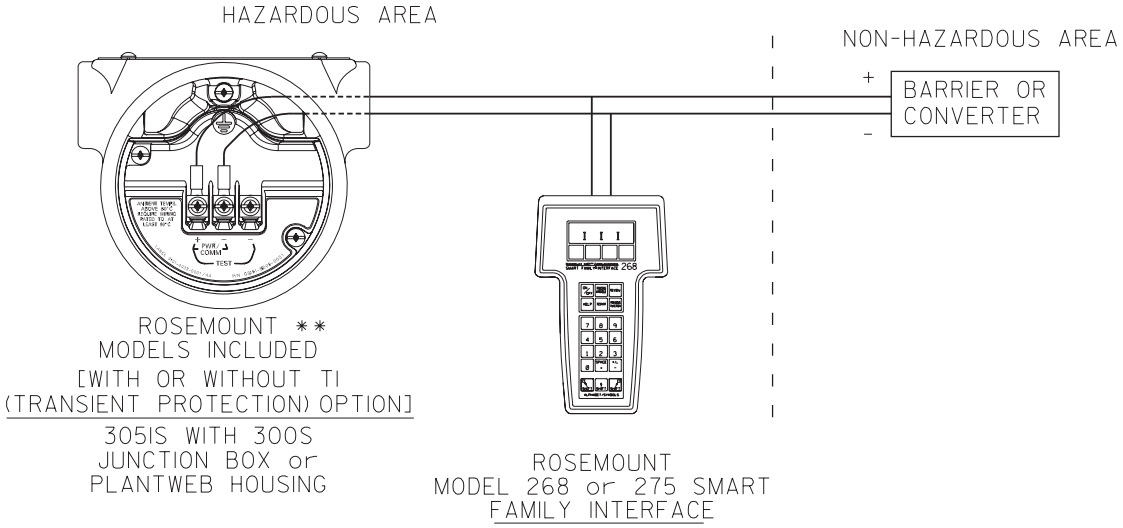
| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AK | | | | |

# CSA INTRINSIC SAFETY APPROVALS

CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE
4-20 mA, ("A" or "B" OUTPUT CODE)




** FOR FIELDBUS OPTIONS("F" or "W" OUTPUT CODE),
SEE PAGE 6 FOR PARAMETERS AND CIRCIUT CONNECTION TO BARRIER.

| | | | | |
|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) | |
| DR. Myles Lee Miller 3/7/001 | SIZE A | FSCM NO | DWG NO. | 03151-1016 |
| ISSUED | SCALE N/A | WT. | SHEET 4 OF 10 | |

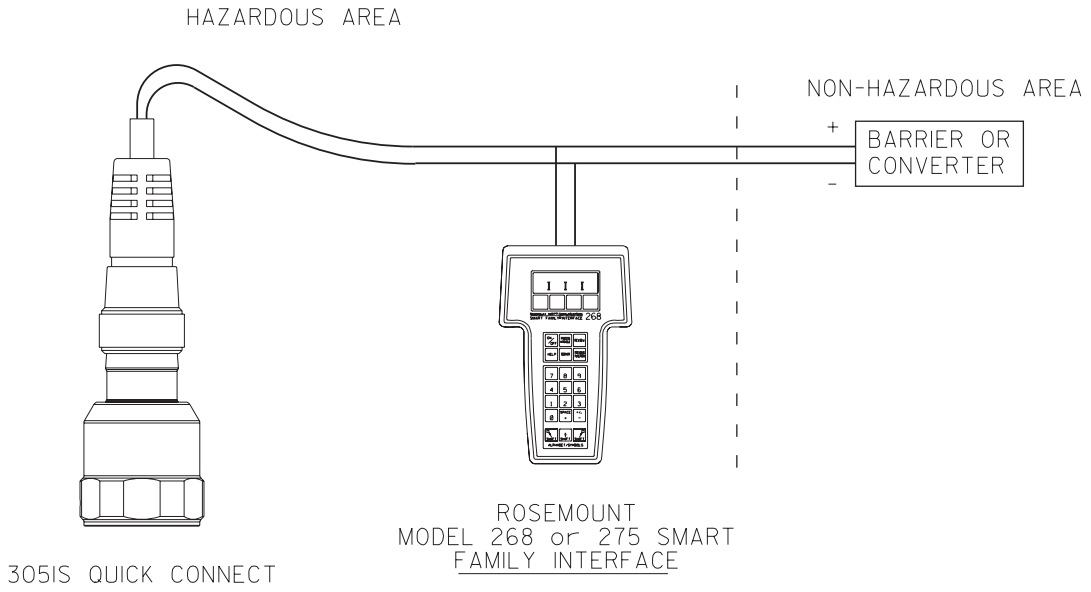
| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AK | | | | |

# CSA INTRINSIC SAFETY APPROVALS

CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE
4-20 mA, ("A" OUTPUT CODE)




| | | | |
|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) |
| DR. Myles Lee Miller 8/17/05 | SIZE A | FSCM NO | DWG NO. 03151-1016 |
| ISSUED | SCALE N/A | WT. | SHEET 5 OF 10 |

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AK | | | | |

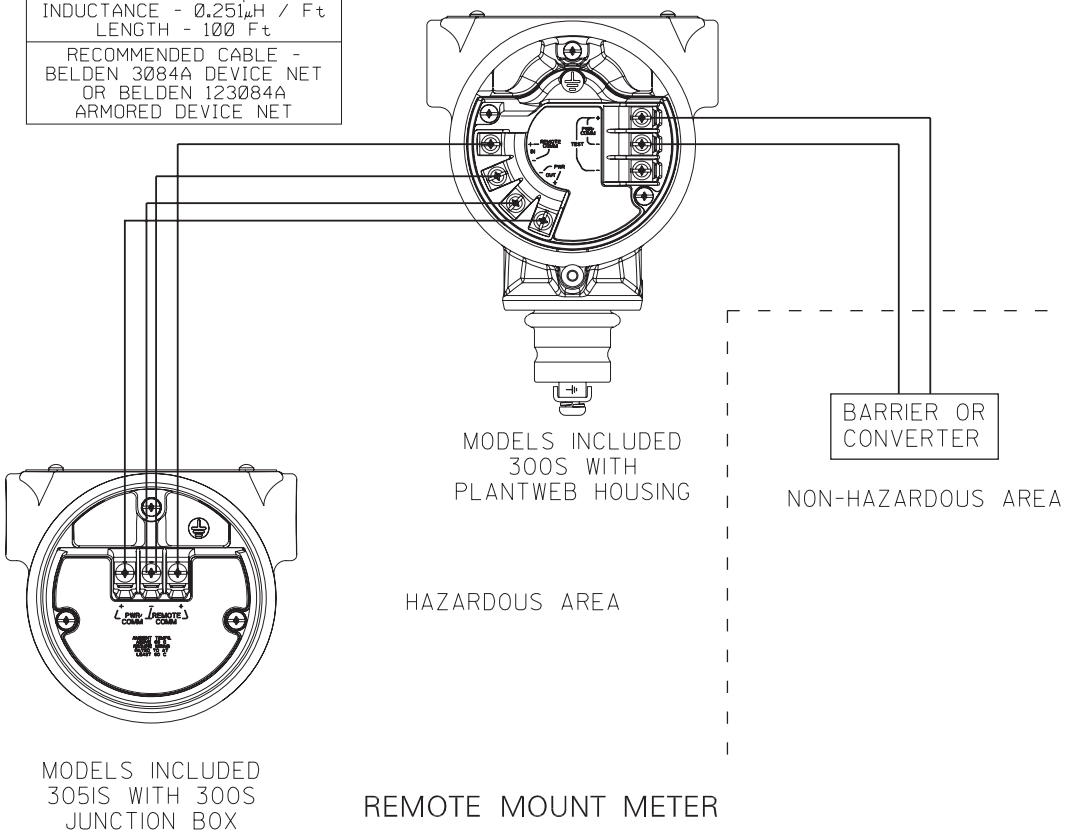
# CSA INTRINSIC SAFETY APPROVALS

CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE
4-20 mA, ("A" OUTPUT CODE)

| MAXIMUM CABLE PARAMETERS |
|---|
| CAPACITANCE - 50 pf / Ft<br>INDUCTANCE - 0.251μH / Ft<br>LENGTH - 100 Ft |
| RECOMMENDED CABLE -<br>BELDEN 3084A DEVICE NET<br>OR BELDEN 123084A<br>ARMORED DEVICE NET |




REMOTE MOUNT METER

| | | | | |
|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) | |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03151-1016 | |
| ISSUED | SCALE N/A | WT. ——— | SHEET 6 OF 10 | |

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AK | | | | |

4-20 mA, ("A" or "B" OUTPUT CODE)

| DEVICE | PARAMETERS | APPROVED FOR CLASS I, DIV.I |
|---|---|---|
| CSA APPROVED SAFETY BARRIER | 30 V OR LESS<br>*330 OHMS OR MORE<br>* 28 V OR LESS<br>300 OHMS OR MORE<br>25 V OR LESS<br>200 OHMS OR MORE<br>* 22 V OR LESS<br>180 OHMS OR MORE | GROUPS A, B, C, D |
| FOXBORO CONVERTER<br>2AI-I2V-CGB, 2AI-I3V-CGB,<br>2AS-I3I-CGB, 3A2-I2D-CGB,<br>3A2-I3D-CGB, 3AD-I3I-CGB,<br>3A4-I2D-CGB, 2AS-I2I-CGB,<br>3F4-I2DA | | GROUPS B, C, D |
| CSA APPROVED SAFETY BARRIER | 30 V OR LESS<br>150 OHMS OR MORE | GROUPS C, D |

| | | | | |
|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) | |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03151-1016 | |
| ISSUED | SCALE N/A | WT. ——— | SHEET 7 OF 10 | |

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AK | | | | |

## FIELDBUS, ("F" or "W" OUTPUT CODE)

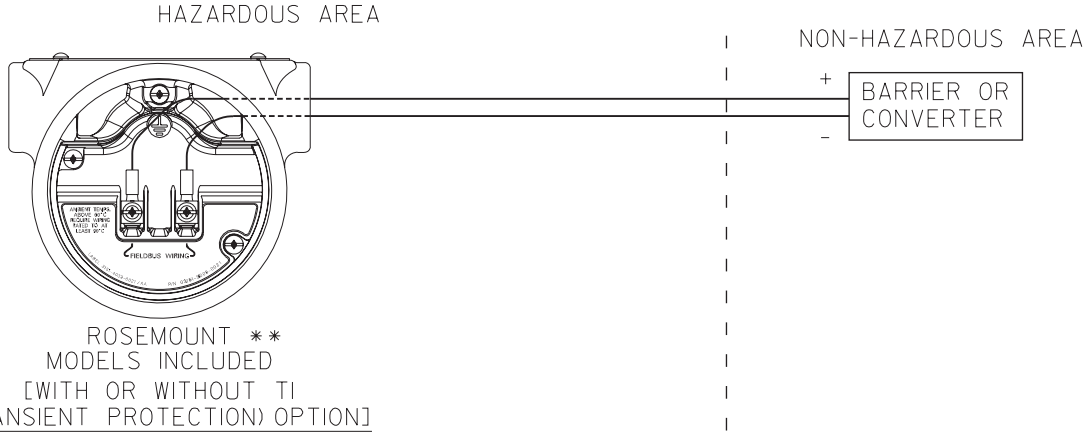
| DEVICE | PARAMETERS | APPROVED FOR CLASS I, DIV.I |
|---|---|---|
| CSA APPROVED SAFETY BARRIER | 30 V OR LESS<br>300 OHMS OR MORE<br>28 V OR LESS<br>235 OHMS OR MORE<br>25 V OR LESS<br>160 OHMS OR MORE<br>22 V OR LESS<br>100 OHMS OR MORE | GROUPS A, B, C, D |

## CSA INTRINSIC SAFETY APPROVALS

CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE
FIELDBUS, ("F" or "W" OUTPUT CODE)




ROSEMOUNT **
MODELS INCLUDED
[WITH OR WITHOUT TI
(TRANSIENT PROTECTION) OPTION]
3051S WITH 300S
PLANTWEB HOUSING

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION I.

AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION I.

| | | | | |
|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) | |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03151-1016 | |
| ISSUED | SCALE N/A | WT. ——— | SHEET 8 OF 10 | |

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AK | | | | |

## FISCO CONCEPT

THE FISCO CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIALLY EXAMINED IN SUCH COMBINATION. THE CRITERIA FOR INTERCONNECTION IS THAT THE VOLTAGE (Vmax), THE CURRENT (Imax), AND THE POWER (Pmax) WHICH AN INTRINSICALLY SAFE APPARATUS CAN RECEIVE AND REMAIN INTRINSICALLY SAFE CONSIDERING FAULTS, MUST BE EQUAL OR GREATER THAN VOLTAGE (Voc), AND CURRENT (Isc) WHICH CAN BE DELIVERED BY THE ASSOCIATED APPARATUS, CONSIDERING FAULTS AND APPLICABLE FACTORS.
IN ADDITION, THE MAXIMUM UNPROTECTED CAPACITANCE ($C_i$) AND THE INDUCTANCE ($L_i$) OF EACH APPARATUS (OTHER THAN THE TERMINATION) CONNECTED TO THE FIELDBUS MUST BE LESS THAN OR EQUAL TO 5 nF AND 10 µH RESPECTIVELY.

IN EACH SEGMENT ONLY ONE ACTIVE DEVICE, NORMALLY THE ASSOCIATED APPARATUS, IS ALLOWED TO PROVIDE THE NECESSARY ENERGY FOR THE FIELDBUS SYSTEM. THE VOLTAGE (Voc) OF THE ASSOCIATED APPARATUS IS LIMITED TO A RANGE OF 14V TO 24Vd.c. ALL OTHER EQUIPMENT CONNECTED TO THE BUS CABLE HAS TO BE PASSIVE, MEANING THAT THEY ARE NOT ALLOWED TO PROVIDE ENERGY TO THE SYSTEM, EXCEPT A LEAKAGE CURRENT OF 50uA FOR EACH CONNECTED DEVICE. SEPARATELY POWERED EQUIPMENT NEEDS GALVANIC ISOLATION TO ASSURE THAT THE INTRINSICALLY SAFE FIELDBUS CIRCUIT REMAINS PASSIVE.
THE CABLE USED TO INTERCONNECT DEVICES NEEDS TO HAVE THE PARAMETERS IN THE FOLLOWING RANGE:

| | |
|---|---|
| Loop Resistance R': | 15.....150 Ohm/km |
| Inductance per unit length L': | 0.4.....1 mH/km |
| Capacitance per unit length C': | 80.....200 nF |

C' = C' line/line + 0.5C' line/screen, if both lines are floating, or
C' = C' line/line + C' line/screen, if the screen is connected to one line

| | |
|---|---|
| Length of trunk cable: | less than or equal to 1000m |
| Length of spur cable: | less than or equal to 30m |
| Length of spur splice: | less than or equal to 1m |

AT EACH END OF THE TRUNK CABLE AN APPROVED INFALLIBLE LINE TERMINATION WITH THE FOLLOWING PARAMETERS IS SUITABLE:

R = 90.....100Ohm  C = 0.....2.2uF

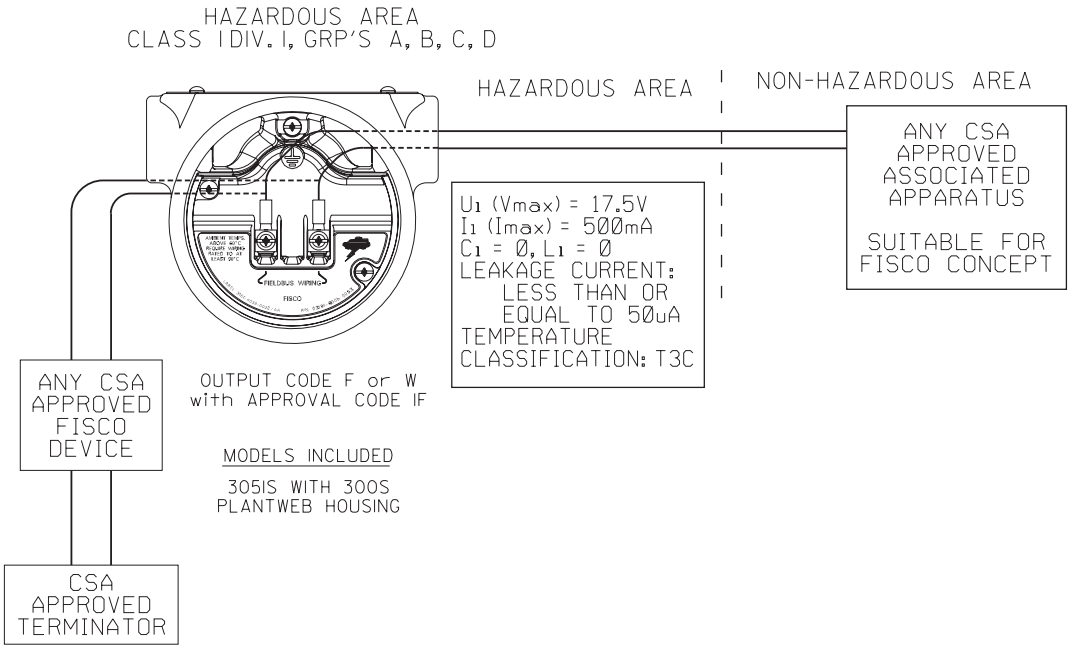
ONE OF THE ALLOWED TERMINATIONS MIGHT ALREADY BE INTEGRATED IN THE ASSOCIATED APPARATUS. THE NUMBER OF PASSIVE APPARATUS CONNECTED TO THE BUS SEGMENT IS NOT LIMITED DUE TO I. S. REASONS. IF THE ABOVE RULES ARE RESPECTED, UP TO A TOTAL LENGTH OF 1000 m (SUM OF TRUNK AND ALL SPUR CABLES) OF CABLE IS PERMITED.
THE INDUCTANCE AND THE CAPACITANCE OF THE CABLE WILL NOT IMPAIR THE INTRINSIC SAFETY OF THE INSTALLATION.

| | | | |
|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. 03151-1016 |
| ISSUED | SCALE N/A | WT. ——— | SHEET 9 OF 10 |

| REVISIONS | | | | |
|---|---|---|---|---|
| REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| AK | | | | |

NOTES:

1. APPROVED ASSOCIATED APPARATUS MUST BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. CSA APPROVED ASSOCIATED APPARATUS MUST MEET THE FOLLOWING PARAMETERS: Voc LESS THAN OR EQUAL TO (Vmax AND Isc LESS THAN OR EQUAL TO (Imax).
3. THE MAXIMUM NON-HAZARDOUS AREA VOLTAGE MUST NOT EXCEED 250V.
4. THE INSTALLATION MUST BE IN ACCORDANCE WITH CANADIAN ELECTRICAL
5. CAUTION: USE ONLY SUPPLY WIRES SUITABLE FOR 5°C ABOVE SURROUNDING TEMPERATURE.
6. WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.




| | | | | |
|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | CAD MAINTAINED (MicroStation) | |
| DR. Myles Lee Miller | SIZE A | FSCM NO | DWG NO. Ø3151-1Ø16 | |
| ISSUED | SCALE N/A | WT. ——— | SHEET 1Ø OF 1Ø | |

## KEMA

| CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY. | REVISIONS | | | | | |
|---|---|---|---|---|---|---|
| | ZONE | REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| | | AA | NEW RELEASE | RTC1009618 | P.C.S. | 9/11/00 |
| | | AB | ADD 3051SL AND TRADITIONAL HOUSING | RTC1015145 | B.L.H. | 4/7/03 |

NOTES:

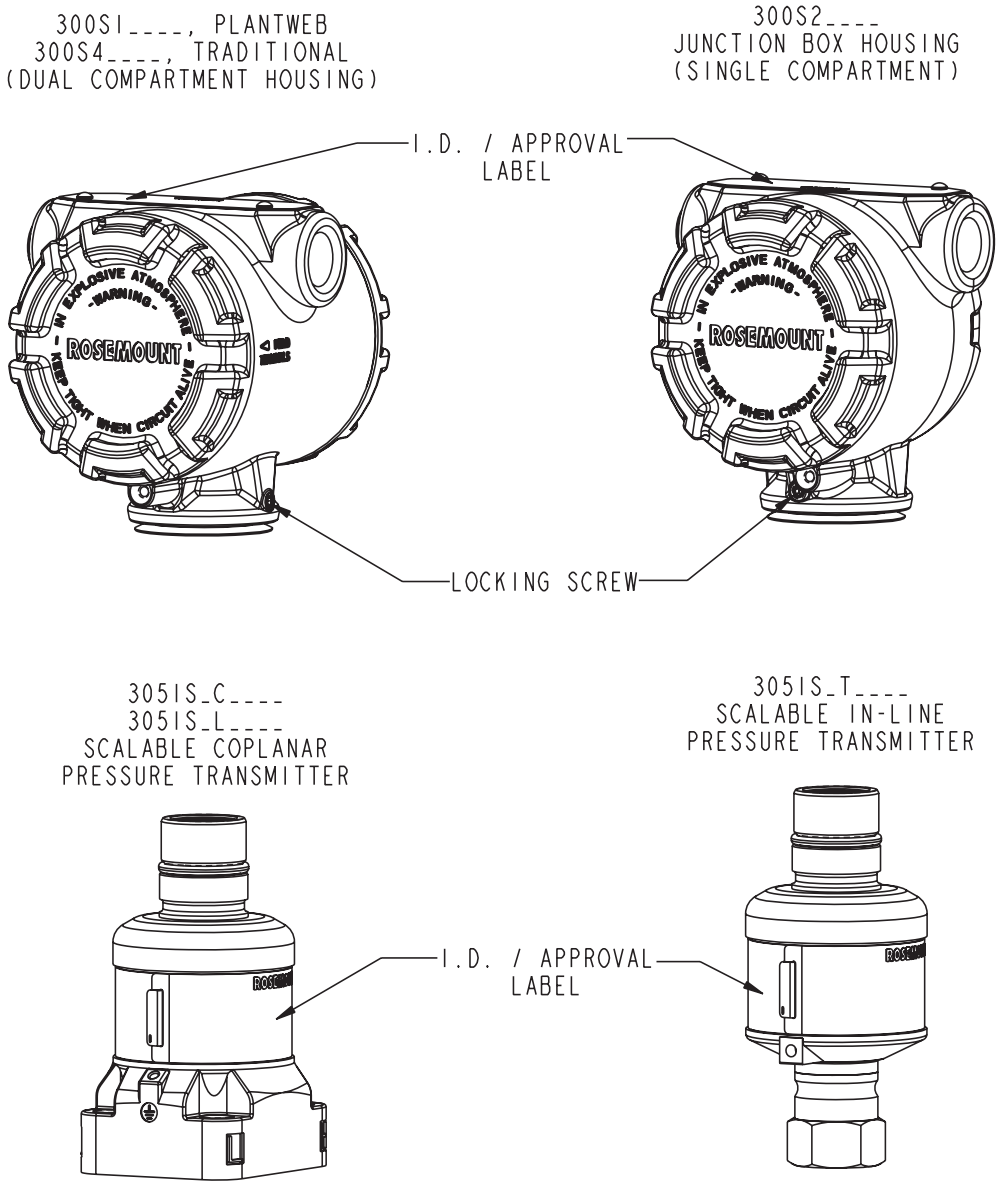
1. WIRING METHOD SUITABLE FOR CATEGORY 2, (ZONE 1) WITH ANY LENGTH.
2. TRANSMITTER MUST NOT BE CONNECTED TO EQUIPMENT GENERATING MORE THAN 250 VAC.
3. ALL CONDUIT THREADS TO BE ASSEMBLED WITH FIVE FULL THREADS MINIMUM.
4. COMPONENTS REQUIRED TO BE APPROVED MUST BE APPROVED FOR GAS GROUP APPROPRIATE TO AREA CLASSIFICATION.
5. 3051SC,3051ST OR 3051SL SENSOR MODULE MUST BE INSTALLED WITH CENELEC FLAMEPROOF APPROVED 300S1, 300S2 OR 300S4 HOUSING ATTACHED TO MEET FLAMEPROOF INSTALLATION REQUIREMENTS.
6. INSTALLATION TO BE IN ACCORDANCE WITH APPLICABLE LOCAL REQUIREMENTS.
7. 300S1, 300S2 OR 300S4 HOUSING MUST BE INSTALLED WITH CENELEC FLAMEPROOF APPROVED 3051SC, 3051ST OR 3051SL SENSOR MODULE ATTACHED TO MEET FLAMEPROOF INSTALLATION REQUIREMENTS.
8. UNUSED CONDUIT ENTRY MUST BE CLOSED WITH A CENELEC FLAMEPROOF APPROVED BLANKING ELEMENT.

CAD Maintained, (Pro/E)

| UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125 | CONTRACT NO. | | EMERSON. Process Management — ROSEMOUNT® 8200 Market Boulevard • Chanhassen, MN 55317 USA | |
|---|---|---|---|---|
| -TOLERANCES- .X ± .1 [2,5] .XX ± .02 [0,5] .XXX ± .010 [0,25] FRACTIONS ± 1/32 ANGLES ± 2° | DR. Myles Lee Miller | 8/28/00 | TITLE | MODEL 3051 / 300 FLAMEPROOF INSTALLATION DRAWING, KEMA |
| | CHK'D . | . | | |
| | APP'D Paul C. Sundet | 9/11/00 | | |
| | APP'D GOVT. | | SIZE A / FSCM NO. / DRAWING NO. | 03151-1023 |
| DO NOT SCALE PRINT | | | SCALE 1:4 / WT. / SHEET 1 OF 3 | |

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| ZONE | REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| | AB | | | | |

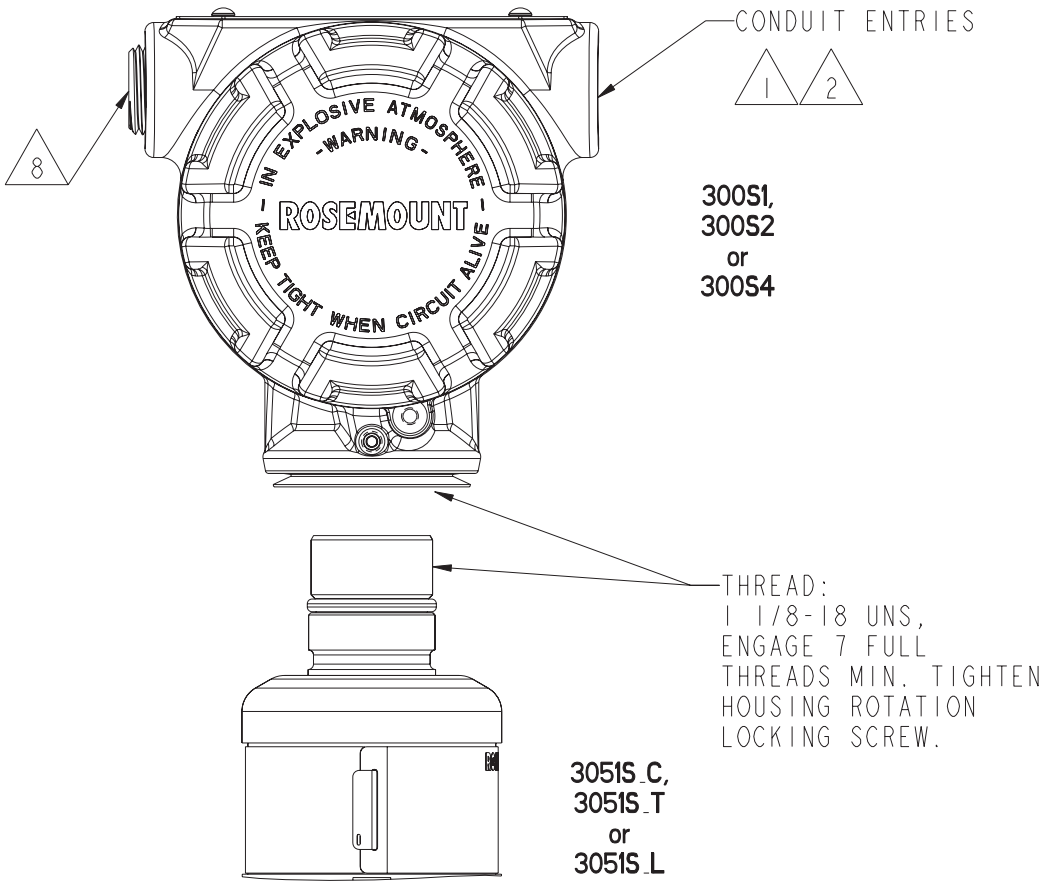
# COMPONENT IDENTIFICATION




| | | | | | |
|---|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | | CAD Maintained, (Pro/E) | |
| DR. *Myles Lee Miller* | 8/28/00 | SIZE A | FSCM NO | DWG NO. 03151-1023 | |
| ISSUED | | SCALE 1:2 | WT. | SHEET 2 OF 3 | |

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| ZONE | REV | DESCRIPTION | CHG. NO. | APP'D | DATE |
| | AB | | | | |

## HOUSING TO MODULE ASSEMBLY

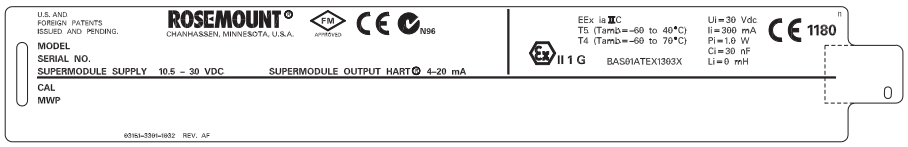



| | | | | | |
|---|---|---|---|---|---|
| Rosemount Inc.<br>8200 Market Boulevard<br>Chanhassen, MN 55317 USA | | | | CAD Maintained, (Pro/E) | |
| DR. *Myles Lee Miller* | 8/28/00 | SIZE A | FSCM NO | DWG NO. 03151-1023 | |
| ISSUED | | SCALE 1:4 | WT. | SHEET 3 OF 3 | |

## EUROPEAN ATEX DIRECTIVE INFORMATION

### CENELEC/BASEEFA

Rosemount 3051S pressure 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.




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

Name and address of the manufacturer (any of the following):

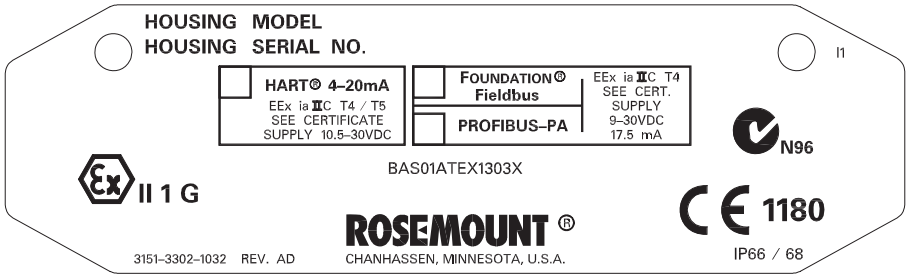
- Rosemount USA
- Rosemount Germany
- Rosemount Singapore

**CE 1180**

- Complete model number
- The serial number of the device
- Year of construction
- Marking for explosion protection:
  EEx ia IIC T5 ($T_{amb}$ = -60 to 40 °C)
  EEx ia IIC T4 ($T_{amb}$ = -60 to 70 °C)
  Ui = 30 V dc, $I_i$ = 300 mA, $P_i$ = 1.0 W, $C_i$ = 30 nF, Li = 0 mH
  BASEEFA ATEX certificate number: BAS01ATEX1303X

**II 1G**

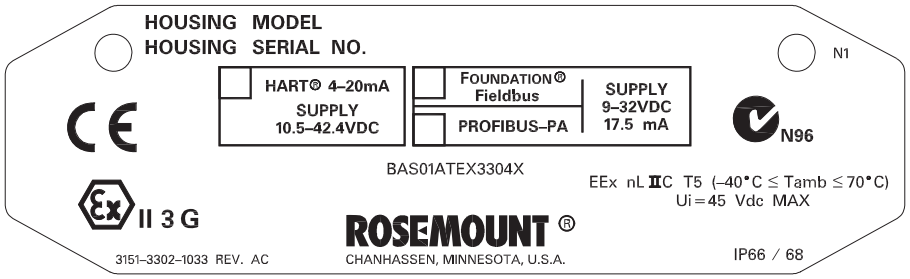
**Intrinsic Safety housing label**




- Marking for explosion protection:
  EEx ia IIC T5 (See Certificate)
  EEx ia IIC T4 (See Certificate)
  BASEEFA ATEX certificate number: BAS01ATEX1303X

**II 1G**

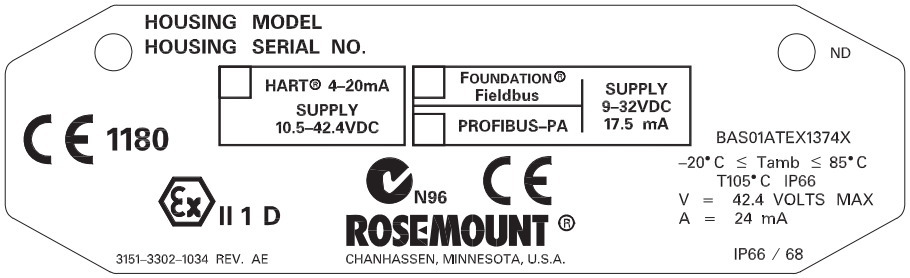
**Type n housing label**




- Marking for explosion protection:
  EEx nL IIC T5 (-40 °C ≤ $T_{amb}$ ≤ 70 °C)
  Ui = 45 Vdc MAX
  BASEEFA ATEX certificate number: BAS01ATEX3304X

**II 3 G**

**Dust housing label**

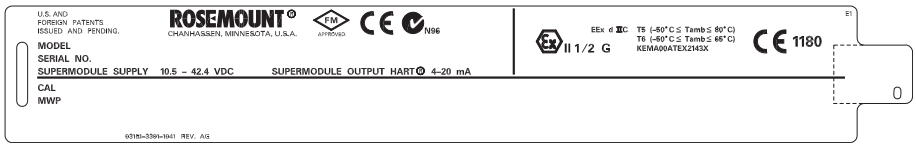



- Marking for explosion protection:
  -20 °C ≤ $T_{amb}$ ≤ 85 °C
  T105°C
  IP66
  V = 42.4 VOLTS MAX
  A = 24 mA
  BASEEFA ATEX certificate number: BAS01ATEX1374X

**II 1 D**

## CENELEC/KEMA Flameproof

The Rosemount 3051S and 300S pressure 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.




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

Name and address of the manufacturer (any of the following):

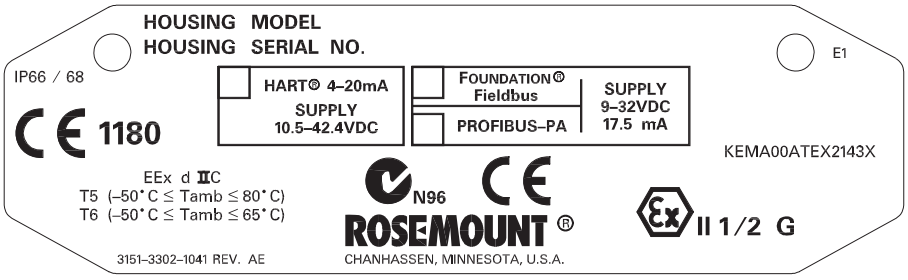
- Rosemount USA
- Rosemount Germany
- Rosemount Singapore

CE 1180

- Complete model number
- The serial number of the device
- Year of construction
- Marking for explosion protection:
  EEx d IIC T6 ($T_{amb}$ = –50 to 65 °C)
  EEx d IIC T5 ($T_{amb}$ = –50 to 80 °C)
  ATEX certificate number: KEMA00ATEX2143X

II 1/2 G

**Housing Label**




- Marking for explosion protection:
  EEx d IIC T6 ($T_{amb}$ = –50 to 65 °C)
  EEx d IIC T5 ($T_{amb}$ = –50 to 80 °C)
  ATEX certificate number: KEMA00ATEX2143X

II 1/2 G

# Index

**Reference Manual**
00809-0100-4801, Rev CB
January 2007

# Rosemount 3051S Series



*Cover Photo: Cosmos/HighRes/305/0305h0061*

**Emerson Process Management**

**Rosemount Inc.**
8200 Market Boulevard
Chanhassen, MN 55317 USA
T (U.S.) 1 800 999 9307
T (International) (952) 906 8888
F (952) 949 7001
www.rosemount.com

**Emerson Process Management GmbH & Co.**
Argelsrieder Feld 3
82234 Wessling
Germany
Tel 49 (8153) 9390
Fax 49 (8153) 939172

**Emerson Process Management Asia Pacific Private Limited**
1 Pandan Crescent
Singapore 128461
T (65) 6777 8211
F (65) 6777 0947
Enquiries@AP.EmersonProcess.com

**Beijing Rosemount Far East Instrument Co., Limited**
No. 6 North Street,
Hepingli, Dong Cheng District
Beijing 100013, China
T (86) (10) 6428 2233
F (86) (10) 6422 8586



EMERSON™
Process Management