Reference Manual
00809-0100-4801, Rev GA
September 2017

Rosemount™ 3051S Series Scalable™ Pressure, Flow, and Level Solution

with HART® Protocol

HART COMMUNICATION PROTOCOL

EMERSON™

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

⚠ 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 Emerson™ Sales Representative.

⚠ WARNING

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- 65 777 211

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 Emerson representative.

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 the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.

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.

⚠ WARNING

Replacement equipment or spare parts not approved by Emerson 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 Emerson 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.

SuperModule and electronics housing must have equivalent approval labeling in order to maintain hazardous location approvals.

- When upgrading, verify SuperModule and electronics housing certifications are equivalent. Differences in temperature class ratings may exist, in which case the complete assembly takes the lowest of the individual component temperature classes (for example, a T4/T5 rated electronics housing assembled to a T4 rated SuperModule is a T4 rated transmitter.)

Severe changes in the electrical loop may inhibit HART® Communication or the ability to reach alarm values. Therefore, Rosemount cannot absolutely warrant or guarantee that the correct Failure Alarm level (HIGH or LOW) can be read by the host system at the time of annunciation.

Section 1 Introduction

1.1 Using this manual

The sections in this manual provide information on installing, operating, and maintaining the Rosemount™ 3051S Pressure Transmitter with HART® Protocol. The sections are organized as follows:

- Section 1: Introduction provides an introduction to the pressure transmitter, how to use the manual, models covered by this manual, and other support information for the transmitter.
- Section 2: Configuration provides instruction on commissioning and operating Rosemount 3051S transmitters from a bench computer or a hand held field device. Information on software functions, configuration parameters, and on line variables are also included.
- Section 3: Installation contains instructions for mounting the transmitter, connecting it to the process, and wiring the transmitter.
- Section 4: Operation and Maintenance contains techniques to maintain the transmitter, and disassembly/assembly directions.
- Section 5: Troubleshooting provides troubleshooting techniques for the most common operating issues.
- Section 6: Safety Instrumented Systems contains identification, commissioning, maintenance, and operations information for the Rosemount 3051S SIS Safety Transmitter.
- Section 7: Advanced HART® Diagnostic Suite contains procedures for installation, configuration, and operation of the Rosemount 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 transmitter with FOUNDATION™ Fieldbus, see Rosemount 3051S Reference Manual.

1.2 Models covered

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

The Rosemount 3051S provides a wide range of applications, and many of these different applications have their own reference manuals. This manual covers the Rosemount 3051S HART, Advanced Diagnostics, and Safety Instrumented Systems (SIS). There are four other Rosemount 3051S Reference Manuals that cover the Rosemount 3051S FOUNDATION Fieldbus, 3051S Wireless, 3051S Electronic Remote Sensor (ERS™) System, and the 3051S MultiVariable™.

Rosemount 3051S Coplanar™ Pressure Transmitter

Performance class	Measurement type		
	Differential	Gage	Absolute
Ultra	X	X	X
Ultra for Flow	X	N/A	N/A
Classic	X	X	X

Rosemount 3051S In-Line Pressure Transmitter

Performance class	Measurement type		
	Differential	Gage	Absolute
Ultra	N/A	X	X
Classic	N/A	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	N/A	N/A
Classic	X	X	X

Rosemount 300S Scalable Housing Kits

Kits are available for all models of Rosemount 3051S Pressure Transmitters.

1.3 Product recycling/disposal

Recycling of equipment and packaging should be taken into consideration and disposed of in accordance with local and national legislation/regulations.

Section 2 Configuration

2.1 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 Field Communicator version 3.3 and AMS Device Manager version 7.0. For convenience, Field Communicator Fast Key sequences are labeled "Fast Keys" for each software function below the appropriate headings.

2.1.1 Example software function

Traditional Fast Keys apply to Device Driver Revision 8 and older. The Device Dashboard Fast Keys apply to Device Driver Revision 9 or newer.

Traditional Fast Keys	1, 2, 3, etc.
Device Dashboard Fast Keys	1, 2, 3, etc.

2.2 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.

⚠ 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.

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.

2.3 Commissioning on the bench

Commissioning consists of testing the transmitter and verifying transmitter configuration data. Rosemount™ 3051S Pressure Transmitters can be commissioned either before or after installation. Commissioning the transmitter on the bench before installation using a Field Communicator or AMS Device Manager ensures all transmitter components are in working order.

⚠ Equipment required to commission on the bench includes a power supply, a milliamp meter, and a Field Communicator or AMS Device Manager. Wire the equipment as shown in Figure 2-1 and Figure 2-2. 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 Field Communicator loop connection and the power supply. Connect the Field Communicator leads to the terminals labeled “PWR/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 alarm and security switch” on page 56.

When using a Field Communicator, any configuration changes made must be sent to the transmitter by using the **Send** key. AMS Device Manager configuration changes are implemented when the **Apply** button is selected.

2.3.1 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 Field Communicator or AMS Device Manager 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.

2.3.2 Wiring diagrams

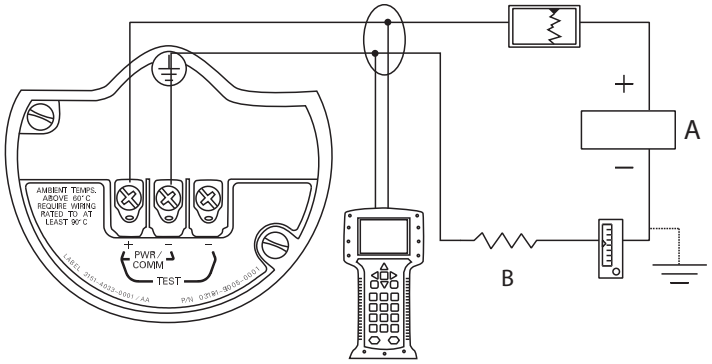
Bench hook-up

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

Field hook-up

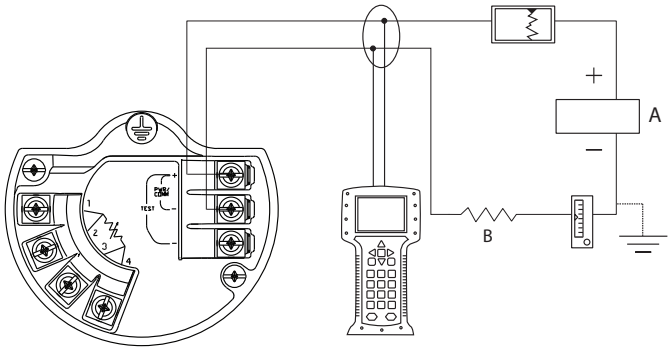
Figures 2-1 and 2-2 illustrate wiring loops for a field hook-up with a Field Communicator or AMS Device Manager. The Field Communicator or AMS Device Manager may be connected at "PWR/COMM" on the transmitter terminal block, across the load resistor, or at any termination point in the signal loop. Signal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

Figure 2-1. Plantweb™ Wiring (4–20 mA)



A. Power supply
B. RL ≥ 250 Ω

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



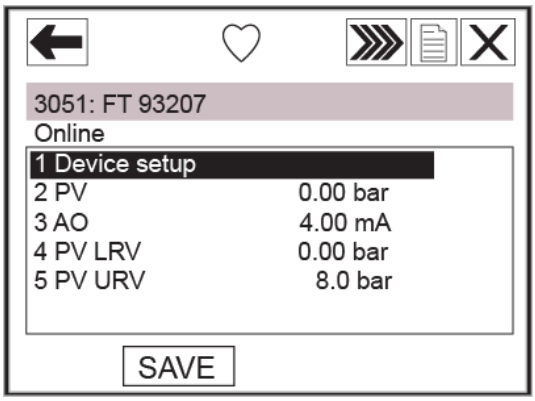
A. Power supply
B. RL ≥ 250 Ω

2.4 Field Communicator

For convenience, Field Communicator Fast Key sequences are labeled “Fast Keys” for each software function below the appropriate headings. Traditional Fast Keys apply to Device Driver Revision 8 and older. The Device Dashboard Fast Keys apply to Device Driver Revision 9 or newer.

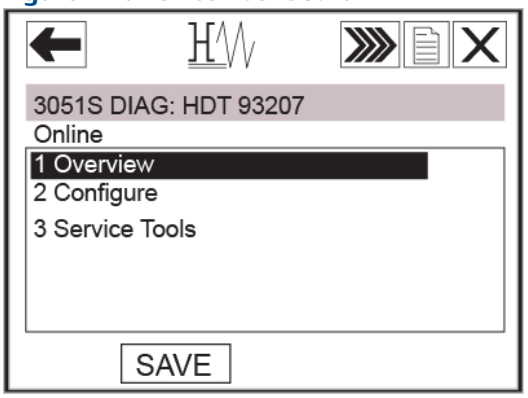
2.4.1 Field Communicator user interface

Figure 2-3. Traditional Interface



Note
The corresponding menu tree can be viewed on page 13.
The Fast Key sequence can be viewed on page 14.

Figure 2-4. Device Dashboard



Note
The corresponding menu tree can be viewed on page 14.
The Fast Key sequence can be viewed on page 18.

2.5 Field Communicator menu trees

Figure 2-5. Overview

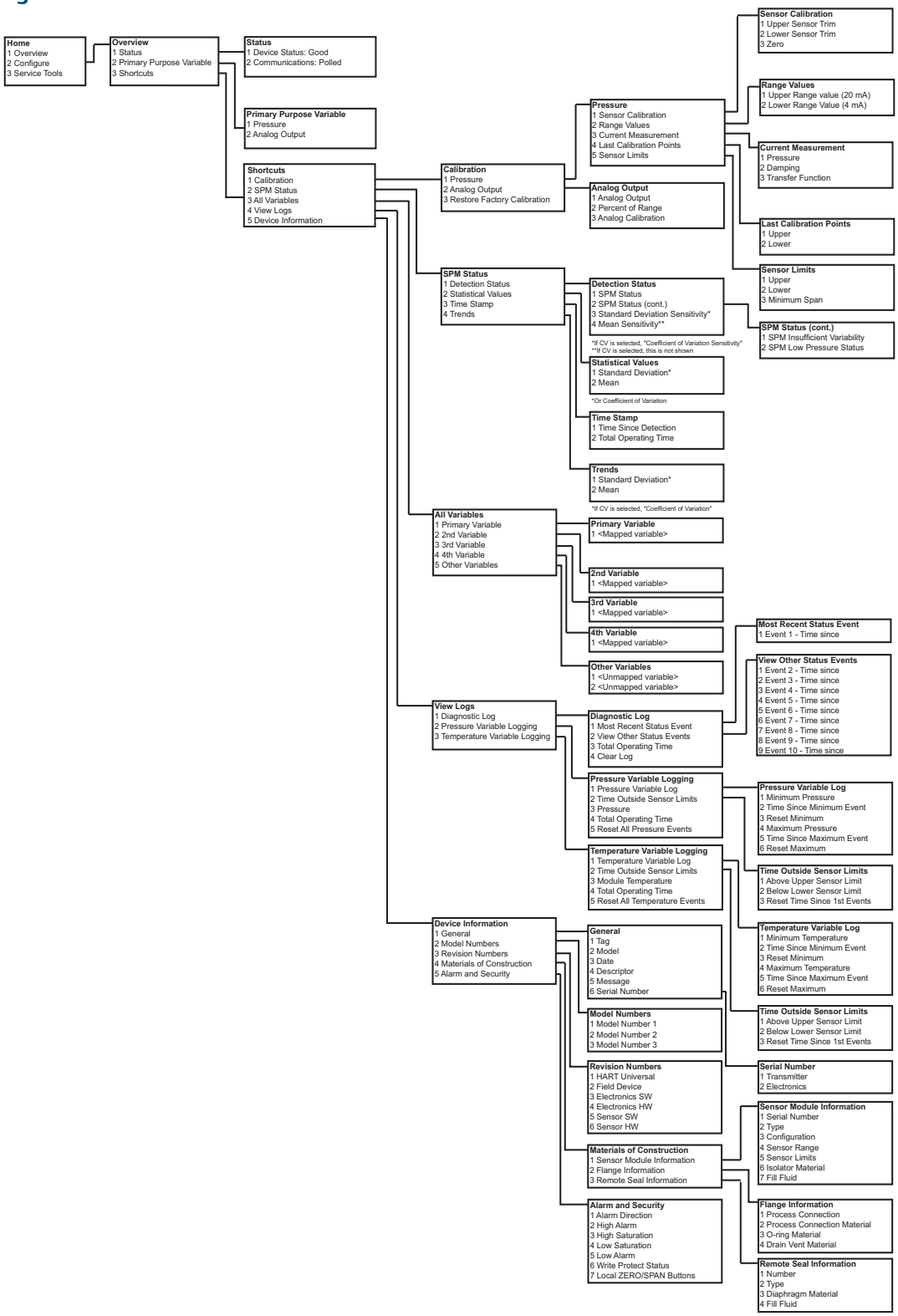


Figure 2-6. Configure (Guided Setup and Manual Setup)

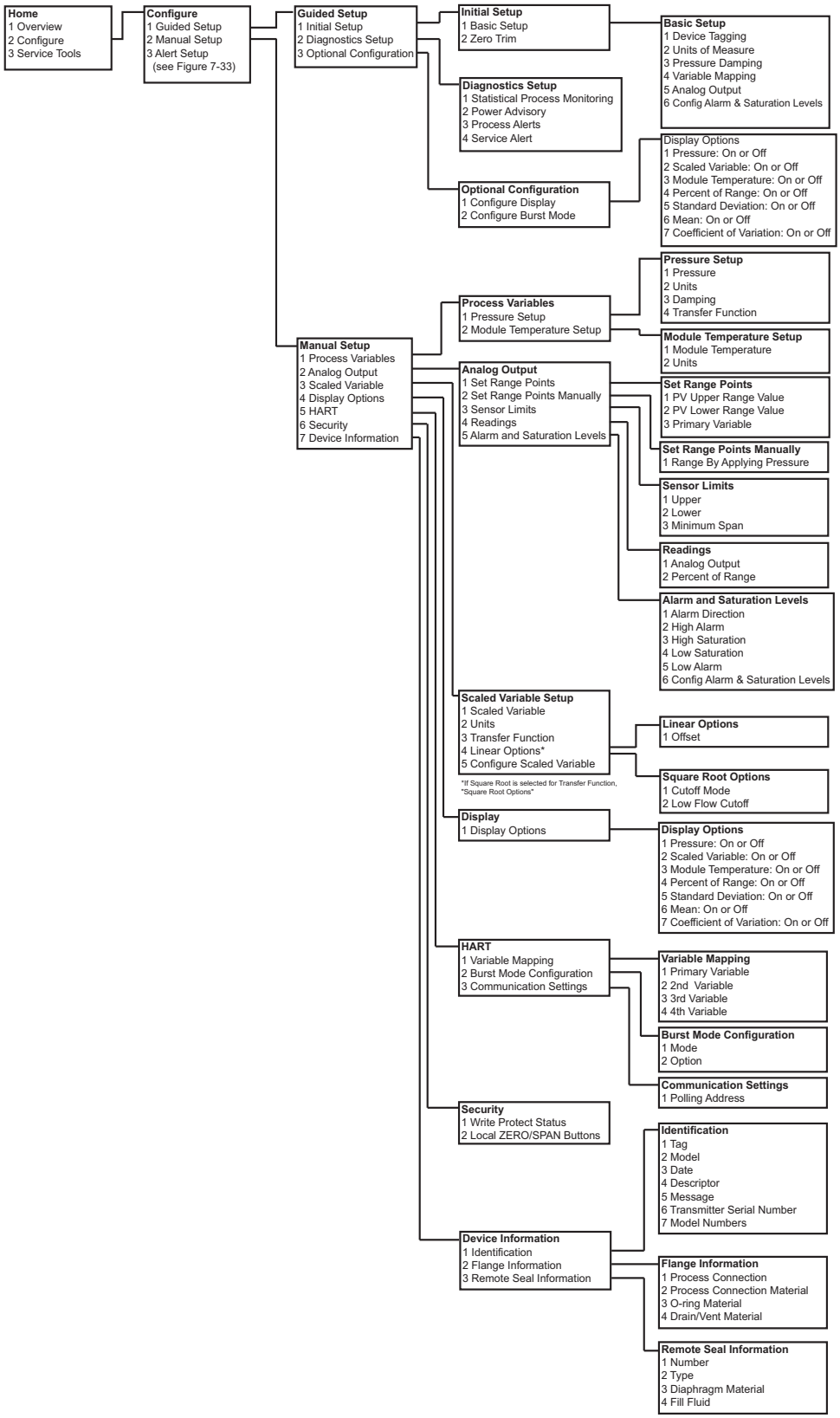


Figure 2-7. Configure (Alert Setup)

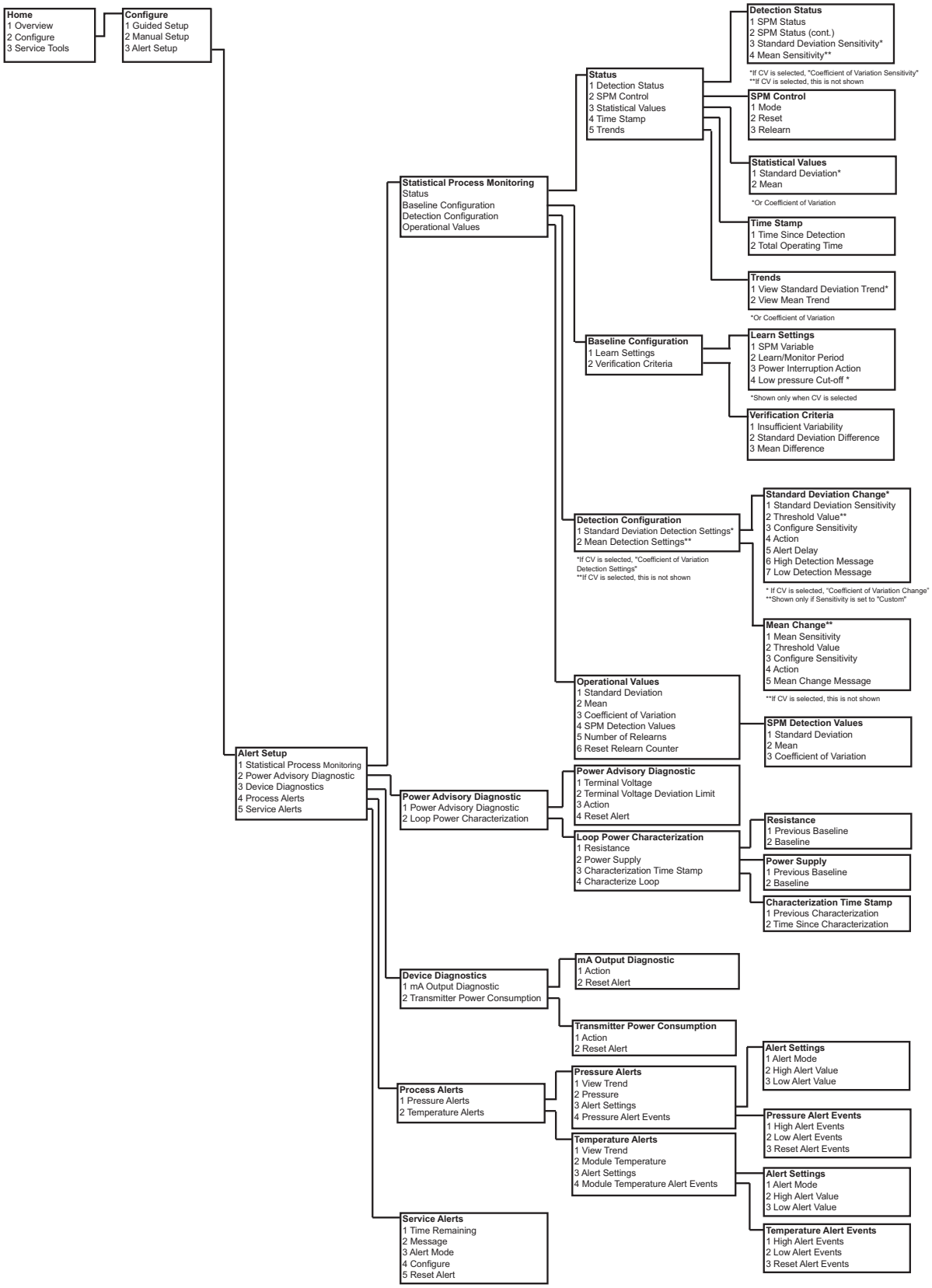
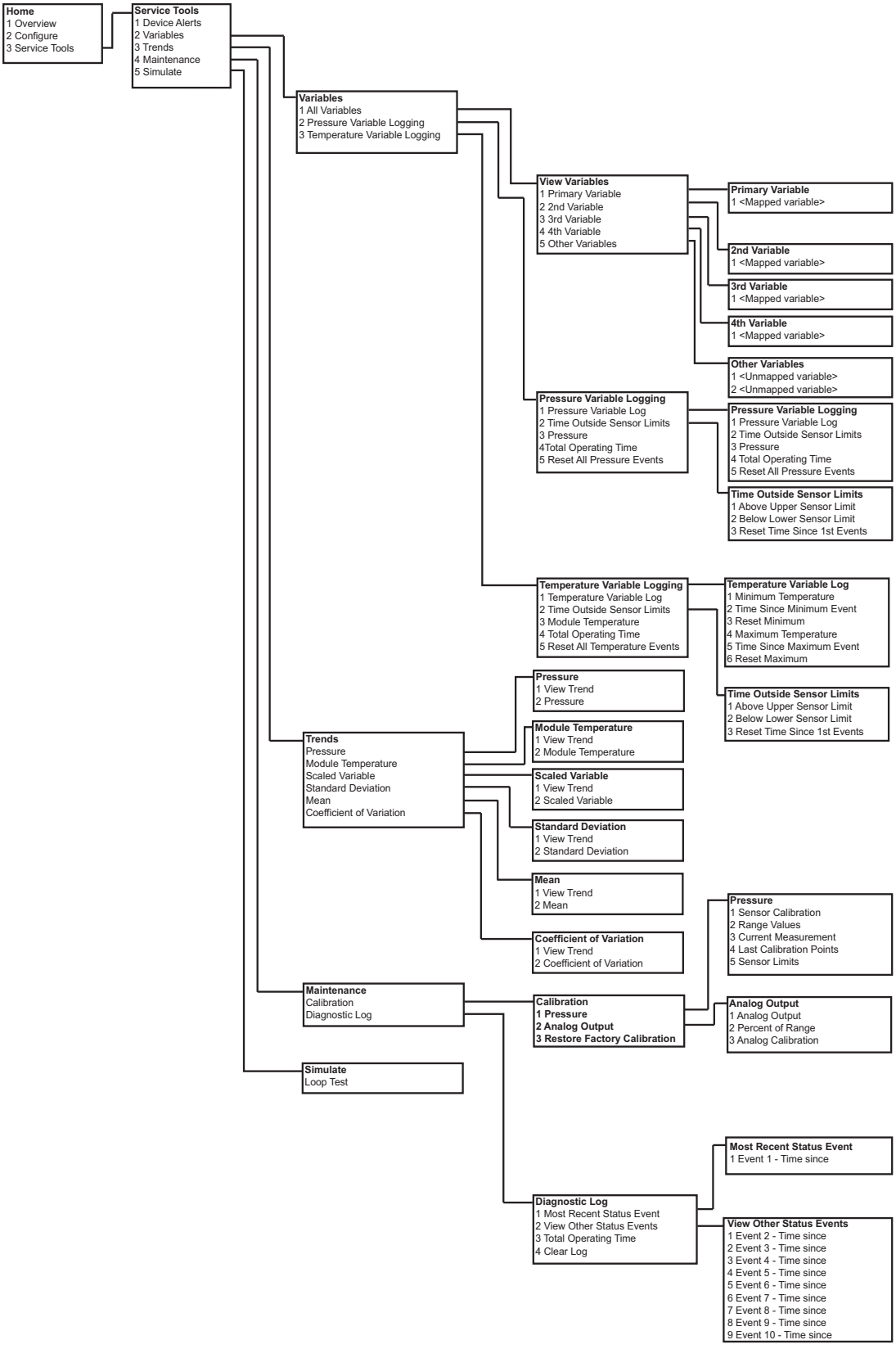
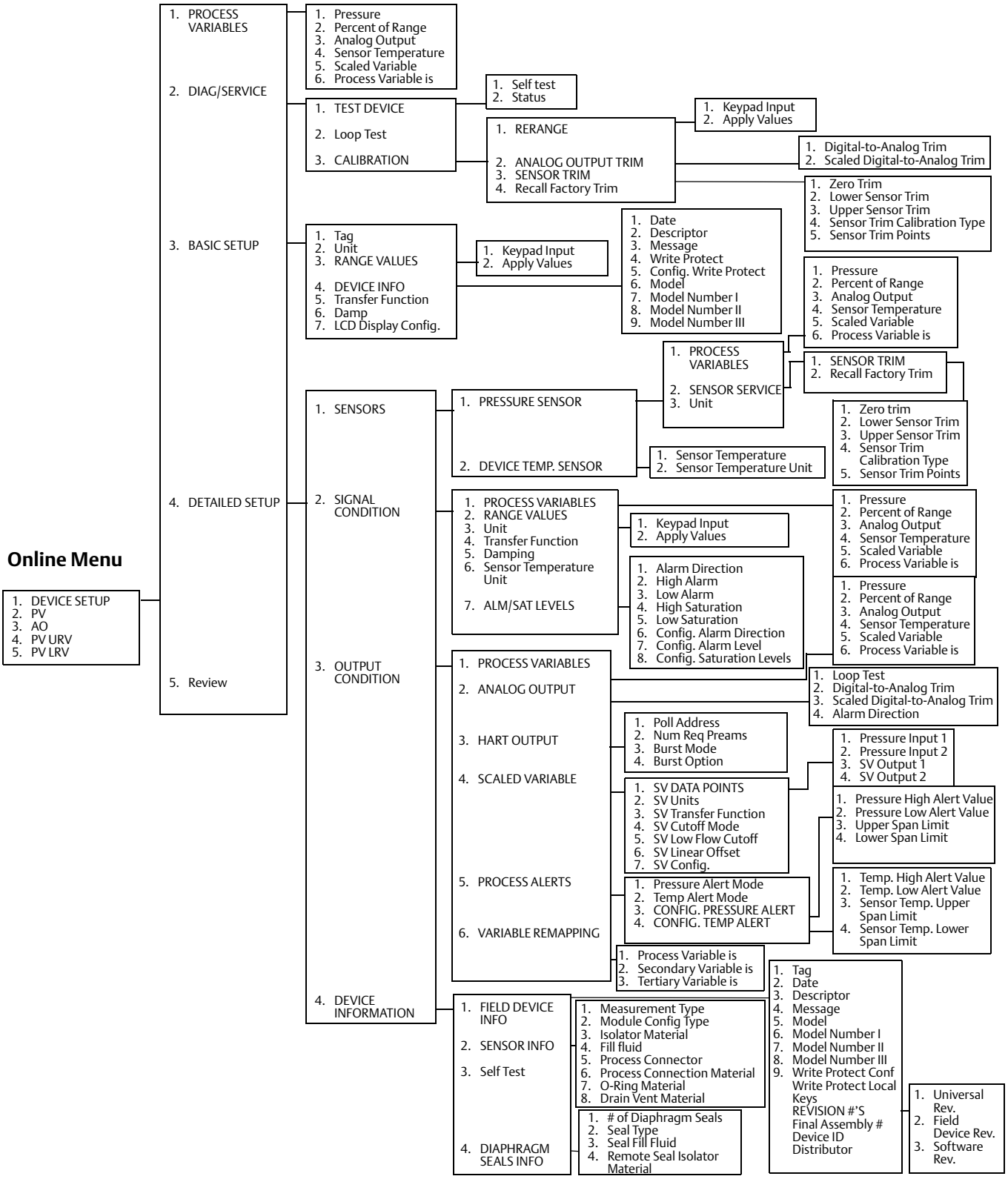


Figure 2-8. Service Tools



2.5.1 Traditional interface menu tree



2.5.2 Device Dashboard menu tree

Figure 2-9. Overview

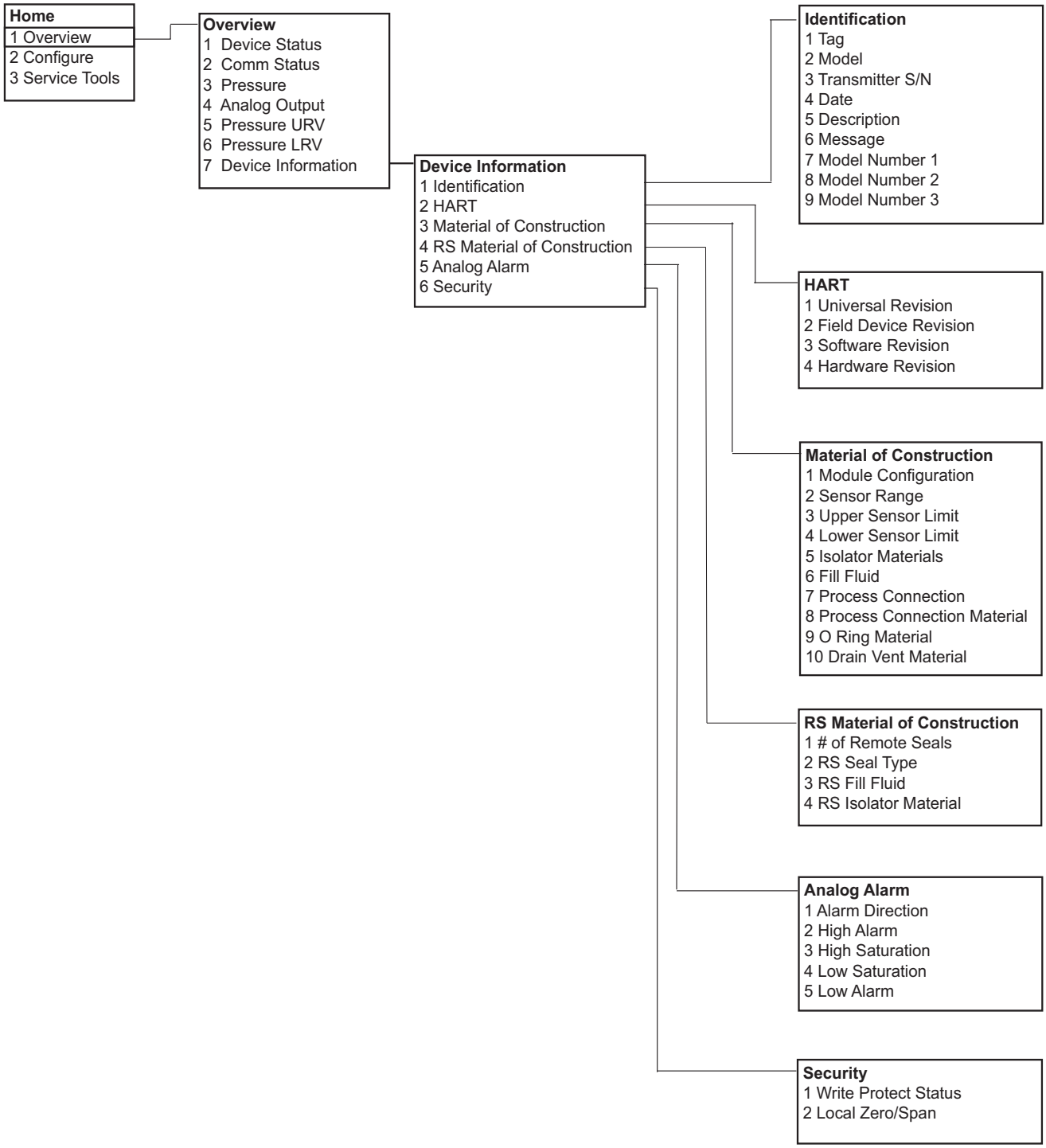


Figure 2-10. Configure

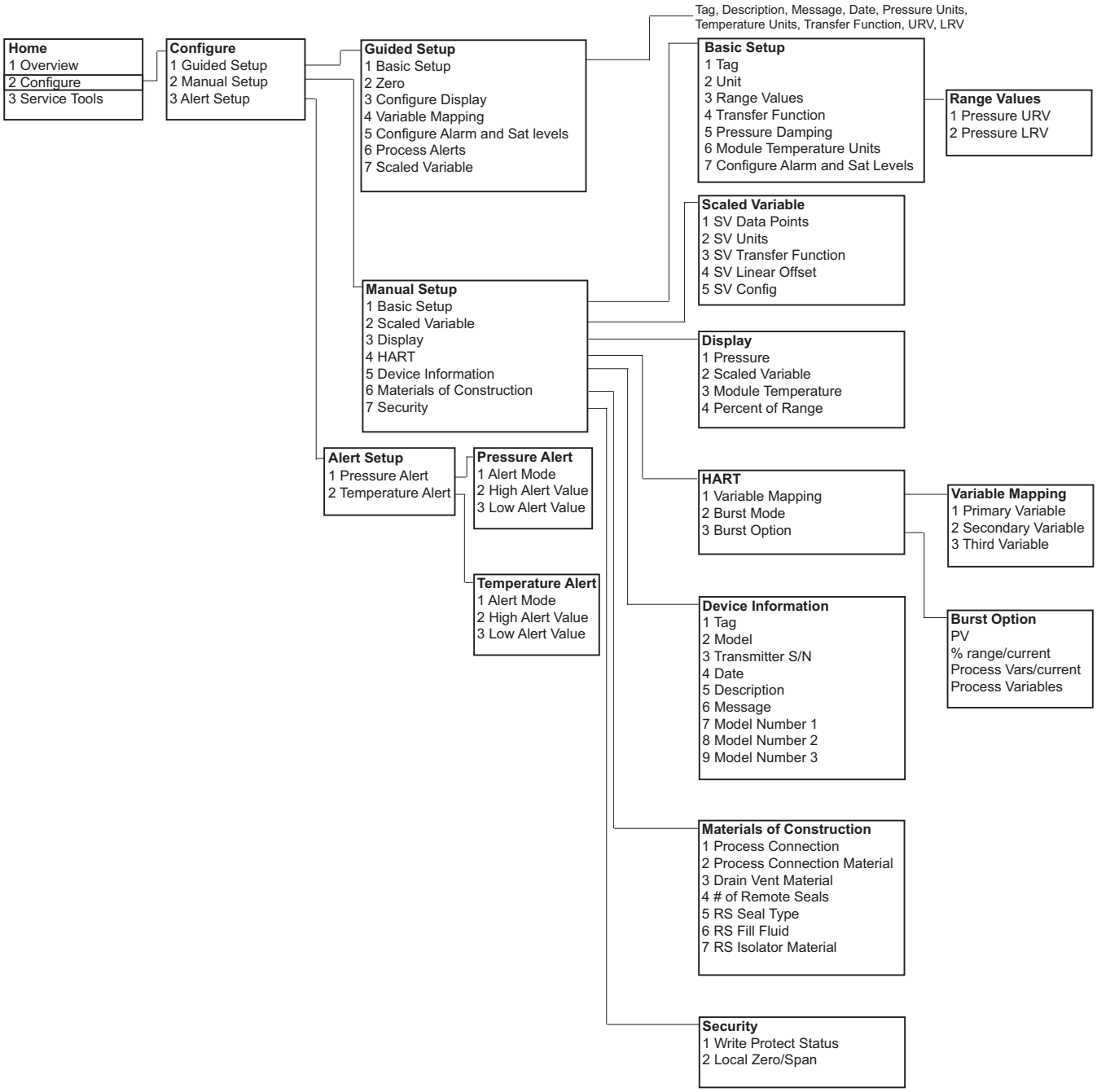
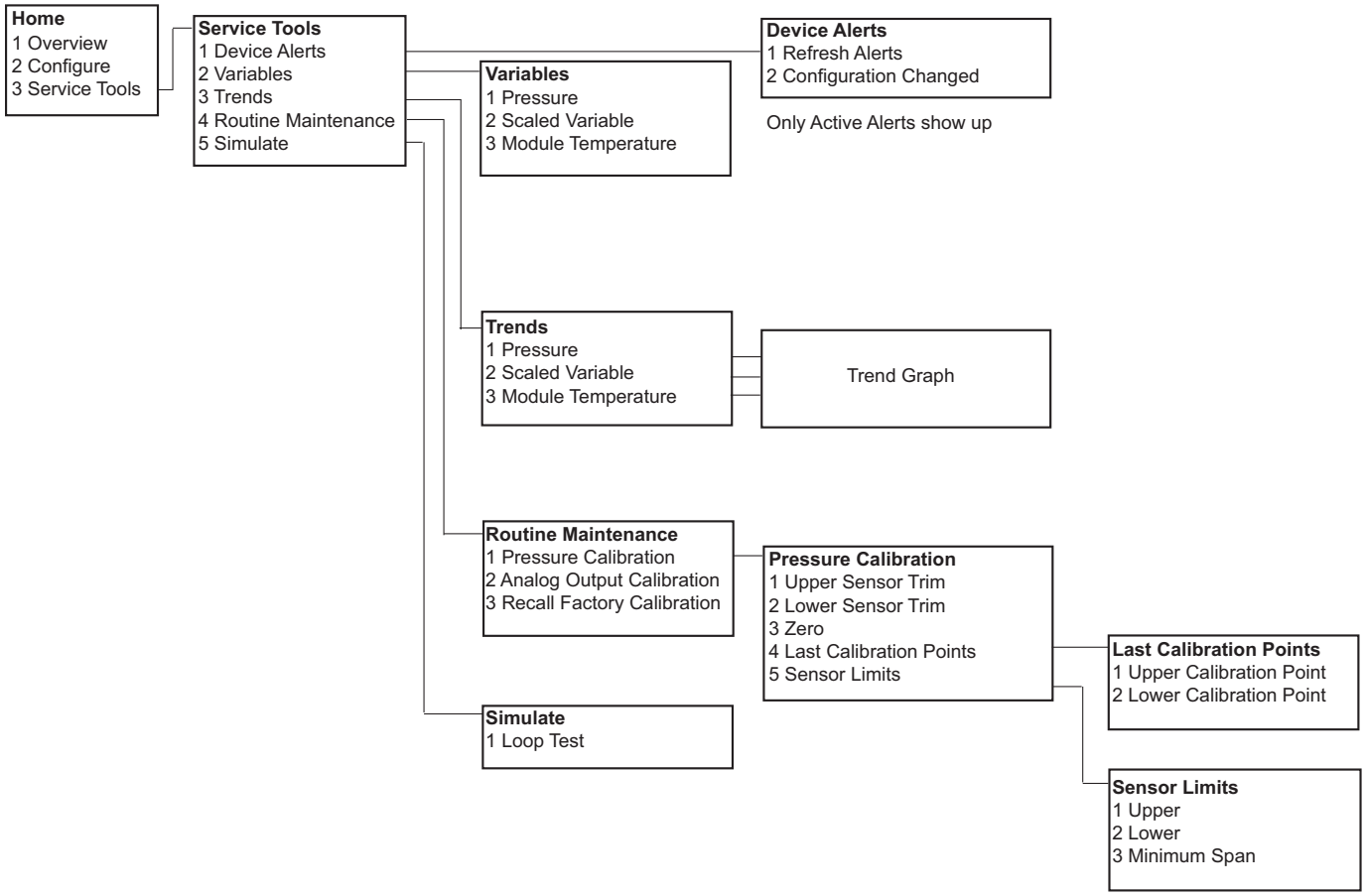


Figure 2-11. Service Tools



2.5.3 Traditional 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	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

2.5.4 Device Dashboard 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	Fast Key sequence
	Alarm and Saturation Levels	1, 4, 5
	Alarm Level Configuration	1, 7, 5
	Analog Output Alarm Direction	1, 4, 5, 1
	Burst Mode Control	1, 7, 5, 1
	Burst Option	2, 2, 4, 3
	Custom Display Configuration	2, 1, 3
✓	Damping	2, 2, 1, 5
	Date	2, 2, 5, 4
	Descriptor	2, 2, 5, 5
	Digital to Analog Trim (4 - 20 mA Output)	3, 4, 2
	Disable Zero & Span Adjustment	3, 4, 2, 1
	Field Device Information	1, 7
	LCD Display Configuration	2, 2, 3
	Loop Test	3, 5, 1
	Lower Sensor Trim	3, 4, 1, 2
	Message	2, 2, 5, 6
	Module Temperature/Trend	3, 3, 3
	Poll Address	1, 2
	Pressure Alert Configuration	2, 3, 1
	Range Values	2, 2, 1, 3
	Re-mapping	2, 2, 4, 1
	Rerange - Keypad Input	1, 5
	Rerange with Keypad	2, 2, 1, 3
	Saturation Level Configuration	2, 2, 1, 7
	Scaled D/A Trim (4 - 20 mA Output)	3, 4, 2
	Scaled Variable Configuration	3, 4, 2, 2
	Sensor Information	2, 2, 2
	Sensor Trim	3, 4, 1
	Sensor Trim Points	3, 4, 1, 4
✓	Tag	2, 2, 5, 1
	Temperature Alert Configuration	2, 3, 2
✓	Transfer Function (Setting Output Type)	2, 2, 1, 4
	Transmitter Security (Write Protect)	2, 2, 7, 1
✓	Units (Process Variable)	2, 2, 1, 2
	Upper Sensor Trim	3, 4, 1, 1
	Zero Trim	3, 4, 1, 3

2.6 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.

2.6.1 Process variables

Traditional Fast Keys	1, 1
Device Dashboard Fast Keys	3, 2

The process variables for the Rosemount 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™.

Field Communicator v3.3

The process variable menu displays the following process variables:

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

Note
Regardless of the range points, the Rosemount 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 inH_2O, and the transmitter detects a pressure of 25 inH_2O, it digitally outputs the 25 inH_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 Device Manager 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
- Module temperature
- Scaled Variable (SV)
- Primary Variable (PV)

2.6.2 Module temperature

Traditional Fast Keys	1, 1, 4
Device Dashboard Fast Keys	3, 2, 3

The Rosemount 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.

Field Communicator v3.3

Enter the Fast Key sequence “Module Temperature” to view the sensor temperature reading.

AMS Device Manager v7.0

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

2.7 Basic setup

2.7.1 Set process variable units

Traditional Fast Keys	1, 3, 2
Device Dashboard Fast Keys	2, 2, 1, 2

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

Field Communicator v3.3

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 Device Manager v7.0

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

2.7.2 Set output (transfer function)

Traditional Fast Keys	1, 3, 5
Device Dashboard Fast Keys	2, 2, 1, 4

The Rosemount 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 pressure transmitter automatically switches to linear output in order to ensure a more smooth, stable output near zero (see Figure 2-12).

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 low flow cutoff configuration is desired, use "Scaled variable configuration" on page 29 to configure square root and "Re-mapping" on page 33 to map scaled variable as the primary variable.

If scaled variable is mapped as the primary variable and square root mode is selected, ensure transfer function is set to linear. Do not set the transfer function to square root if square root mode is selected for the primary variable as this would cause the square root function to be performed twice.

Do not map to square root and set the transfer function to square root, this would cause the square root function to be performed twice.

Field Communicator v3.3

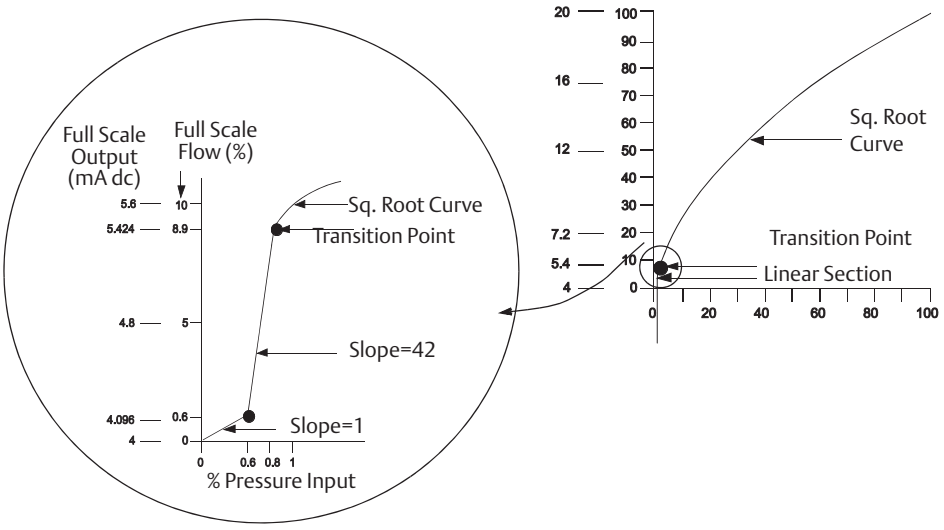
Enter the Fast Key sequence "Set Output (Transfer function)."

AMS Device Manager v7.0

Right click on the device and select **Configure** from the menu.

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

Figure 2-12. Square Root Output Transition Point



Note
For a flow turn down 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. Alternatively, you can configure Scaled Variable for square root output. This configuration allows you to select a low flow cutoff value, which will work best for the application. If low flow cutoff configuration is desired, use "Scaled variable configuration" on page 29 to configure square root and "Re-mapping" on page 33 to map Scaled Variable as the primary variable.

2.7.3 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 and sensor limits, refer to "Range and sensor limits" on page 140.

Note
Transmitters are shipped from Emerson 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 Field Communicator only.
- Rerange with a pressure input source and a Field Communicator.
- Rerange with a pressure input source and the local zero and span buttons (option D1).
- Rerange with AMS Device Manager only.
- Rerange with a pressure input source and AMS Device Manager.

Note
If the transmitter security jumper/switch is **ON,** adjustments to the zero and span cannot be made. Refer to "Configure alarm and security switch" on page 56 for security information.

Field Communicator v3.3 only

Traditional Fast Keys	1, 2, 3, 1, 1
Device Dashboard Fast Keys	1, 5

The easiest and most popular way to rerange is to use the Field 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.
3. Select **Send** to complete reranging the transmitter.

Pressure input source and Field Communicator v3.3

Traditional Fast Keys	1, 2, 3, 1, 2
Device Dashboard Fast Keys	3, 4, 1

Reranging using the Field 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 Field Communicator** to configure lower and upper range values.
2. Follow the on-screen instructions.

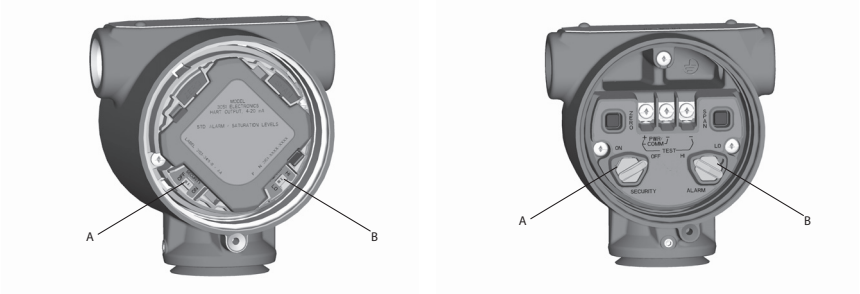
Pressure input source and the local zero and span buttons (option D1)

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

A way to rerange the transmitter is to use the local zero and span adjustments and an accurate pressure source.

1. Using a pressure source with an accuracy **at least three 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 10 seconds.

Plantweb **Junction Box**



A. Zero
B. Span

AMS Device Manager 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.
2. Select **Apply**.
3. After carefully reading the warning provided, select **Yes**.

Pressure input source and AMS Device Manager 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.

2.7.4 Damping

Traditional Fast Keys	1, 3, 6
Device Dashboard Fast Keys	2, 2, 1, 5

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 in "Damping" on page 93.

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 Field Communicator Fast Keys or going to "Configure" in AMS Device Manager.

Field Communicator v3.3

Enter the Fast Key sequence "Damping."

AMS Device Manager 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.
2. Select **Apply**.
3. After carefully reading the warning provided, select **Yes**.

2.8 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.

Field Communicator v3.3

Traditional Fast Keys	1, 3, 7
Device Dashboard Fast Keys	2, 2, 3

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
- Module Temperature

AMS Device Manager 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.
2. Select **Apply**.
3. After carefully reading the warning provided, select **Yes**.

2.9 Detailed setup

2.9.1 Failure mode alarm and saturation

Rosemount 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 alarm and security switch" on page 56.

Note
The failure mode alarm direction can also be configured using the Field Communicator or AMS Device Manager.

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

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

Table 2-1. 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 2-2. 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 2-3. Custom Alarm and Saturation Values

Level	4–20 mA saturation	4–20 mA alarm
Low	3.7 — 3.9 mA	3.4 — 3.8 mA
High	20.1 — 21.5 mA	20.2 — 23.0 mA

Failure mode alarm and saturation levels can be configured using a Field Communicator or AMS Device Manager, see "Alarm and saturation level configuration" on page 26. Per Table 2-3, 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 Field Communicator or AMS Device Manager will provide an error message if a configuration rule is violated.

2.9.2 Alarm and saturation level configuration

Traditional Fast Keys	1, 4, 2, 7
Device Dashboard Fast Keys	2, 2, 1, 7

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

Field Communicator v3.3

1. From the *HOME* screen, follow the Fast Key sequence.
2. Select **6: Config. Alarm and Sat. Levels** to configure alarm levels.
3. Select desired setting; if *OTHER* is selected, enter HI and LO custom values.

AMS Device Manager v7.0

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

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

2.9.3 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

2.9.4 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

2.9.5 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 2-1, Table 2-2, and Table 2-3 on page 26, and “Loop Test” on page 34).

2.9.6 Process alerts

Traditional Fast Keys	1, 4, 3, 5
Device Dashboard Fast Keys	2, 3

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 Field Communicator, AMS Device Manager 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.

Field Communicator v3.3

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

1. From the *HOME* screen, follow the Fast Key sequence Process Alerts.
2. Select **1, Pressure Alerts** to configure the pressure alert.
   Select **2, Temperature Alerts** to configure the temperature alerts.
3. Use the right arrow key to configure the HI and LO alert values.
4. Select **Send** to enable changes.

AMS Device Manager 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 select **Apply**.
5. After carefully reading the warning provided, select **yes**.

2.9.7 Scaled variable configuration

Traditional Fast Keys	1, 4, 3, 4, 7
Device Dashboard Fast Keys	2, 2, 2

The scaled variable configuration allows the user to create a relationship/conversion between the pressure units and user-defined/custom units. There are two use cases for scaled variable. The first use case is to allow custom units to be displayed on the transmitter's LCD display. The second use case is to allow custom units to drive the transmitter's 4-20 mA output.

If the user desires custom units to drive the 4-20 mA output, scaled variable must be re-mapped as the primary variable. Refer to "Re-mapping" on page 33.

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 (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 - 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. It is highly recommended to use the low flow cutoff function in order to have a stable output and avoid problems due to process noise at a low flow or no flow condition. A low flow cutoff value that is practical for the flow element in the application should be entered.

Note
If Scaled Variable is mapped as the primary variable and square root mode is selected, ensure transfer function is set to linear. Refer to "Set output (transfer function)" on page 20.

Field Communicator v3.3

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

1. From the *HOME* screen, follow the Fast Key sequence *Scaled Variable Configuration*.
2. Select **SV Config** to configure scaled variable.
   - Units can be up to five characters long and include A—Z, 0—9, –, /,%, and *. Default unit is DEFLT.
   - The first character is always an asterisk (*), which identifies the units displayed are scaled variable units.
3. Select scaled data options.
   a. Select linear if the relationship between PV and scaled variable units are linear. Linear prompts for two data points, which results in four values to enter.
   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, requiring two values to be entered.
4. 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.
5. Enter scaled variable position 1.
   a. (If performing a Linear Function) enter the lower known value point in terms of the scaled variable; 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.
6. Enter pressure value position 2. Pressure values must be within the range of the transmitter.
   a. Enter the upper known value point in terms of pressure.
7. 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 the maximum scaled variable unit that is equated to the high pressure from step 6; this value must be no longer than seven digits. Skip to Step 9.
8. Enter linear offset value in pressure units (If performing a Linear Function). Skip to Step 10.
9. (If performing a Square Root Function) enter Low Flow cutoff mode.
   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 in scaled variable (custom) units on the next screen.
10. Select **OK** to acknowledge that the loop can be returned to automatic control.

AMS Device Manager v7.0

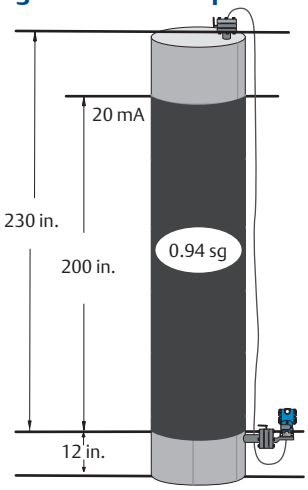
Right click on the device, select **Device Configuration**, then select **SV Config** from the menu.Select **Next** after setting the control loop to manual.

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

DP Level example

Below is an example of scaled variable in a DP Level application. The Rosemount 3051S reads the DP in units of inH_2O, but the output scaled variable is the height of the liquid in the tank, inches

Figure 2-13. Example Tank



A differential transmitter is used in a level application where the span is 188 inH_2O (200-in. 0.94 sg). Once installed on an empty tank and taps vented, the process variable reading is –209.4 inH_2O. The process variable reading is the head pressure created by fill fluid in the capillary. Based on Figure 2-13, the Scaled Variable configuration would be as follows:

Scaled Variable units:	inches
Scaled data options:	linear
Pressure value position 1:	0 inH_2O (0 mbar)
Scaled Variable position 1:	12 in. (305 mm)
Pressure value position 2:	188 inH_2O (0.47 bar)
Scaled Variable position 2:	212 in. (5385 mm)
Linear offset:	–209.4 inH_2O (–0.52 bar)

DP Flow example of scaled variable

This DP Flow example of scaled variable takes the DP reading of inH_2O, and outputs the resulting flow in gal/h. Output is scaled with a square root operation internally. The DP transmitter is used in conjunction with an orifice plate in a flow application where the differential pressure at full scale flow is 125 inH_2O. In this particular application, the flow rate at full scale flow is 20,000 gallons of water per hour. It is highly recommended to use the low flow cutoff function in order to have a stable output and avoid problems due to process noise at a low flow or no flow condition. A low flow cutoff value that is practical for the flow element in the application should be entered. In this particular example, the low flow cutoff value is 1000 gallons of water per hour. 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 inH_2O (311 mbar)
Scaled Variable position 2:	20,000 gal/h (75,708 lt/hr)
Low Flow Cutoff:	1000 gal/h (ON)

Note
Pressure value position 1 and Scaled Variable position 1 are always set to zero for a flow application. No configuration of these values is required.

2.9.8 Re-mapping

Traditional Fast Keys	1, 4, 3, 6
Device Dashboard Fast Keys	2, 2, 4, 1

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.

Field Communicator v3.3

From the *HOME* screen, enter the Fast Key sequence Re-mapping.

1. Set the control loop to manual (see "Setting the loop to manual" on page 6).
2. Select desired primary variable and select **Enter**.
3. Select desired secondary variable and select **Enter**.
4. Select desired tertiary variable and select **Enter**.
5. Select **Send** to complete the changes, then return to loop to automatic control.
6. Select **OK** to acknowledge that the loop can be returned to automatic control.

AMS Device Manager v7.0

Right click on the device and select **Configure**.

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

2.9.9 Sensor temperature unit

Traditional Fast Keys	1, 4, 1, 2, 2
Device Dashboard Fast Keys	2, 2, 1, 6

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

Field Communicator v3.3

Enter the Fast Key sequence Sensor Temperature Unit and select **degC** for Celsius or **degF** for Fahrenheit.

AMS Device Manager v7.0

Right click on the device and select **Configure** from the menu.

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

2.10 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.

2.10.1 Loop test

Traditional Fast Keys	1, 2, 2
Device Dashboard Fast Keys	3, 5, 1

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.

Field Communicator v3.3

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 6).
4. Select a discrete milliamp level for the transmitter to output. At the *CHOOSE ANALOG OUTPUT* prompt, select **1: 4mA**, **2: 20mA**, or **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 2-1, Table 2-2, and Table 2-3).

5. Check the reference meter installed in the test loop to verify 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 Device Manager 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. Select **Next** after setting the control loop to manual.
3. Select desired analog output level. Select **Next**.
4. Select **Next** to acknowledge output being set to desired level.
5. Check the reference meter installed in the test loop to verify 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 then **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.

2.11 Advanced functions

2.11.1 Saving, recalling, and cloning configuration data

Traditional Fast Keys	left arrow, 1, 2
Device Dashboard Fast Keys	N/A

Use the cloning feature of the Field Communicator or the AMS Device Manager “User Configuration” feature to configure several Rosemount 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 or AMS Device Manager online guides. One common method is as follows:

Field Communicator v3.3

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 Field Communicator screen.
   b. Select 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 Field 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 Field Communicator informs you of the status. Repeat Step 3 through Step 9 to configure another transmitter.

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

AMS Device Manager 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 select 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 select **OK**.
5. The template is copied into the *User Configurations* window with the tag name highlighted; rename it as appropriate and select **Enter**.

Note
A device icon can also be copied by dragging and dropping a device template or any other device icon from Wireless 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. Select **Apply** to apply the values, or select **OK** to apply the values and close the window.

AMS Device Manager 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 Device Manager 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 Wireless Revision 5.0 or earlier, the same model type and revision number are required.

To apply a user configuration, perform the following procedure:

1. In the *User Configurations* window, select the desired user configuration.
2. Drag the icon onto a like device in *Wireless 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. Select **OK** to apply the configuration and close the window.

2.11.2 Burst mode

Traditional Fast Keys	1, 4, 3, 3, 3
Device Dashboard Fast Keys	2, 2, 4, 2

When configured for burst mode, the Rosemount 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 Field Communicator, AMS Device Manager 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 Field Communicator, AMS Device Manager 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.

Field Communicator v3.3

To configure the transmitter for burst mode, perform the following step: from the *HOME* screen, enter the Fast Key sequence *Burst Mode*.

AMS Device Manager 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, select **Apply**.
3. After carefully reading the warning provided, select **yes**.

2.12 Multidrop communication

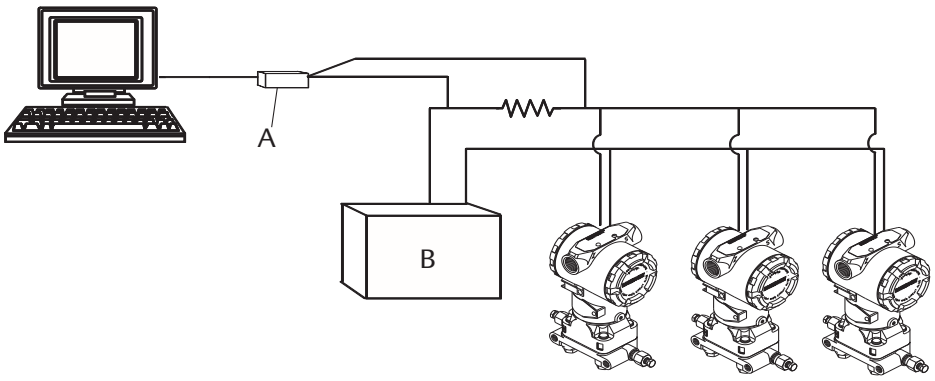
Multidropping transmitters refers to the connection of several transmitters to a single communications transmission line. Communication between the host and the transmitters takes place digitally with the analog output of the transmitters deactivated. With smart communications protocol, up to fifteen 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. Field Communicators and AMS Device Manager can test, configure, and format a multidropped transmitter the same way as a transmitter in a standard point-to-point installation.

Figure 2-14 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 2-14. Typical Multidrop Network



A. HART modem
B. Power supply

The Rosemount 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, setting 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.

2.12.1 Changing a transmitter address

Traditional Fast Keys	1, 4, 3, 3, 1
Device Dashboard Fast Keys	1, 2

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.

Field Communicator v3.3

1. From the *HOME* screen, enter the Fast Key sequence *Changing a Transmitter Address* and select **OK**.
2. After removing loop from automatic control, select **OK** again and enter the address (0–15).

AMS Device Manager v7.0

Right click on the device and select **Configure** from the menu.

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

2.12.2 Communicating with a multidropped transmitter

Traditional Fast Keys	Left arrow, 3, 1, 1
Device Dashboard Fast Keys	1, 2

Field Communicator v3.3

To communicate with a multidropped transmitter, configure the Field 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 Field Communicator automatically polls for devices at addresses 0-15 upon start up.

AMS Device Manager v7.0

1. Select the **HART modem** icon.
2. Select **Scan All Devices**.

2.12.3 Polling a multidropped transmitter

Traditional Fast Keys	Left arrow, 3, 1
Device Dashboard Fast Keys	1, 2

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

Field Communicator v3.3

1. From the *HOME* screen, enter the Fast Key sequence Polling a Multidropped Transmitter.

AMS Device Manager v7.0

1. Select the **HART modem** icon.
2. Select **Scan All Devices**.

Section 3 Installation

3.1 Overview

The information in this section covers installation considerations for HART® protocol. A Quick Start Guide for HART protocol is shipped with every transmitter to describe basic installation, wiring, and startup procedures. Dimensional drawings for each Rosemount™ 3051S Pressure Transmitter variation and mounting configuration are included in Appendix A: Specifications and Reference Data.

Note
The following sections contain installation instructions for many optional features. Only follow a section's directions if the transmitter being installed comes with the features described.

3.2 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.

⚠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 the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.

Electrical shock can result in death or serious injury.

Avoid contact with the leads and terminals.

Replacement equipment or spare parts not approved by Emerson™ 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 Emerson as spare parts.

⚠WARNING

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.

SuperModule and electronics housing must have equivalent approval labeling in order to maintain hazardous location approvals.

- When upgrading, verify SuperModule™ and electronics housing certifications are equivalent. Differences in temperature class ratings may exist, in which case the complete assembly takes the lowest of the individual component temperature classes (for example, a T4/T5 rated electronics housing assembled to a T4 rated SuperModule is a T4 rated transmitter).

3.3 Mount the transmitter

3.3.1 Determine mounting location

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.

Mounting requirements

Impulse piping configurations depend on specific measurement conditions. Refer to Figure 3-3 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 the transmitter so that the drain/vent valves are oriented 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 144 for details.

Figure 3-1. Coplanar Installation Examples

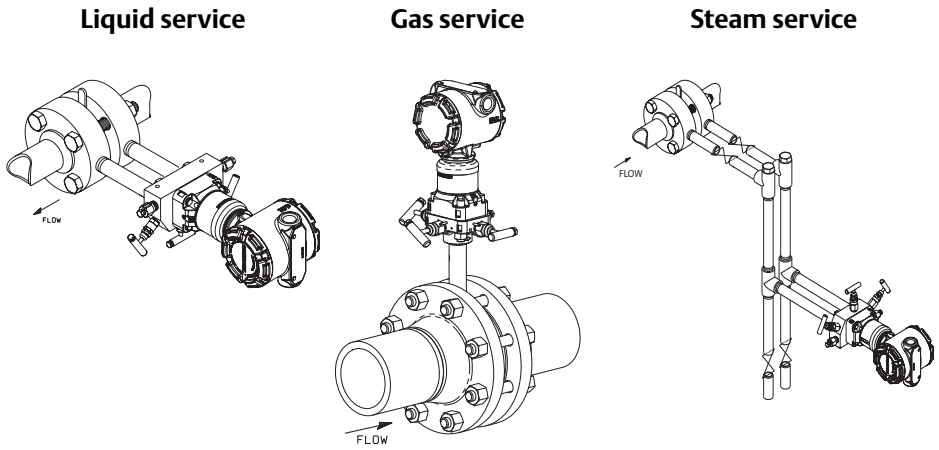
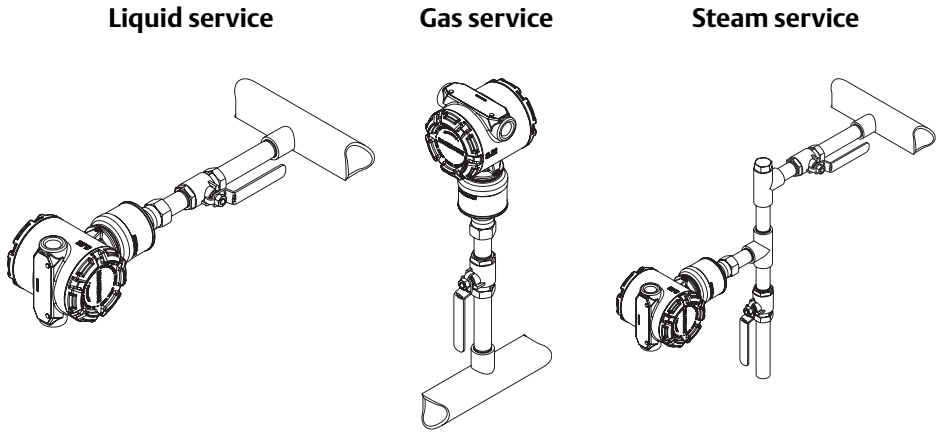


Figure 3-2. In-Line Installation Examples



Side mounting

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 3-1 on page 43, keeping drain/vent connections on the bottom for gas service and on the top for liquid service.

3.3.2 Install impulse piping

Systems that will use impulse piping should follow the guidance in the following section. Not all Rosemount 3051S measurement systems will use impulse piping, especially systems with remote seals, an annubar, compact orifice plates, or an integral orifice place. Each of these systems has their own manual to assist with installation.

Steam service

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.

Impulse piping

The piping between the process and the transmitter must accurately transfer the pressure to obtain accurate measurements. These are some 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.

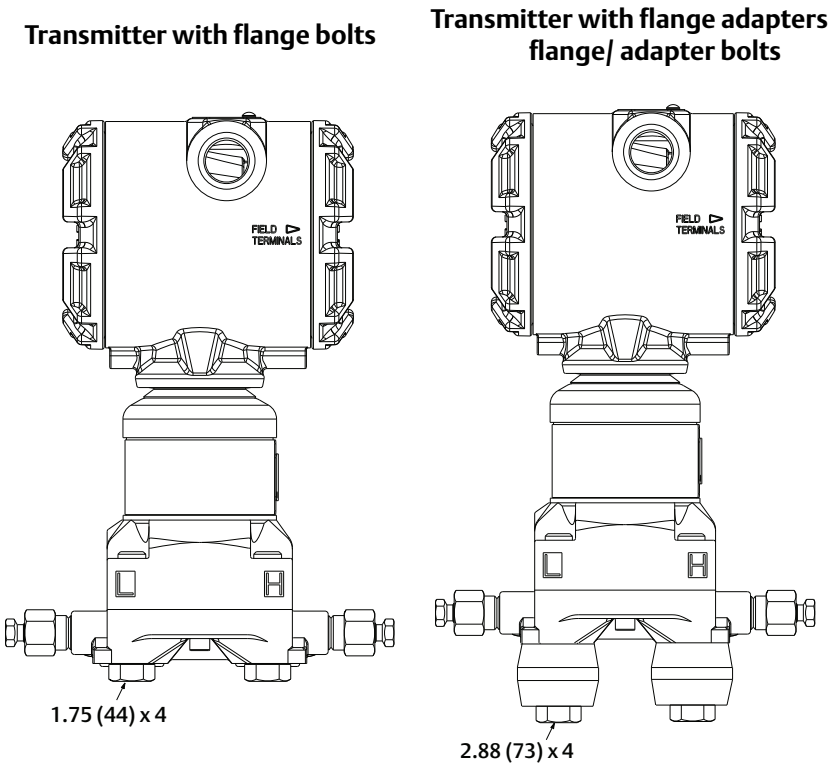
The best location for the transmitter in relation to the process pipe depends on the process itself. Use the following guidelines to determine transmitter location and placement of impulse piping:

- Keep impulse piping as short as possible.
- For liquid service, slope the impulse piping at least 1-in. per foot (8 cm per m) downward from the process connection to the transmitter.
- For gas service, slope the impulse piping at least 1-in. per foot (8 cm per m) upward from the process connection to the transmitter.
- 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.

3.3.3 Flange bolts and flange adapters

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.

Figure 3-3. Flange Bolts and Adapters



Dimensions are in inches (millimeters).

Flange adapters

Flange adapters are not required for use on an in line transmitter; they are generally used for coplanar and traditional style transmitters. Rosemount 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-in. (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-in. (51 mm), 2 1/8-in. (54 mm), or 2 1/4-in. (57 mm).

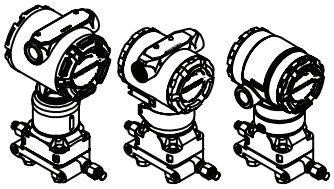
To install adapters to a coplanar flange, perform the following procedure:

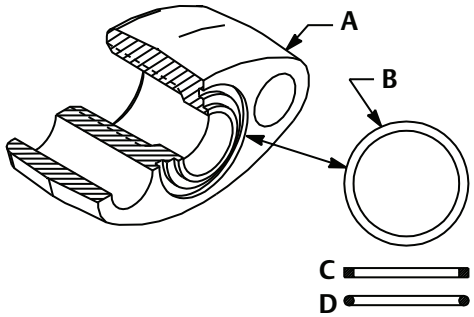
1. Remove the flange bolts.
2. Leaving the flange in place, move the adapters into position with the O-ring installed.
3. Clamp the adapters and the coplanar flange to the transmitter module using the longer of the bolts supplied.
4. Tighten the bolts (reference Table 3-1 on page 47 for torque specifications).

⚠WARNING

Failure to install proper flange adapter O-rings may 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/3051/2051/3095





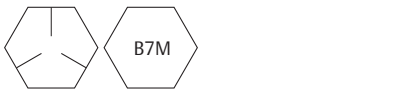
A. Flange Adapter
B. O-ring
C. PTFE Based
D. Elastomer

⚠ Whenever you remove flanges or adapters, visually inspect the PTFE 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 "Reassembly procedures" on page 87.

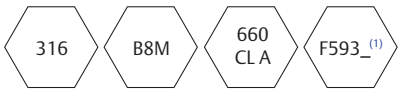
Flange bolts

If the transmitter installation requires assembly of the process flanges, manifolds, or flange adapters, follow these assembly guidelines to ensure a tight seal for optimal performance characteristics of the transmitters. Use only bolts supplied with the transmitter or sold by Emerson as spare parts. Figure 3-3 on page 45 illustrates common transmitter assemblies with the bolt length required for proper transmitter assembly.

The Rosemount 3051S can be shipped with a coplanar flange or a traditional flange installed with four 1.75-in. flange bolts. Mounting bolts and bolting configurations for the coplanar and traditional flanges can be found on page 2. Stainless steel bolts supplied by Emerson 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 are identified by their head markings:



Carbon Steel (CS) head markings



Stainless Steel (SST) head markings

Alloy K-500 head marking

1.The last digit in the F593_ head marking may be any letter between A and M.

Bolt installation

⚠ Only use bolts supplied with the Rosemount 3051S or sold by Emerson as spare parts. When installing the transmitter to one of the optional mounting brackets, torque the bolts to 125 in-lb (14.1 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.

Initial and final torque values for the flange and manifold adapter bolts are as follows:

Table 3-1. Bolt Installation Torque Values

Bolt material	Initial torque value	Final torque value
CS-ASTM-A449 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)
Alloy K-500 —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)

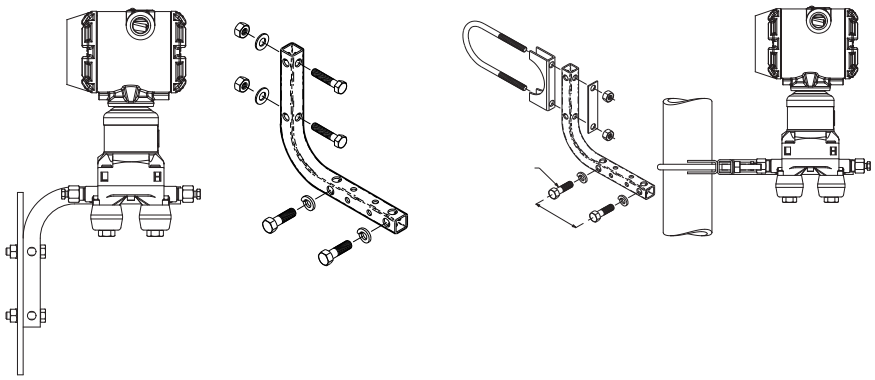
3.3.4 Install mounting bracket and transmitter

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 Mounting Configurations (B4 Bracket)" on page 152 shows bracket dimensions and mounting configurations for the B4 option.

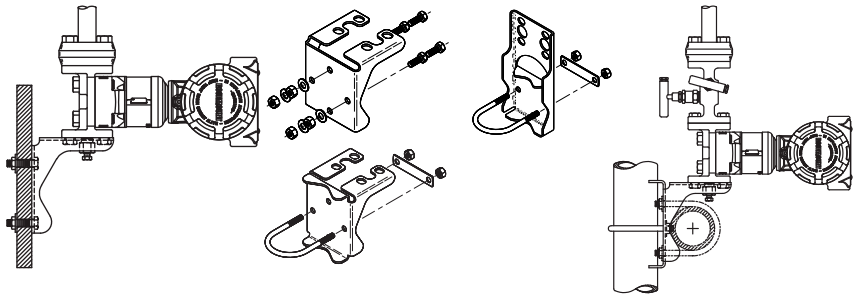
Options B1–B3 and B7–B9 are sturdy, epoxy/polyester-painted brackets designed for use with the traditional flange. The B1–B3 brackets have carbon steel bolts, while the B7–B9 brackets have stainless steel bolts. The BA and BC brackets and bolts are stainless steel. The B1/B7/BA and B3/B9/BC style brackets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

Panel mount **Pipe mount**

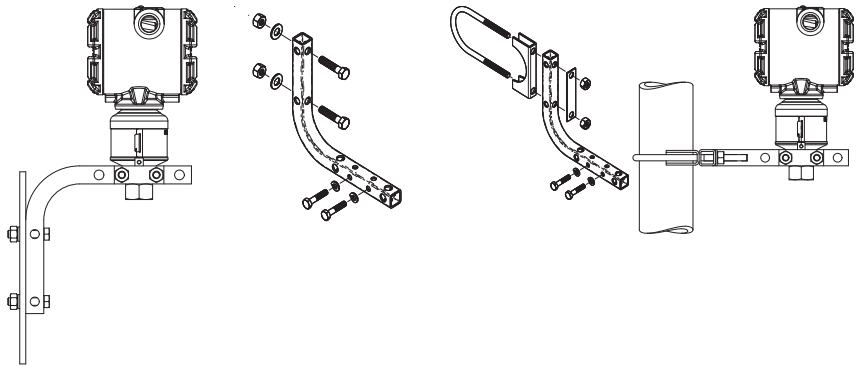
Coplanar flange



Traditional flange



In-line



Installation

Access requirements and cover installation on page 43 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.

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

Special considerations for draft range transmitter

For the Rosemount 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.

There are two recommended methods of reducing process noise.

- Damping (reference Section 2)
- Reference side filtering in gage applications (reference below)

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.

Housing clearance

Mount the transmitter so the terminal side and the LCD display are accessible. Clearance of 0.75-in. (19 mm) is required for cover removal on the terminal side. For transmitters without an LCD display, provide 0.75-in. (19 mm) of clearance. Three inches of clearance are required for cover removal if an LCD display is installed.

3.3.5 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 × flange and flange × 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.

Rosemount 305 and 304 Manifold styles

The Rosemount 305 Integral Manifold is available in two styles: coplanar and traditional. The Traditional 305 Integral Manifold can be mounted to most primary elements with mounting adapters.

Figure 3-4. Integral Manifold Designs

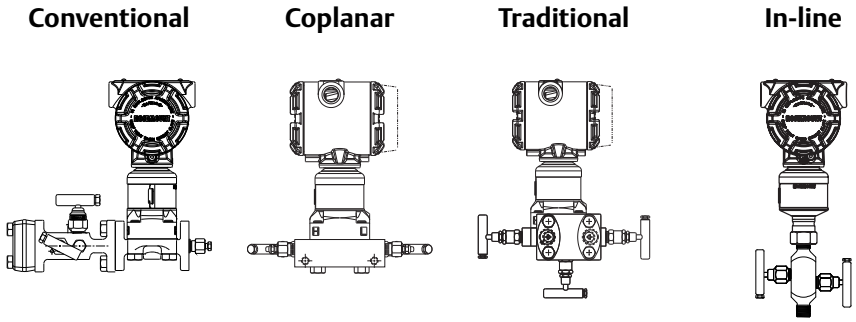
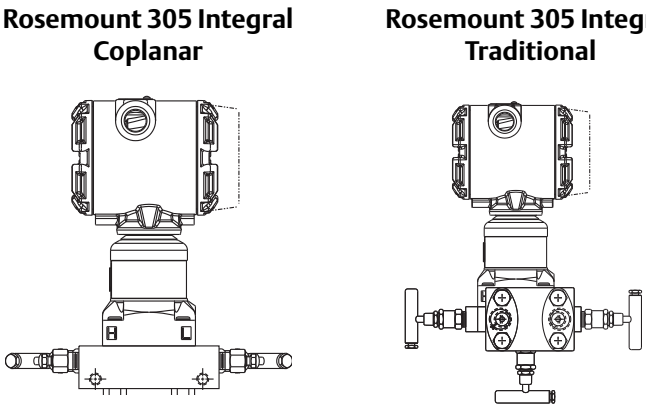


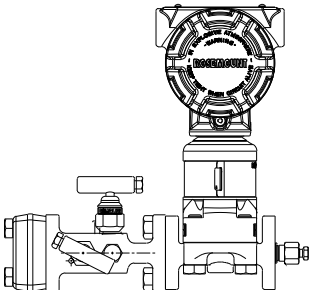
Figure 3-5. Rosemount 305 Manifold Styles



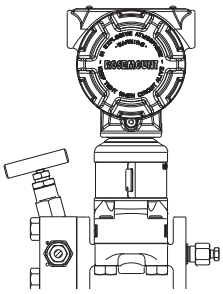
The Rosemount 304 comes in two basic styles: traditional (flange × flange and flange × pipe) and wafer. The Rosemount 304 Traditional Manifold comes in 2-, 3-, and 5-valve configurations. The Rosemount 304 Wafer Manifold comes in 3- and 5-valve configurations.

Figure 3-6. Rosemount 304 Manifold Styles

Rosemount 304 Traditional



Rosemount 304 Wafer



3.3.6 Manifold operation

⚠WARNING

Improper installation or operation of manifolds may result in process leaks, which may cause death or serious injury.

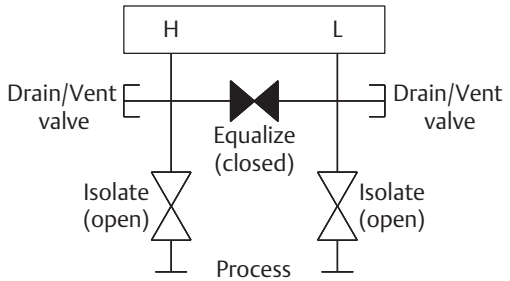
Always perform a zero trim on the transmitter/manifold assembly after installation to eliminate any shift due to mounting effects. See "Sensor trim overview" on page 71.

Coplanar transmitters

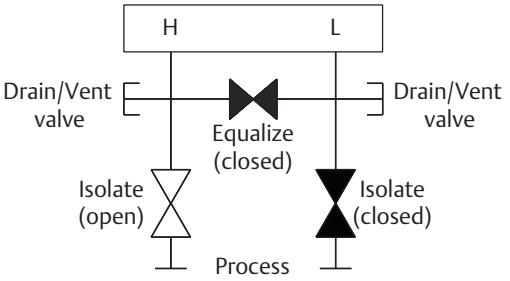
3- and 5-valve manifolds

Performing zero trim at static line pressure

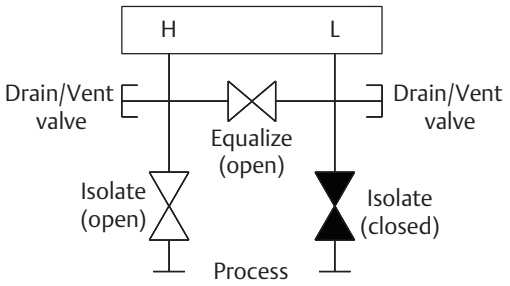
In normal operation the two isolate (block) valves between the process ports and transmitter will be open and the equalize valve will be closed.



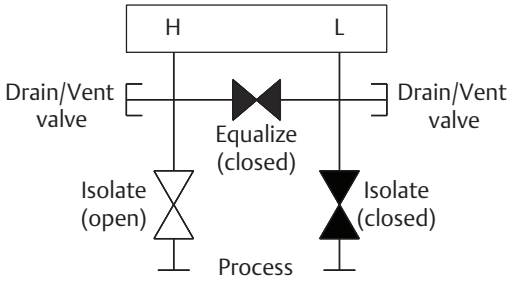
1. To zero trim the transmitter, close the isolate valve on the low side (downstream) side of the transmitter.



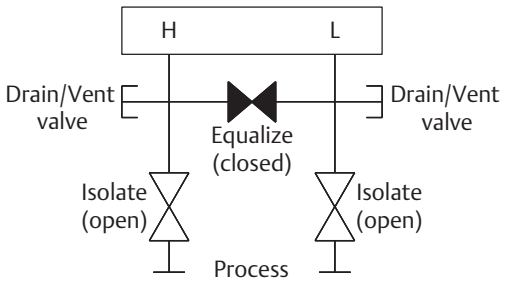
2. Open the equalize valve to equalize the pressure on both sides of the transmitter. The manifold is now in the proper configuration for performing a zero trim on the transmitter.



3. After performing a zero trim on the transmitter, close the equalize valve.



4. Finally, to return the transmitter to service, open the low side isolate valve.

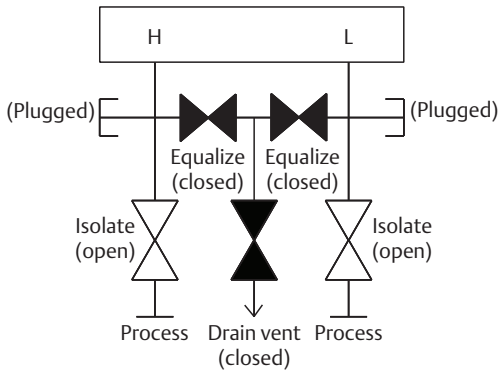


5-valve natural gas manifold

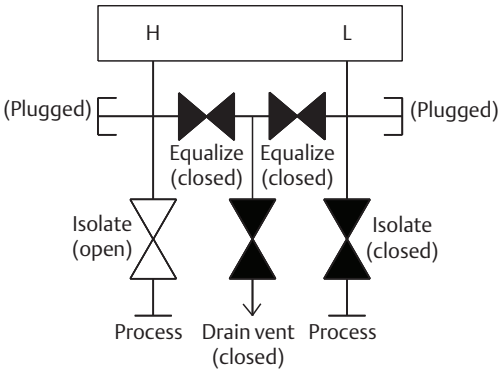
Performing zero trim at static line pressure

5-valve natural gas configurations shown:

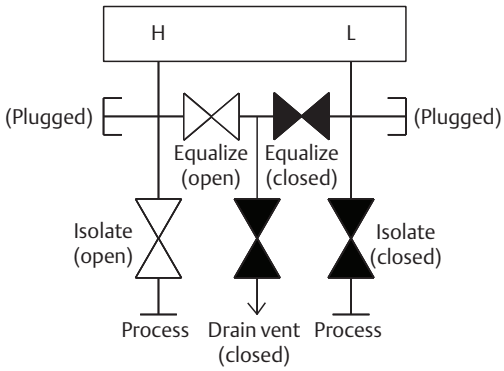
In normal operation, the two isolate (block) valves between the process ports and transmitter will be open, and the equalize valves will be closed. Vent valves may be opened or closed.



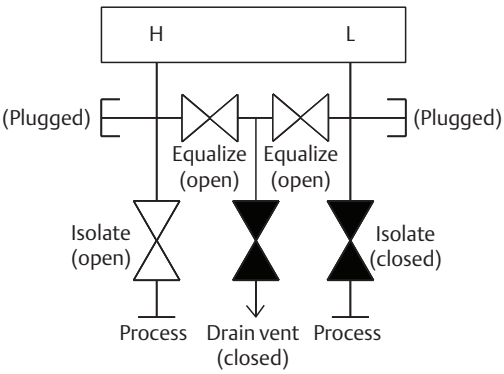
1. To zero trim the transmitter, first close the isolate valve on the low pressure (downstream) side of the transmitter and the vent valve.



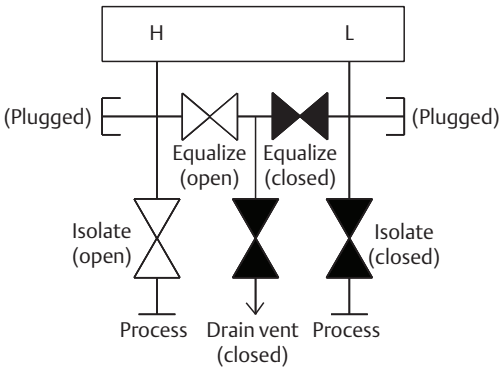
2. Open the equalize valve on the high pressure (upstream) side of the transmitter.



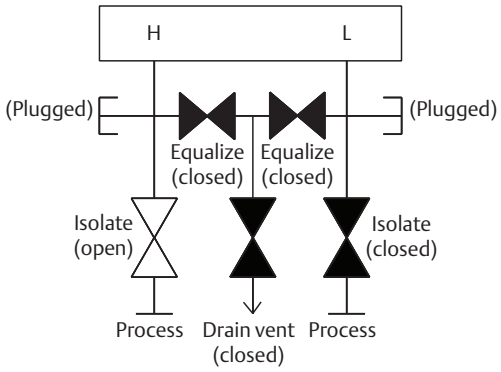
3. Open the equalize valve on the low pressure (downstream) side of the transmitter. The manifold is now in the proper configuration for performing a zero trim on the transmitter.



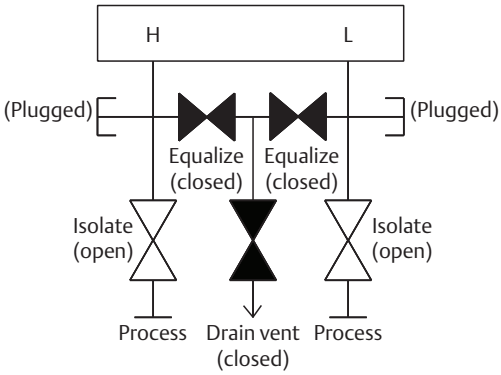
4. After performing a zero trim on the transmitter, close the equalize valve on the low pressure (downstream) side of the transmitter.



5. Close the equalize valve on the high pressure (upstream) side.



6. Finally, to return the transmitter to service, open the low side isolate valve and vent valve. The vent valve can remain open or closed during operation.

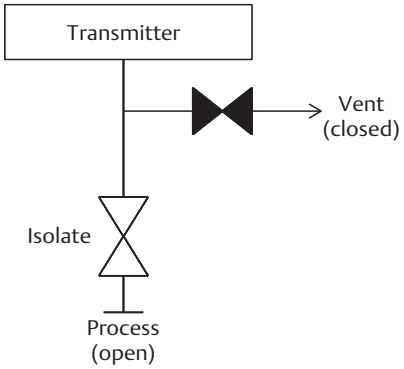


In-line transmitters

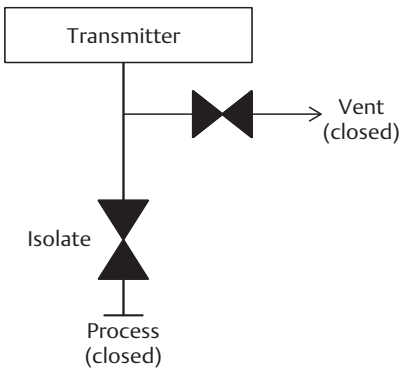
2-valve and block and bleed style manifolds

Isolating the transmitter

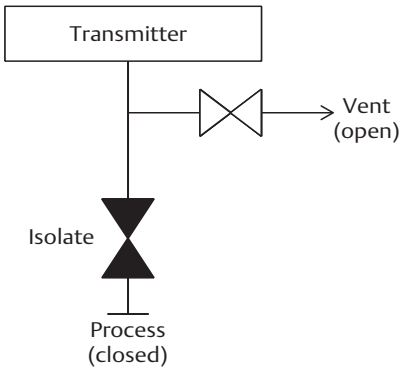
In normal operation the isolate (block) valve between the process port and transmitter will be open and the test/vent valve will be closed. On a block and bleed style manifold, a single block valve provides transmitter isolation and a bleed screw provides drain/vent capabilities.



1. To isolate the transmitter, close the isolate valve.



2. To bring the transmitter to atmospheric pressure, open the vent valve or bleed screw.

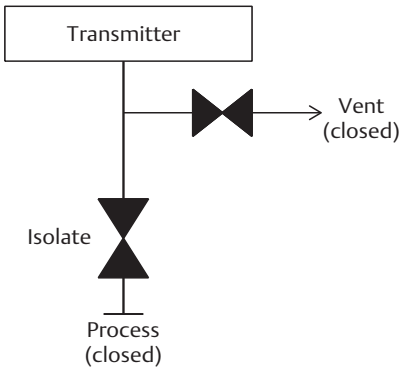


Note

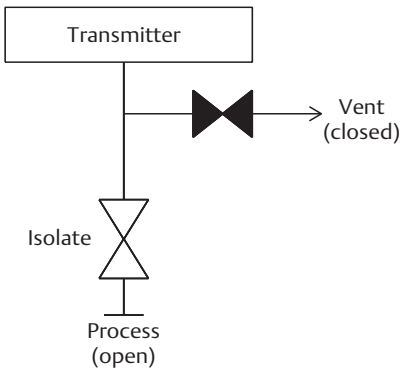
A 1/4-in. male NPT pipe plug may be installed in the test/vent port and will need to be removed with a wrench in order to vent the manifold properly.

⚠ Always use caution when venting directly to atmosphere.

3. After venting to atmosphere, perform any required calibration and then close the test/vent valve or replace the bleed screw.



4. Open the Isolate (block) valve to return the transmitter to service.



Adjusting valve packing

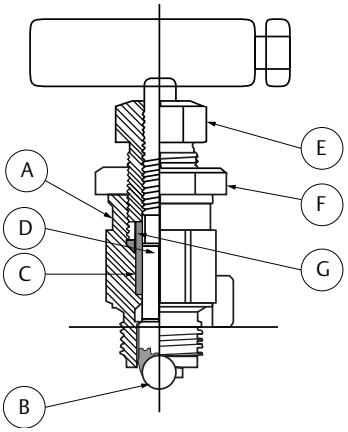
Over time, the packing material inside a Rosemount manifold may require adjustment in order to continue to provide proper pressure retention. Not all Rosemount manifolds have this adjustment capability. The Rosemount manifold model number will indicate what type of stem seal or packing material has been used.

The following steps are provided as a procedure to adjust valve packing:

1. Remove all pressure from device.
2. Loosen manifold valve jam nut.
3. Tighten manifold valve packing adjuster nut 1/4 turn.
4. Tighten manifold valve jam nut.
5. Re-apply pressure and check for leaks.

Above steps can be repeated, if necessary. If the above procedure does not result in proper pressure retention, the complete manifold should be replaced.

Figure 3-7. Valve Components



A. Bonnet
B. Ball seat
C. Packing
D. Stem
E. Packing adjuster
F. Jam nut
G. Packing follower

3.3.7 Rotate housing and LCD display

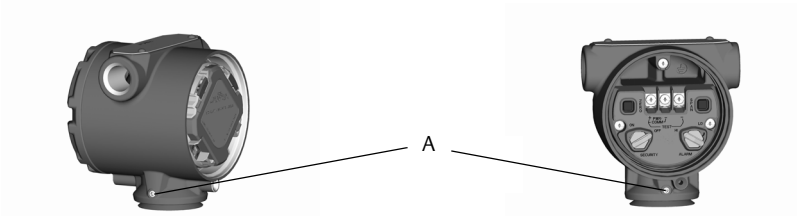
Housing rotation

To improve field access to wiring or to better view the optional LCD display:

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.

Figure 3-8. Housings

Plantweb® housing **Junction box housing**



A. Housing rotation set screw

LCD display

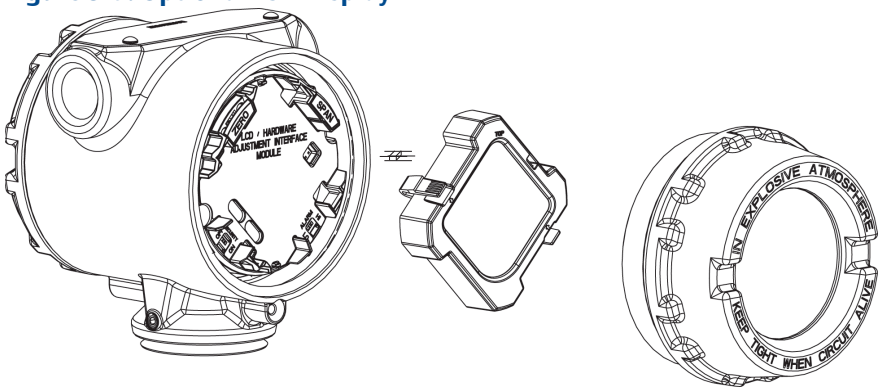
The LCD display requires a Plantweb housing. In addition to housing rotation, the optional display can be rotated in 90 degree increments by squeezing the two tabs, pulling out, rotating and snapping back into place. If the LCD display pins are inadvertently removed from the interface board when the display is pulled from the housing, carefully remove the pins from the back of the display, and then re-insert the pins into the interface board. Once the pins are back in place, snap the display into place.

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

Use the following procedure and Figure 3-9 to replace an 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 ensure metal to metal contact.

Figure 3-9. Optional LCD Display



3.3.8 Configure alarm and security switch

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 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 25 for more information.

Configure security (write protect)

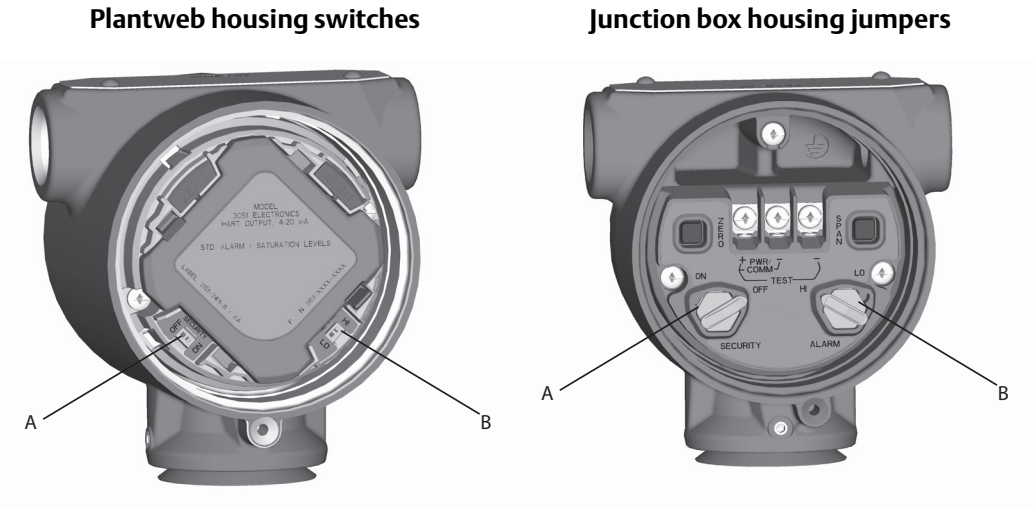
Changes can be prevented to the transmitter configuration data with the write protection Plantweb housing switches and junction box housing jumpers. Security is controlled by the security (write protect) switch/jumper located on the interface assembly or terminal block. Position the switch/jumper in 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.

Reposition the switches/jumpers

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. To reposition the switches/jumpers as desired for the specific housing compartment see Figure 3-10.
   a. Slide the security and alarm switches into the preferred position by using a small screwdriver. (An LCD display or an adjustment module must be in place to activate the switches.)
   b. Pull the pins out and rotate 90° into desired position to set the security and alarm.
4. ⚠ Re-install the transmitter cover. Transmitter covers must be fully engaged to meet explosion-proof requirements.

Figure 3-10. Switch and Jumper Configuration (Option D1)



A. Security
B. Alarm

Usage note

The Field 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 “Example software function” on page 5.

3.4 Wiring the device

3.4.1 Remove orange conduit plugs

Use a conduit plug in the unused conduit opening. Thread sealing (PTFE) tape or paste on male threads of conduit is required to provide a water/dust tight conduit seal and meets requirements of NEMA® Type 4X, IP66, and IP68. Consult factory if other Ingress Protection ratings are required.

For M20 threads, install conduit plugs to full thread engagement or until mechanical resistance is met.

Remove orange plugs from the transmitter conduit openings. The orange plugs are used to keep the housing free of debris during shipping. They are not meant to be in the conduit openings when the transmitter is installed and in use.

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

For material compatibility considerations, refer to Material Selection Technical Note.

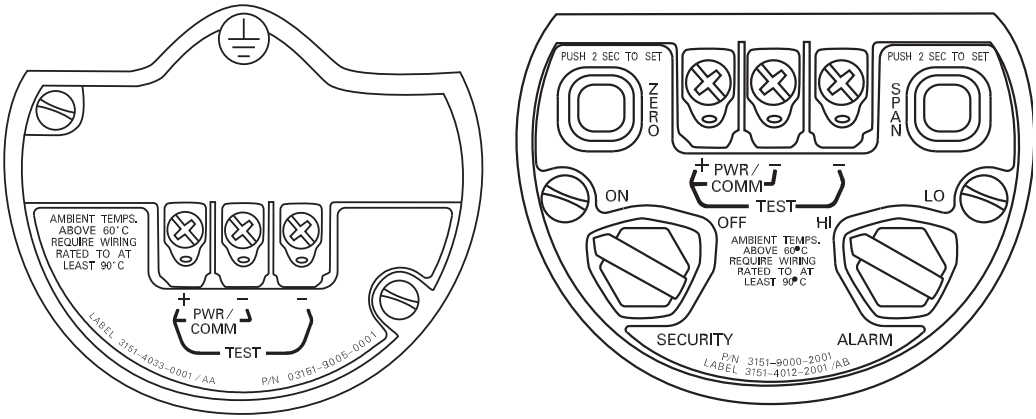
3.4.2 Wire the device

Use twisted pairs to yield best results. To ensure proper communication, use 24 to 14 AWG wire, and do not exceed 5000 ft. (1500 m).

Note
Determine local wiring and conduit requirements. Understand local wiring and conduit requirements prior to installation and be sure to follow all regulations during the transmitter's installation.

Figure 3-11. HART Terminal Blocks

Plantweb **Junction box**



To make connections, perform the following procedure:

1. Remove the housing cover on terminal compartment side. Do not remove the cover in explosive environments 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. Ensure full contact with Terminal Block screw and washer. When using a direct wiring method, wrap wire clockwise to ensure it is in place when tightening the terminal block screw.

Note
The use of a pin or ferrule wire terminal is not recommended as the connection may be more susceptible to loosening over time or under vibration.

4. 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

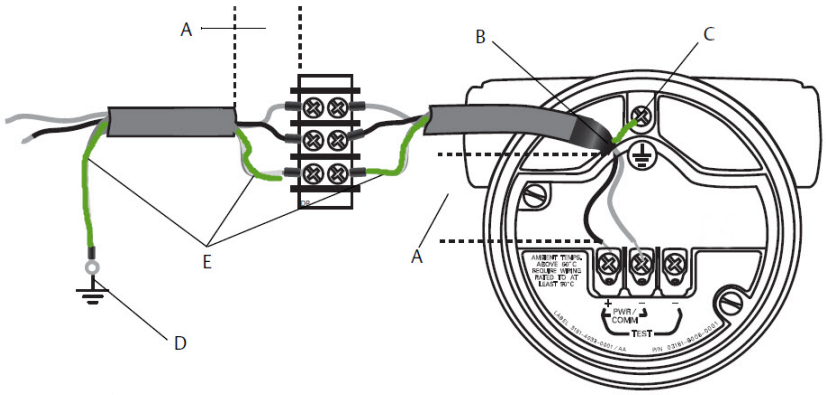
The transient protection terminal block can be ordered as an installed option (Option Code T1 in the transmitter model number) or as a spare part to retrofit existing Rosemount 3051S Transmitters in the field. For a complete listing of spare part numbers for transient protection terminal blocks, refer to page 81. 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. Grounding terminations are provided on the sensor module and inside the terminal compartment. These grounds are used when transient protect terminal blocks are installed or to fulfill local regulations. See Step 2 below for more information on how the cable shield should be grounded.

1. Remove the field terminals housing cover.
2. Connect the wiring pair and ground as indicated in Figure 3-12.
   a. The terminals are not polarity sensitive.
   b. The cable shield should:
      – Be trimmed close and insulated from touching the transmitter housing
      – Continuously connect to the termination point
      – Be connected to a good earth ground at the power supply end

Figure 3-12. Wiring



A. Minimize distance
B. Trim shield and insulate
C. Ground for transient protection
D. Connect shield back to the power supply ground
E. Insulate shield

3. Replace the housing cover. It is recommended that the cover be tightened until there is no gap between the cover and the housing.
4. Plug and seal unused conduit connections.

Note
A minimum loop resistance of 250 ohms is required to communicate with a Field Communicator. If a single power supply is used to power more than one Rosemount 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.

Note
Verify transmitter zero point after installation. To reset zero point, refer to "Sensor trim overview" on page 71.

Cover installation

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

3.4.3 Ground the transmitter housing

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 an 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 Rosemount 3051S Transmitters.

Table 3-2. Option Codes with External Ground Screw Included

Option code	Description
E1	ATEX Flameproof
N1	ATEX Type n
ND	ATEX Dust
E4	TIIS Flameproof
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E1, I1, N1, and ND)
E7	IECEx Flameproof, Dust ignition-proof
N7	IECEx Type n
K7	IECEx Flameproof, Dust ignition-proof, Intrinsic Safety, and Type n (combination of E7, I7, and N7)
KA	ATEX and CSA Explosion-proof, Intrinsically Safe, Division 2 (combination of E1, E6, I1, and I6)
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E1, I5, and I1)
T1	Transient terminal block
D4	External ground screw assembly

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.

3.4.4 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 Rosemount 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 3-13 on page 62 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. 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 ft. (31 m) depending upon cable capacitance

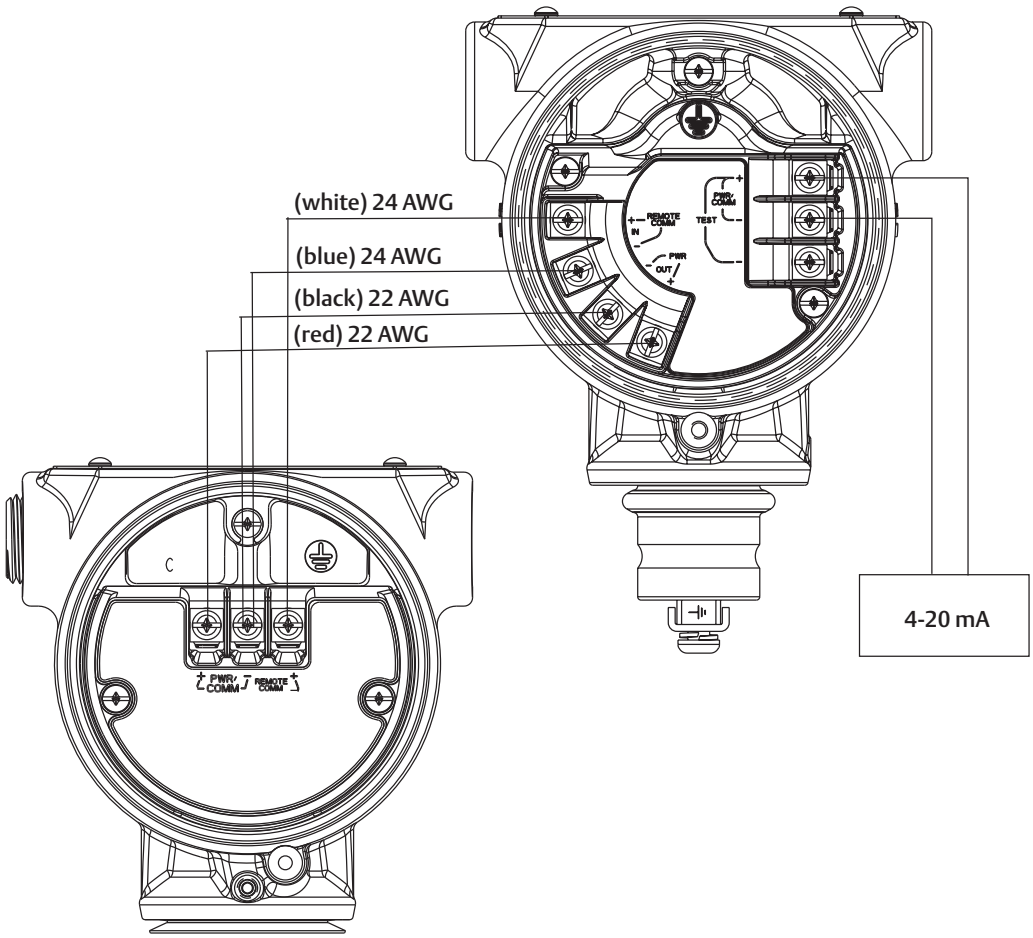
Cable capacitance: The capacitance as wired must be less than 5000 picofarads total. This allows up to 50 picofarads per ft. (0.3 m) for a 100 ft. (31 m) cable.

Intrinsic Safety Consideration: The transmitter assembly with remote display has been approved with Madison AWM Style 2549 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: Product Certifications 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.

Important
For ambient temperatures above 140 °F (60 °C), cable wiring must be rated at least 9 °F (5 °C) above the maximum ambient temperature.

Figure 3-13. Remote Mount Display Wiring Diagram



Note
Wire colors provided above are per Madison AWM Style 2549 cable. Wire color may vary depending on cable selected.

Madison AWM Style 2549 cable includes a ground shield. This shield must be connected to earth ground at either the SuperModule or the Remote Display, but not both.

3.4.5 eurofast®/minifast® connection

For Rosemount 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 "Installation Drawings" on page 191.

Reassembly of conduit receptacles

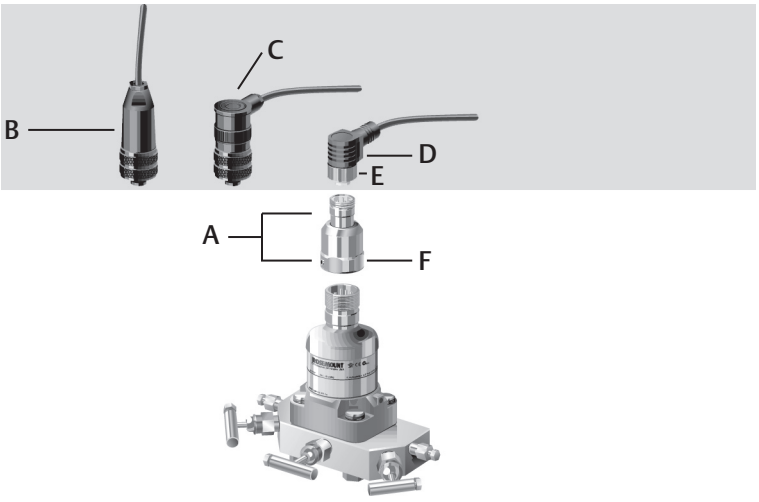
If the conduit receptacle is removed or replaced, follow the instructions below to re-wire the GE or GM conduit receptacle to the terminal block:

1. Connect the green/yellow lead wire to the internal ground screw.
2. Connect the brown lead wire to the terminal marked (+).
3. Connect the blue lead wire to the terminal marked (pwr/comm-).

3.4.6 Quick connect wiring

As standard, the Rosemount 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 3-14. Quick Connect Exploded View



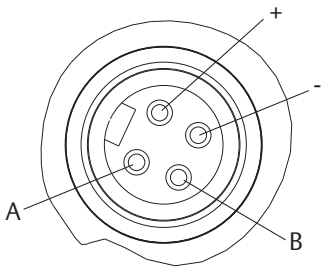
A. Quick Connect housing
B. Straight field wireable connector[1][3]
C. Right angle field wireable connector[2][3]
D. Cordset[4]
E. Cordset/field wireable coupling nut
F. Quick Connect coupling nut

1. Order part number 03151-9063-0001.
2. Order part number 03151-9063-0002.
3. Field wiring supplied by customer.
4. Supplied by cordset vendor.

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 3-15. Quick Connect Housing Pin-Out



A. Ground
B. No connection

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

3.4.7 Power the transmitter

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

See "Load limitations" on page 142.

3.4.8 Cover jam screw

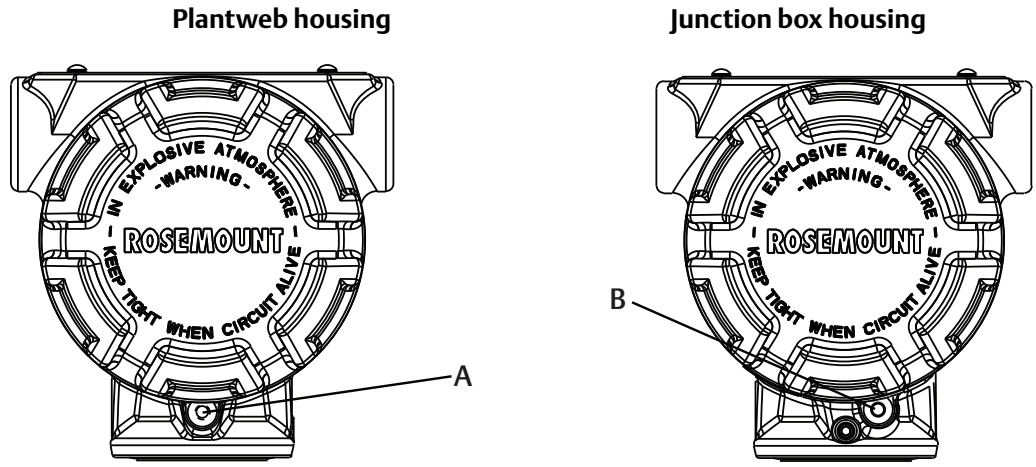
For transmitter housings shipped with a cover jam screw, as shown in Figure 3-16, the screw should be properly installed once the transmitter has been wired and powered up. The cover jam screw is intended to disallow the removal of the transmitter cover in flameproof environments without the use of tooling. Follow these steps to install the cover jam screw:

1. Verify the cover jam screw is completely threaded into the housing.
2. Install the transmitter housing cover and verify 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.

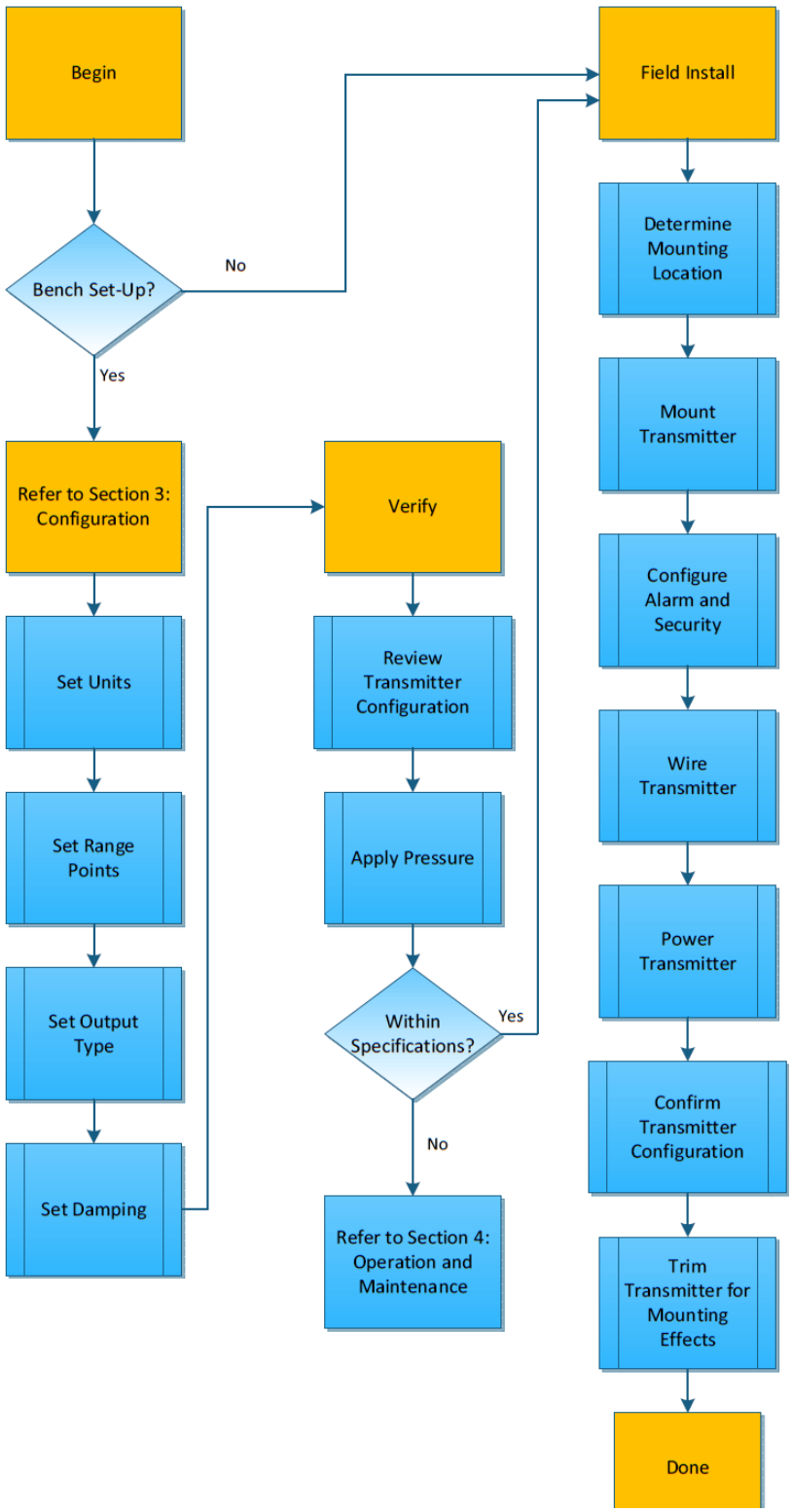
5. Verify the cover cannot be removed.

Figure 3-16. Cover Jam Screw



A. 2× cover jam screw (1 per side)
B. Cover jam screw

Figure 3-17. HART Installation Flowchart



Section 4 Operation and Maintenance

4.1 Overview

This section contains information on commissioning and operating Rosemount™ 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 Field Communicator version 3.3 and AMS Device Manager version 7.0. For convenience, Field Communicator Fast Key sequences are labeled "Fast Keys" for each software function below the appropriate headings.

4.2 Calibration for HART® protocol

Calibrating a Rosemount 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 Rosemount 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
Rosemount 3051S_ CD, 3051S_ CG, 3051S_ L, 3051S_TG, Range 1-4	1. Set output configuration parameters: a. Set the range points. b. Set the output units. c. Set the output type. d. Set the damping value. 2. Optional: Perform a sensor trim. (Accurate pressure source required) 3. Optional: Perform an analog output trim. (Accurate multimeter required)	1. Reconfigure parameters if necessary. 2. Zero trim the transmitter to compensate for mounting effects or static pressure effects.
Rosemount 3051S_ CA, 3051S_ TA, 3051S_ TG, Range 5	1. Set output configuration parameters: a. Set the range points. b. Set the output units. c. Set the output type. d. Set the damping value. 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. 3. Optional: Perform an analog output trim (Accurate multimeter required)	1. Reconfigure parameters if necessary. 2. Perform low trim value section of the sensor trim procedure to correct for mounting position effects.

Note:
A Field 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 (Range 4 and 5)" on page 77).

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

4.2.1 Calibration overview

Complete calibration of the Rosemount 3051S involves the following tasks:

Configure the analog output parameters

- Set Process Variable Units (page 20)
- Set Output Type (page 20)
- Rerange (page 22)
- Set Damping (page 24)

Calibrate the sensor

- Sensor Trim (page 72)
- Zero Trim (page 72)

Calibrate the 4–20 mA output

- 4–20 mA Output Trim (page 74); or
- 4–20 mA Output Trim Using Other Scale (page 75)

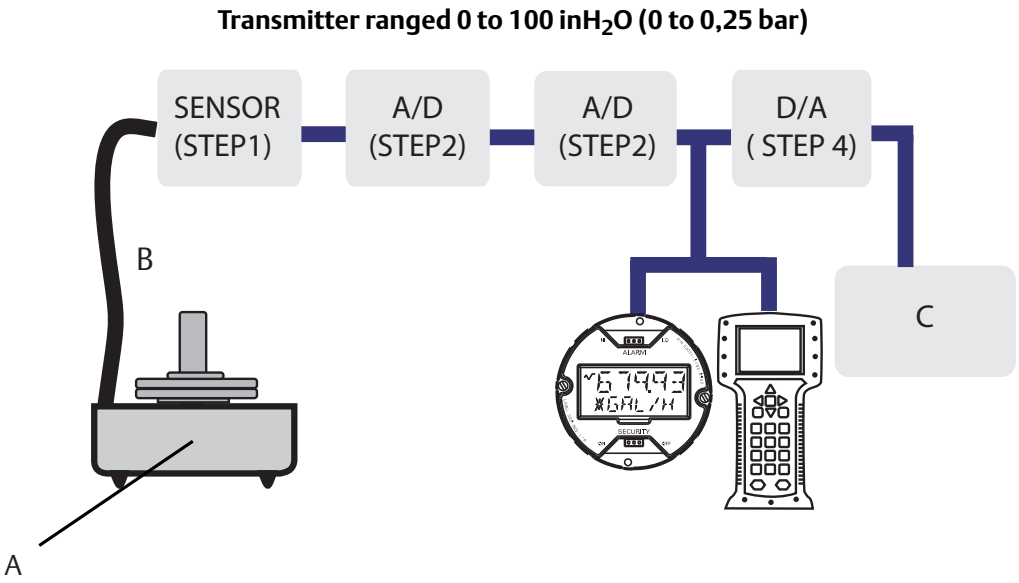
Figure 4-1 on page 69 illustrates Rosemount 3051S Transmitter data flow. Data flow can be summarized in four major steps:

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 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 transmitter for bench or field calibration.

Figure 4-1. Transmitter Data Flow with Calibration Options



A. Pressure source
B. Output: 100 inH_2O
C. Output: 20.00 mA

4.2.2 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:	Rosemount 3051S_CD, range 2A [URL= 250 inH_2O(623 mbar)], classic performance
Calibrated span:	150 inH_2O (374 mbar)
Ambient temperature change:	± 50 °F (28 °C)
Line pressure:	500 psig (34.5 bar)

Step 3: Calculate 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.

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

4.2.3 Selecting 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 Field Communicator or AMS Device Manager, and a digital readout device to the transmitter.
2. Establish communication between the transmitter and the Field 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 Field Communicator or the *Process Variables* screen in AMS Device Manager. For instructions on how to access process variables, see page 19 of Section 2: 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 71 to determine which trim to perform.
5. Compare the Analog Output (AO) line, on the Field Communicator or AMS Device Manager, 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 74.

4.2.4 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 50.

Note
Do not perform a zero trim on Rosemount 3051S Absolute Pressure Transmitters. Zero trim is zero based, and absolute pressure transmitters reference absolute zero. To correct mounting position effects on an 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 2-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.

4.2.5 Zero trim

Fast Keys	1, 2, 3, 3, 1
Device Dashboard Fast Keys	3, 4, 1, 3

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

Field Communicator

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

1. Vent the transmitter and attach a Field Communicator to the measurement loop.
2. From the *HOME* screen, follow the Fast Key sequence Zero Trim.
3. Follow the commands provided by the Field Communicator to complete the zero trim adjustment.

AMS Device Manager

1. Right click on the device and select **Calibrate** then **Zero trim** from the menu.
2. Set the control loop to manual, then select **Next**.
3. Select **Next** to acknowledge warning.
4. Apply appropriate pressure to sensor, then select **Next** .
5. Select **Next** to acknowledge the loop can be returned to automatic control.
6. Select **Finish** to acknowledge the method is complete.

4.2.6 Sensor trim

Fast Keys	1, 2, 3, 3
Device Dashboard Fast Keys	3, 4, 1

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

Field Communicator

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

1. Assemble and power the entire calibration system including a transmitter, Field 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 22 of Section 2: Configuration. The transmitter allows approximately five percent deviation.

4. Follow the commands provided by the Field Communicator to complete the adjustment of the lower value.
5. Repeat for the upper value, in Step 3, Select **3:Upper sensor trim**.

AMS Device Manager

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. Set the control loop to manual, then select **Next**.
3. Apply appropriate pressure to sensor, then select **Next**.
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**, then **Sensor trim** from the menu**.**
7. Select **Upper sensor trim** and repeat steps 2-5.

4.2.7 Recall factory trim—sensor trim

Fast Keys	1, 2, 3, 4, 1
Device Dashboard Fast Keys	3, 4, 3

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.

Field Communicator

Enter the Fast Key sequence Recall Factory Trim—Sensor Trim.

AMS Device Manager

1. Right click on the device and select **Calibrate** then **Recall Factory Trim** from the menu.
2. Set the control loop to manual, then select **Next**.
3. Select **Sensor trim** under *Trim to recall* and select **Next**.
4. Select **Next** to acknowledge restoration of trim values is complete.
5. Select **Next** to acknowledge the loop can be returned to automatic control.
6. Select **Finish** to acknowledge the method is complete.

4.2.8 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 69).

4.2.9 Digital-to-analog trim

Fast Keys	1, 2, 3, 2, 1
Device Dashboard Fast Keys	3, 4, 2

Field Communicator

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

1. From the *HOME* screen, enter the Fast Key sequence Digital-to-Analog Trim.
2. Select **OK** after setting the control loop to manual, see "Setting the loop to manual" on page 6.
3. 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.
4. Select **OK** after connecting the reference meter.
5. Select **OK** at the *SETTING FLD DEV OUTPUT TO 4 MA* prompt. The transmitter outputs 4.0 mA.
6. Record the actual value from the reference meter, and enter it at the *ENTER METER VALUE* prompt. The Field Communicator prompts you to verify whether or not the output value equals the value on the reference meter.
7. 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 8.
   b. If 2 is selected: **No**, repeat Step 7.
8. Select **OK** at the *SETTING FLD DEV OUTPUT TO 20 MA* prompt, and repeat Step 5 and Step 6 until the reference meter value equals the transmitter output value.
9. Select **OK** after the control loop is returned to automatic control.

AMS Device Manager

1. Right click on the device and select **Calibrate** then **D/A Trim** from the menu.
2. Set the control loop to manual, then select **Next**.
3. Connect the reference meter., then select **Next**
4. Select **Next** at the *Setting fld dev output to 4 mA* screen.
5. Record the actual value from the reference meter, and enter it at the *Enter meter value* screen and select **Next**.
6. Select **Yes**, if the reference meter value equals the transmitter output value, or **No** if it does not. Select **Next**.
   a. If Yes is selected, proceed to Step 7.
   b. If No is selected, repeat Step 5.
7. Select **Next** at the *Setting fld dev output to 20mA* screen.
8. Repeat Step 5 - Step 6 until the reference meter equals the transmitter output value.
9. Select **Next** to acknowledge the loop can be returned to automatic control.
10. Select **Finish** to acknowledge the method is complete.

4.2.10 Digital-to-analog trim using other scale

Fast Keys	1, 2, 3, 2, 2
Device Dashboard Fast Keys	3, 4, 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 (i.e., 1–5 volts if measuring across a 250 ohm load, or 0–100 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 23 mA output (maximum alarm value) with additional loop resistance.

Field Communicator

Enter the Fast Key sequence Digital-to-Analog Trim Using Other Scale.

AMS Device Manager

1. Right click on the device and select **Calibrate** then **Scaled D/A trim** from the menu.
2. Set the control loop to manual, select **Next**.
3. Select **Change** to change scale and select **Next**.
4. Enter Set scale-Lo output value, select **Next**.
5. Enter Set scale-Hi output value, select **Next**.
6. Select **Next** to proceed with Trim.
7. Connect the reference meter, select **Next**.

8. Select **Next** at the *Setting fld dev output to 4 mA* screen.
9. Record the actual value from the reference meter, and enter it at the *Enter meter value* screen and select **Next**.
10. Select **Yes**, if the reference meter value equals the transmitter output value, or **No** if it does not. Select **Next**.
    a. If Yes is selected, proceed to Step 11.
    b. If No is selected, repeat Step 9.
11. Select **Next** at the *Setting fld dev output to 20mA* screen.
12. Repeat Step 9 - Step 10 until the reference meter equals the transmitter output value.
13. Select **Next** to acknowledge the loop can be returned to automatic control.
14. Select **Finish** to acknowledge the method is complete.

4.2.11 Recall factory trim—analog output

Fast Keys	1, 2, 3, 4, 2
Device Dashboard Fast Keys	3, 4, 3

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.

Field Communicator

Enter the Fast Key sequence Recall Factory Trim—Analog Output.

AMS Device Manager

1. Right click on the device and select **Calibrate**, then **Recall Factory Trim** from the menu.
2. Set the control loop to manual, then select **Next**.
3. Select **Analog output trim** under *Trim to recall* and select **Next**.
4. Select **Next** to acknowledge restoration of trim values is complete.
5. Select **Next** to acknowledge the loop can be returned to automatic control.
6. Select **Finish** to acknowledge the method is complete.

4.2.12 Line pressure effect (Range 2 and 3)

The following specifications show the static pressure effect for the Rosemount 3051S Range 2 and 3 Pressure Transmitters used in differential pressure applications where line pressure exceeds 2000 psi (138 bar).

Zero effect

Ultra and Ultra for Flow:	± 0.05% of the upper range limit plus an additional ± 0.1% of upper range limit error for each 1000 psi (69 bar) of line pressure above 2000 psi (138 bar).
Classic:	± 0.1% of the upper range limit plus an additional ± 0.1% 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) for Ultra performance transmitter. Zero effect error calculation:

± {0.05 + 0.1 × [3 kpsi - 2 kpsi]} = ± 0.15% of the upper range limit

Span effect

Refer to "Line pressure effect (Range 2 and 3)" on page 76.

4.2.13 Compensating for line pressure (Range 4 and 5)

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 Rosemount 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 Rosemount 3051S Range 4 and 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 72.

The following specifications show the static pressure effect for the Rosemount 3051S Range 4 and 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 × [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 –0.85% of reading per 1000 psi (69 bar) for Range 4 transmitters, and –0.95% 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 inH_2O (1.2 bar) and 20 mA at 1500 inH_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 × (LRV) × P

Where:

- LT = Corrected low trim value
- LRV = Lower range value
- S = –(Span shift per specification)
- P = Static line pressure

HT = URV + S × (URV) × 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 inH_2O (3.74 bar)
- LRV = 500 inH_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 inH_2O (1.26 bar)

To calculate the high trim (HT) value:

- HT = 1500 + (0.01/1000)(1500)(1200)
- HT = 1518 inH_2O (3.78 bar)

Complete a sensor trim and enter the corrected values for low trim (LT) and high trim (HT), refer to "Sensor trim" on page 72.

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

Note
After sensor trimming Rosemount 3051S Range 4 and 5 Transmitters for high differential pressure applications, verify the 4 and 20 mA points are at the correct values using the Field 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.

4.2.14 Diagnostic messages

In addition to output, the LCD displays abbreviated operation, error, and warning messages for trouble-shooting. Messages appear according to their priority; normal operating messages appear last. To determine the cause of a message, use a Field Communicator or AMS Device Manager to further interrogate the transmitter. A description of each LCD display 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 Field Communicator or AMS Device Manager 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 84.

Fail configuration

A memory fault has been detected in a location that could affect transmitter operation, and is user-accessible. To correct this problem, use a Field Communicator or AMS Device Manager 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.

LCD update error

A communications error has occurred between the LCD display and the SuperModule. Verify the LCD display is firmly seated by squeezing the two tabs, pulling the LCD display out, making sure the pins are in the feature board and snapping the LCD display aback into place. If this does not clear the error, replace the LCD display.

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 Field Communicator or AMS Device Manager to interrogate and reconfigure the appropriate portion of the transmitter memory. This warning does not affect 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 rangedown 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 rangedown allowed for a particular range, or the pressure sensed by the transmitter exceeds the sensor limits.

Keys disable

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 Field Communicator or AMS Device Manager. 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.

4.3 Field upgrades

4.3.1 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.

4.3.2 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 "Spare parts" on page 97 for ordering information.

Hardware adjustments

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.

Advanced HART diagnostics

The DA2 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 03151-9071-0001). 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 and before putting the transmitter back into operation.

FOUNDATION™ Fieldbus

FOUNDATION Fieldbus Upgrade Kits are available for Plantweb housings. Each kit includes an electronics assembly and terminal block. To upgrade to FOUNDATION Fieldbus, replace the existing electronics assembly with the FOUNDATION Fieldbus Output Electronics assembly (P/N 03151-9020-0001) and replace the existing terminal block with the FOUNDATION Fieldbus terminal block (part number will vary based on the kit selected). Table 4-2 shows the available kits.

Table 4-2. FOUNDATION Fieldbus Upgrade Kits

Kit	Part number
Standard FOUNDATION Fieldbus Upgrade kit	03151-9021-0021
Transient Protection FOUNDATION Fieldbus Upgrade kit	03151-9021-0022
FISCO FOUNDATION Fieldbus Upgrade kit	03151-9021-0023

Refer to "Disassembly procedures" on page 84 for information on assembly.

Section 5 Troubleshooting

5.1 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 Field 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.

5.2 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.

⚠ 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 Rosemount™ 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. Troubleshooting

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

5.3 Disassembly procedures

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

5.3.1 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 PTFE 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 Rosemount 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 Rosemount 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.

5.3.2 Remove terminal block

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

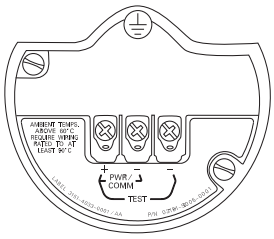
Plantweb™ housing

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

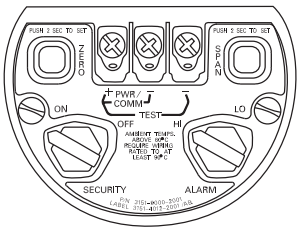
Junction box housing

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

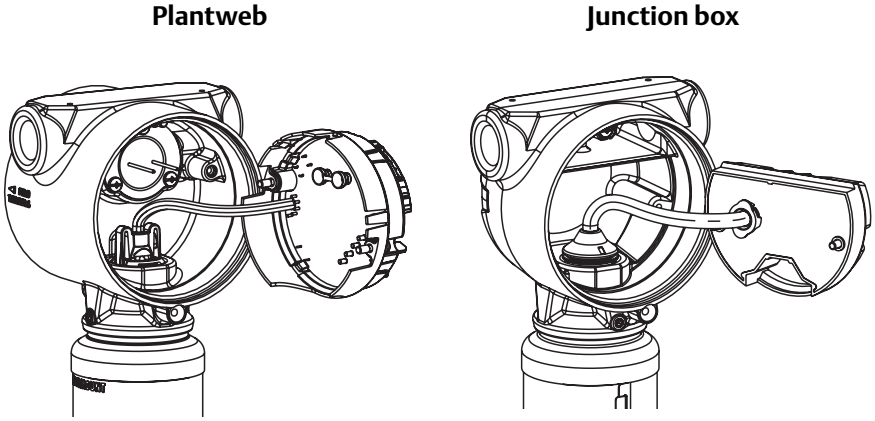


5.3.3 Remove interface assembly

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 push in the two tabs at the point where they meet the SuperModule and pull upwards (avoid pulling wires.) Housing rotation may be required to access locking tabs (Plantweb housing only.)

Figure 5-1. SuperModule Connector View

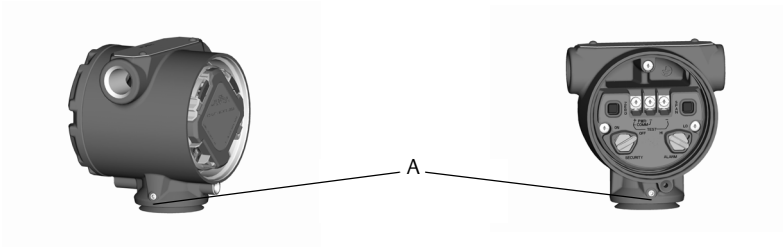


5.3.4 Remove the SuperModule from the housing

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 $^{3}/_{32}$-in. hex wrench, then rotate back one full turn.
2. Unscrew the housing from the SuperModule.

Plantweb **Junction box**



A. Housing rotation set screw ($^{3}/_{32}$-in.)

5.4 Reassembly procedures

important
The V-seal must be installed at the bottom of the housing.

5.4.1 Attach SuperModule to 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 $^{3}/_{32}$-in. hex wrench.

5.4.2 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.

5.4.3 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 49.

5.4.4 Reassemble the process flange

1. Inspect the SuperModule PTFE 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 on page 21 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-A449 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)
Alloy K-500 —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 PTFE 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.

5.5 Service support

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

Within the United States, call the Emerson 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 Instrument and Valves Response Center representatives will explain the additional information and procedures necessary to return goods exposed to hazardous substances.

Section 6 Safety Instrumented Systems

6.1 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.

⚠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.

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.

6.2 Certification

The Rosemount™ 3051S Safety Certified Pressure Transmitter is certified to:
Low Demand; Type B
SIL 1 and SIL 2 Capability for hardware (single use transmitter)
SIL 3 Capability for software (multiple use transmitter)

6.2.1 Rosemount 3051S safety certified identification

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

Note
There are several versions of the safety certified Rosemount 3051S pressure transmitters. For the Rosemount 3051S, Safety Instrumented Systems . With option code DA2 (advanced Diagnostics)"Advanced HART® Diagnostic Suite" on page 99. With a yellow SIS circuit board, refer to the Safety-Certified Manual Supplement.

identify a safety certified Rosemount 3051S with Advanced HART Diagnostics:

1. Connect a HART host to the transmitter.
2. Check transmitter revision numbers to verify that Electronics SW rev is 10 or higher and Sensor SW rev is 5 or higher.

Fast Key Sequence - 1, 7, 2

Revision Numbers	
Field Device	3
Electronics Software	10 or higher
Electronics Hardware	1
Sensor Software	5 or higher

3. Verify that option code DA2 is included in the transmitter model code.

Installation is to be performed by qualified personnel.

6.3 Installation

Installations are to be performed by qualified personnel. No special installation is required in addition to the standard installation practices outlined in Section 3 of this document. Always ensure a proper seal by installing the electronics housing cover(s) so that metal contacts metal if housing is used.

Environmental and operational limits are available in Appendix A: Specifications and Reference Data.

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 be in the "ON" position during normal operation. See Figure 6-2, "Security and alarm configuration (option D1)" on page 94. 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.

6.4 Configuring in SIS applications

Use any HART capable configuration tool to communicate with and verify configuration of the Rosemount 3051S.

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 Field Communicator Reference Manual. AMS Device Manager help can be found in the Wireless online guides within the Wireless system.

6.4.1 Damping

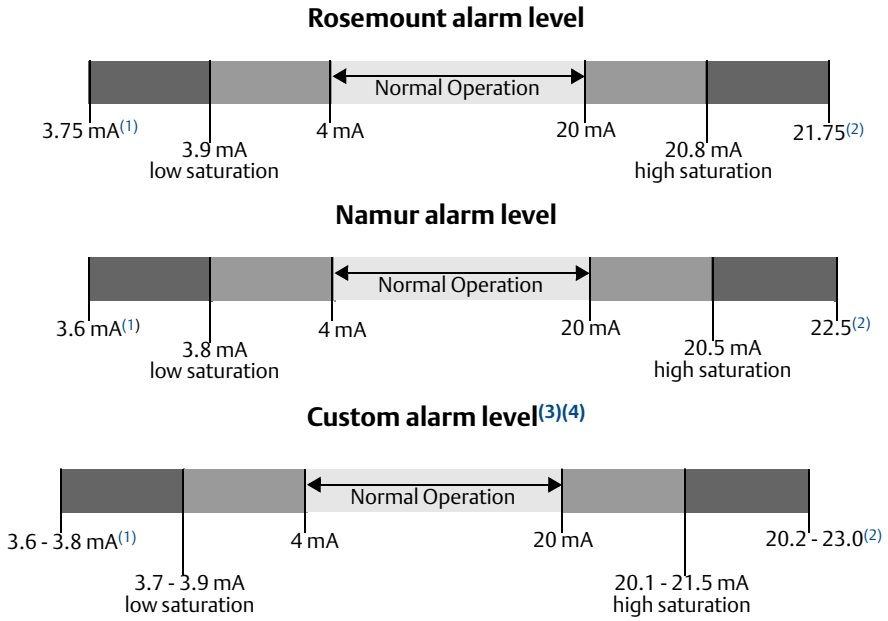
Fast Key sequence	2, 2, 1, 5

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. See "Damping" on page 24.

6.4.2 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	2, 1, 5
Saturation levels Fast Key	2, 1, 5

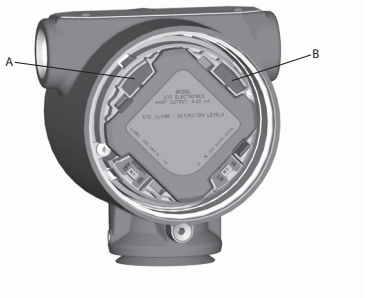
2. Manually set the direction for the Alarm to HI or LO using the ALARM switch as shown in Figure 6-2.

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:

Alaerm levels Fast Key	2, 1, 5
Saturation levels Fast Key	2, 1, 5
Alarm direction Fast Key	1, 7, 5, 1

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



A. Security
B. Alarm

6.5 Operation and maintenance

6.5.1 Proof test

The following proof tests are recommended. Proof test results and corrective actions taken must be documented at Emerson.com/Rosemount/Safety-Web-Apps/Report-A-Failure (Report a Failure button) in the event that an error is found in the safety functionality.

Use “Traditional Fast Key sequence” on page 17 to perform a Loop Test, Analog Output Trim, or Sensor Trim.

Partial proof test

A suggested proof test consists of an analog output loop test. This test will detect ~41 percent of possible DU failures in the device when PATC is not utilized. Power Advisory and Transmitter Power

Consumption (PATC) must both be enabled and set to alarm values to use the “Comprehensive Proof Test - PATC Diagnostics Enabled”.

Required tools: Field Communicator and mA meter.

Steps for partial proof test

1. Bypass the safety function and take appropriate action to avoid a false trip.
2. Use HART communications retrieve any diagnostics and take appropriate action.
3. Send a HART command to the transmitter to go to the high alarm current output and verify that the analog current reaches that value.
4. Send a HART command to the transmitter to go to the low alarm current output and verify that the analog current reaches that value.
5. Remove the bypass and otherwise restore normal operation.

Note
The partial proof test checks for possible quiescent current related failures, and for voltage problems such as a low loop power supply voltage or increased wiring distance, and other possible errors.

Comprehensive proof test

The alternative proof test consists of the following steps. This test will detect approximately 92 percent of possible DU failures in the Rosemount 3051S, coplanar configuration, and 95 percent of possible DU failure for the In-Line configuration.

Required tools: Field Communicator and pressure calibration equipment.

Steps for comprehensive proof test

1. Bypass the safety function and take appropriate action to avoid a false trip.
2. Use HART Communications retrieve any diagnostics and take appropriate action.
3. Send a HART command to the transmitter to go to the high alarm current output and verify that the analog current reaches that value.
4. Send a HART command to the transmitter to go to the low alarm current output and verify that the analog current reaches that value.
5. Perform a two-point calibration of the transmitter over the full working range.
6. Remove the bypass and otherwise restore normal operation.

Note
The user determines the proof test requirements for impulse piping.
The partial proof test checks for possible quiescent current related failures, and for voltage problems such as a low loop power supply voltage or increased wiring distance, and other possible errors.

Comprehensive proof test- PATC Diagnostics Enabled

This proof test with e PATC diagnostics enabled will detect ~ 78 percent of DU failures in the device.

Required tools: Field Communicator and pressure calibration equipment.

Steps for comprehensive proof test

1. Bypass the safety function and take appropriate action to avoid a false trip.
2. Use HART Communications retrieve any diagnostics and take appropriate action.
3. Perform a two-point calibration of the transmitter over the full working range.
4. Remove the bypass and otherwise restore normal operation.

When the Power Advisory and Transmitter Power Consumption (PATC) diagnostics are enabled and alarm values configured, the testing functionality describes in Step 3 and 4 of the partial and comprehensive proof test. This eliminates the need for the partial proof test, simplifies the comprehensive proof test, and thereby reduces the total proof test workload.

6.5.2 Inspection

Product repair

The Rosemount 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 Emerson.com/Rosemount/Safety-Web-Apps/Report-A-Failure

6.6 Specifications

The Rosemount 3051S must be operated in accordance to the functional and operational specifications provided in the Appendix A: Specifications and Reference Data.

6.6.1 Failure rate data

The FMEDA report includes failure rates.

The report is available at Emerson.com/Rosemount/Safety-Products.

Failure values

Safety accuracy: ±2.0% of analog output span [(1)]
Transmitter response time: 1.5 seconds
Self-diagnostics test: At least once every 60 minutes

6.6.2 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 Emerson.com/Rosemount/Safety-Web-Apps/Report-A-Failure.

1. *Trip values in the DCS or safety logic solver should be derated by this device safety accuracy.*

6.7 Spare parts

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

Section 7 Advanced HART® Diagnostic Suite

7.1 Overview

The Advanced HART Diagnostic Suite is an extension of the Rosemount™ 3051S Series of Instrumentation and takes full advantage of the scalable architecture. The Rosemount 3051S SuperModule™ Platform generates the pressure measurement while the diagnostic electronics board is mounted in the Plantweb™ housing and plugs into the top of the SuperModule. The electronics board communicates with the SuperModule and produces standard 4–20 mA and HART outputs while adding advanced diagnostic capability.

Note
When a new SuperModule is connected to the diagnostic electronics board for the first time, the transmitter will be in alarm state until pressure range is specified.

The Advanced HART Diagnostics Suite is designated by the option code “DA2” in the model number. All options can be used with DA2 except the following:

- FOUNDATION™ Fieldbus protocol (Output code F)
- Wireless (Output code X)
- Quick Connect (Housing code 7J)
- Junction box (Housing code 2A, 2B, 2C, 2J)
- Remote display (Housing code 2E, 2F, 2G, 2M)

The HART Diagnostic transmitter has seven 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. Statistical Process Monitoring (SPM) – SPM technology detects 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, standard deviation, and coefficient of variation) under normal conditions and then analyzing the recorded baseline values to current values over time. If a significant change in the current values is detected, the transmitter can generate HART alerts or analog alarms, depending on user configuration. The condition is time stamped and is also noted on LCD display.

   The statistical values are also available as secondary variables from the transmitter via HART. Users can trend their process noise signature, perform their own analysis or generate their own alarms or alerts based on the secondary variables. Trending of statistical values in an analog system can be done with the Wireless 775 THUM™ Adapter or Rosemount 333 Tri-Loop™. Refer to pages 131 and 132 for more details.

2. Power Advisory Diagnostic – This diagnostic functionality detects changes in the characteristics of the electrical loop that may jeopardize loop integrity. This is done by characterizing the electrical loop after the transmitter is installed and powered up in the field. If terminal voltage deviates outside of user configured limits, the transmitter can generate HART alerts or analog alarms.
3. Diagnostic Log – The transmitter logs up to ten device status events, each associated with the time stamp of when the event occurred. Referencing this log allows for better understanding of the device health and can be used in conjunction with device troubleshooting.
4. Variable Log – The transmitter logs the following values: Minimum and Maximum Pressure and Minimum and Maximum Temperature with independent time stamped values. The transmitter also logs total elapsed time in over-pressure or over-temperature conditions and number of pressure or temperature excursions outside of sensor limits.
5. Process Alerts – These are configurable alerts for both process pressure and sensor temperature. Users can receive a HART alert if pressure or temperature exceeds threshold limits. The time stamp of when the alert occurred and the number of alert events is also recorded in the transmitter. When alert is active, this notification is displayed on the LCD display.
6. Service Alerts – This is a configurable service reminder that generates a HART alert after user-specified time has expired. When alert is active, this notification is displayed on the LCD display.
7. Time Stamp – The diagnostic electronics board includes an embedded Operational Hours clock whose purpose is two-fold.
   a. Provides 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:DD: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.

7.2 User interface

The Rosemount 3051S with Advanced HART Diagnostic Suite can be used with any asset management software that supports Electronic Device Description Language (EDDL) or FDT/DTM.

Advanced HART Diagnostics is best viewed and configured using the latest Device Dashboard interface based on Human Centered Design concepts. The Device Dashboard can be obtained with DD revision 3051S HDT Dev. 3 Rev. 1.

The following screen shots are taken from Emerson™'s AMS Device Manager, version 10.5. All screens shown are based on the Device Dashboard interface.

Figure 7-1. Device Dashboard

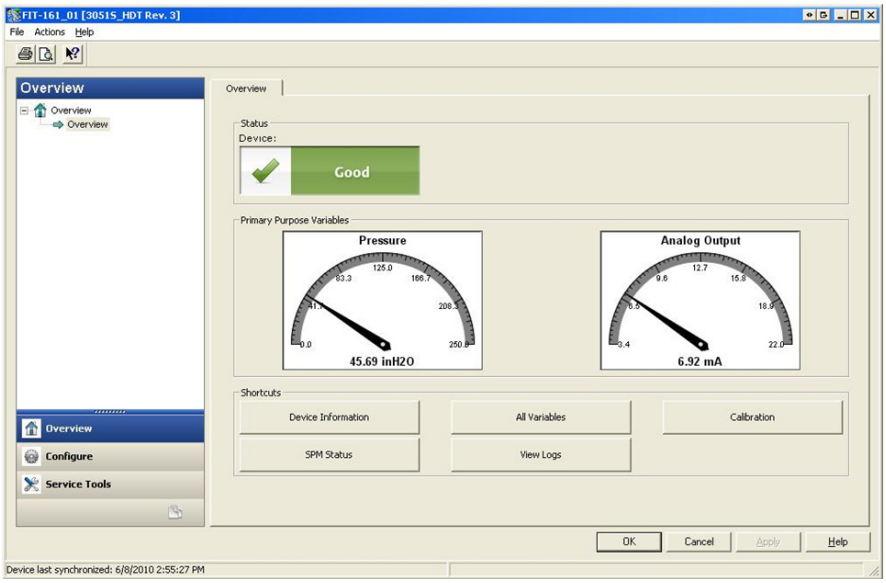


Figure 7-1 is the landing screen for the Rosemount 3051S with Advanced HART Diagnostic Suite. The device status will change if any device alerts are active. Graphical gauges provide quick reading of the primary purpose variables. Shortcut buttons are available for the most common tasks.

7.2.1 Diagnostic action settings

Each diagnostic allows the user to select a type of action to take if the diagnostic is tripped.

None – Transmitter provides no indication that any trip values were exceeded or the diagnostic is turned off.

Alert Unlatched – Transmitter generates digital HART alert and does not affect the 4–20 mA signal. When conditions return to normal or within threshold levels, the alert is automatically cleared.

Alert Latched – Transmitter generates digital HART alert and does not affect the 4–20 mA signal. When conditions return to normal, an alert reset is required to clear the status. This type of alert action is recommended if a third party alert monitor software is likely to miss alerts due to slow polling of HART data.

Alarm – Transmitter drives mA output to the configured Failure Alarm level (HIGH or LOW).

7.3 Statistical process monitoring

7.3.1 Introduction

SPM 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 the Rosemount 3051S and software resident in the diagnostic electronics to compute statistical parameters that characterize and quantify the noise or variation. These statistical parameters are the mean, standard deviation, and coefficient of variation 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 is affected by changes in noise level while the mean or average value remains constant. Figure 7-3 shows an example of how the coefficient of variation is affected by changes in the standard deviation and mean.

The calculation of the statistical parameters within the device is accomplished on a parallel software 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 Effect on Statistical Parameters

Standard Deviation increases or decreases with changing noise level.

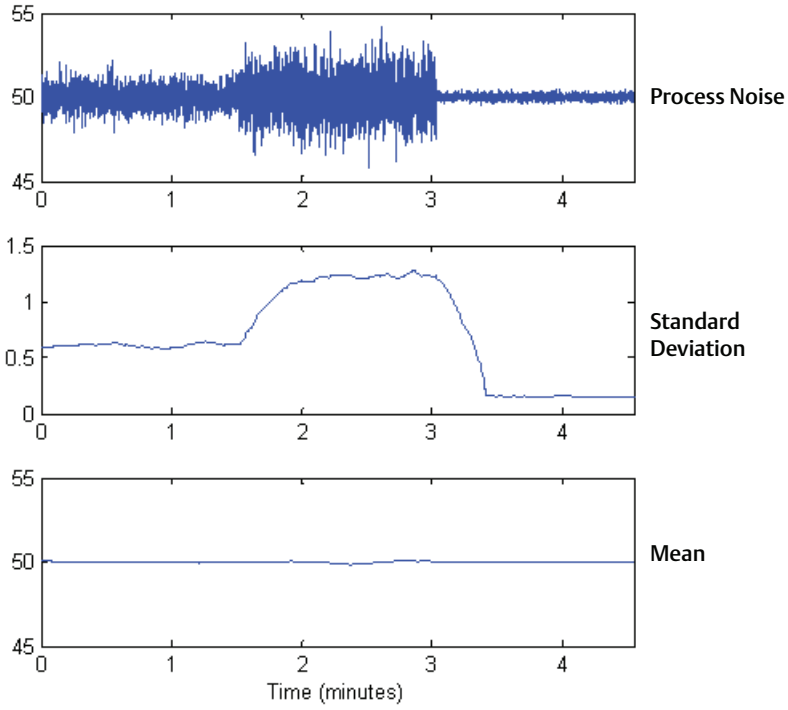
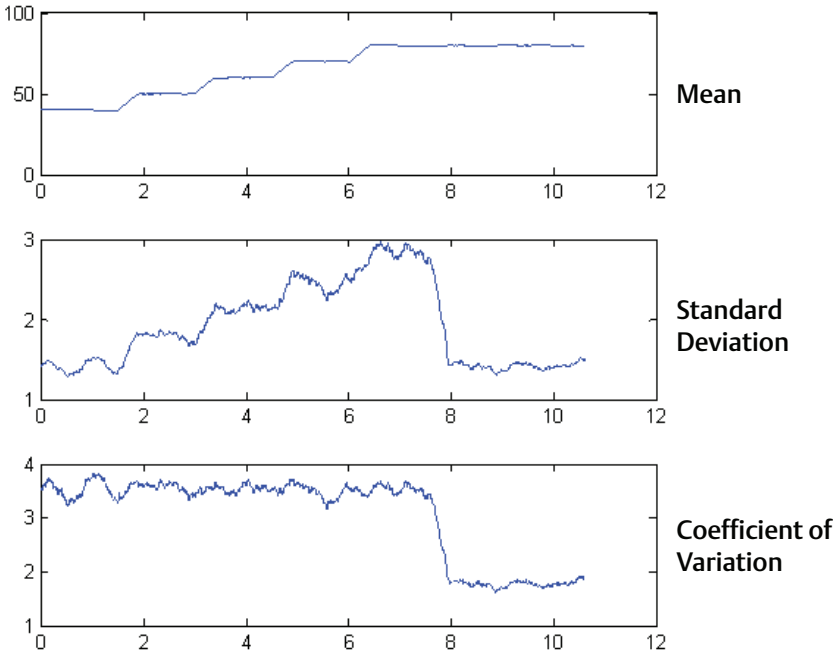


Figure 7-3. CV is the Ratio of Standard Deviation to Mean

CV is stable if Mean is proportional to Standard Deviation.



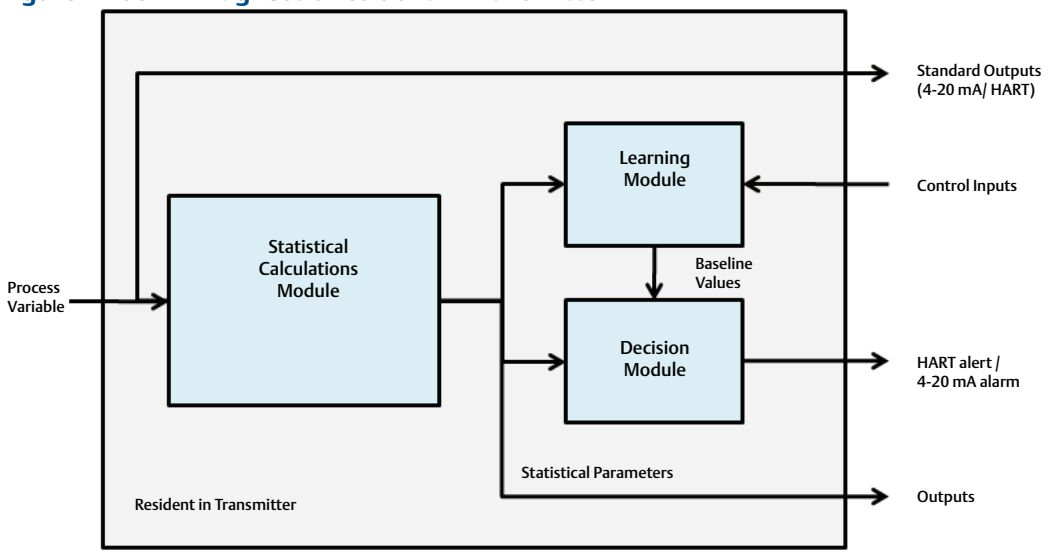
SPM provides statistical information to the user in two ways. First, the statistical parameters can be made available to the host system directly via HART communication protocol or HART to other protocol converters. Once available, the system can make use of these statistical parameters to indicate or detect a change in process conditions. In the simplest example, the statistical values may be stored in a data 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.

The second way for SPM to provide statistical information is with software embedded in the Rosemount 3051S. The Rosemount 3051S uses SPM to baseline the process noise or signature via a learning process. Once the learning process is completed, the user can set thresholds for any of the statistical parameters. The device itself can then 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.

7.3.2 Overview

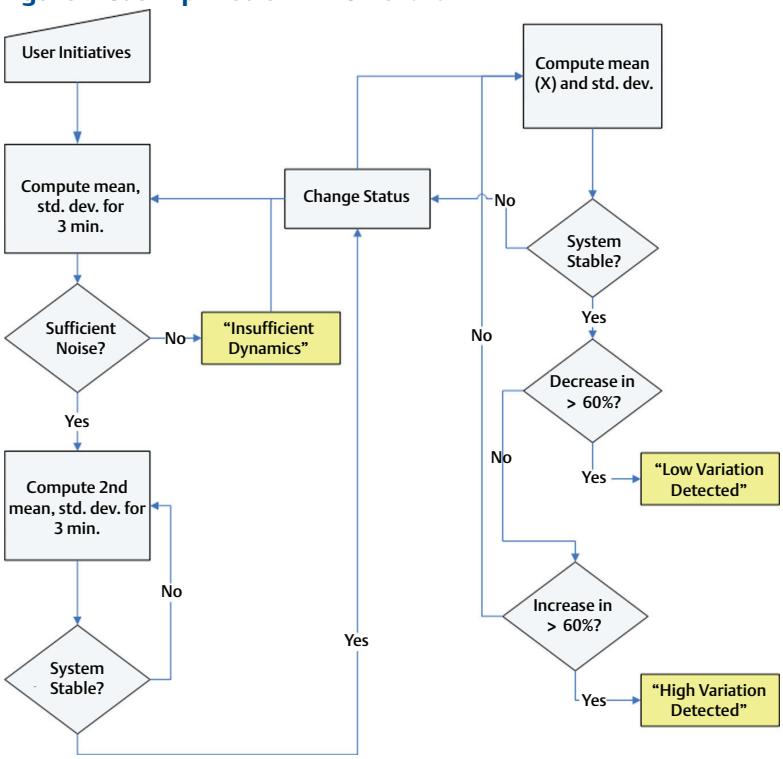
A block diagram of the SPM diagnostic is shown in Figure 7-4. The pressure process variable is input to a module where basic high pass filtering is performed on the pressure signal. The mean (or average) is calculated on the unfiltered pressure signal, the standard deviation calculated from the filtered pressure signal. These statistical values are available via HART and handheld communication devices like the Field Communicator or asset management software like Emerson'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 Wireless 775 THUM Adapter or Rosemount 333 HART Tri-Loop.

Figure 7-4. SPM Diagnostic Resident in 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 statistical values. 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 7-5. Simplified SPM Flowchart



Further detail of the operation of the SPM diagnostic is shown in the Figure 7-5 flowchart. This is a simplified version showing operation using the default values. While SPM continuously calculates the mean, standard deviation, and coefficient of variation values, the learning and decision modules must be turned on to operate. Once enabled, SPM enters the learning/verification mode and the status will be "Learning". The baseline statistical values are calculated over a period of time controlled by the user (Learning/Monitoring Period; default is three minutes). 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 change 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, statistical values of mean, standard deviation, and coefficient of variation are continuously calculated, with new values available every second. When using mean and standard deviation as the SPM variables, 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 and exceeds configured sensitivity thresholds, this may indicate a change has occurred in the process, equipment, or transmitter installation and a HART alert or analog alarm is generated.

For DP flow applications where the mean pressure is likely to change due to changing process operation, the recommended SPM variable for process diagnostics is the coefficient of variation. Since the coefficient of variation is the ratio of standard deviation to mean, it represents normalized process noise values even when the mean is changing. If the coefficient of variation changes significantly relative to the baseline and exceeds sensitivity thresholds, the transmitter can generate a HART alert or analog alarm.

Note
SPM 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 SPM will accurately detect each specific condition under all circumstances.

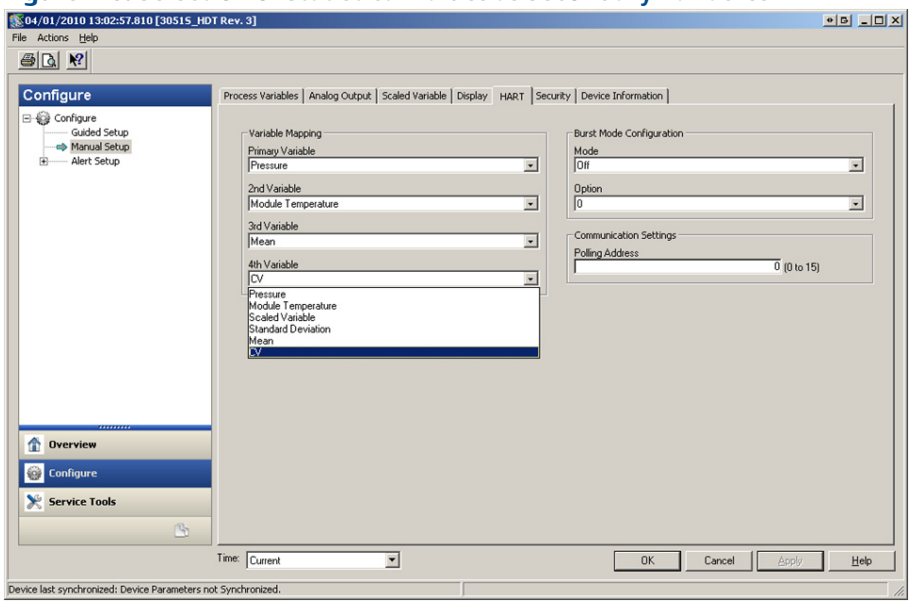
7.3.3 Assigning statistical values to outputs

Device Dashboard Fast Keys	2, 2, 5, 1

The statistical values of mean, standard deviation, and coefficient of variation can be made available to other systems or data historians via HART Communication. *Wireless*HART® adaptor, such as the Wireless 775 THUM Adapter can also be used to obtain additional variables. Devices that convert HART variables to analog 4–20 mA outputs, such as the Rosemount 333 Tri-Loop can also be used.

Statistical values can be assigned to be 2nd, 3rd, or 4th variable. This is accomplished through Variable Mapping. See Figure 7-6.

Figure 7-6. Selection of Statistical Values as Secondary Variables

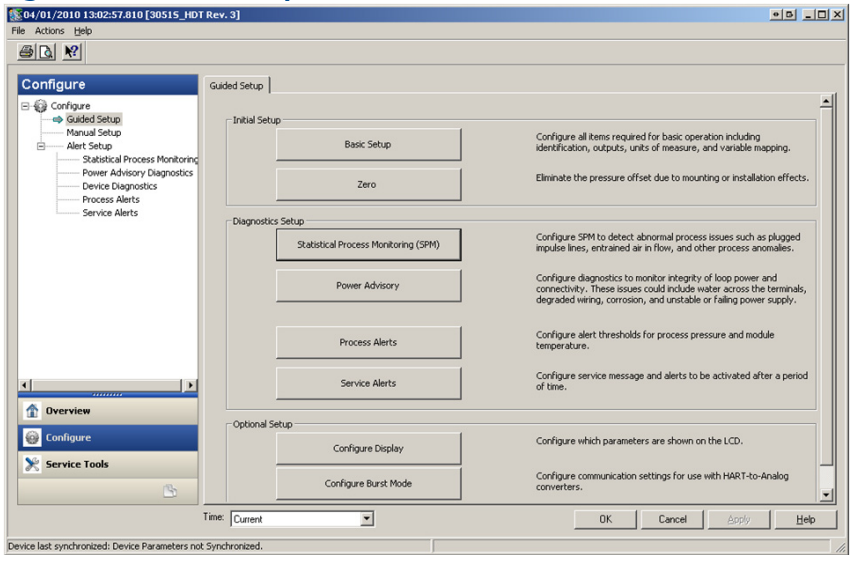


7.3.4 SPM configuration

Device Dashboard Fast Keys	2, 1, 2, 1

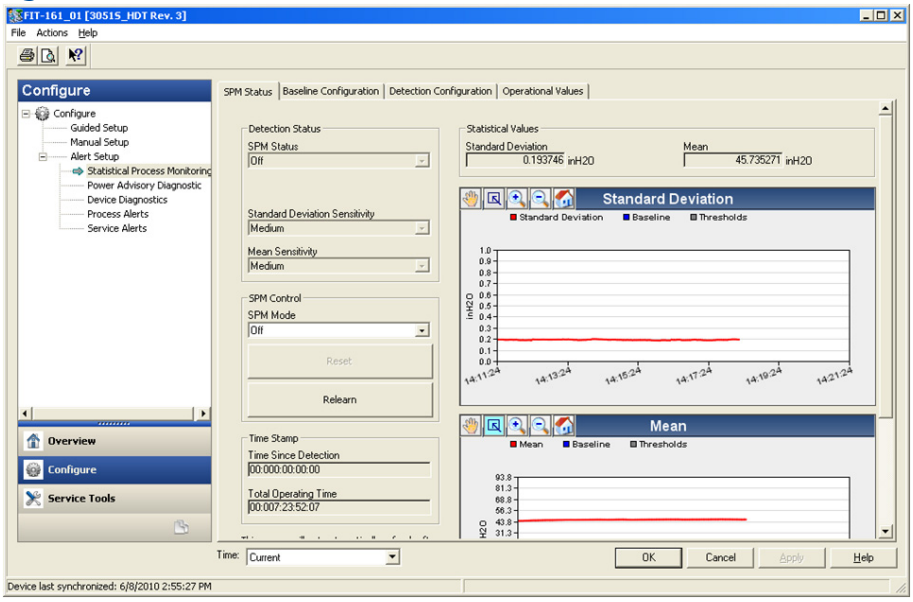
For inexperienced users, guided setup is recommended. Guided setup walks the user through settings that configure the SPM diagnostic for most common usage and applications.

Figure 7-7. Guided Setup Menu



The rest of the configuration section explains the parameters for manual configuration of SPM diagnostic.

Figure 7-8. SPM Main Screen



The SPM Status screen shows overview information for the diagnostic.

The process for operation of the SPM diagnostic is:

- Configure the diagnostic using *Baseline Configuration* and *Detection Configuration* screens.
- Turn on the diagnostic from the *SPM Status* screen.

The configuration process starts with Baseline Configuration, Figure 7-9 on page 108. The configurable fields are:

SPM variable

This is the statistical variable to be used for SPM diagnostic detection.

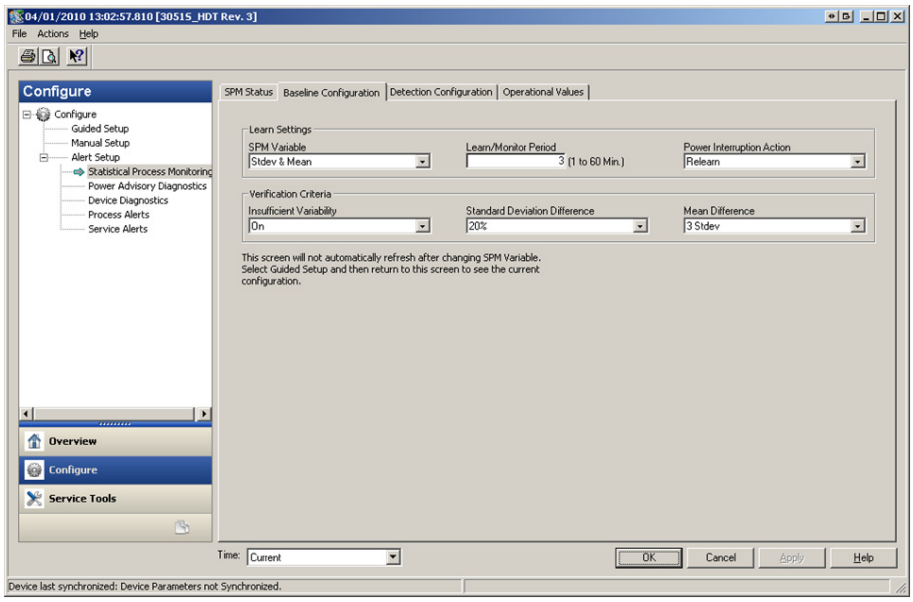
Stdev & mean (default)

Standard deviation and mean of the process are calculated. Users can set independent sensitivity thresholds for both statistical variables.

Coefficient of variation (CV)

CV is calculated from the ratio of standard deviation to mean and is better suited for DP flow applications where the mean pressure is likely to change due to changing process operation. CV puts standard deviation in context of the mean and is represented as a% value.

Figure 7-9. Baseline Configuration Screen

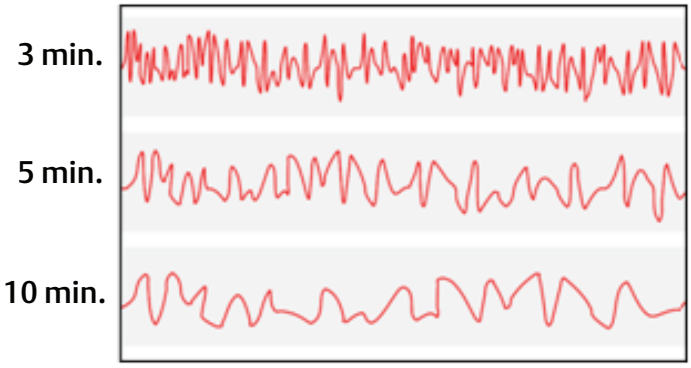


Learn/monitor period

This is the learning and monitoring time period that SPM diagnostic uses to sample the pressure signal. The mean and standard deviation or coefficient of variation values determined during the learning period will become the Baseline values. Decreasing this period can speed up the set up time and is recommended for stable process operations. Increasing this value will give a better baseline value for noisier processes. If false trips for “High Variation Detected” are occurring due to rapid changes in the process and statistical value, increasing the learning period is recommended. The Learning/Monitoring Period is always set in minutes. The default value is three minutes and the valid range is one to 60 minutes.

Figure 7-10 illustrates the effect of Learn/Monitor Period on the statistical calculations. Notice how a shorter sampling window of three minutes captures more variation (e.g. plot looks noisier) in the trend. With the longer sampling window of 10 minutes, the trend looks smoother because SPM uses process data sampled over a longer period of time.

Figure 7-10. Effect of Learn/Monitor Period on Statistical Values



Power interruption action

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 (default)

When SPM restarts, the diagnostic returns to the Monitoring mode immediately and uses the baseline values computed before the interruption.

Relearn

When SPM restarts, the diagnostic enters the Learning mode and will recalculate new baseline values.

Low pressure cut-off

This is the minimum pressure required to operate the diagnostic with Coefficient of Variation selected as the statistical variable. The coefficient of variation is a ratio of standard deviation to mean and is defined for non-zero mean values. When the mean value is near zero, the coefficient of variation is sensitive to small changes in the mean, limiting its usefulness. Default value is one percent of upper sensor limit.

Insufficient variability

The SPM diagnostic uses process noise to baseline the process and detect abnormal situations. Typically the Insufficient Variability check is on to ensure there is sufficient noise for proper operation. In a quiet application with very minimal process noise, this setting can be turned off. The default setting is ON.

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

Standard deviation difference, mean difference

If these difference values are exceeded during the Verification mode, SPM diagnostic will not start Monitoring mode and will continue verifying the baseline. If SPM diagnostic will not leave the Verification mode, these values should be increased. If the diagnostic still remains in the Verification mode with the highest level, the Learning/Monitoring period should be increased.

Table 7-1. Standard Deviation Verification Criteria

Parameter	Definition
None	Do not perform any verification checks for standard deviation.
10%	If the difference between baseline standard deviation value and the verification value exceeds 10%, diagnostic will stay in Verification mode.
20% (default)	If the difference between baseline standard deviation value and the verification value exceeds 20%, diagnostic will stay in Verification mode.
30%	If the difference between baseline standard deviation value and the verification value exceeds 30%, diagnostic will stay in Verification mode.

Table 7-2. Mean Verification Criteria

Parameter	Definition
None	Do not perform any verification checks for mean.
3 Stdev (default)	If the difference between baseline mean value and the verification value exceeds 3 standard deviations, diagnostic will stay in Verification mode.
6 Stdev	If the difference between baseline mean value and the verification value exceeds 6 standard deviations, diagnostic will stay in Verification mode.
2%	If the difference between baseline mean value and the verification value exceeds 2%, diagnostic will stay in Verification mode.

The *Detection Configuration* screen (Figure 7-11 and Figure 7-12) allows for configuration of sensitivity threshold values for tripping the diagnostic and how to receive the HART alert or analog alarm.

Figure 7-11. Detection Configuration Screen for Standard Deviation and Mean

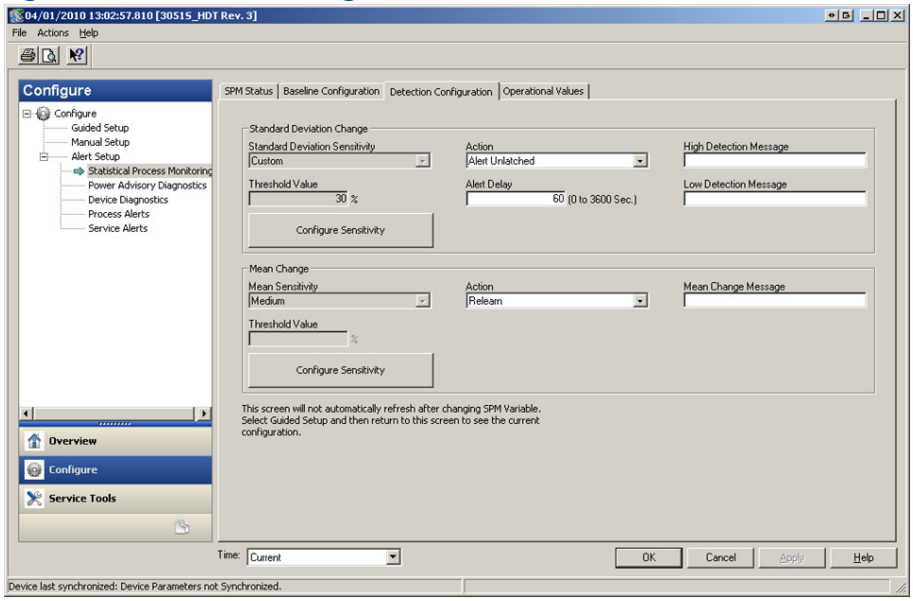
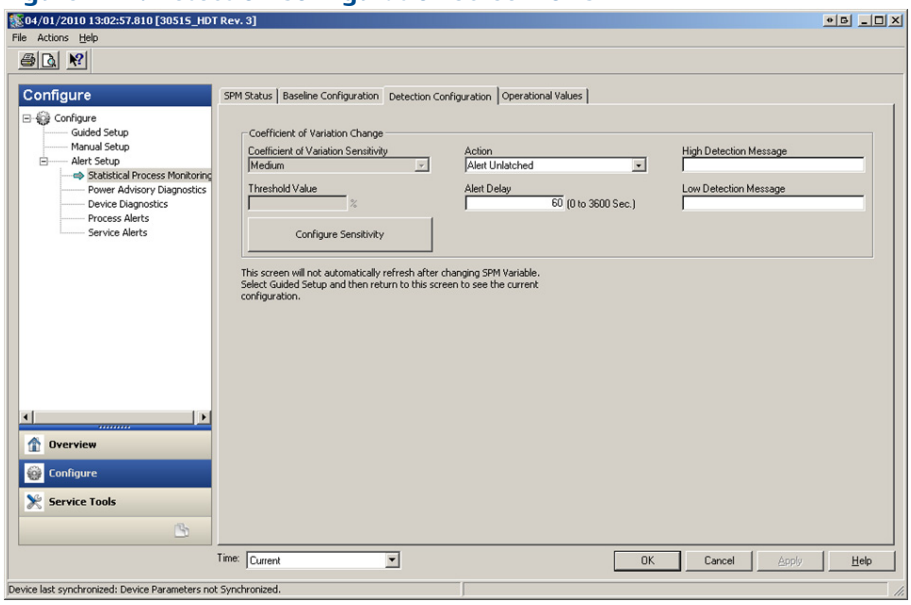


Figure 7-12. Detection Configuration Screen for CV



Standard deviation sensitivity, mean sensitivity

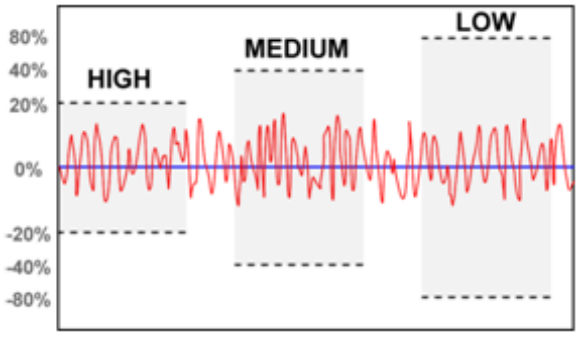
Shows the current sensitivity level for detecting changes in standard deviation or mean. Users can choose from preset values of High, Medium, and Low. Custom sensitivity levels can also be configured.

CV sensitivity

Shows the current sensitivity level for detecting changes in the CV. Users can choose from preset values of High, Medium, and Low. Custom sensitivity levels can also be configured.

Figure 7-13 illustrates the differences in preset sensitivity limits of High, Medium, and Low. The preset High sensitivity setting (e.g. 20%) will cause the SPM diagnostic to be more sensitive to changes in the process profile. The preset Low sensitivity setting (e.g. 80%) will cause the SPM diagnostic to be less sensitive as a much greater change in the process profile is needed to trip the alert.

Figure 7-13. Preset Sensitivity Levels



Threshold value

If sensitivity is custom, this field will display the custom sensitivity setting as percent change from the baseline value.

Configure sensitivity

This button launches a window for entering sensitivity settings.

Table 7-3. Standard Deviation Sensitivity Choices

Parameter	Definition
Low	80% change from baseline value will trip the diagnostic
Medium (default)	60% change from baseline value will trip the diagnostic
High	40% change from baseline value will trip the diagnostic
Custom	Adjustable from 1 to 10000%

Table 7-4. Mean Sensitivity Choices

Parameter	DP	GP/AP
Low	40% of baseline or 4% of span, whichever is greater	20% of span
Medium (default)	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

Table 7-5. CV Sensitivity Choices

Parameter	Definition
Low	80% change from baseline value will trip the diagnostic
Medium (default)	40% change from baseline value will trip the diagnostic
High	20% change from baseline value will trip the diagnostic
Custom	Adjustable from 1 to 10000%

Alert delay

This value specifies the amount of delay from when the transmitter detects a deviation of the sensitivity threshold to generating an alert or alarm. The default value is 60 seconds and valid range is zero to 3600 seconds. Increasing the alert delay helps to avoid false detections resulting from the standard deviation or CV exceeding the threshold only momentarily.

High detection message

Customizable message field related to standard deviation/coefficient of variation crossing the upper threshold value. This message can be used to describe the abnormal process condition or provide additional details for troubleshooting. Message will appear along with the High Variation or High CV Detected alert. Character limit is 32 including spaces.

Low detection message

Customizable message field related to standard deviation/coefficient of variation crossing the lower threshold value. This message can be used to describe the abnormal process condition or provide additional details for troubleshooting. Message will appear along with the Low Variation or Low CV Detected alert. Character limit is 32 including spaces.

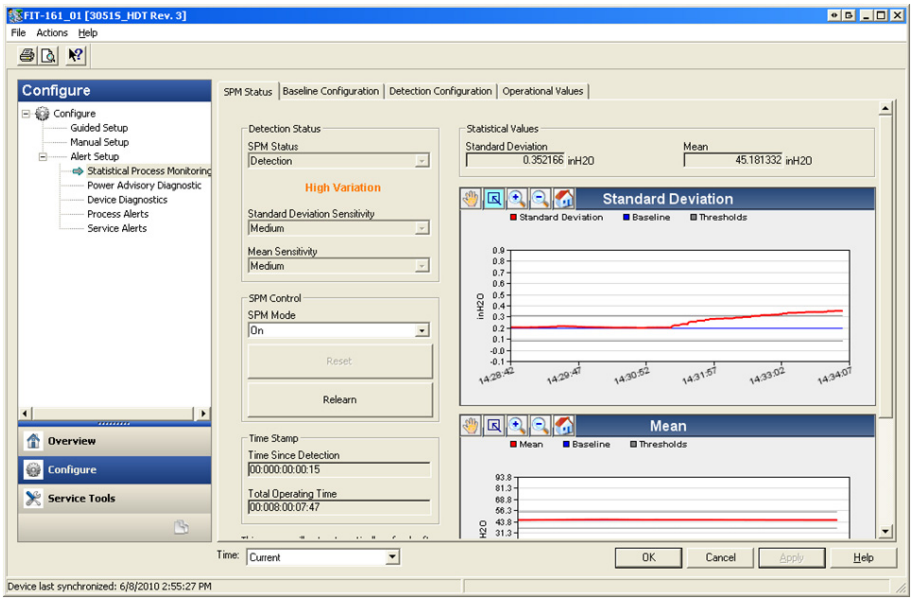
Mean change message

Customizable message field related to mean value crossing either the upper or lower threshold value. This message can be used to describe the abnormal process condition or provide additional details for troubleshooting. Message will appear along with the Mean Change Detected alert. Character limit is 32 including spaces.

7.3.5 Operation

Device Dashboard Fast Keys	1, 3, 2

Figure 7-14. SPM Diagnostic can be Activated from the SPM Status Screen



Turning on the SPM diagnostic

The SPM diagnostic is enabled by selecting On for “SPM Mode”, shown on Figure 7-14. Upon enabling SPM, 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 Baseline 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 Baseline 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 gray lines that indicate the sensitivity setting will appear on the charts.

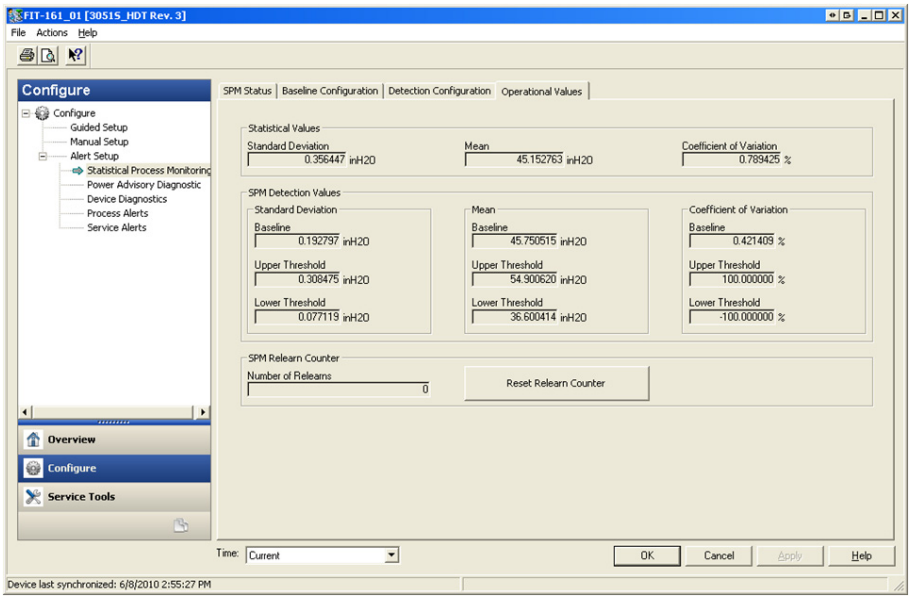
Reset

If SPM trip action is set to “Alert Latched”, clicking on Reset will clear the alert when process conditions are back to normal or baseline.

Relearn

Selecting this button will cause SPM to relearn the process condition and establish a new baseline. Manually performing a relearn is recommended if the process profile has been intentionally changed to a new set point.

Figure 7-15. Operational Values Screen



The operational values screen contains the parameter values used in the SPM diagnostic.

Standard deviation

This is the current value of standard deviation. This value is continuously calculated and can be provided as a secondary variable.

Mean

This is the current value of mean. This value is continuously calculated and can be provided as a secondary variable.

CV

This is the current value for coefficient of variation. The CV is derived from the ratio of standard deviation to mean. This value is continuously calculated and can be provided as a secondary variable.

Number of relearns

This is the number of times SPM relearn has been initiated by the user or via automatic relearn.

Detection

If the SPM diagnostic detects a Standard Deviation, Mean, or CV change outside the threshold values, the SPM Status box will indicate “Detection”, followed by the type of detection.

The LCD display will also indicate the diagnostic condition. The “Time Since Detection” clock in the Time Stamp box will start incrementing until the statistical value is returned to normal. If the diagnostic alert is latched, the “Time Since Detection” clock will continue to increment until the alert is reset or SPM diagnostic is 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 7-6. Possible Causes of SPM Diagnostic Events

Detection type	LCD display	Potential cause	Corrective action
High Variation Detected/High CV Detected	HIGH VARIA/ HIGH CV	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 flow).	a. If aeration is undesired, take necessary steps to eliminate aeration. 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 flow).	If liquid is undesired, take necessary steps to eliminate liquid in gas or steam flow. If some liquid is normal, and error correction in the gas flow measurement is being done (such as an over-reading in wet natural gas measurements), you may need to determine the volume fraction of the liquid (e.g. using a test separator) and a new error correction factor for the gas flow measurement.
		Solids present or solids level increased.	If solids are undesired, take necessary steps to eliminate.
		Control loop problem (valve stiction, controller issue, etc.).	Review control valve or loop for control problems.
		Process or equipment change or problem has resulted in an increase in the pressure noise level.	Check process equipment.
High Variation Detected	HIGH VARIA	Rapid change of process variable mean value.	Rapid changes in the process variable can result in indication of high variation. If undesired, increase Alert Delay value (default is 60 seconds). Increase the Learn/Monitor period (default is 3 minutes).

Table 7-6. Possible Causes of SPM Diagnostic Events

Detection type	LCD display	Potential cause	Corrective action
Low Variation Detected/Low CV Detected	LOW VARIA/ LOW CV	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	MEAN CHANGE	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.

Note
Emerson cannot absolutely warrant or guarantee that SPM will accurately detect each specific abnormal condition under all circumstances. Standard maintenance procedures and safety precautions should not be ignored because SPM diagnostic is enabled.

7.3.6 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, and then alternately close the high and 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 or coefficient of variation under the closed conditions and adjust the sensitivity values as needed.

Table 7-7. Possible SPM Issues and Resolutions

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.

7.4 Power advisory

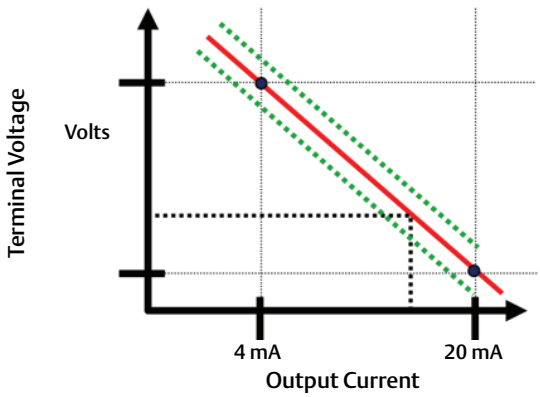
7.4.1 Introduction

Power Advisory diagnostic provides a means to detect issues that may jeopardize the integrity of the electrical loop. Some examples are: water entering the wiring compartment and makes contact with the terminals, an unstable power supply nearing end of life, or heavy corrosion on the terminals.

This technology is based on the premise that once a transmitter is installed and powered up, the electrical loop has a baseline characteristic that reflects the proper installation. If the transmitter terminal voltage deviates from the baseline and outside the user configured threshold, the Rosemount 3051S can generate a HART alert or analog alarm.

To make use of this diagnostic, the user must first create a baseline characteristic for the electrical loop after the transmitter has been installed. The loop is automatically characterized with the push of a button. This creates a linear relationship for expected terminal voltage values along the operating region from 4–20 mA, see Figure 7-16.

Figure 7-16. Baseline Operating Region



7.4.2 Overview

The transmitter is shipped with Power Advisory off as default and without any loop characterization performed. Once the transmitter is installed and powered up, loop characterization must be performed for Power Advisory diagnostic to function.

When the user initiates a loop characterization, the transmitter will check to see if the loop has sufficient power for proper operation. Then the transmitter will drive the analog output to both 4 and 20 mA to establish a baseline and determine the maximum allowable terminal voltage deviation. Once this is complete, the user enters a sensitivity threshold called “Terminal Voltage Deviation Limit” and a check is in place to make sure this threshold value is valid.

Once the loop has been characterized and Terminal Voltage Deviation Limit is set, Power Advisory actively monitors the electrical loop for deviations from the baseline. If the terminal voltage has changed relative to the expected baseline value, exceeding the configured Terminal Voltage Deviation Limit, the transmitter can generate an alert or alarm.

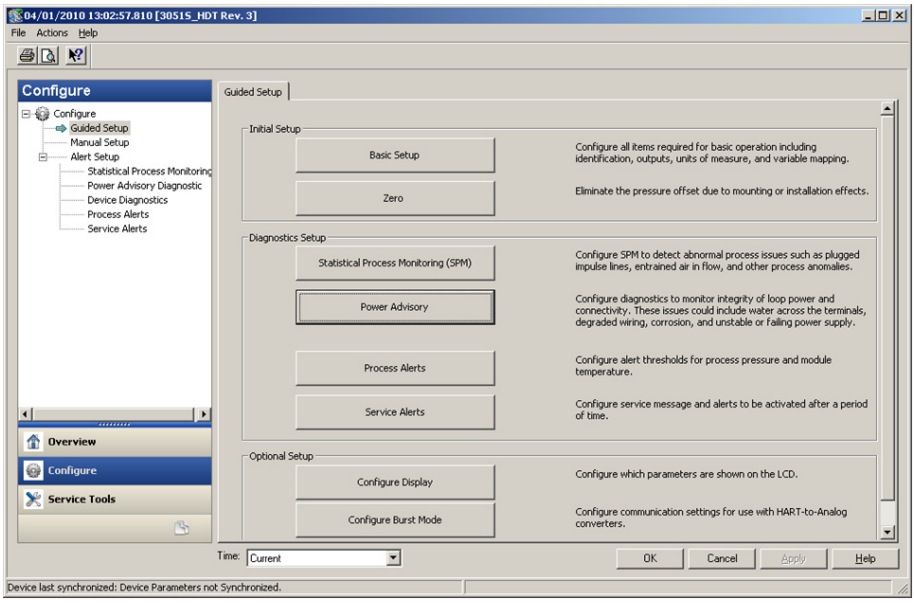
Note
Power Advisory diagnostic in the Rosemount 3051S HART Pressure Transmitter monitors and detects changes in the terminal voltage from expected values to detect common failures. It is not possible to predict and detect all types of electrical failures on the 4–20mA output. Therefore, Emerson cannot absolutely warrant or guarantee that Power Advisory Diagnostic will accurately detect failures under all circumstances.

7.4.3 Configuration

Device Dashboard Fast Keys	2, 1, 2, 2

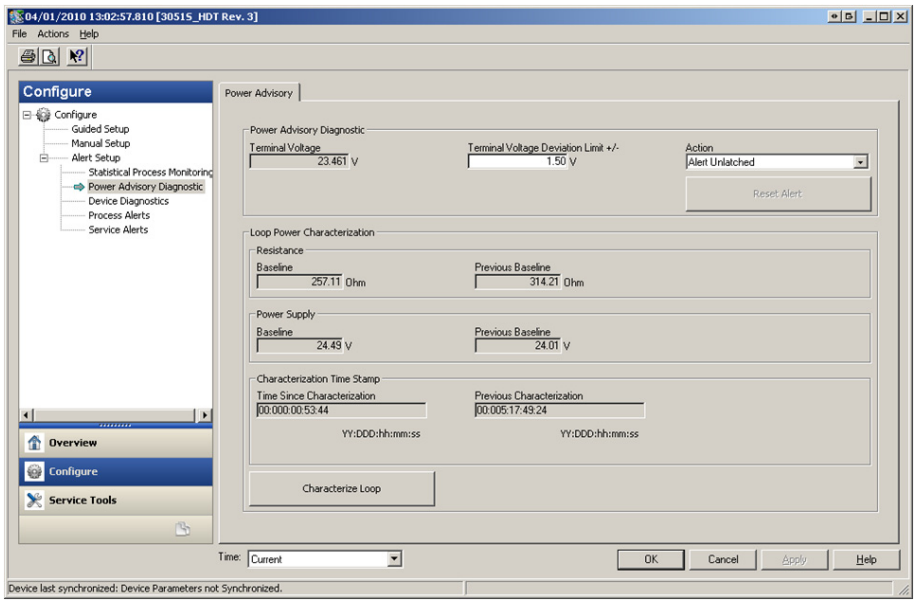
For inexperienced users, guided setup is recommended. Guided setup walks the user through settings that configure the Power Advisory diagnostic for most common usage and applications.

Figure 7-17. Guided Setup Menu



The rest of the configuration section explains the parameters for manual configuration of Power Advisory diagnostic.

Figure 7-18. Manual Configuration of Power Advisory Main Screen



The Power Advisory configuration screen allows users to characterize the loop and configure the Terminal Voltage Deviation Limit and the Action. Two instances of loop characterization data are recorded and presented on this screen: *Baseline* and *Previous Baseline*. Baseline represents values from the most recent loop characterization whereas Previous Baseline represents values recorded prior to the most recent characterization.

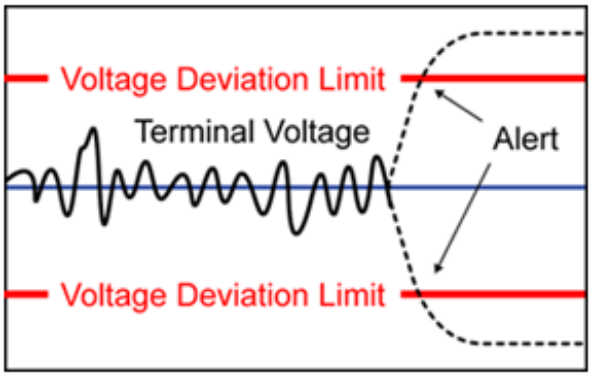
Terminal voltage

This field shows the current terminal voltage value in Volts. The terminal voltage is a dynamic value and is directly related to the mA output value.

Terminal voltage deviation limit ±

The terminal voltage deviation limit should be set large enough that “expected” voltage changes do not cause false failures. The default value of 1.5 V will accommodate typical deviation of customer power supply voltage and loop tests (amp meters connected across the test diode on the terminal block). This value should be increased if your loop has additional “*expected*” variation

Figure 7-19. Voltage Deviation Limit



⚠WARNING

Severe changes in the electrical loop may inhibit HART Communication or the ability to reach alarm values. Therefore, Emerson cannot absolutely warrant or guarantee that the correct Failure Alarm level (HIGH or LOW) can be read by the host system at the time of annunciation.

Resistance

This value is the calculated resistance of the electrical loop (in Ohms) measured during the Characterize Loop procedure. Changes in the resistance may occur due to changes in the physical condition of the loop installation. Baseline and Previous Baselines can be compared to see how much resistance has changed over time.

Power supply

This value is the calculated power supply voltage of the electrical loop (in Volts) measured during the characterize loop procedure. Changes in this value may occur due to degraded performance of the power supply. Baseline and Previous Baselines can be compared to see how much the power supply has changed over time.

Characterization time stamp

This is the time stamp or elapsed time of the loop characterization event. All time values are non-volatile and displayed in the following format: YY:DD:hh:mm:ss (years:days:hours:minutes:seconds).

Characterize loop

Loop characterization must be initiated when the transmitter is first installed or when electrical loop characteristics have been intentionally altered. Examples include more transmitters being added onto the loop, modified power supply level or loop resistance of the system, changing the terminal block on the transmitter, or adding the Wireless 775 THUM Adapter to the transmitter. Another case of required re-characterization is if the diagnostic electronics is taken out of an existing Rosemount 3051S Transmitter and placed in a new Rosemount 3051S installed on a different loop.

Note
Power Advisory diagnostic is not recommended for transmitters operating in HART Burst Mode (fixed current mode) or multidrop.

7.4.4 Troubleshooting

Table 7-8. Possible Power Advisory issues and resolutions

Issue	Resolution
Transmitter automatically resets upon annunciation of HIGH alarm.	The loop has been severely degraded and the transmitter does not have enough voltage to generate a HIGH alarm. Transmitter reset will create a low off-scale reading. Repair damaged loop.
Transmitter does not generate LOW alarm value when it should.	The loop has been severely degraded and the host system is not able to read the proper mA output from the transmitter. This may occur if water floods the terminal compartment and “shorts out” the + to – terminals or the terminals to chassis. This is most likely to occur if the loop resistor is connected to the + side of the power supply. Repair the damaged loop. Consider setting alarm direction to HIGH.
Transmitter does not generate HIGH alarm value.	The loop has been severely degraded and the host system is not able to read the proper mA output from the transmitter. This may occur if water floods the terminal compartment and “shorts out” the + to – terminals or the terminals to chassis. This is most likely to occur if the loop resistor is connected to the – side of the power supply and is earth grounded. Repair the damaged loop. Consider setting alarm direction to LOW.
Diagnostic does not detect a damaged loop.	Diagnostic will not trip if loop characterization was performed when the loop was already damaged. Repair damaged loop and re-characterize.
Diagnostic is detecting false alarms or alerts.	Re-characterize the loop and compare the baseline with the previous baseline. Resistance changes may indicate poor or intermittent connections. Power supply voltage changes may indicate unstable supply. Test for the presence of AC voltage using an AC DVM or oscilloscope. Adding an amp meter across the test diode will cause voltage changes of up to 1V. If all conditions look acceptable, increase the terminal voltage deviation.

7.5 Diagnostic log

Device Dashboard Fast Keys	3, 4, 2

7.5.1 Overview

The diagnostic log provides a history of the last ten transmitter alerts and time stamp of when they occurred. This allows the user to reference a sequence of events or alerts to aid the troubleshooting process. The log prioritizes and manages the alerts in a first-in, first-out manner. This log is stored in the non-volatile internal memory of the Rosemount 3051S Transmitter. If power is removed from transmitter, the log remains intact and can be viewed again when powered up.

Figure 7-20. Diagnostic Log

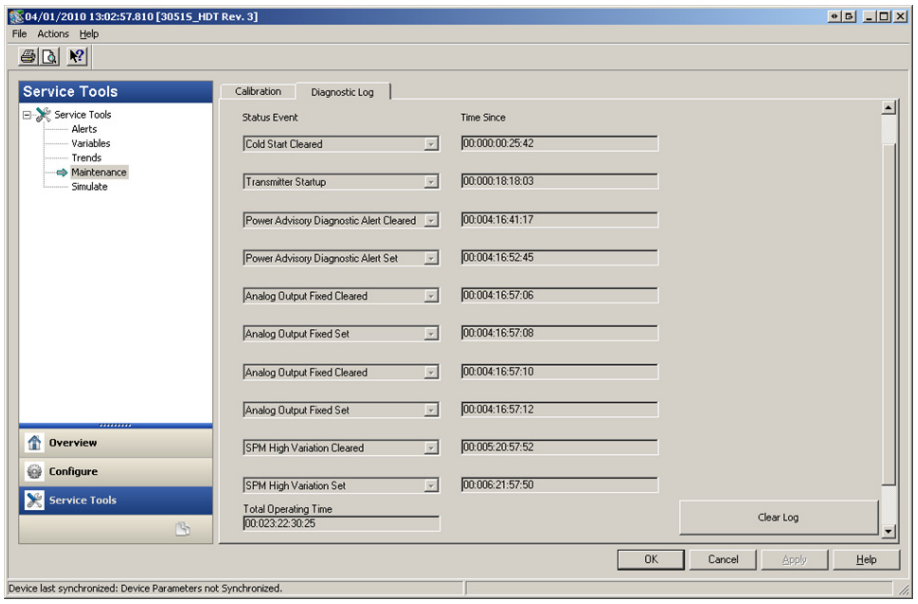


Figure 7-20 shows the Diagnostic Log screen where a set of ten events and time stamp can be seen.

Status event

This is the name of the event that was recorded in the transmitter. Table 7-9 shows a list of possible status events that can be recorded.

Table 7-9. Possible Status Events for Diagnostic Log

Alert/status	Criticality
CPU Error Set, Cleared	Failed
Electronics Failure Set, Cleared	Failed
Field Device Malfunction Set, Cleared	Failed
HW/SW Incompatibility Set, Cleared	Failed
mA Output Diagnostic Alert Set, Cleared	Failed
NV Error Set, Cleared	Failed
Pressure Not Updating Set, Cleared	Failed
RAM Error Set, Cleared	Failed
ROM Error Set, Cleared	Failed
Sensor Failure Set, Cleared	Failed
Stack Overflow Set, Cleared	Failed
SW Flow Control Error Set, Cleared	Failed
Transmitter Power Consumption Alert Set, Cleared	Failed

Table 7-9. Possible Status Events for Diagnostic Log

Alert/status	Criticality
Analog Output Fixed Set, Cleared	Maintenance
Analog Output Saturated Set, Cleared	Maintenance
Power Advisory Diagnostic Alert Set, Cleared	Maintenance
Pressure Out of Limits Set, Cleared	Maintenance
Sensor Trim Mode Set, Cleared	Maintenance
Temperature Compensation Error Set, Cleared	Maintenance
Temperature Not Updating Set, Cleared	Maintenance
Cold Start Cleared	Advisory
High CV Change Set, Cleared	Advisory
Key Error Set, Cleared	Advisory
LCD Update Error Set, Cleared	Advisory
Low CV Change Set, Cleared	Advisory
New Sensor Set, Cleared	Advisory
Pressure Alert Set, Cleared	Advisory
Scaled Variable Low Flow Set, Cleared	Advisory
Service Alert Set, Cleared	Advisory
SPM High Variation Set, Cleared	Advisory
SPM Low Pressure Cutoff Set, Cleared	Advisory
SPM Low Variation Set, Cleared	Advisory
SPM Mean Change Detected Set, Cleared	Advisory
Stuck Key Set, Cleared	Advisory
Temperature Alert Set, Cleared	Advisory
Temperature Out of Limits Set, Cleared	Advisory
Transmitter Startup	Advisory

Note
It is recommended that transmitters showing *"Failed"* status should be replaced.

Time since

This is the time stamp or elapsed time of the status event. All time values are non-volatile and displayed in the following format: Yy:ddd:hh:mm:ss (years:days:hours:minutes:seconds).

Clear log

This button launches a method to clear the status events in the Diagnostic Log.

7.6 Variable logging

7.6.1 Overview

Variable Logging can be used in a number of ways. The first function is the logging and time-stamping of the minimum and maximum pressures and module 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. Figure 7-21 shows the Pressure Variable Logging screen. Figure 7-22 shows the Temperature Variable Logging screen.

7.6.2 Pressure variable log

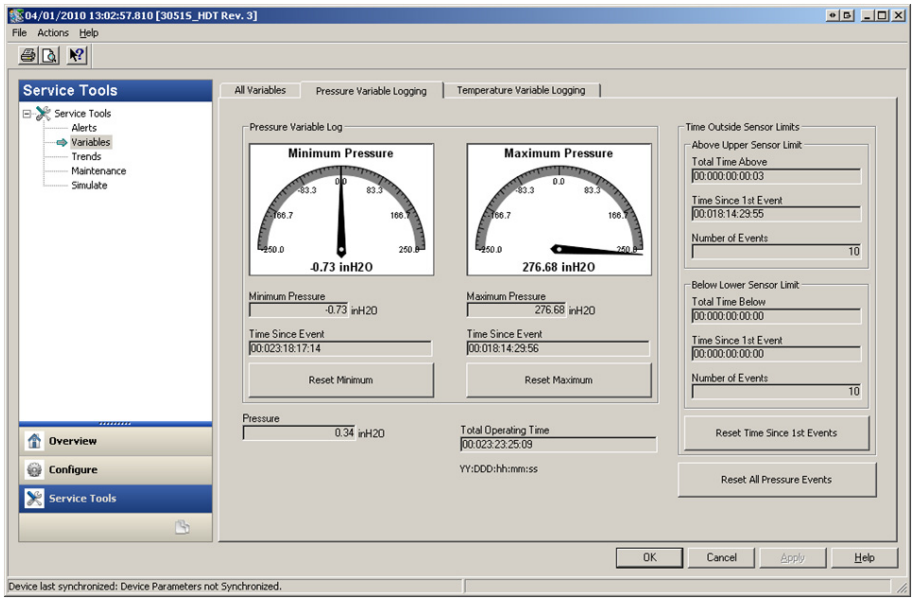
Device Dashboard Fast Keys	3, 2, 2

Minimum, maximum pressure

The meters indicate the lowest and highest pressure the transmitter has measured since the last time the value was cleared. Time Since Event indicates the elapsed time since the min/max pressure was measured.

Both the Min and Max values can be reset independently. Clicking on **Reset All Pressure Events** will reset the Time Since Event clock and sets the pressure to the currently measured value.

Figure 7-21. Pressure Variable 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, Number of Events, and Total time.

Total time above/below

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.

Time since 1st event

The elapsed time since the first over-pressure was detected. This time can be reset by clicking the Reset Time Since 1st Events button.

Number of events

This is the number of times the pressure sensor has been in an over-pressure condition. These values are not resettable.

Reset time since 1st events

Selecting this reset will set the Since 1st Event for both Above Upper Sensor Limit and Below Lower Sensor Limit to zero.

Reset all pressure events

Selecting this will reset all values on this screen to zero with the exception of Total Operating Time, the Total Time above and below sensor limit, and the Number of Events for above and below sensor limit.

7.6.3 Temperature variable log

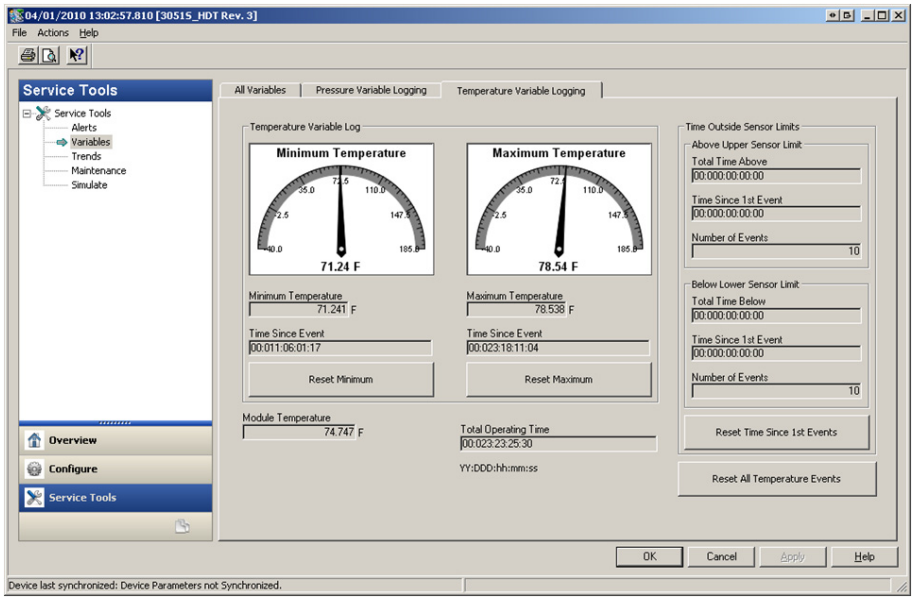
Device Dashboard Fast Keys	3, 2, 3

Minimum, maximum temperature

The meter indicates the lowest and highest temperature the transmitter has measured since the last time the value was cleared. The Time Since Event indicates the elapsed time since that temperature was measured.

Both the Min and Max values can be reset independently. Selecting on **Reset All Temperature Events** will reset the Time Since Event clock and sets the temperature to the currently measured value.

Figure 7-22. Temperature Variable 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, Number of Events, and Total time.

Total time above/below

This is the accumulated time the temperature sensor 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 the transmitter was in this condition. These values are not resettable.

Time since 1st event

The elapsed time since the first over- temperature was detected. This time can be reset by clicking the Reset Time Since 1st Events button.

Number of events

This is the number of times the temperature sensor has been in an over- temperature condition. These values are not resettable.

Reset time since 1st events

Selecting this reset will set the Since 1st Event for both Above Upper Sensor Limit and Below Lower Sensor Limit to zero.

Reset all temperature events

Selecting this will reset all values on this screen to zero with the exception of Total Operating Time, the Total Time above and below sensor limit, and the Number of Events for above and below sensor limit.

7.7 Process alerts

7.7.1 Overview

Process alerts can be used in addition to alarm or alerts generated in the control system to indicate problems with the process or installation.

7.7.2 Pressure alerts

Device Dashboard Fast Keys	2, 3, 4, 1

Figure 7-23. Process Pressure Alerts Screen

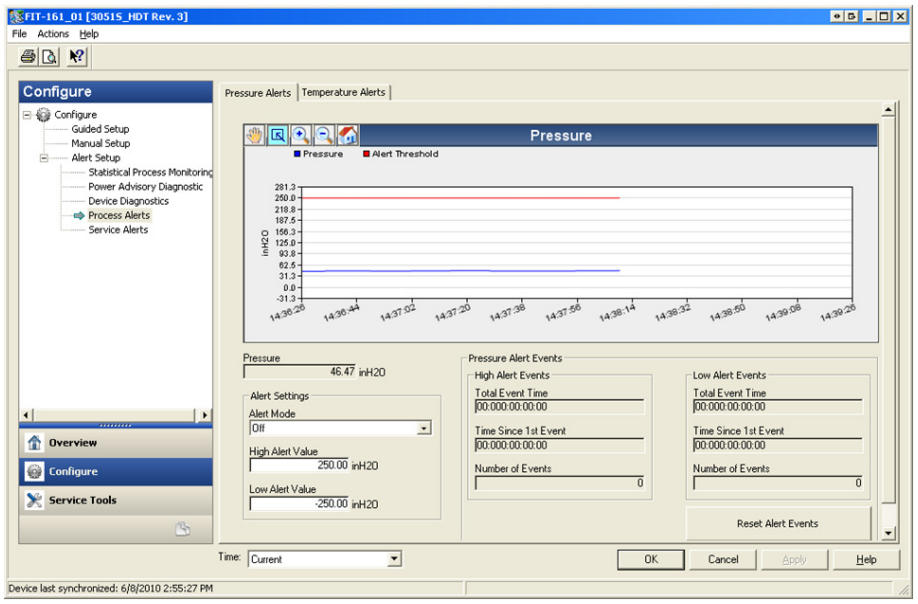


Figure 7-23 shows the configuration section for Pressure Alert. If applied pressure goes above or below the alert values, the LCD display will indicate a pressure alert and a HART alert will be generated by the transmitter. An active alert will not affect the transmitter's
4–20 mA output signal.

Alert mode

This setting dictates whether the diagnostic is On or Off. Selecting **On Unlatched** will generate a HART alert when the alert values are tripped. When pressure returns to normal and within the alert limits, the alert is automatically cleared. Selecting **On Latched** will generate the same HART alert but will require a manual reset to clear the alert.

Latched alert action is recommended if 3rd party alert monitor software is likely to miss alerts due to slow polling of HART data.

High alert value/low alert value

These are independent trip values for the diagnostic. These values are represented on the graph by the red lines.

Total event time (high/low)

These fields show the total time the transmitter's input pressure was above the High Alert Value or below the Low Alert Value.

Time since 1st event (high/low)

This is the elapsed time since the first Pressure Alert event for High Alert Value and Low Alert Value. Subsequent events will increment the Total Event Time values but this value will remain unchanged.

Number of events (high/low)

This is the number of times the transmitter's input pressure was above the High Alert Value or below the Low Alert Value.

Reset alert events

Selecting this will reset all time stamp values and number of events to zero.

7.7.3 Temperature alerts

Device Dashboard Fast Keys	2, 3, 4, 2

Figure 7-24. Module Temperature Alert Screen

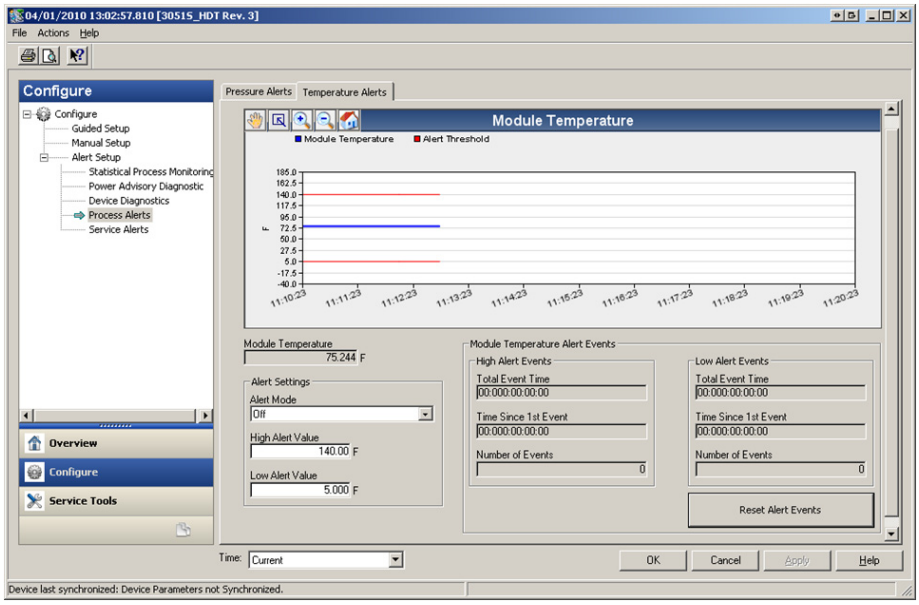


Figure 7-24 shows the configuration section for Temperature Alert. If ambient temperature goes above or below the alert values, the LCD display will indicate a temperature alert and a HART alert will be generated by the transmitter. An active alert will not affect the transmitter's 4–20 mA output signal.

Alert mode

This setting dictates whether the diagnostic is On or Off. Selecting **On Unlatched** will generate a HART alert when the alert values are tripped. When temperature returns to normal and within the alert limits, the alert is automatically cleared. Selecting **On Latched** will generate the same HART alert but will require a manual reset to clear the alert.

Latched alert action is recommended if 3rd party alert monitor software is likely to miss alerts due to slow polling of HART data.

High alert value/low alert value

These are independent trip values for the diagnostic. These values are represented on the graph by the red lines.

Total event time (high/low)

These fields show the total time the transmitter's module temperature was above the High Alert Value or below the Low Alert Value.

Time since 1st event (high/low)

This is the elapsed time since the first Temperature Alert event for High Alert Value and Low Alert Value. Subsequent events will increment the Total Event Time values but this value will remain unchanged.

Number of events (high/low)

This is the number of times the transmitter's module temperature was above the High Alert Value or below the Low Alert Value.

Reset alert events

Selecting this will reset all time stamp values and number of events to zero.

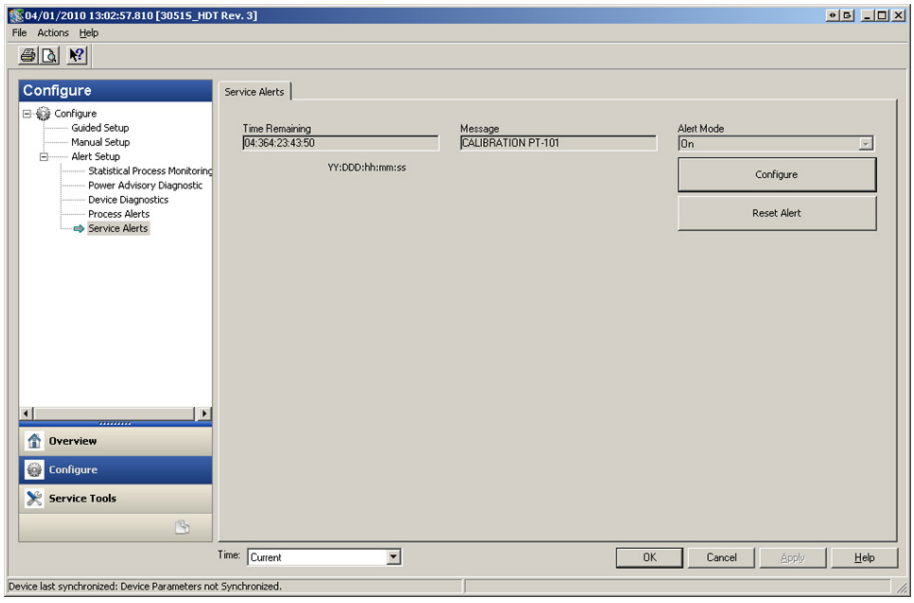
7.8 Service alerts

Device Dashboard Fast Keys	2, 3, 5

7.8.1 Overview

Service Alert can be used to generate a time-based HART alert with customizable message. This can be used to remind personnel when to perform maintenance on the transmitter. When the alert is generated, the LCD display will indicate "TIMER ALERT" and a HART alert will be generated by the transmitter. An active alert will not affect the transmitter's 4–20 mA output signal.

Figure 7-25. Service Alert Screen



Time remaining

Amount of time remaining before the HART alert is generated. This value begins counting down to zero as soon as the diagnostic is turned on. Time remaining can be configured in terms of number of years, days, and hours.

If transmitter loses power, Time Remaining will not continue to count down. Once powered up again, the timer resumes operation.

Message

User customizable message associated to the Service Alert. The message field can contain up to 32 alphanumeric characters and is stored in the non-volatile memory of the transmitter.

Alert mode

This indicates whether the diagnostic is turned On or Off.

Configure

This method controls the Alert Mode of the diagnostic and allows for configuration of timer and message.

Reset alert

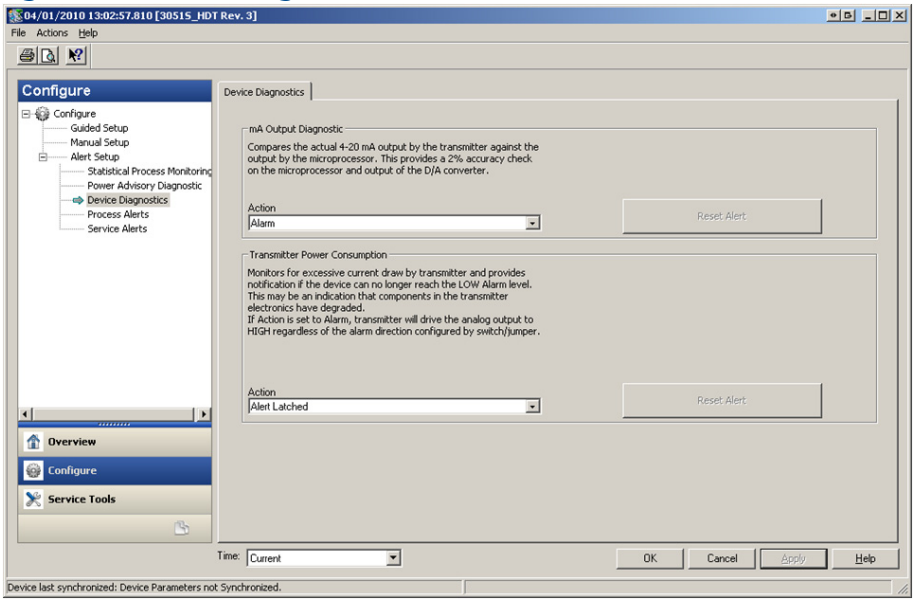
Selecting this will reset the Time Remaining value and start the count down process again.

7.9 Device diagnostics

7.9.1 Overview

In addition to standard device diagnostics that provide notification of when the transmitter fails, the Rosemount 3051S HART Diagnostic Transmitter has predictive device diagnostics that detect issues in the electronics that may result in on-scale failure.

Figure 7-26. Device Diagnostics Screen



7.9.2 mA output diagnostic

The mA Output Diagnostic measures the actual 4–20 mA output from the transmitter's Digital-to-Analog converter and compares it against the output by the transmitter's microprocessor. If the measured value deviates from the expected value by 2% or more, the diagnostic will generate an alarm or alert.

Note
The default trip action for mA Output Diagnostic is set to Alarm. For use in SIS, the trip action must not be changed or the proper safety coverage stated on the FMEDA will not be realized.

7.9.3 Transmitter power consumption

Transmitter Power Consumption diagnostic monitors for excessive current draw by the transmitter. This diagnostic is used to detect a potential on-scale failure due to current leakage or failing electronics.

Note
If trip action is set to Alarm, the transmitter will drive the 4–20 mA output to fail HIGH regardless of the alarm direction configured by the alarm switch.

7.10 Wireless 775 THUM Adapter configuration

7.10.1 Overview

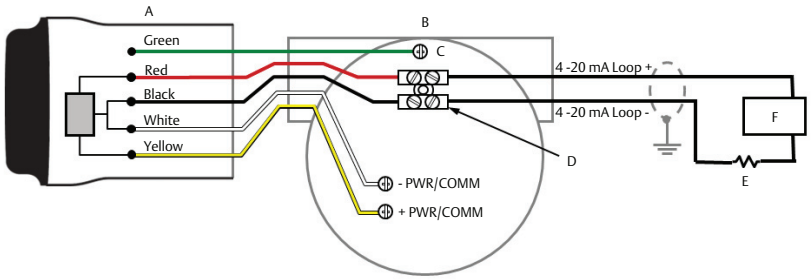
Many older legacy control systems that only use analog can not take full advantage of HART diagnostics or additional process variables. The Wireless 775 THUM Adapter can transmit up to four process variables and additional HART status information at the user configurable update rate. The selectable process variables are Pressure, Module Temperature, Scaled Variable, Standard Deviation, Mean, and Coefficient of Variation.

7.10.2 Installation and commissioning

Below are the four major steps to commission the Rosemount 3051S HART Diagnostics Transmitter and THUM Adapter. Further detail on these steps can be found in the Wireless 775 THUM Adapter Reference Manual.

1. Check the Rosemount 3051S variable assignments (2nd, 3rd, and 4th variable) and remap as necessary to assign variables intended for use with the THUM Adapter.
2. Configure the Network ID and Join Key in order for the THUM Adapter to join wireless network.
3. Configure Update Rate for the THUM Adapter. This is frequency at which HART data is taken and transmitted over the wireless network.
4. Connect the Rosemount 3051S to the THUM Adapter, as shown in Figure 7-27 on page 132, and make sure there is at least 250 Ohms resistance in the loop.

Figure 7-27. Wiring Diagram for 2-Wire Device



A. THUM Adapter
B. Wired device
C. Ground
D. Splice connector
E. Load resistor ≥ 250 Ω
F. Power supply

Note
The THUM Adapter has a minimum update rate of eight seconds and may not capture alerts that appeared in between updates. It is recommended to set diagnostic trip action to “Alert Latched” to minimize chance of missed alerts in between updates.

Note
When using Power Advisory Diagnostic and the THUM Adapter to detect changes on the electrical loop, a re-characterization of the loop must be performed when the THUM Adapter is installed for the first time.

7.11 Rosemount 333 Hart Tri-Loop configuration

7.11.1 Overview

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

7.11.2 Installation and commissioning

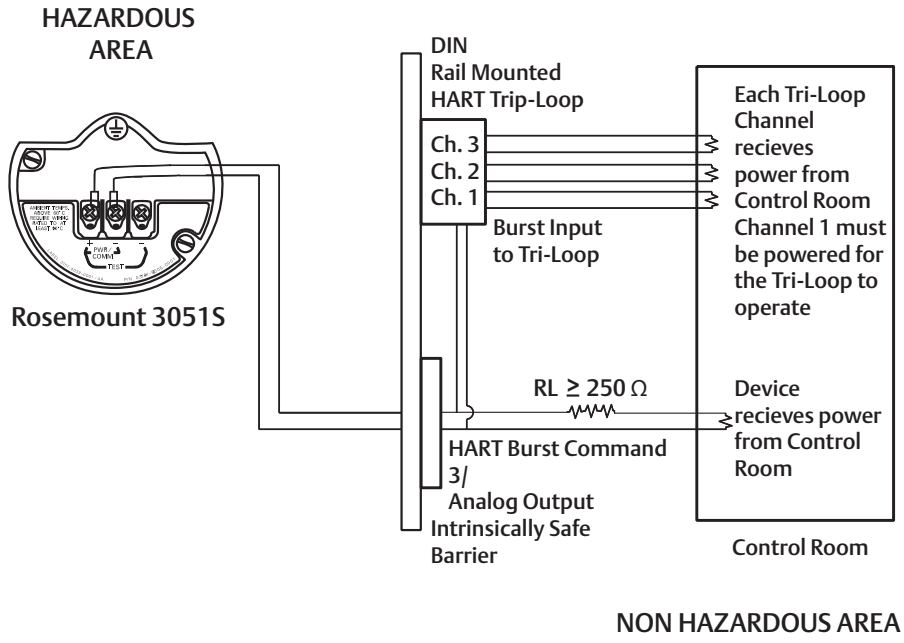
Below are the four major steps to commission the Rosemount 3051S and Tri-Loop. Further detail on these steps can be found in the Rosemount 333 HART Tri-Loop Reference Manual.

1. Check the Rosemount 3051S variable mapping and remap as necessary to assign the three variables intended to be the Tri-Loop output. Take note of the 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. Some useful variables for process diagnostics include Standard Deviation, Mean, Coefficient of Variation, and Sensor Temperature.

Note
The measured pressure will continue to be reported as a 4–20 mA value via the primary variable output.

2. Connect the Rosemount 3051S to the Rosemount 333 Tri-Loop. The Rosemount 3051S 4–20mA output connects to the Rosemount 333 Burst Input. See Figure 7-28.

Figure 7-28. 333 Tri-Loop Wiring Diagram



3. Configure the Tri-Loop. The Channel configuration must be identical to the variables mapped in the Rosemount 3051S.

Note
The Tri Loop default address is 1. The HART host must be configured to Poll for the Rosemount 333 in order to find the Tri-Loop.

4. Enable Burst mode in the Rosemount 3051S. The Burst Mode must be ON and the Burst Option must be set to Process Vars/Crnt.

Appendix A Specifications and Reference Data

A.1 Performance specifications

For zero-based spans, reference conditions, silicone oil fill, glass-filled PTFE O-rings, SST materials, coplanar flange (Rosemount™ 3051S_C Pressure Transmitter) or 1/2–14 NPT (Rosemount 3051S_T) process connections digital trim values set to equal range points.

A.1.1 Conformance to specification (±3σ [Sigma])

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

A.1.2 Reference accuracy

Stated reference accuracy equations include terminal based linearity, hysteresis, and repeatability.

Transmitter with coplanar sensor module (single variable)

Differential Pressure (DP) (Rosemount 3051S_CD) Gage Pressure (Rosemount 3051S_CG)			
	Ultra	**Classic**	**Ultra for Flow[1]**
Ranges 2 - 4	±0.025% of span; For spans less than 10:1, ±(0.005 + 0.0035[URL/Span])% of span	±0.035% of span; For spans less than 10:1, ±(0.015 + 0.005[URL/Span]) % of span	±0.04% of reading up to 8:1 DP turndown from URL; ±(0.04 + 0.0023[URL/ Reading]) % of reading to 200:1 DP turndown from URL
Range 5	±0.05% of span; For spans less than 10:1, ±(0.005 + 0.0045[URL/Span])% of span	±0.065% of span; For spans less than 10:1, ±(0.015 + 0.005[URL/Span]) % of span	N/A
Range 1	±0.09% of span; For spans less than 15:1, ±(0.015 + 0.005[URL/Span])% of span	±0.10% of span; For spans less than 15:1, ±(0.025 + 0.005[URL/Span])% of span	N/A
Range 0	±0.09% of span; For spans less than 2:1, ±0.045% of URL	±0.10% of span; For spans less than 2:1, ±0.05% of URL	N/A
Absolute pressure (Rosemount 3051S_CA)			
	Ultra	**Classic**	
Ranges 1 - 4	±0.025% of span; For spans less than 10:1, ±(0.004[URL/Span])% of span	±0.035% of span; For spans less than 10:1, ±(0.0065[URL/Span])% of span	
Range 0	±0.075% of span; For spans less than 5:1, ±(0.025 + 0.01[URL/Span])% of span	±0.075% of span; For spans less than 5:1, ±(0.025 + 0.01[URL/Span])% of span	

1. Ultra for Flow is only available for Rosemount 3051S_CD ranges 2-3. For calibrated spans from 1:1 to 2:1 of URL, add ±0.005% of span analog output error.

Transmitter with in-line sensor module

Absolute Pressure (Rosemount 3051S_TA) Gage Pressure (Rosemount 3051S_TG)		
	Ultra	**Classic**
Ranges 1 - 4	±0.025% of span For spans less than 10:1, ±(0.004[URL/Span])% of span	±0.035% of span For spans less than 10:1, ±(0.0065[URL/Span])% of span
Range 5	±0.04% of span. For spans less than 10:1 ±0.004% of URL.	±0.065% of span. For spans less than 10:1 ±0.0065% of URL.

Liquid level transmitter

Rosemount3051SAL		
	Ultra	**Classic**
	±0.055% of span For spans less than 10:1, ±(0.015 + 0.005[URL/Span])% of span	±0.065% of span For spans less than 10:1, ±(0.015 + 0.005[URL/Span])% of span

A.1.3 Transmitter total performance

Total performance is based on combined errors of reference accuracy, ambient temperature effect, and line pressure effect at normal operating conditions (70 percent of span typical reading, 740 psi (51 bar) line pressure)

Classic	**Ultra for Flow[1]**
±0.14% of span; for ±50 °F (28 °C) temperature changes; 0–100% relative humidity, from 1:1 to 5:1 rangedown	±0.15% of reading; for ±50 °F (28 °C) temperature changes; 0–100% relative humidity, over 8:1 DP turndown from URL

1. Ultra for Flow is only available for 3051S_CD Ranges 2-3.

Rosemount transmitters		**Ultra**
3051S_CD	Ranges 2–3	±0.1% of span; for ±50 °F (28 °C) temperature changes; 0-100% relative humidity, from 1:1 to 5:1 rangedown
3051S_CG	Ranges 2–5	
3051S_CA	Ranges 2–4	
3051S_T	Ranges 2–4	
3051SAL		Use Instrument Toolkit™ or the QZ Option to quantify the total performance of a remote seal assembly under operating conditions.

A.1.4 Long term stability

Rosemount Transmitters		**Ultra and Ultra for Flow[1]**	**Classic**
3051S_CD	Ranges 2–5	±0.20% of URL for 10 years; for ±50 °F (28 °C) temperature changes, up to 1000 psi (68,9 bar) line pressure	±0.125% of URL for 5 years; for ±50 °F (28 °C) temperature changes, up to 1000 psi (68,9 bar) line pressure
3051S_CG	Ranges 2–5		
3051S_CA	Ranges 1–4		
3051S_T	Ranges 1–5		

1. Ultra for Flow is only available on 3051S_CD ranges 2-3.

A.1.5 Warranty[1]

Transmitters	Ultra and Ultra for Flow	Classic
All Rosemount 3051S Products	12-year limited warranty[2]	1-year limited warranty[3]

1. Warranty details can be found in Emerson Terms & Conditions of Sale, Document 63445, Rev G (10/06).
2. Rosemount Ultra and Ultra for Flow transmitters have a limited warranty of 12 years from date of shipment. All other provisions of Emerson standard limited warranty remain the same.
3. Goods are warranted for 12 months from the date of initial installation or 18 months from the date of shipment by seller, whichever period expires first.

A.1.6 Dynamic performance

Total time response at 75 °F (24 °C), includes dead time[1]

Rosemount 3051S_C and 3051SAL

DP Ranges 2–5: 100 ms

Range 1: 255 ms

Range 0: 700 ms

Rosemount 3051S_T

100 ms

Dead time[2]

Rosemount 3051S_C, 3051S_T, and 3051SAL

45 ms (nominal)

Update rate

Rosemount 3051S_C or T, and 3051SAL

22 updates per second

1. *For option code DA2, add 45 ms (nominal) to stated values.*
2. *For option code DA2, dead time is 90 milliseconds (nominal).*

A.1.7 Ambient temperature effect

Transmitter with coplanar sensor module (single variable)

Differential Pressure: (Rosemount 3051S_CD) Gage Pressure: (Rosemount 3051S_CG)			
	Ultra per 50 °F (28 °C)	**Classic per 50 °F (28 °C)**	**Ultra for Flow[1] -40 to 185 °F (-40 to 85 °C)**
Ranges 2 - 5[2]	±(0.009% URL + 0.025% span) from 1:1 to 10:1; ±(0.018% URL + 0.08% span) from >10:1 to 200:1	±(0.0125% URL +0.0625% span) from 1:1 to 5:1; ±(0.025% URL + 0.125% span) from >5:1 to 100:1	±0.13% of reading up to 8:1 DP turndown from URL; ±[0.13 + 0.0187(URL/reading)]% of reading to 100:1 DP turndown from URL
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	N/A
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	N/A
Absolute Pressure: (Rosemount 3051S_CA)			
	Ultra per 50 °F (28 °C)	**Classic per 50 °F (28 °C)**	
Ranges 2-4	±(0.0125% URL + 0.0625% span) from 1:1 to 5:1; ±(0.025% URL + 0.125% span) from >5:1 to 200:1	±(0.0125% URL + 0.0625% span) from 1:1 to 5:1; ±(0.025% URL + 0.125% span) from >5:1 to 150:1	
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; ±(0.025% URL + 0.125% span) from >5:1 to 100:1	±(0.0125% URL + 0.0625% span) from 1:1 to 5:1; ±(0.025% URL + 0.125% span) from >5:1 to 100:1	

1. Ultra for Flow is only available for Rosemount 3051S_CD Ranges 2-3.
2. Use Classic specification for Rosemount 3051S_CD Range 5 Ultra.

Transmitter with in-line sensor module

Absolute Pressure: (Rosemount 3051S_TA) Gage Pressure: (Rosemount 3051S_TG)		
	Ultra per 50 °F (28 °C)	**Classic per 50 °F (28 °C)**
Ranges 2-4	±(0.009% URL + 0.025% span) from 1:1 to 10:1; ±(0.018% URL + 0.08% span) from >10:1 to 200:1	±(0.0125% URL + 0.0625% span) from 1:1 to 5:1; ±(0.025% URL + 0.125% span) from >5:1 to 150:1
Range 5	±(0.05% URL + 0.075% span) from 1:1 to 10:1	±(0.05% URL + 0.075% span) from 1:1 to 10:1
Range 1	±(0.0125% URL + 0.0625% span) from 1:1 to 5:1; ±(0.025% URL + 0.125% span) from >5:1 to 100:1	±(0.0125% URL + 0.0625% span) from 1:1 to 5:1; ±(0.025% URL + 0.125% span) from >5:1 to 100:1

Liquid level transmitter

Rosemount 3051SAL		
	Ultra	**Classic**
	See Instrument Toolkit	See Instrument Toolkit

A.1.8 Line pressure effect(1)

Rosemount 3051S_CD	Ultra and Ultra for Flow	Classic
Zero Error(2)		
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 (6,9 bar)	± 0.125% URL per 100 psi (6,9 bar)
Range 1	± 0.25% URL per 1000 psi (69 bar)	± 0.25% URL per 1000 psi (69 bar)
Span Error(3)		
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 (6,9 bar)	± 0.15% of reading per 100 psi (6,9 bar)
Range 1	± 0.4% of reading per 1000 psi (69 bar)	± 0.4% of reading per 1000 psi (69 bar)

1. For zero error specifications for line pressures above 2000 psi (137,9 bar) or line pressure effect specifications for DP Ranges 4-5, see "Compensating for line pressure (Range 4 and 5)" on page 77.
2. Zero error can be removed by performing a zero trim at line pressure.
3. Specifications for option code P0 are 2 times those shown above.

A.1.9 Mounting position effects

Rosemount transmitters	Ultra, Ultra for Flow, and Classic
3051S_CD or CG	Zero shifts up to ±1.25 inH_2O (3,11 mbar), which can be zeroed Span: no effect
3051S_CA 3051S_T	Zero shifts to ±2.5 inH_2O (6,22 mbar), which can be zeroed Span: no effect
3051SAL	With liquid level diaphragm in vertical plane, zero shift of up to ±1 inH_2O (2,5 mbar). With diaphragm in vertical plane, zero shift of up to ±5 inH_2O (12,5 mbar) plus extension length on extended units. All zero shifts can be zeroed. Span: no effect

A.1.10 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).

For Housing Style codes 1J, 1K, 1L, 2J, and 2M:
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).

A.1.11 Power supply effect

Less than ±0.005% of calibrated span per volt change in voltage at the transmitter terminals

A.1.12 Electromagnetic Compatibility (EMC)

Meets all industrial environment requirements of EN61326 and NAMUR NE-21[(1)(2)]. Maximum deviation < 1% Span during EMC disturbance[(3)(4)(5)].

A.1.13 Transient protection (option T1)

Tested in accordance with IEEE C62.41.2-2002,
Location Category B

6 kV crest (0.5 µs– 100 kHz)

3 kA crest (8 ×20 microseconds)

6 kV crest (1.2 × 50 microseconds)

1. *NAMUR NE-21 is met on Rosemount 3051SMV output type A if no external temperature sensor is attached.*
2. *NAMUR NE-21 does not apply to wireless output code X or ERS configurations.*
3. *During surge event device may exceed maximum EMC deviation limit or reset; however, device will self-recover and return to normal operation within specified start-up time.*
4. *For devices with Junction Box housing or Remote Display (housing styles: 2A-2C, 2E-2G, 2J, 2M) testing performed with shielded cable.*
5. *Rosemount 3051SMV Measurement Type 1, 3, 5, 6 and Rosemount 3051SF Measurement Type 1, 3, 5, 7 require shielded cable for the process temperature connection.*

A.2 Functional specifications

A.2.1 Range and sensor limits

Transmitter with coplanar sensor module (single variable)

Range	Differential Pressure Sensor (Rosemount 3051S_CD, 3051SALD)		Gage Pressure Sensor (Rosemount 3051S_CG, 3051SALG)		Absolute Pressure Sensor[(1)] (Rosemount 3051S_CA, 3051SALA)	
	Lower (LRL)[(2)]	Upper (URL)	Lower (LRL)[(3)]	Upper (URL)	Lower (LRL)	Upper (URL)
0	–3 inH_2O (–7,5 mbar)	3 inH_2O (7,5 mbar)	N/A	N/A	0 psia (0 bar)	5 psia (0,34 bar)
1	–25 inH_2O (–62,3 mbar)	25 inH_2O (62,3 mbar)	–25 inH_2O (–62,3 mbar)	25 inH_2O (62,3 mbar)	0 psia (0 bar)	30 psia (2,07 bar)
2	–250 inH_2O (–0,62 bar)	250 inH_2O (0,62 bar)	–250 inH_2O (–0,62 bar)	250 inH_2O (0,62 bar)	0 psia (0 bar)	150 psia (10,34 bar)
3	–1000 inH_2O (–2,49 bar)	1000 inH_2O (2,49 bar)	–393 inH_2O (–979 mbar)	1000 inH_2O (2,49 bar)	0 psia (0 bar)	800 psia (55,16 bar)
4	–300 psi (–20,7 bar)	300 psi (20,7 bar)	–14.2 psig (–979 mbar)	300 psi (20,7 bar)	0 psia (0 bar)	4000 psia (275,8 bar)
5	-2000 psi (–137,9 bar)	2000 psi (137,9 bar)	–14.2 psig (–979 mbar)	2000 psi (137,9 bar)	N/A	N/A

1. Range 0 is not available for Rosemount 3051SALA.
2. The Lower Range Limit (LRL) is 0 inH_20 (0 mbar) for Ultra for Flow performance class.
3. Assumes atmospheric pressure of 14.7 psia (1 bar-a).

Transmitter with in-line sensor module

Range	Gage pressure sensor (Rosemount 3051S_TG)		Absolute pressure sensor (Rosemount 3051S_TA)	
	Lower (LRL)[1]	Upper (URL)	Lower (LRL)	Upper (URL)
1	–14.7 psig (-1,01 bar)	30 psig (2,07 bar)	0 psia (0 bar)	30 psia (2,07 bar)
2	–14.7 psig (-1,01 bar)	150 psig (10,34 bar)	0 psia (0 bar)	150 psia (10,34 bar)
3	–14.7 psig (-1,01 bar)	800 psig (55,16 bar)	0 psia (0 bar)	800 psia (55,16 bar)
4	–14.7 psig (-1,01 bar)	4000 psig (275,8 bar)	0 psia (0 bar)	4000 psia (275,8 bar)
5	–14.7 psig (-1,01 bar)	10000 psig (689,5 bar)	0 psia (0 bar)	10000 psia (689,5 bar)

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

A.2.2 Minimum span limits

Transmitter with coplanar sensor module (single variable)

Range	Differential Pressure Sensor (Rosemount 3051S_CD, 3051SAL_D)		Gage Pressure Sensor (Rosemount 3051S_CG, 3051SAL_G[1])		Absolute Pressure Sensor (Rosemount 3051S_CA, 3051SAL_A[1])	
	Ultra & Ultra for Flow	Classic	Ultra	Classic	Ultra	Classic
0	0.10 inH_2O (0.25 mbar)	0.10 inH_2O (0.25 mbar)	N/A	N/A	0.167 psia (11.49 mbar)	0.167 psia (11.49 mbar)
1	0.50 inH_2O (1.24 mbar)	0.50 inH_2O (1.24 mbar)	0.50 inH_2O (1.24 mbar)	0.50 inH_2O (1.24 mbar)	0.30 psia (20.68 mbar)	0.30 psia (20.68 mbar)
2	1.25 inH_2O (3.11 mbar)	1.67 inH_2O (4.14 mbar)	1.25 inH_2O (3.11 mbar)	1.67 inH_2O (4.14 mbar)	0.75 psia (51.71 mbar)	1.00 psia (68.95 mbar)
3	5.00 inH_2O (12.43 mbar)	6.67 inH_2O (16.58 mbar)	5.00 inH_2O (12.43 mbar)	6.67 inH_2O (16.58 mbar)	4.00 psia (275.79 mbar)	5.33 psia (367.72 mbar)
4	1.50 psi (103.42 mbar)	2.00 psi (137.90 mbar)	1.50 psig (103.42 mbar)	2.00 psig (137.90 mbar)	20.00 psia (1.38 bar)	26.67 psia (1.84 bar)
5	10.00 psi (689.48 mbar)	13.33 psi (919.07 mbar)	10.00 psig (689.48 mbar)	13.33 psig (919.07 mbar)	N/A	N/A

1. For Rosemount 3051SAL models, use Classic minimum span limits.

Transmitter with in-line sensor module

Range	Gage Pressure Sensor (Rosemount 3051S_TG)		Absolute pressure sensor (Rosemount 3051S_TA)	
	Ultra	Classic[1]	Ultra	Classic[1]
1	0.3 psig (20.7 mbar)	0.3 psig (20.7 mbar)	0.3 psia (20.7 mbar)	0.3 psia (20.7 mbar)
2	0.75 psig (51.7 mbar)	1.5 psig (103.4 bar)	0.75 psia (51.7 mbar)	1.5 psia (103.4 bar)
3	4 psig (275.8 mbar)	5.33 psig (367.72 mbar)	4 psia (275.8 mbar)	5.33 psia (367.72 mbar)
4	20 psig (1.58 bar)	26.67 psig (1.84 bar)	20 psia (1.58 bar)	26.67 psia (1.84 bar)
5	1000 psig (68.9 bar)	2000 psig (137.9 bar)	1000 psia (68.9 bar)	2000 psia (137.9 bar)

1. For Rosemount 3051SAL models, use Classic minimum span limits.

Service

Liquid, gas, and vapor applications

HART/4–20 mA

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

2-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.

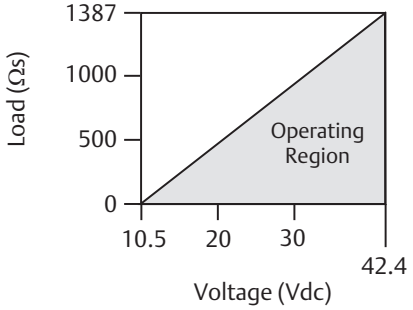
- Rosemount 3051S: 10.5 to 42.4 Vdc with no load
- Rosemount 3051S with Advanced HART Diagnostics Suite: 12 to 42.4 Vdc with no load

Load limitations

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

Rosemount 3051S

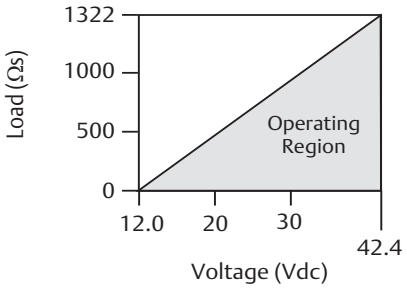
Max. Loop Resistance = 43.5 (Power Supply Voltage – 10.5)



The Field Communicator requires a minimum loop resistance of 250 ohms.

Rosemount 3051S with HART Diagnostics (option code DA2)

Max. Loop Resistance = 43.5 (Power Supply Voltage – 10.5)



The Field Communicator requires a minimum loop resistance of 250 ohms.

Advanced HART Diagnostics Suite (Option Code DA2)

Statistical Process Monitoring (SPM) provides statistical data (standard deviation, mean, coefficient of variation) that can be used to detect process and process equipment anomalies, including plugged impulse lines, air entrainment, pump capitation, furnace flame instability, distillation column flooding and more. This diagnostic allows you to take preventative measures before abnormal process situations result in unscheduled downtime or rework.

Power Advisory diagnostic proactively detects and notifies you of degraded electrical loop integrity before it can affect your process operation. Example loop problems that can be detected include water in the terminal compartment, corrosion of terminals, improper grounding, and unstable power supplies.

The Device Dashboard presents the diagnostics in a graphical, task-based interface that provides single click access to critical process/device information and descriptive graphical troubleshooting.

Suite includes: Statistical Process Monitoring (SPM), Power Advisory, Status Log, Variable Log, Advanced Process Alerts, Service Alerts, and Time Stamp capability.

Power supply

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

Current draw

17.5 mA for all configurations (including LCD display option)

A.2.3 Overpressure limits

Transmitters withstand the following limits without damage:

Coplanar sensor module (single variable)

Range	Differential pressure[1] and gage pressure	Absolute pressure
	Rosemount 3051S_CD, 3051S_CG	Rosemount 3051S_CA
0	750 psi (51.7 bar)	60 psia (4.13 bar)
1	2000 psi (137.9 bar)	750 psia (51.7 bar)
2	3626 psi (250.0 bar)	1500 psia (103.4 bar)
3	3626 psi (250.0 bar)	1600 psia (110.3 bar)
4	3626 psi (250.0 bar)	6000 psia (413.7 bar)
5	3626 psi (250.0 bar)	N/A

1. The overpressure limit of a Differential Pressure Sensor with the P9 option is 4500 psig (310.3 bar). The overpressure limit of a DP Sensor with the P0 option is 6092 psig (420 bar).

In-line sensor module

Range	Gage pressure	Absolute pressure
	Rosemount 3051S_TG	Rosemount 3051S_TA
1	750 psi (51.7 bar)	
2	1500 psi (103.4 bar)	
3	1600 psi (110.3 bar)	
4	6000 psi (413.7 bar)	
5	15000 psi (1034.2 bar)	

Liquid level transmitter (Rosemount 3051SAL)

Overpressure limit is dependent on the flange rating or sensor rating (whichever is lower). Use Instrument Toolkit to ensure the seal system meets all pressure and temperature limits.

A.2.4 Static pressure limits

Coplanar sensor module (single variable)

Operates within specifications between static line pressures of:

Range	DP Sensor[1]
	Rosemount 3051S_CD
0	0.5 psia to 750 psig (0.03 to 51.71 bar)
1	0.5 psia to 2000 psig (0.03 to 137.9 bar)
2	0.5 psia to 3626 psig (0.03 to 250 bar)
3	0.5 psia to 3626 psig (0.03 to 250 bar)
4	0.5 psia to 3626 psig (0.03 to 250 bar)
5	0.5 psia to 3626 psig (0.03 to 250 bar)

1. The static pressure limit of a DP Sensor with the P9 option is 4500 psig (310.3 bar). The static pressure limit of a DP Sensor with the P0 option is 6092 psig (420 bar).

A.2.5 Burst pressure limits

Coplanar sensor module (Rosemount 3051S_C)

10000 psig (689.5 bar)

In-line sensor module (Rosemount 3051S_T)

- Ranges 1–4: 11000 psi (758.4 bar)
- Range 5: 26000 psi (1792.64 bar)

A.2.6 Temperature limits

Ambient

–40 to 185 °F (–40 to 85 °C)

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

With option code P0: -20 to 185 °F (–29 to 85 °C)

Storage

–50 to 185 °F (–46 to 85 °C)
With LCD display: –40 to 185 °F (–40 to 85 °C)

Process temperature limits

At atmospheric pressures and above:

Coplanar sensor module (Rosemount 3051S_C)	
Silicone Fill Sensor [(1)(2)]	
with Coplanar Flange[(3)(8)]	–40 to 250 °F (–40 to 121 °C)
with Traditional Flange[(3)(4)(8)]	–40 to 300 °F (–40 to 149 °C)
with Level Flange[(3)(8)]	–40 to 300 °F (–40 to 149 °C)
with 305 Integral Manifold[(3)(4)(8)]	–40 to 300 °F (–40 to 149 °C)
Inert Fill Sensor[(1)(5)(6)(7)(8)]	–40 to 185 °F (–40 to 85 °C)
In-line sensor module (Rosemount 3051S_T)[(1)(3)(8)]	
Silicone Fill Sensor	–40 to 250 °F (–40 to 121 °C)
Inert Fill Sensor	–22 to 250 °F (–30 to 121 °C)
Rosemount 3051SAL Level Transmitter[(8)]	
SYLTHERM™ XLT	–102 to 293 °F (–75 to 145 °C)
Silicone 704[(9)]	32 to 401 °F (0 to 205 °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 401 °F (–15 to 205 °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. For example, for process temperature of 195 °F (91 °C), new ambient temperature limit is equal to 170 °F (77 °C). This can be determined as follows: (195 °F - 185 °F) × 1.5 = 15 °F, 185 °F - 15 °F = 170 °F
2. 212 °F (100 °C) is the upper process temperature limit for DP Range 0.
3. 220 °F (104 °C) limit in vacuum service; 130 °F (54 °C) for pressures below 0.5 psia.
4. -20 °F (-29 °C) is the lower process temperature limit with option code P0.
5. 32 °F (0 °C) is the lower process temperature limit for DP Range 0.
6. For 3051S_C, 160 ° F (71 °C) limit in vacuum service.
7. Not available for 3051S_CA.
8. Upper temperature limit is 437 °F (225 °C) for a 2-in. direct-mount extension or greater.
9. Upper temperature limit is 464 °F (240 °C) for a 2-in. direct-mount extension, 500 °F (260 °C) for a 4-in. direct-mount extension, and 599 °F (315 °C) for an In-Line Thermal Optimizer direct-mount connection.

A.2.7 Humidity Limits

0–100% relative humidity

A.2.8 Turn-on time

When power is applied to the transmitter during startup, performance will be within specifications per the time period described below:

Rosemount transmitter	Turn-on time (typical)
3051S, 3051SAL	2 seconds
Diagnostics	5 seconds

A.2.9 Volumetric displacement

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

A.2.10 Damping

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

A.2.11 Failure mode alarm

HART 4-20 mA (output option code 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 Alarm configuration below).

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

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][3]	20.2 - 23.0 mA	3.4 - 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.
3. For option code DA2, low alarm custom values are 3.6 - 3.8 mA.

A.3 Physical specifications

A.3.1 Electrical connections

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

A.3.2 Process connections

Coplanar sensor module (Rosemount 3051S_C, 3051SMV, 3051SF, 3051SAM_ _G or A)	
Standard	1/4-18 NPT on 2 1/8-in. centers
Flange adapters	1/2-14 NPT and RC 1/2 on 2-in. (50.8 mm), 2 1/8-in. (54.0 mm), or 2 1/4-in. (57.2 mm) centers
In-Line sensor module (Rosemount 3051S_T, 3051SAM_ _T or E)	
Standard	1/2-14 NPT Female
F11 Code	Non-threaded instrument flange (available in SST for sensor ranges 1-4 only)
G11 Code	G 1/2 A DIN 16288 male (available in SST for sensor ranges 1-4 only)
H11 Code	Autoclave type F-250C (Pressure relieved 9/16-18 gland thread; 1/4 OD high pressure tube 60° cone; available in SST for sensor range 5 only)
Level Transmitter (Rosemount 3051SAL)	
FF Seal	2-in. (DN 50), 3-in. (DN 80), or 4-in. (DN 100); ANSI Class 150, 300, or 600 flange; JIS 10K, 20K, or 40K flange; PN 10/16 or PN 40 flange
EF Seal	
RF Seal	1-in. (DN 25) or 1.5-in. (DN 40); ANSI Class 150, 300, or 600 flange; JIS 10K, 20K, or 40K flange; PN 40 flange
RT Seal	1/4–18, 1/2–14, 3/4–14, or 1-11.5 NPT Female
SC Seal	1.5-in, 2-in, or 3-in. Hygienic Tri-Clover Style Tri Clamp
SS Seal	4-in. Hygienic Tank Spud

A.3.3 Process-wetted parts

Process isolating diaphragms

Coplanar sensor module (Rosemount 3051S_C, 3051SMV)	
316L SST (UNS S31603), Alloy C-276 (UNS N10276), Alloy 400 (UNS N04400), Tantalum (UNS R05440), Gold-Plated Alloy 400, Gold-plated 316L SST	
B11 Code	Low side process connection is SST
In-line sensor module (Rosemount 3051S_T)	
316L SST (UNS S31603), Alloy C-276 (UNS N10276)	
Level transmitter (Rosemount 3051SAL)	
FF Seal	316L SST, Alloy C-276, Tantalum
EF Seal	
RF Seal	
RT Seal	
SC Seal	316L SST, Alloy C-276
SS Seal	

Drain/vent valves

316 SST, Alloy C-276, or Alloy 400/K-500[1] material
(Drain vent seat: Alloy 400, Drain vent stem: Alloy K-500)

Process flanges and flange adapters

Plated carbon steel
SST: CF-8M (Cast 316 SST) per ASTM A743
Cast C-276: CW-12MW per ASTM A494
Cast Alloy 400: M-30C per ASTM A494

Wetted O-rings

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

Rosemount 3051SAL Mounting Flange

Zinc-cobalt plated CS or 316 SST

Rosemount 3051SAL Seal Extension

CF-3M (Cast 316L SST, material per ASTM A743) or
CW-12MW (Cast C-276, material per ASTM A494)

A.3.4 Non-wetted parts

Electronics housing

Low-copper aluminum alloy or CF-8M (Cast 316 SST)
Enclosures meet NEMA® Type 4X, IP66, and IP68 [66 ft (20 m)

for 168 hours] when properly installed.

Coplanar sensor module housing

SST: CF-3M (Cast 316L SST)

Bolts

Plated carbon steel per ASTM A449, Type 1
Austenitic 316 SST per ASTM F593
ASTM A453, Class D, Grade 660 SST
ASTM A193, Grade B7M alloy steel
ASTM A193, Class 2, Grade B8M SST
Alloy K-500

Sensor module fill fluid

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

Seal fill fluid (liquid level only)

Rosemount 3051SAL: SYLTHERM XLT, Silicone 704, Silicone 200, inert, glycerin and water, Neobee M-20, propylene glycol and water.

Paint for aluminum housing

Polyurethane

Cover o-rings

Buna-N

Wireless antenna

External Antenna (WK/WM): PBT/PC integrated omni-directional antenna
Remote Antenna (WN): Fiberglass omni-directional antenna

Power module

Field replaceable, keyed connection eliminates the risk of incorrect installation, Intrinsically Safe Lithium-thionyl chloride Power Module with PBT enclosure

1. Alloy 400/K-500 is not available with Rosemount 3051SAL.

A.3.5 Shipping weights

Sensor module weights

Coplanar sensor module[1]	3.1 lb (1.4 kg)
In-line sensor module	1.4 lb (0.6 kg)

1. Flange and bolts not included.

Transmitter weights[1]

Transmitter with Coplanar Sensor Module (Rosemount 3051S_C)	
Junction box housing, SST flange	6.3 lb (2.8 kg)
Plantweb Housing, SST flange	6.7 lb (3.1 kg)
Transmitter with In-Line Sensor Module (Rosemount 3051S_T)	
Junction box housing	3.2 lb (1.4 kg)
Plantweb Housing	3.7 lb (1.7 kg)

1. Fully functional transmitter with sensor module, housing, terminal block, and covers. Does not include LCD display.

Transmitter option weights

Option code	Option	Add lb (kg)
1J, 1K, 1L	SST Plantweb housing	3.5 (1.6)
2J	SST Junction Box housing	3.4 (1.5)
7J	SST Quick Connect	0.4 (0.2)
2A, 2B, 2C	Aluminum Junction Box housing	1.1 (0.5)
1A, 1B, 1C	Aluminum Plantweb housing	1.1 (0.5)
M5[1]	LCD display for Aluminum Plantweb housing, LCD display for SST Plantweb housing	0.8 (0.4) 1.6 (0.7)
B4	SST Mounting Bracket for Coplanar Flange	1.2 (0.5)
B1, B2, B3	Mounting Bracket for Traditional Flange	1.7 (0.8)
B7, B8, B9	Mounting Bracket for Traditional Flange with SST Bolts	1.7 (0.8)
BA, BC	SST Bracket for Traditional Flange	1.6 (0.7)
B4	SST Mounting Bracket for In-Line	1.3 (0.6)
F12, F22[2]	SST Traditional Flange with SST Drain Vents	3.2 (1.5)
F13, F23[2]	Cast C-276 Traditional Flange with Alloy C-276 Drain Vents	3.6 (1.6)
E12, E22[2]	SST Coplanar Flange with SST Drain Vents	1.9 (0.9)
F14, F24[2]	Cast Alloy 400 Traditional Flange with Alloy 400/K-500 Drain Vents	3.6 (1.6)
F15, F25[2]	SST Traditional Flange with Alloy C-276 Drain Vents	3.2 (1.5)
G21	Level Flange—3 in., Class 150	12.6 (5.7)
G22	Level Flange—3 in., Class 300	15.9 (7.2)
G11	Level Flange—2 in., Class 150	6.8 (3.1)
G12	Level Flange—2 in., Class 300	8.2 (3.7)
G31	DIN Level Flange, SST, DN 50, PN 40	7.8 (3.5)
G41	DIN Level Flange, SST, DN 80, PN 40	13.0 (5.9)

1. Includes LCD display and display cover.
2. Includes mounting bolts.

Item	Weight in lb. (kg)
Aluminum standard cover	0.4 (0.2)
SST standard cover	1.3 (0.6)
Aluminum display cover	0.7 (0.3)
SST display cover	1.5 (0.7)
LCD display[1]	0.1 (0.04)
Junction box terminal block	0.2 (0.1)
Plantweb terminal block	0.2 (0.1)
Power module	0.5 (0.2)

1. Display only.

Table A-1. Rosemount 3051SAL Weights without SuperModule Platform, Housing, or Transmitter Options

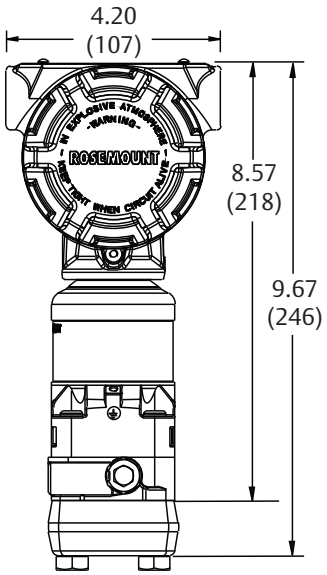
Flange	Flush lb. (kg)	2-in. Ext. lb (kg)	4-in. Ext. lb (kg)	6-in. Ext. lb (kg)
2-in., Class 150	9.5 (4,3)	N/A	N/A	N/A
3-in., Class 150	15.7 (7,1)	16.4 (7,4)	17.6 (8,0)	18.9 (8,6)
4-in., Class 150	21.2 (9,6)	20.9 (9,5)	22.1 (10,0)	23.4 (10,6)
2-in., Class 300	11.3 (5,1)	N/A	N/A	N/A
3-in., Class 300	19.6 (8,9)	20.3 (9,2)	21.5 (9,8)	22.8 (10,3)
4-in., Class 300	30.4 (13.8)	30.3 (13,7)	31.5 (14,3)	32.8 (14,9)
2-in., Class 600	12.8 (5,8)	N/A	N/A	N/A
3-in., Class 600	22.1 (10,0)	22.8 (10,3)	24.0 (10,9)	25.3 (11,5)
DN 50/PN 40	11.3 (5,1)	N/A	N/A	N/A
DN 80/PN 40	16.0 (7,3)	16.7 (7,6)	17.9 (8,1)	19.2 (8,7)
DN 100/PN 10/16	11.2 (5,1)	11.9 (5,4)	13.1 (5,9)	14.4 (6,5)
DN 100/PN 40	12.6 (5,7)	13.3 (6,0)	14.5 (6,6)	15.8 (7,1)

A.4 Dimensional drawings

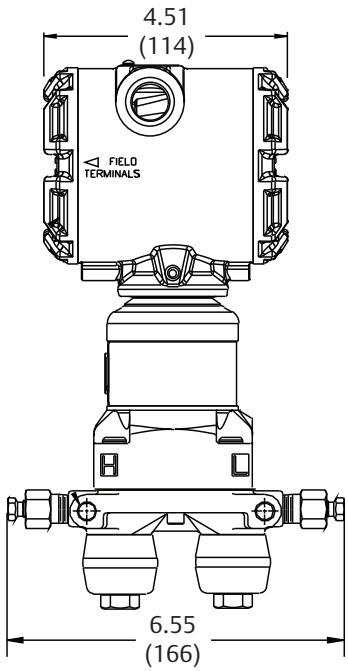
Figure A-1. Transmitter with Coplanar Sensor Module and Flange

Plantweb housing

Front view

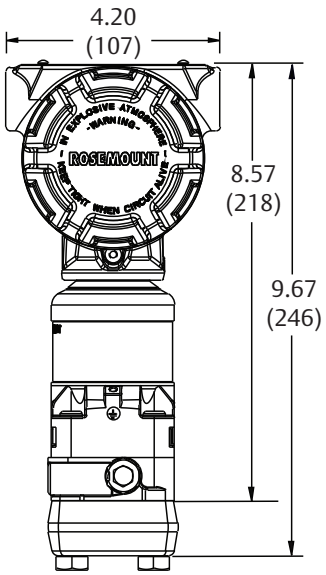


Side view

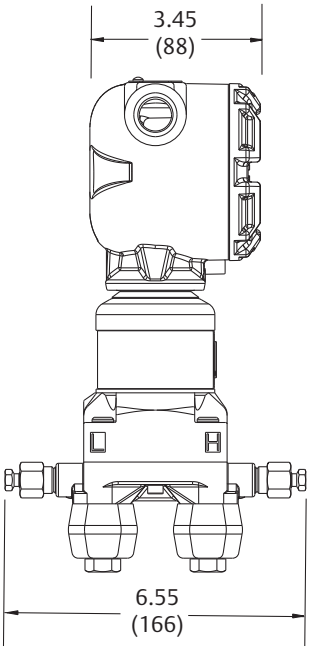


Junction box housing

Front view

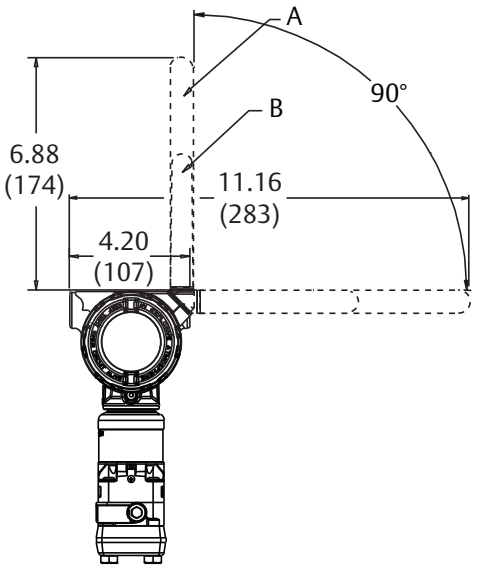


Side view



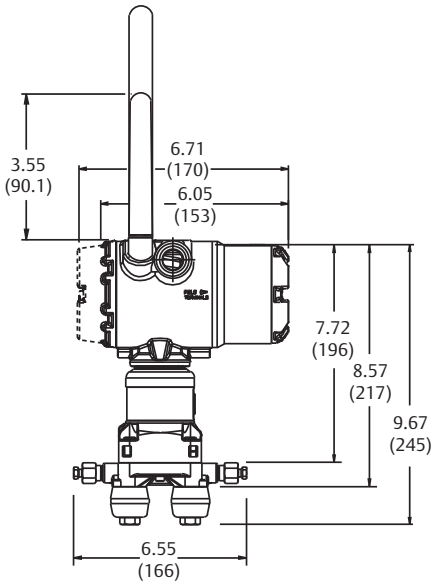
Wireless housing

Front view



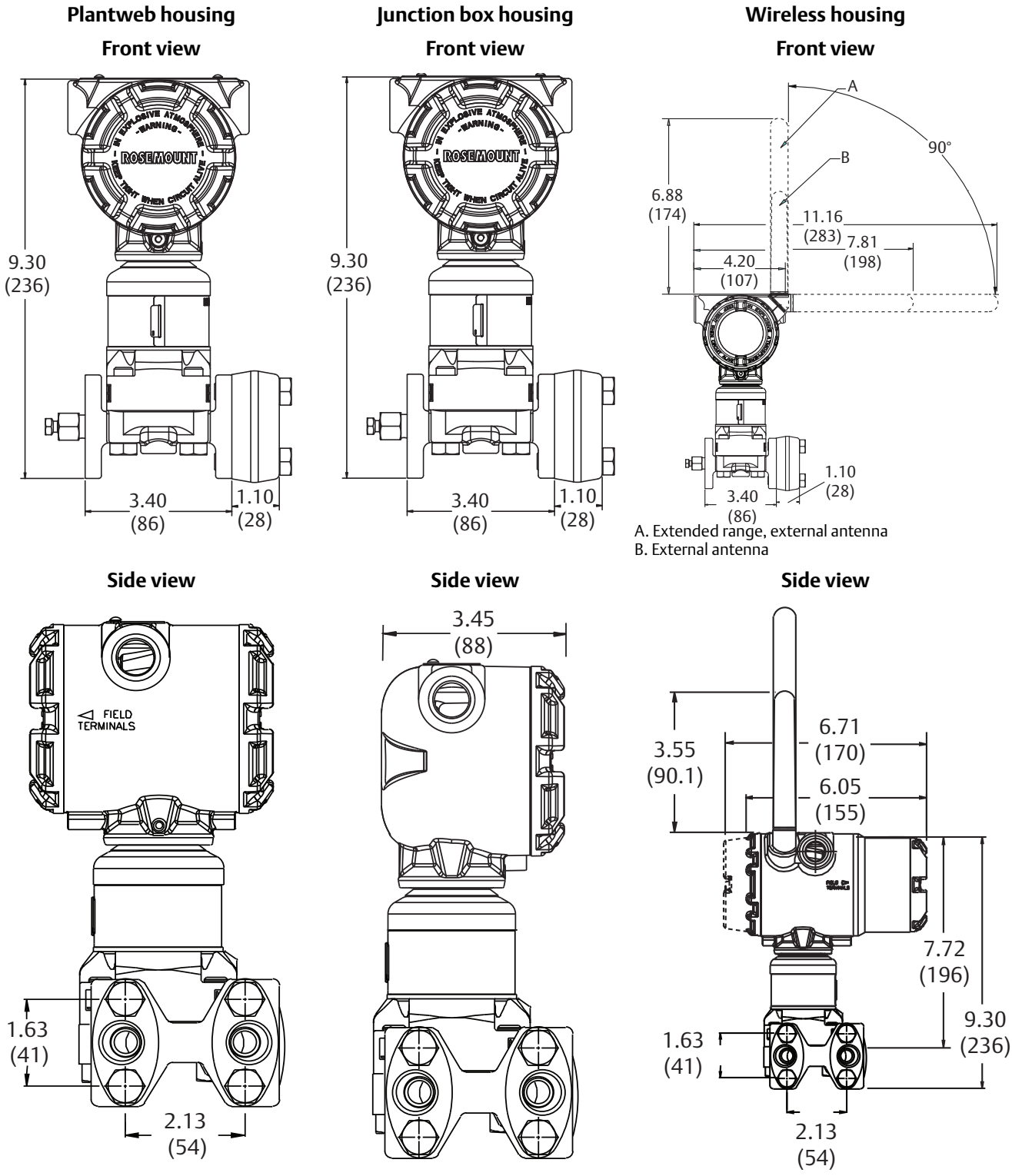
A. Extended range, external antenna
B. External antenna

Side view



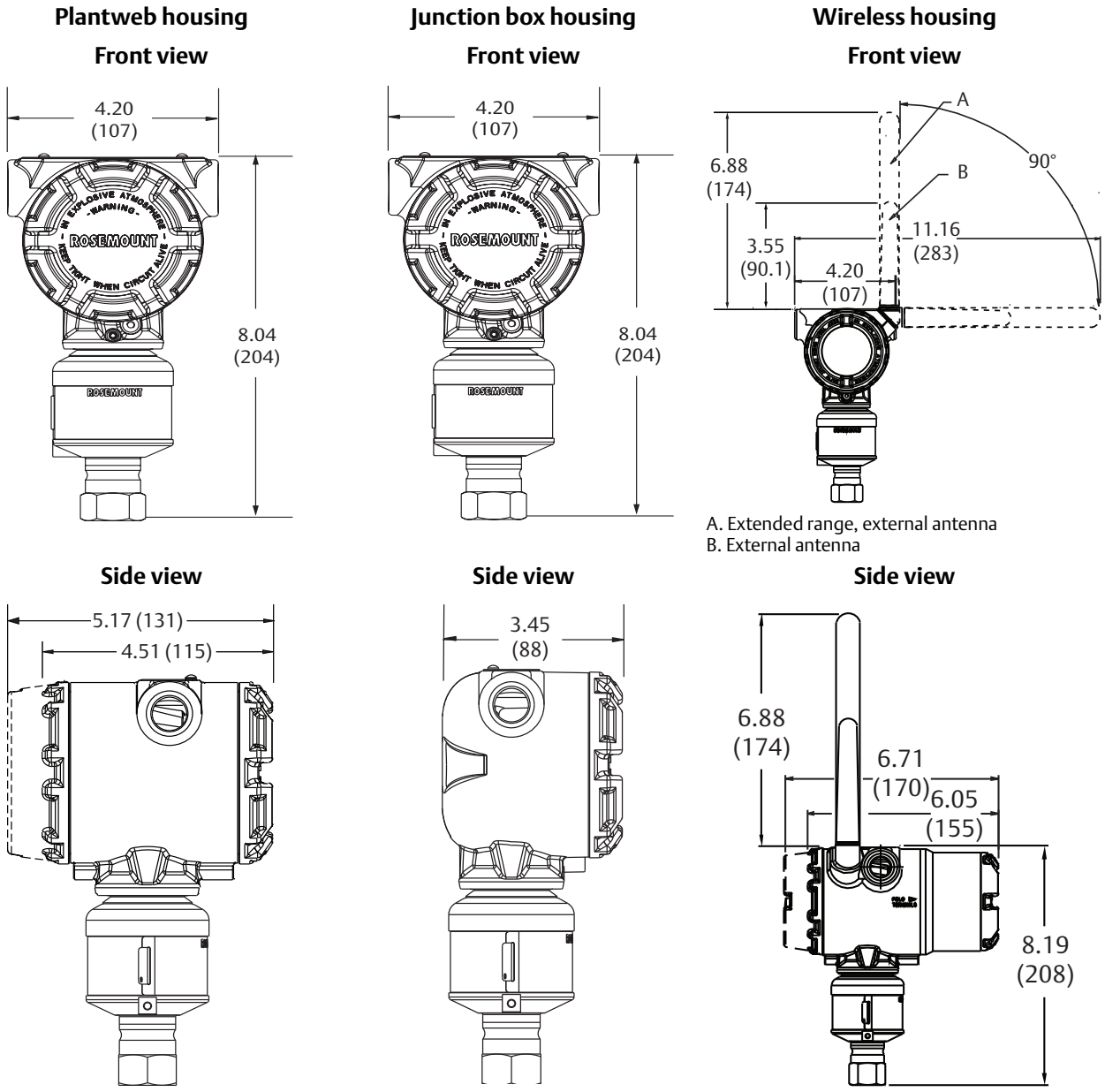
Dimensions are in inches (millimeters).

Figure A-2. Transmitter with Coplanar Sensor Module and Traditional Flange



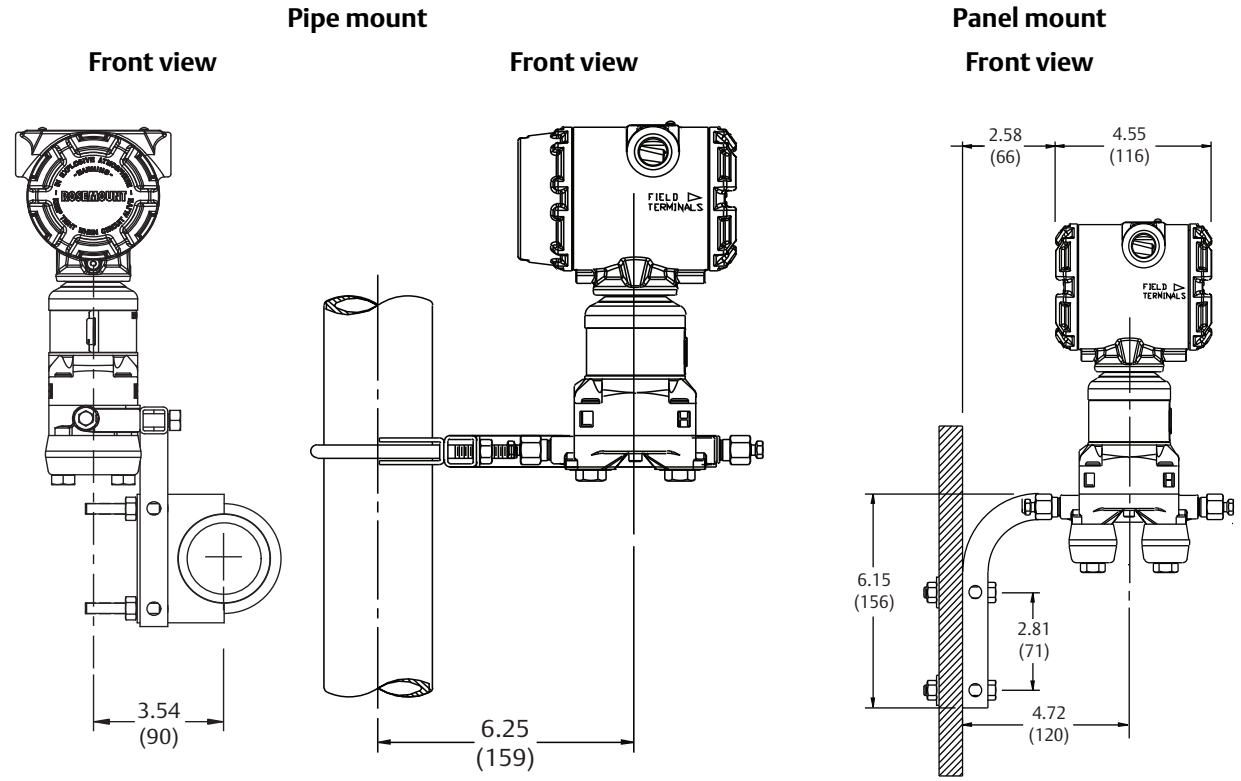
Dimensions are in inches (millimeters).

Figure A-3. Transmitter with In-Line Sensor Module



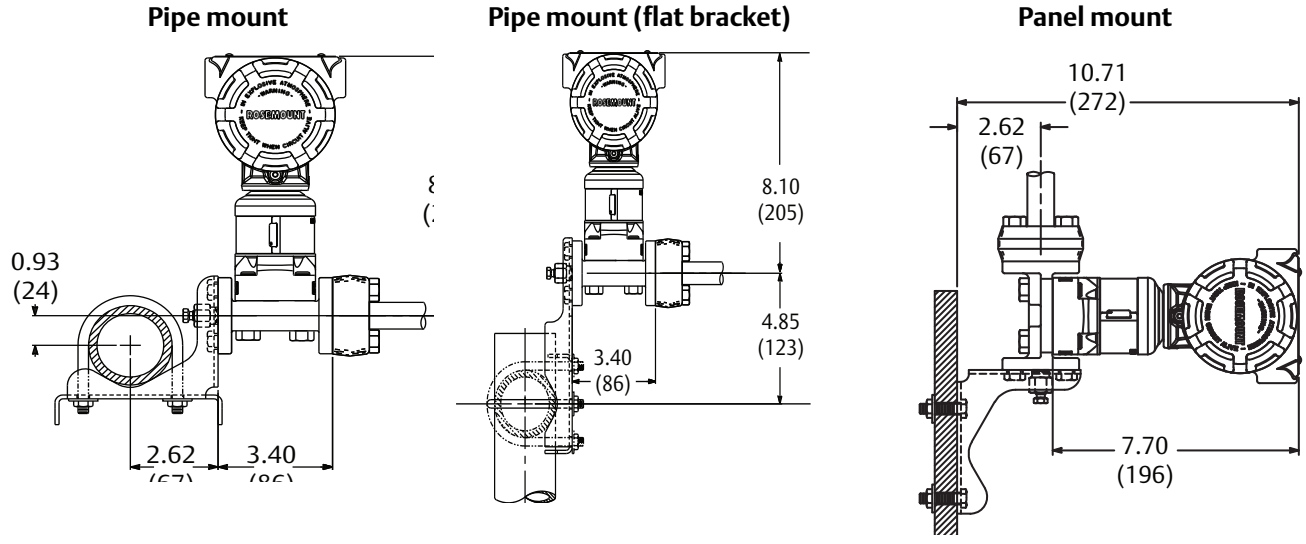
Dimensions are in inches (millimeters).

Figure A-4. Coplanar Mounting Configurations (B4 Bracket)



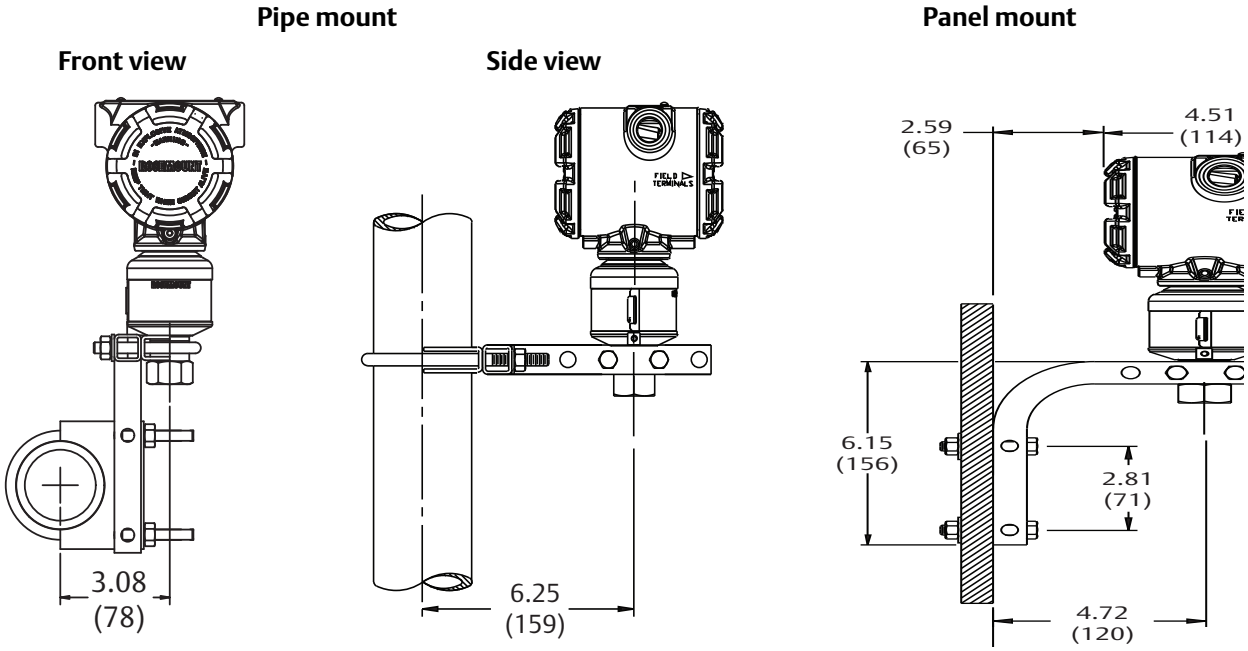
Dimensions are in inches (millimeters).

Figure A-5. Traditional Mounting Configurations



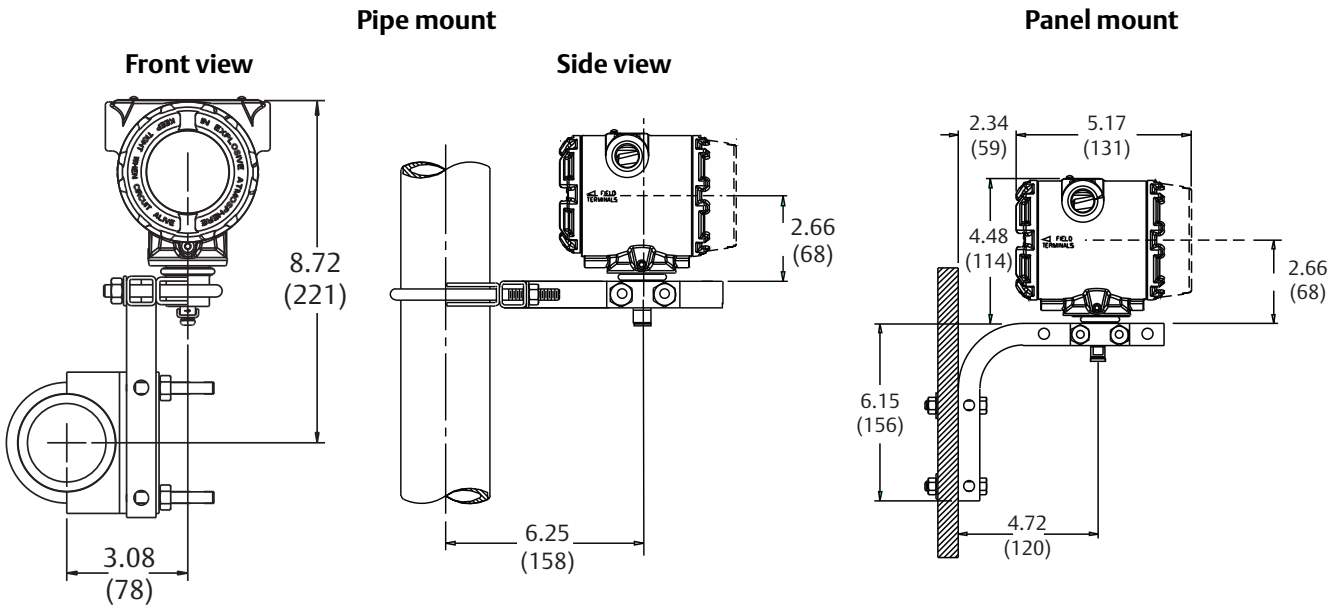
Dimensions are in inches (millimeters).

Figure A-6. In-Line Mounting Configurations (B4 Bracket)



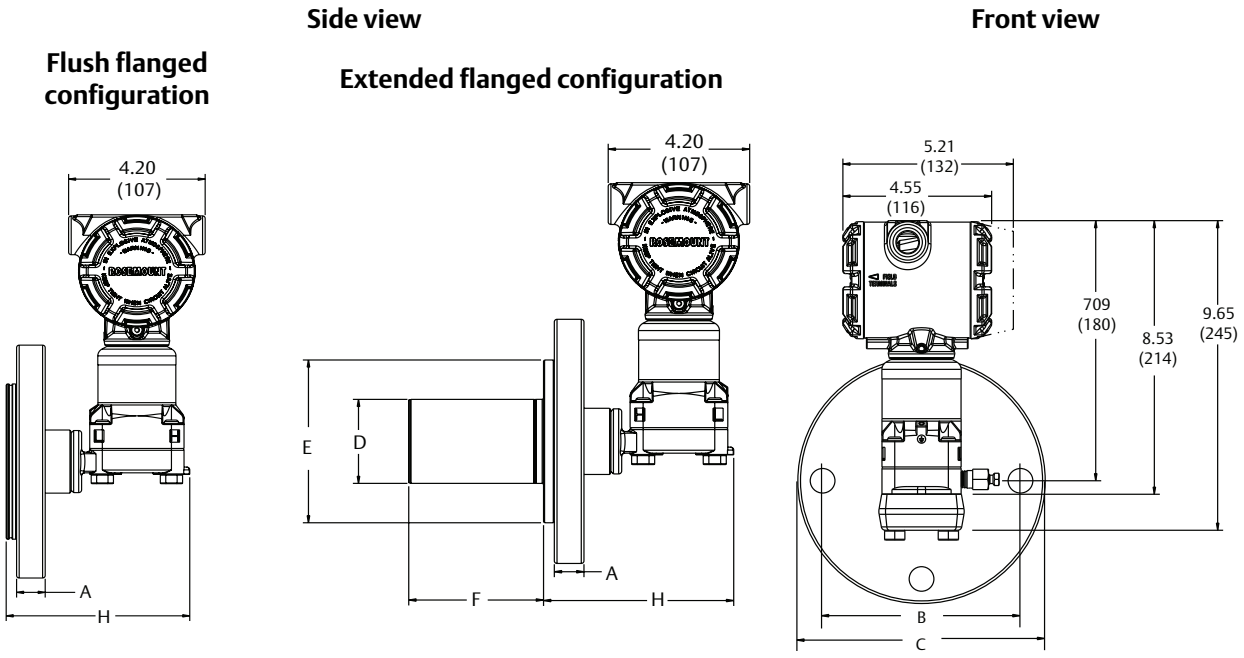
Dimensions are in inches (millimeters).

Figure A-7. Remote Display Mounting Configurations (B4 Bracket)



Dimensions are in inches (millimeters).

Figure A-8. Rosemount 3051SAL Liquid Level Transmitter



For A, B, C, D, E, and H, refer to Table A-2
F. Extension 2, 4, or 5 (51, 102, or 152)
Dimensions are in inches (millimeters).

Table A-2. Rosemount 3051SAL Liquid Level Transmitter Dimensions

Class	Pipe size	Flange thickness A	Bolt circle diameter B	Outside diameter C	No. of bolts	Bolt hole diameter	Extension diameter [1] D	E	H
ASME B16.5 (ANSI) 150	2 (51)	0.69 (18)	4.75 (121)	6.0 (152)	4	0.75 (19)	N/A	3.6 (92)	5.65 (143)
	3 (76)	0.88 (22)	6.0 (152)	7.5 (191)	4	0.75 (19)	2.58 (66)	5.0 (127)	5.65 (143)
	4 (102)	0.88 (22)	7.5 (191)	9.0 (229)	8	0.75 (19)	3.5 (89)	6.2 (158)	5.65 (143)
ASME B16.5 (ANSI) 300	2 (51)	0.82 (21)	5.0 (127)	6.5 (165)	8	0.75 (19)	N/A	3.6 (92)	5.65 (143)
	3 (76)	1.06 (27)	6.62 (168)	8.25 (210)	8	0.88 (22)	2.58 (66)	5.0 (127)	5.65 (143)
	4 (102)	1.19 (30)	7.88 (200)	10.0 (254)	8	0.88 (22)	3.5 (89)	6.2 (158)	5.65 (143)
ASME B16.5 (ANSI) 600	2 (51)	1.00 (25)	5.0 (127)	6.5 (165)	8	0.75 (19)	N/A	3.6 (92)	7.65 (194)
	3 (76)	1.25 (32)	6.62 (168)	8.25 (210)	8	0.88 (22)	2.58 (66)	5.0 (127)	7.65 (194)
DIN 2501 PN 10–40	DN 50	20 mm	125 mm	165 mm	4	18 mm	N/A	4.0 (102)	5.65 (143)
DIN 2501 PN 25/40	DN 80	24 mm	160 mm	200 mm	8	18 mm	66 mm	5.4 (138)	5.65 (143)
	DN 100	24 mm	190 mm	235 mm	8	22 mm	89 mm	6.2 (158)	5.65 (143)
DIN 2501 PN 10/16	DN 100	20 mm	180 mm	220 mm	8	18 mm	89 mm	6.2 (158)	5.65 (143)

1. Tolerances are 0.040 (1.02), –0.020 (0.51).

A.5 Ordering information

Table A-3. Rosemount 3051S Scalable Coplanar Pressure Transmitter Ordering Information

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

Model	Transmitter type			
3051S	Scalable Pressure Transmitter			
Performance class				
1	Ultra: 0.025 percent span accuracy, 200:1 rangedown, 10-year stability, 12-year limited warranty			★
3[(1)]	Ultra for Flow: 0.04 percent reading accuracy, 200:1 turndown, 10-year stability, 12-year ltd warranty			★
2	Classic: 0.055 percent span accuracy, 100:1 rangedown, 5-year stability			★
Connection type				
C	Coplanar			★
Measurement type[(2)]				
D	Differential			★
G	Gage			★
A	Absolute			
Pressure range				
	Differential	**Gage**	**Absolute**	
1A	–25 to 25 inH_2O (–62,2 to 62,2 mbar)	–25 to 25 inH_2O (–62,2 to 62,2 mbar)	0 to 30 psia (0 to 2,06 bar)	★
2A	–250 to 250 inH_2O (–623 to 623 mbar)	–250 to 250 inH_2O (–623 to 623 mbar)	0 to 150 psia (0 to 10,34 bar)	★
3A	–1000 to 1000 inH_2O (–2,5 to 2,5 bar)	–393 to 1000 inH_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	★
0A[(3)]	–3 to 3 inH_2O (–7,47 to 7,47 mbar)	N/A	0 to 5 psia (0 to 0,34 bar)	
Isolating diaphragm				
2[(4)]	316L SST			★
3[(4)]	Alloy C-276			★
4	Alloy 400			
5[(5)]	Tantalum			
6	Gold-Plated Alloy 400 (includes Graphite-Filled PTFE o-ring)			
7	Gold-plated 316L SST			

Table A-3. Rosemount 3051S Scalable Coplanar Pressure Transmitter Ordering Information

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

Process connection		Size	Materials of construction			
			Flange material	Drain vent	Bolting	
000[6]	None.					★
A11[7]	Assemble to Rosemount 305 Integral Manifold					★
A12[7]	Assemble to Rosemount 304 or AMF Manifold and SST traditional flange					★
B11[7][8][9]	Assemble to one Rosemount 1199 Seal		SST			★
B12[7][8][9]	Assemble to two Rosemount 1199 Seals		SST			★
C11[7]	Assemble to Rosemount 405 Primary Element					★
D11[7]	Assemble to Rosemount 1195 integral orifice and Rosemount 305 Integral Manifold					★
EA2[7]	Assemble to Rosemount Annubar Primary Element with coplanar flange		SST	316 SST	N/A	★
EA3[7]	Assemble to Rosemount Annubar Primary Element with coplanar flange		Cast C-276	Alloy C-276	N/A	★
EA5[7]	Assemble to Rosemount Annubar Primary Element with coplanar flange		SST	Alloy C-276	N/A	★
E11	Coplanar flange	1/4–18 NPT	CS	316 SST	N/A	★
E12	Coplanar flange	1/4–18 NPT	SST	316 SST	N/A	★
E13[4]	Coplanar flange	1/4–18 NPT	Cast C-276	Alloy C-276	N/A	★
E14	Coplanar flange	1/4–18 NPT	Cast Alloy 400	Alloy400/K-500	N/A	★
E15[4]	Coplanar flange	1/4–18 NPT	SST	Alloy C-276	N/A	★
E16[4]	Coplanar flange	1/4–18 NPT	CS	Alloy C-276	N/A	★
E21	Coplanar flange	RC 1/4	CS	316 SST	N/A	★
E22	Coplanar flange	RC 1/4	SST	316 SST	N/A	★
E23[4]	Coplanar flange	RC 1/4	Cast C-276	Alloy C-276	N/A	★
E24	Coplanar flange	RC 1/4	Cast Alloy 400	Alloy 400/K-500	N/A	★
E25[4]	Coplanar flange	RC 1/4	SST	Alloy C-276	N/A	★
E26[4]	Coplanar flange	RC 1/4	CS	Alloy C-276	N/A	★
F12	Traditional flange	1/4–18 NPT	SST	316 SST	N/A	★
F13[4]	Traditional flange	1/4–18 NPT	Cast C-276	Alloy C-276	N/A	★
F14	Traditional flange	1/4–18 NPT	Cast Alloy 400	Alloy 400/K-500	N/A	★
F15[4]	Traditional flange	1/4–18 NPT	SST	Alloy C-276	N/A	★
F22	Traditional flange	RC 1/4	SST	316 SST	N/A	★
F23[4]	Traditional flange	RC 1/4	Cast C-276	Alloy C-276	N/A	★
F24	Traditional flange	RC 1/4	Cast Alloy 400	Alloy 400/K-500	N/A	★
F25[4]	Traditional flange	RC 1/4	SST	Alloy C-276	N/A	★

Table A-3. Rosemount 3051S Scalable Coplanar Pressure Transmitter Ordering Information

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

F52	DIN-compliant traditional flange	1/4–18 NPT	SST	316 SST	7/16-in. bolting	★
G11	Vertical mount level flange	2-in. ANSI Class 150	SST	316 SST	N/A	★
G12	Vertical mount level flange	2-in. ANSI Class 300	SST	316 SST	N/A	★
G21	Vertical mount level flange	3-in. ANSI Class 150	SST	316 SST	N/A	★
G22	Vertical mount level flange	3-in. ANSI Class 300	SST	316 SST	N/A	★
G31	Vertical mount level flange	DIN- DN 50 PN 40	SST	316 SST	N/A	★
G41	Vertical mount level flange	DIN- DN 80 PN 40	SST	316 SST	N/A	★
F32	Bottom vent traditional flange	1/4–18 NPT	SST	316 SST	N/A	
F42	Bottom vent traditional flange	RC 1/4	SST	316 SST	N/A	
F62	DIN-compliant traditional flange	1/4–18 NPT	SST	316 SST	M10 bolting	
F72	DIN-compliant traditional flange	1/4–18 NPT	SST	316 SST	M12 bolting	
Transmitter output						
A	4–20 mA with digital signal based on HART protocol					★
F[10]	FOUNDATION Fieldbus protocol					★
X[11]	Wireless (Requires wireless options and wireless Plantweb housing)					★
Housing style				**Material**	**Conduit entry size**	
00	None (SuperModule spare part, order output code A)					★
1A	Plantweb housing			Aluminum	1/2–14 NPT	★
1B	Plantweb housing			Aluminum	M20 × 1.5	★
1J	Plantweb housing			SST	1/2–14 NPT	★
1K	Plantweb housing			SST	M20 × 1.5	★
5A[23]	Wireless Plantweb housing			Aluminum	1/2–14 NPT	★
5J[23]	Wireless Plantweb housing			SST	1/2–14 NPT	★
2A	Junction box housing			Aluminum	1/2–14 NPT	★
2B	Junction box housing			Aluminum	M20 × 1.5	★
2J	Junction box housing			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 × 1.5	★
2M	Junction box Housing with output for remote display and interface			SST	1/2–14 NPT	★

Table A-3. Rosemount 3051S Scalable Coplanar Pressure Transmitter Ordering Information

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

7J[12]	Quick Connect (A size Mini, 4-pin male termination)	SST	N/A	★
1C	Plantweb housing	Aluminum	G1/2	
1L	Plantweb housing	SST	G1/2	
2C	Junction box housing	Aluminum	G1/2	
2G	Junction box Housing with output for remote display and interface	Aluminum	G1/2	

Wireless options (Requires option code X and wireless Plantweb housing)

Update rate		
WA	User Configurable Update Rate	★
Operating frequency and protocol		
3	2.4 GHz DSSS, IEC 62591 (*Wireless*HART)	★
Omni-directional wireless antenna		
WK	External Antenna	★
WM	Extended Range, External Antenna	★
SmartPower™ [13]		
1	Adapter for Black Power Module (I.S. power module sold separately)	★

Other options (Include with selected model number)

Plantweb control functionality[14]		
A01	FOUNDATION Fieldbus Advanced Control Function Block Suite	★
Plantweb diagnostic functionality[14]		
D01	FOUNDATION Fieldbus Diagnostics Suite	★
DA2[15]	Advanced HART Diagnostics Suite	★
Plantweb enhanced measurement functionality[14][16]		
H01	FOUNDATION Fieldbus Fully Compensated Mass Flow Block	★
Mounting bracket[17]		
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	★

Table A-3. Rosemount 3051S Scalable Coplanar Pressure Transmitter Ordering Information

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

Software configuration		
C1[18]	Custom software configuration (Requires Configuration Data Sheet)	★
C2	Custom flow configuration (Requires H01 and Configuration Data Sheet)	★
Gage pressure calibration		
C3	Gage pressure calibration on Rosemount 3051S_CA4 only	★
Alarm limit[14][18]		
C4	NAMUR alarm and saturation levels, high alarm	★
C5	NAMUR alarm and saturation levels, low alarm	★
C6	Custom alarm and saturation signal levels, high alarm (Requires C1 and Configuration Data Sheet)	★
C7	Custom alarm and saturation signal levels, low alarm (Requires C1 and Configuration Data Sheet)	★
C8	Low alarm (standard Rosemount alarm and saturation levels)	★
Hardware adjustments[14][18][19]		
D1	Hardware adjustments (zero, span, alarm, security)	★
Flange adapter[17]		
D2	1/2-14 NPT flange adapter	★
D9	RC1/2 SST flange adapter	
Custody transfer[20]		
D3	Measurement Canada Accuracy Approval	★
Ground screw		
D4	External ground screw assembly	★
Drain/vent valve[17]		
D5	Delete transmitter drain/vent valves (install plugs)	★
D7	Coplanar flange without drain/vent ports	
Conduit plug[21]		
DO	316 SST Conduit Plug	★
Product certifications[22]		
E1	ATEX Flameproof	★
I1	ATEX Intrinsic Safety	★
IA	ATEX FISCO Intrinsic Safety (FOUNDATION Fieldbus protocol only)	★
N1	ATEX Type n	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
ND	ATEX Dust	★
E4	TIIS Flameproof	★
I4[23]	TIIS Intrinsic Safety	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5	FM Intrinsically Safe, Division 2	★

Table A-3. Rosemount 3051S Scalable Coplanar Pressure Transmitter Ordering Information

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

IE	FM FISCO Intrinsically Safe (FOUNDATION Fieldbus protocol only)	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E6[24]	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
I6	CSA Intrinsically Safe	★
IF	CSA FISCO Intrinsically Safe (FOUNDATION Fieldbus protocol only)	★
K6[24]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
IG	IECEx FISCO Intrinsic Safety (FOUNDATION Fieldbus protocol only)	★
N7	IECEx Type n	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
N3	China Type n	★
KA[24]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB[24]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[24]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
Sensor fill fluid[25]		
L1	Inert sensor fill fluid	★
O-ring		
L2	Graphite-filled PTFE o-ring	★
Bolting material[17]		
L4	Austenitic 316 SST bolts	★
L5[4]	ASTM A 193, Grade B7M bolts	★
L6	Alloy K-500 bolts	★
L7[4]	ASTM A453, Class D, Grade 660 bolts	★
L8	ASTM A193, Class 2, Grade B8M bolts	★
Display type[26]		
M5	Plantweb LCD display	★
M7[14][27][28]	Remote mount LCD display and interface, Plantweb housing, no cable, SST bracket	★
M8[14][27]	Remote mount LCD display and interface, Plantweb housing, 50 ft. (15 m) cable, SST bracket	★
M9[14][27]	Remote mount LCD display and interface, Plantweb housing, 100-ft. (31 m) cable, SST bracket	★

Table A-3. Rosemount 3051S Scalable Coplanar Pressure Transmitter Ordering Information

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

Pressure testing[29]		
P1	Hydrostatic testing with certificate	
Special cleaning[17]		
P2	Cleaning for special services	
P3	Cleaning for less than 1PPM chlorine/fluorine	
Maximum static line pressure		
P9	4500 psig (310 bar) static pressure limit (Rosemount 3051S_CD only)	★
P0[30]	6092 psig (420 bar) static pressure limit (Rosemount 3051S_CD only)	★
Calibration certification		
Q4	Calibration certificate	★
QP	Calibration certificate and tamper evident seal	★
Material traceability certification		
Q8	Material traceability certification per EN 10204 3.1	★
Quality certification for safety		
QS[14][18]	Prior-use certificate of FMEDA Data	★
QT[31]	Safety-certified to IEC 61508 with certificate of FMEDA data	★
Transient protection[32][33]		
T1	Transient terminal block	★
Drinking water approval[34]		
DW	NSF Drinking Water Approval	★
Surface finish certification		
Q16	Surface finish certification for sanitary remote seals	★
Toolkit total system performance reports		
QZ	Remote Seal System Performance Calculation Report	★
Conduit electrical connector[35]		
GE	M12, 4-pin, male connector (eurofast®)	★
GM	A size Mini, 4-pin, male connector (minifast®)	★
Typical model number: 3051S1CD 2A 2 E12 A 1A DA2 B4 M5		

1. This option is only available with range codes 2A and 3A, 316L SST or Alloy C-276 isolating diaphragm and silicone fill fluid.
2. Performance Class code 3 is available with Measurement Type code D only.
3. Rosemount 3051S_CD0 is only available with traditional flange, 316L SST diaphragm material, 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. When ordered with option 000, the Rosemount 3051S does not go through calibration in production.
7. "Assemble to" items are specified separately and require a completed model number. Process connection option codes B12, C11, D11, EA2, EA3, and EA5 are only available on differential Measurement Type, code D.
8. Consult an Emerson representative for performance specifications.
9. Not available with performance class code 3.

10. Requires Plantweb housing.
11. Available approvals are FM Intrinsically Safe, Division 2 (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).
12. Available with output code A only. Available approvals are FM Intrinsically Safe, Division 2 (option code I5), ATEX Intrinsic Safety (option code I1), or IECEx Intrinsic Safety (option code I7). Contact an Emerson representative for additional information.
13. Long-Life Power Module must be shipped separately, order Part #00753-9220-0001.
14. Not available with output code X.
15. Requires Plantweb housing and output code A. Includes Hardware Adjustments as standard.
16. Requires Rosemount Engineering Assistant to configure.
17. Not available with process connection option code A11.
18. Not available with output code F.
19. Not available with housing style codes 00, 2E, 2F, 2G, 2M, 5A, 5J, or 7J.
20. Requires Plantweb housing and Hardware Adjustments option code D1. Limited availability depending on transmitter type and range. Contact an Emerson representative for additional information.
21. Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug.
22. Valid when SuperModule Platform and housing have equivalent approvals.
23. Only available with output code X.
24. Not available with M20 or $G^1/2$ conduit entry size.
25. Only available on differential and gage measurement types. Silicone fill fluid is standard.
26. Not available with Housing code 7J.
27. Not available with output code F, option code DA2, or option code QT.
28. See the Rosemount 3051S Reference Manual for cable requirements. Contact an Emerson representative for additional information.
29. P1 is not available with Rosemount 3051S_CA0.
30. Requires 316L SST, Alloy C-276, or Gold-plated 316L SST 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.
31. Not available with output code F or X. Not available with housing code 7J.
32. Not available with Housing code 00, 5A, 5J, or 7J.
33. The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA, IE, IF, and IG.
34. Requires 316L SST diaphragm material, glass-filled PTFE O-ring (standard), and Process Connection code E12 or F12.
35. Not available with Housing code 00, 5A, 5J, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).

Table A-4. Rosemount 3051S Scalable In-Line Pressure Transmitter Ordering Information

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

Model	**Transmitter type**			
3051S	Scalable pressure transmitter			
Performance class				
1	Ultra: 0.025 percent span accuracy, 200:1 rangedown, 10 year stability, 12 year limited warranty			★
2	Classic: 0.055 percent span accuracy, 100:1 rangedown, 5 year stability			★
Connection type				
T	In-Line			★
Measurement type				
G	Gage			★
A	Absolute			★
Pressure range				
	Gage	**Absolute**		
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)		★
Isolating diaphragm				
2[(1)]	316L SST			★
3[(1)]	Alloy C-276			★
Process Connection				
A11[(2)]	Assemble to Rosemount 306 Integral Manifold			★
B11[(2)(3)]	Assemble to one Rosemount 1199 Seal			★
E11	1/2–14 NPT female			★
G11	G1/2 A DIN 16288 male (Range 1-4 only)			★
F11	Non-threaded instrument flange (I-flange) (Range 1-4 only)			
Transmitter output				
A	4–20 mA with digital signal based on HART protocol			★
F[(4)]	FOUNDATION Fieldbus protocol			★
X[(5)]	Wireless (Requires wireless options and wireless Plantweb housing)			★
Housing style		**Material**	**Conduit entry size**	
00	None (SuperModule spare part, order output code A)			★
1A	Plantweb housing	Aluminum	1/2–14 NPT	★
1B	Plantweb housing	Aluminum	M20 × 1.5	★
1J	Plantweb housing	SST	1/2–14 NPT	★
1K	Plantweb housing	SST	M20 × 1.5	★

Table A-4. Rosemount 3051S Scalable In-Line Pressure Transmitter Ordering Information

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

5A[16]	Wireless Plantweb housing	Aluminum	1/2–14 NPT	★
5J[16]	Wireless Plantweb housing	SST	1/2–14 NPT	★
2A	Junction Box housing	Aluminum	1/2–14 NPT	★
2B	Junction Box housing	Aluminum	M20 × 1.5	★
2J	Junction Box housing	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 × 1.5	★
2M	Junction Box housing with output for remote display and interface	SST	1/2–14 NPT	★
7J[6]	Quick Connect (A size Mini, 4-pin male termination)	SST	N/A	★
1C	Plantweb housing	Aluminum	G1/2	
1L	Plantweb housing	SST	G1/2	
2C	Junction Box housing	Aluminum	G1/2	
2G	Junction Box housing with output for remote display and interface	Aluminum	G1/2	

Wireless options (Requires option code X and wireless Plantweb housing)

Update rate		
WA	User configurable update rate	★
Operating frequency and protocol		
3	2.4 GHz DSSS, IEC 62591 (*Wireless*HART)	★
Omnidirectional wireless antenna		
WK	External antenna	★
WM	Extended range, external antenna	★
SmartPower		
1[7]	Adapter for black power module (I.S. power module sold separately)	★

Other options (Include with selected model number)

Plantweb control functionality[8]		
A01	FOUNDATION Fieldbus Advanced Control Function Block suite	★
Plantweb diagnostic functionality[8]		
D01	FOUNDATION Fieldbus diagnostics suite	★
DA2[9]	Advanced HART diagnostics suite	★
Mounting bracket[10]		
B4	Bracket, all SST, 2-in. pipe and panel	★
Software configuration[11]		
C1	Custom software configuration (requires Configuration Data Sheet)	★

Table A-4. Rosemount 3051S Scalable In-Line Pressure Transmitter Ordering Information

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

Alarm limit[8][11]		
C4	NAMUR alarm and saturation levels, high alarm	★
C5	NAMUR alarm and saturation levels, low alarm	★
C6	Custom alarm and saturation signal levels, high alarm (requires C1 and Configuration Data Sheet)	★
C7	Custom alarm and saturation signal levels, low alarm (requires C1 and Configuration Data Sheet)	★
C8	Low alarm (standard Rosemount alarm and saturation levels)	★
Hardware adjustments[8][11][12]		
D1	Hardware adjustments (zero, span, alarm, security)	★
Custody transfer[13]		
D3	Measurement Canada Accuracy Approval	★
Ground screw		
D4	External ground screw assembly	★
Conduit plug[14]		
DO	316 SST Conduit Plug	★
Product certifications[15]		
E1	ATEX Flameproof	★
I1	ATEX Intrinsic Safety	★
IA	ATEX FISCO Intrinsic Safety (FOUNDATION Fieldbus protocol only)	★
N1	ATEX Type n	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
ND	ATEX Dust	★
E4	TIIS Flameproof	★
I4[16]	TIIS Intrinsic Safety	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5	FM Intrinsically Safe, Division 2	★
IE	FM FISCO Intrinsically Safe (FOUNDATION Fieldbus protocol only)	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E6[17]	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
I6	CSA Intrinsically Safe	★
IF	CSA FISCO Intrinsically Safe (FOUNDATION Fieldbus protocol only)	★
K6[17]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
IG	IECEx FISCO Intrinsic Safety (FOUNDATION Fieldbus protocol only)	★
N7	IECEx Type n	★

Table A-4. Rosemount 3051S Scalable In-Line Pressure Transmitter Ordering Information

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

K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
N3	China Type n	★
KA[17]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB[17]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[17]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
Sensor fill fluid[18]		
L1	Inert sensor fill fluid	★
Display type[19]		
M5	Plantweb LCD display	★
M7[8][20][21]	Remote mount LCD display and interface, Plantweb housing, no cable, SST bracket	★
M8[8][20]	Remote mount LCD display and interface, Plantweb housing, 50 ft. (15 m) cable, SST bracket	★
M9[8][20]	Remote mount LCD display and interface, Plantweb housing, 100 ft. (31 m) cable, SST bracket	★
Pressure testing		
P1	Hydrostatic testing with certificate	
Special cleaning[10]		
P2	Cleaning for special services	
P3	Cleaning for less than 1PPM chlorine/fluorine	
Calibration certification		
Q4	Calibration certificate	★
QP	Calibration certificate and tamper evident seal	★
Material traceability certification		
Q8	Material traceability certification per EN 10204 3.1	★
Quality certification for safety		
QS[8][11]	Prior-use certificate of FMEDA Data	★
QT[22]	Safety-certified to IEC 61508 with certificate of FMEDA data	★
Transient protection[23][24]		
T1	Transient terminal block	★
Drinking water approval[25]		
DW	NSF Drinking Water Approval	★

Table A-4. Rosemount 3051S Scalable In-Line Pressure Transmitter Ordering Information

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

Surface finish certification		
Q16	Surface finish certification for sanitary remote seals	★
Toolkit total system performance reports		
QZ	Remote Seal System Performance Calculation Report	★
Conduit electrical connector		
GE[26]	M12, 4-pin, male connector (eurofast)	★
GM[26]	A size mini, 4-pin, male connector (minifast)	★
Typical model number: 3051S1TG 2A 2 E11 A 1A DA2 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. "Assemble to" items are specified separately and require a completed model number.
3. Consult an Emerson representative for performance specifications.
4. Requires Plantweb housing.
5. Available approvals are FM Intrinsically Safe, Division 2 (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).
6. Available with output code A only. Available approvals are FM Intrinsically Safe, Division 2 (option code I5), ATEX Intrinsic Safety (option code I1), or IECEx Intrinsic Safety (option code I7). Contact an Emerson representative for additional information.
7. Long-Life Power Module must be shipped separately, order Part #00753-9220-0001.
8. Not available with output code X.
9. Requires Plantweb housing and output code A. Includes Hardware Adjustments as standard.
10. Not available with process connection option code A11.
11. Not available with output code F.
12. Not available with housing style codes 00, 01, 2E, 2F, 2G, 2M, 5A, 5J, or 7J.
13. Requires Plantweb housing and Hardware Adjustments option code D1. Limited availability depending on transmitter type and range. Contact an Emerson representative for additional information.
14. Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug.
15. Valid when SuperModule Platform and housing have equivalent approvals.
16. Only available with output code X.
17. Not available with M20 or $G^1/2$ conduit entry size.
18. Silicone fill fluid is standard.
19. Not available with Housing code 7J.
20. Not available with output code F, option code DA2, or option code QT.
21. See the Rosemount 3051S Reference Manual for cable requirements. Contact an Emerson representative for additional information.
22. Not available with output code F or X. Not available with housing code 7J.
23. Not available with Housing code 00, 5A, 5J, or 7J.
24. The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA, IE, IF, and IG.
25. Requires 316L SST diaphragm material and Process Connection code E11 or G11.
26. Not available with Housing code 00, 5A, 5J, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).

Table A-5. Rosemount 3051S Liquid Level Transmitter Ordering Information

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

Model	Transmitter type			
3051S	Liquid level transmitter			
Performance class				
1	Ultra: 0.065% span accuracy, 100:1 rangedown, 12-year limited warranty			★
2	Classic: 0.065% span accuracy, 100:1 rangedown			★
Connection type				
L	Level			★
Measurement type				
D	Differential			★
G	Gage			★
A	Absolute			★
Pressure range				
	Differential (LD)	**Gage (LG)**	**Absolute (LA)**	
2A	–250 to 250 inH_2O (–623 to 623 mbar)	–250 to 250 inH_2O (–623 to 623 mbar)	0 to 150 psia (10 bar)	★
3A	–1000 to 1000 inH_2O (–2,5 to 2,5 bar)	–393 to 1000 inH_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	★
Transmitter output				
A	4–20 mA with digital signal based on HART protocol			★
F [1]	FOUNDATION Fieldbus protocol			★
X [2]	Wireless (Requires wireless options and wireless Plantweb housing)			★
Housing style		**Material**	**Conduit entry size**	
00	None (SuperModule spare part, order output code A)			★
1A	Plantweb housing	Aluminum	1/2–14 NPT	★
1B	Plantweb housing	Aluminum	M20 × 1.5	★
1J	Plantweb housing	SST	1/2–14 NPT	★
1K	Plantweb housing	SST	M20 × 1.5	★
2A	Junction Box housing	Aluminum	1/2–14 NPT	★
2B	Junction Box housing	Aluminum	M20 × 1.5	★
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 × 1.5	★

Table A-5. Rosemount 3051S Liquid Level Transmitter Ordering Information

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

2J	Junction Box housing	SST	1/2–14 NPT	★
Housing style		**Material**	**Conduit entry size**	
2M	Junction Box housing with output for remote interface	SST	1/2–14 NPT	★
5A[17]	Wireless Plantweb housing	Aluminum	1/2–14 NPT	★
5J[17]	Wireless Plantweb housing	SST	1/2–14 NPT	★
7J[3]	Quick Connect (A size Mini, 4-pin male termination)	SST	N/A	★
1C	Plantweb housing	Aluminum	G1/2	
1L	Plantweb housing	SST	G1/2	
2C	Junction Box housing	Aluminum	G1/2	
2G	Junction Box housing with output for remote interface	Aluminum	G1/2	
Seal system type				
1	Direct-mount seal system			★
High pressure side extension (between transmitter flange and seal)				
0	Direct-Mount (No Extension)			★
Sensor module configuration (low side)				
1[4]	Tuned-System Assembly, One Capillary Remote Seal (requires 1199 model number, see Table A.5 of Rosemount DP Level PDS for seal information)			★
2	316L SST isolator/SST transmitter flange			★
3	Alloy C-276 isolator/SST transmitter flange			★
Capillary length				
0	None			★
Seal Fill fluid (high side)		**Temperature limits (Ambient temperature of 70° F [21° C])**		
A	Syltherm XLT	–102 to 293 °F (-75 to 145 °C)		★
C	Silicone 704	32 to 401 °F (0 to 205 °C)		★
D	Silicone 200	– 49 to 401 °F (– 45 to 205 °C)		★
H	Inert (Halocarbon)	– 49 to 320 °F (– 45 to 160 °C)		★
G	Glycerine and Water	5 to 203 °F (–15 to 95 °C)		★
N	Neobee M-20	5 to 401 °F (–15 to 205 °C)		★
P	Propylene Glycol and Water	5 to 203 °F (–15 to 95 °C)		★
Process connection style				
FF	Flush Flanged Seal			★
EF	Extended Flanged Seal			★

Table A-5. Rosemount 3051S Liquid Level Transmitter Ordering Information

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

Process connection size (high side)				
	Flush flanged seal	**Extended flanged seal**		
G	2-in./DN 50	N/A		★
7	3-in.	3-in./DN 80, 2.58-in. diaphragm		★
J	DN 80	N/A		★
9	4-in./DN 100	4-in./DN 100, 3.5-in. diaphragm		★
Flange rating (high side)				
1	ANSI/ASME B16.5 Class 150			★
2	ANSI/ASME B16.5 Class 300			★
4	ANSI/ASME B16.5 Class 600			★
G	PN 40 per EN 1092-1			★
E	PN 10/16 per EN 1092-1, Available with DN 100 only			★
Isolator, flange material (high side)				
	Flush flanged seal isolator	**Extended flanged seal isolator and wetted parts**	**Flange material**	
CA	316L SST	316L SST	CS	★
DA	316L SST	316L SST	SST	★
CB	Alloy C-276	Alloy C-276	CS	★
DB	Alloy C-276	Alloy C-276	SST	★
CC	Tantalum - seam welded [(5)]	N/A	CS	★
DC	Tantalum - seam welded [(5)]	N/A	SST	★
Lower housing material for FF, Extension length for EF (high side)[(6)]				
	Flush flanged seal	**Extended flanged seal**		
0	None	N/A		★
2	N/A	2-in. (50 mm)		★
4	N/A	4-in. (100 mm)		★
6	N/A	6-in. (150 mm)		★
A	316 SST	N/A		★
B	Alloy C-276	N/A		★
D	Carbon Steel	N/A		★
Flushing connection quantity and size (Lower housing, high side)				
	Flush flanged seal	**Extended flanged seal**		
0	None	None		★
1	1 (1/4 –18 NPT)	N/A		★
3	2 (1/4 –18 NPT)	N/A		★
7	1 (1/2 –14 NPT)	N/A		★
9	2 (1/2–14 NPT)	N/A		★

Wireless options (Requires option code X and wireless Plantweb housing)

Table A-5. Rosemount 3051S Liquid Level Transmitter Ordering Information

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

Update rate		
WA	User configurable update rate	★
Operating frequency and protocol		
3	2.4 GHz DSSS, IEC 62591 (*Wireless*HART)	★
Omni-directional wireless antenna		
WK	External antenna	★
WM	Extended range, external antenna	★
SmartPower[7]		
1	Adapter for Black Power Module (I.S. Power Module sold separately)	★

Other options (Include with selected model number)

Diaphragm thickness		
SC	0.006-in. (150 µm) available with 316L SST and Alloy C-276	
Flushing plug, Vent/Drain valve		
SD	Alloy C-276 plug(s) for flushing connection(s)	★
SG	316 SST plug(s) for flushing connection(s)	★
SH	316 SST vent/drain for flushing connection(s)	★
Gasket material		
SJ	PTFE gasket (for use with flushing connection ring)	★
SN	Grafoil® gasket (for use with flushing connection ring)	
Code conformance[8]		
ST	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103	★
Plantweb control functionality[11]		
A01	FOUNDATION Fieldbus Advanced Control Function Block suite	★
Plantweb diagnostic functionality[11]		
D01	FOUNDATION Fieldbus Diagnostics suite	★
DA2[9]	Advanced HART Diagnostics suite	★
Software configuration[10]		
C1	Custom software configuration (requires Configuration Data Sheet)	★
Gage pressure calibration		
C3	Gage Pressure Calibration (3051SxLA4 only)	★
Alarm limit[10][11]		
C4	NAMUR alarm and saturation levels, high alarm	★
C5	NAMUR alarm and saturation levels, low alarm	★
C6	Custom alarm and saturation signal levels, high alarm (requires C1 and Configuration Data Sheet)	★
C7	Custom alarm and saturation signal levels, low alarm (requires C1 and Configuration Data Sheet)	★
C8	Low alarm (standard Rosemount alarm and saturation levels)	★

Table A-5. Rosemount 3051S Liquid Level Transmitter Ordering Information

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

Hardware adjustments[10][11][12]		
D1	Hardware adjustments (zero, span, alarm, security)	★
Flange adapter		
D2	1/2–14 NPT flange adapter	★
D9	RC 1/2 SST flange adapter	
Custody transfer[13]		
D3	Measurement Canada Accuracy Approval	★
Ground screw		
D4	External ground screw assembly	★
Drain/vent valve		
D5	Delete transmitter drain/vent valves (install plugs)	★
Conduit plug[14]		
DO	316 SST conduit plug	★
Product certifications[15]		
E1	ATEX Flameproof	★
E2	INMETRO Flameproof	★
E3	China Flameproof	★
E4	TIIS Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6[16]	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I1	ATEX Intrinsic Safety	★
I2	INMETRO Intrinsic Safety	★
I3	China Intrinsic Safety	★
I4[17]	TIIS Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7	IECEx Intrinsic Safety	★
IA	ATEX FISCO Intrinsic Safety (FOUNDATION Fieldbus protocol only)	★
IE	FM FISCO Intrinsically Safe (FOUNDATION Fieldbus protocol only)	★
IF	CSA FISCO Intrinsically Safe (FOUNDATION Fieldbus protocol only)	★
IG	IECEx FISCO Intrinsic Safety (FOUNDATION Fieldbus protocol only)	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K2	INMETRO Flameproof, Intrinsic Safety	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K6[17]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n	★

Table A-5. Rosemount 3051S Liquid Level Transmitter Ordering Information

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

KA[17]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB[17]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[17]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
N1	ATEX Type n	★
N3	China Type n	★
N7	IECEx Type n	★
ND	ATEX Dust	★
Sensor fill fluid[18]		
L1	Inert sensor fill fluid	★
O-ring		
L2	Graphite-filled PTFE o-ring	★
Bolting material		
L4	Austenitic 316 SST bolts	★
L5 [8]	ASTM A193, Grade B7M bolts	★
L6	Alloy K-500 bolts	★
L7 [8]	ASTM A453, Class D, Grade 660 bolts	★
L8	ASTM A193, Class 2, Grade B8M bolts	★
Display type [19]		
M5	Plantweb LCD display	★
M7 [11][20][21]	Remote mount LCD display and interface, Plantweb housing, no cable, SST bracket	★
M8 [11][20]	Remote mount LCD display and interface, Plantweb housing, 50 ft. (15 m) cable, SST bracket	★
M9 [11][20]	Remote mount LCD display and interface, Plantweb housing, 100 ft. (31 m) cable, SST bracket	★
Pressure testing		
P1	Hydrostatic testing with certificate	
Special cleaning		
P2	Cleaning for special services	
P3	Cleaning for less than 1PPM chlorine/fluorine	
Calibration certification		
Q4	Calibration certificate	★
QP	Calibration certificate and tamper evident seal	★
Material traceability certification		
Q8	Material traceability certification per EN 10204 3.1	★

Table A-5. Rosemount 3051S Liquid Level Transmitter Ordering Information

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

Quality certification for safety		
QS [10][11]	Prior-use certificate of FMEDA data	★
QT [22]	Safety certified to IEC 61508 with certificate of FMEDA data	★
Transient protection[23][24]		
T1	Transient terminal block	★
Toolkit total system performance reports		
QZ	Remote Seal System Performance Calculation report	★
Conduit electrical connector		
GE [25]	M12, 4-pin, male connector (eurofast)	★
GM[25]	A size mini, 4-pin, male connector (minifast)	★
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.
2. Available approvals are FM Intrinsically Safe, Division 2 (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).
3. Available with output code A only. Available approvals are FM Intrinsically Safe, Division 2 (option code I5), ATEX Intrinsic Safety (option code I1), or IECEx Intrinsic Safety (option code I7). Contact an Emerson representative for additional information.
4. With option code 1, user must select Seal Location option code M in Table A-1of Rosemount DP Level PDS.
5. Not recommended for use with spiral wound metallic gaskets (see Rosemount 1199 Product Data Sheet for additional options).
6. Standard gasket for lower housing consists of non-asbestos fiber.
7. Long-life Power Module must be shipped separately, order Part No. 00753-9220-0001.
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.
9. Requires Plantweb housing and output code A. Includes Hardware Adjustments as standard.
10. Not available with output code F.
11. Not available with output code X.
12. Not available with housing style codes 00, 2E, 2F, 2G, 2M, 5A, 5J, or 7J.
13. Requires Plantweb housing and Hardware Adjustments option code D1. Limited availability depending on transmitter type and range. Contact an Emerson representative for additional information.
14. Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug.
15. Valid when SuperModule Platform and housing have equivalent approvals.
16. Not available with M20 or G ½ conduit entry size.
17. Only available with output code X.
18. Only available on differential and gage measurement types. Silicone fill fluid is standard.
19. Not available with Housing 7J.
20. Not available with output code F, option code DA2, or option code QT.
21. See the Rosemount 3051S Reference Manual for cable requirements. Contact an Emerson representative for additional information.
22. Not available with output code F or X. Not available with housing code 7J.
23. Not available with Housing code 00, 5A, 5J, or 7J.
24. The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA, IE, IF, and IG.
25. Not available with Housing code 00, 5A, 5J, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).

Table A-6. Housing Kit for Rosemount 3051S Series Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Transmitter type			
300S	Housing for Rosemount 3051S Scalable Pressure Transmitter			
Code	**Housing style**	**Material**	**Conduit entry size**	
1A	Plantweb housing	Aluminum	1/2–14 NPT	★
1B	Plantweb housing	Aluminum	M20 × 1.5	★
1J	Plantweb housing	SST	1/2–14 NPT	★
1K	Plantweb housing	SST	M20 × 1.5	★
2A	Junction Box housing	Aluminum	1/2–14 NPT	★
2B	Junction Box housing	Aluminum	M20 × 1.5	★
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 × 1.5	★
2J	Junction Box housing	SST	1/2–14 NPT	★
2M	Junction Box housing with output for remote interface	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 × 1.5	★
3J	Remote mount display and interface housing	SST	1/2–14 NPT	★
7J [(1)]	Quick Connect (A size Mini, 4-pin male termination)	SST	N/A	★
1C	Plantweb housing	Aluminum	G1/2	
1L	Plantweb housing	SST	G 1/2	
2C	Junction Box housing	Aluminum	G1/2	
2G	Junction Box housing with output for remote interface	Aluminum	G1/2	
3C	Remote mount display and interface housing	Aluminum	G1/2	
Transmitter output				
A	4–20 mA with digital signal based on HART protocol			★
F [(2)]	FOUNDATION Fieldbus protocol			★

Options (Include with selected model number)

Plantweb control functionality		
A01	FOUNDATION Fieldbus Advanced Control Function Block Suite	★
D01	FOUNDATION Fieldbus Diagnostics Suite	★
DA2[(3)]	Advanced HART Diagnostics Suite	★
Hardware adjustments[(4)(5)]		
D1	Hardware adjustments (zero, span, alarm, security)	★
Conduit plug		
DO	316 SST conduit plug	★
Product certifications		

Table A-6. Housing Kit for Rosemount 3051S Series Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

E1	ATEX Flameproof	★
I1	ATEX Intrinsic Safety	★
IA	ATEX FISCO Intrinsic Safety (FOUNDATION Fieldbus protocol only)	★
N1	ATEX Type n	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
ND	ATEX Dust	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5	FM Intrinsically Safe, Division 2	★
IE	FM FISCO Intrinsically Safe (FOUNDATION Fieldbus protocol only)	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
I6	CSA Intrinsically Safe	★
IF	CSA FISCO Intrinsically Safe (FOUNDATION Fieldbus protocol only)	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
IG	IECEx FISCO Intrinsic Safety (FOUNDATION Fieldbus protocol only)	★
N7	IECEx Type n	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
N3	China Type n	★
KA[6]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB[6]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC[6]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[6]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
Display type [7]		
M5	Plantweb LCD display	★
M7 [8]	Remote mount LCD display and interface, Plantweb housing, no cable, SST bracket	★
M8 [9]	Remote mount LCD display and interface, SST bracket, 50 ft. (15 m) cable	★
M9	Remote mount LCD display and interface, SST bracket, 100 ft. (31 m) cable	★

Table A-6. Housing Kit for Rosemount 3051S Series Ordering Information

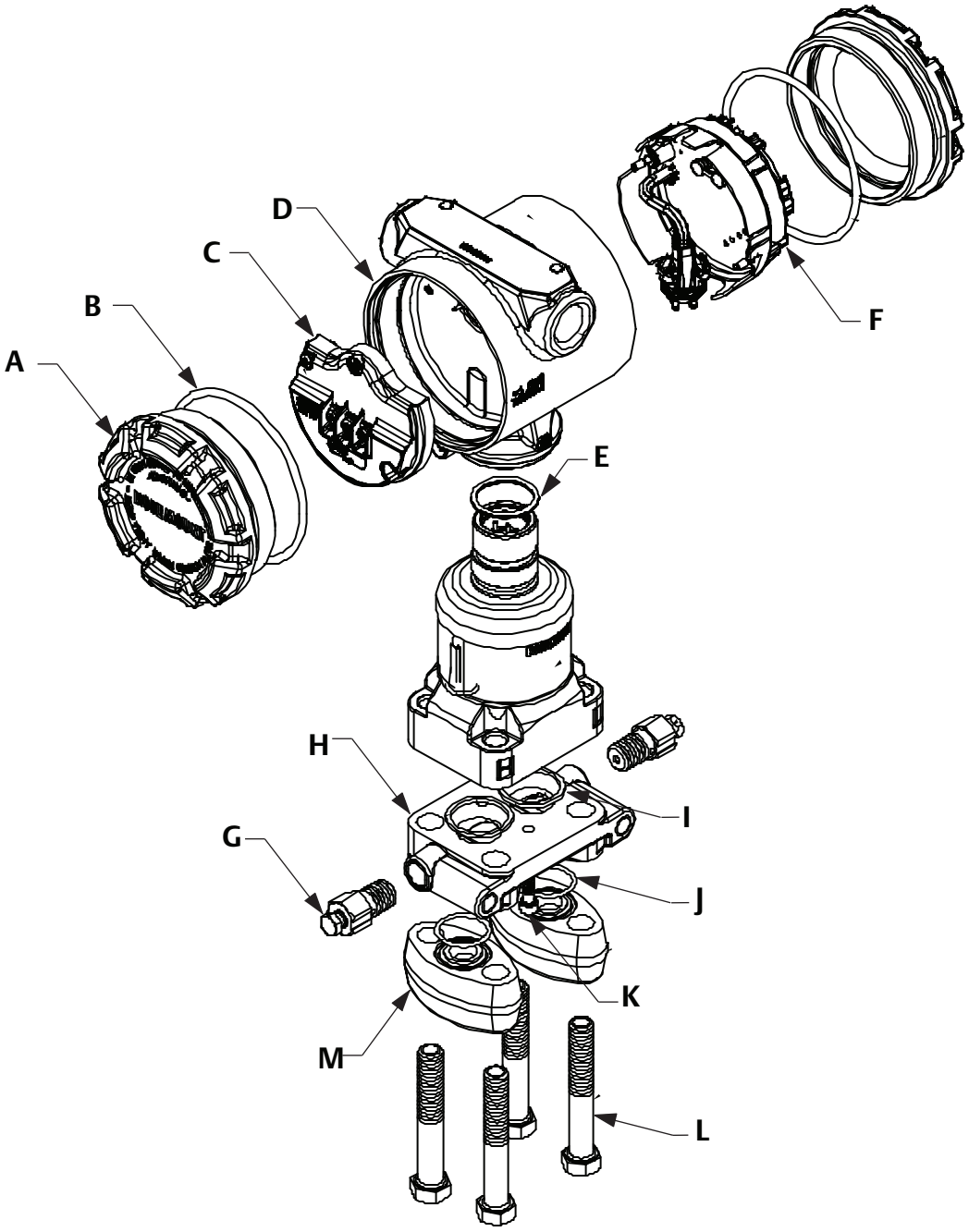
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transient protection[10]		
T1	Transient terminal block	★
Conduit electrical connector[11]		
GE	M12, 4-pin, male connector (eurofast)	★
GM	A size mini, 4-pin, male connector (minifast)	★
Typical model number: 300S 1A A E5		

1. Available with output code A only. Available approvals are FM Intrinsically Safe, Division 2 (option code I5), ATEX Intrinsic Safety (option code I1), or IECEx Intrinsic Safety (option code I7). Contact an Emerson representative for additional information.
2. Requires Plantweb housing.
3. Requires Plantweb housing and output code A. Includes Hardware Adjustments as standard.
4. Not available with output code F.
5. Not available with Housing Style codes 2E, 2F, 2G, 2M, 3A, 3B, 3C, 3J, or 7J.
6. Only available on Housing Style codes IA, IJ, 2A, 2J, 2E, 2M, 3A, or 3J.
7. Not available with Housing code 7J.
8. See the 3051S Reference Manual for cable requirements. Contact an Emerson representative for additional information.
9. Not available with output code F, or option code DA2. Only available on Housing Style codes 3A, 3B, 3C, or 3J.
10. Not available with Housing code 3A, 3B, 3C, 3J, or 7J.
11. Not available with Housing code 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).

A.6 Exploded view diagram

The following drawing shows the name and location for commonly ordered spare parts.



A. Cover
B. Cover O-ring
C. Terminal block
D. Plantweb housing
E. Module O-ring
F. Transmitter electronics
G. Drain/vent valve.
H. Coplanar flange
I. Process flange O-ring
J. Flange adapter O-ring
K. Flange alignment screw (not pressure retaining)
L. Flange adapter bolts
M. Flange adapters

A.7 Spare parts

See Rosemount 3051S_C, 3051S_T & 3051SAL ordering tables (A-23, A-29, and A-33 respectively) for ordering spare sensor modules.

- Typical Model Number 3051S1CD2A2000A00.

Electronics board assembly hardware (Plantweb housing)	Part number
LCD/housing interface assemblies for HART output	
Standard Interface	03151-9010-0001
Hardware adjustment kit	03151-9015-0001
Adjustment interface	
Adjustment module	
Adjustment interface	03151-9017-0001
Adjustment module	03151-9019-0001
Remote display interface	03151-9023-0001
Remote display and interface cable, 50 ft. (15 m)	03151-9101-0001
Remote display and interface cable, 100 ft. (31 m)	03151-9101-0002
Fieldbus output (includes A01 and D01 Plantweb functionality)	
FOUNDATION Fieldbus upgrade kit (standard)	03151-9021-0021
FOUNDATION Fieldbus output electronics	
Standard dual compartment terminal block	
FOUNDATION Fieldbus upgrade kit (with transient protection)	03151-9021-0022
FOUNDATION Fieldbus output electronics	
Transient dual compartment terminal block	
FOUNDATION Fieldbus upgrade kit (FISCO)	03151-9021-0023
FOUNDATION Fieldbus output electronics	
FISCO dual compartment terminal block	
FOUNDATION Fieldbus output electronics	03151-9020-0001
HART Diagnostics electronics	
Advanced HART Diagnostics upgrade assembly	03151-9071-0001
Advanced HART Diagnostics upgrade assembly for SIS	03151-9071-0002
Advanced HART Diagnostics replacement assembly	03151-9071-0003
Miscellaneous	
Plantweb housing header cable O-ring (package of 12)	03151-9011-0001
Electrical housing, terminal blocks	
See Rosemount 300S Series Housing “Kit” in Table A-6 on page 177 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	
Differential coplanar flange	
Nickel-plated carbon steel	03151-9200-0025
316 SST	03151-9200-0022
Cast C-276	03151-9200-0023
Cast Alloy 400	03151-9200-0024
Gage/absolute coplanar flange	
Nickel-plated carbon steel	03151-9200-1025
316 SST	03151-9200-1022
Cast C-276	03151-9200-1023
Cast Alloy 400	03151-9200-1024
Coplanar flange alignment screw (package of 12)	03151-9202-0001
Traditional flange	
316 SST	03151-9203-0002
Cast C-276	03151-9203-0003
Cast Alloy 400	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 PTFE O-rings	
SST Adapters	03031-1300-0002
Cast C-276 Adapters	03031-1300-0003
Cast Alloy 400 Adapters	03031-1300-0004
Ni Plated CS Adapters	03031-1300-0005
SST bolts, glass filled PTFE O-rings	
SST Adapters	03031-1300-0012
Cast C-276 Adapters	03031-1300-0013
Cast Alloy 400 Adapters	03031-1300-0014
Ni Plated CS Adapters	03031-1300-0015
CS bolts, graphite PTFE O-rings	
SST Adapters	03031-1300-0102
Cast C-276 Adapters	03031-1300-0103
Cast Alloy 400 Adapters	03031-1300-0104
Ni Plated CS Adapters	03031-1300-0105
SST bolts, graphite PTFE O-rings	
SST Adapters	03031-1300-0112
Cast C-276 Adapters	03031-1300-0113
Cast Alloy 400 Adapters	03031-1300-0114
Ni Plated CS Adapters	03031-1300-0115
Flange adapter union	
Nickel-plated carbon steel	03151-9259-0005
316 SST	03151-9259-0002
Cast C-276	03151-9259-0003
Cast Alloy 400	03151-9259-0004
Drain/vent valve kits (each kit contains parts for one transmitter)	
Differential Drain/Vent Kits	
316 SST valve stem and seat kit	03151-9268-0022
Alloy C-276 valve stem and seat kit	03151-9268-0023
Alloy K-500 valve stem and Alloy 400 seat kit	03151-9268-0024
316 SST Ceramic ball drain/vent kit	03151-9258-0122
Alloy C-276 Ceramic ball drain/vent kit	03151-9268-0123
Alloy 400/K-500 Ceramic ball drain/vent kit	03151-9268-0124
Gage/Absolute Drain/Vent Kits	
316 SST Valve stem and seat kit	03151-9268-0012
Alloy C-276 Valve stem and seat kit	03151-9268-0013
Alloy K-500 Valve stem and Alloy 400 seat kit	03151-9268-0014
316 SST Ceramic ball drain/vent kit	03151-9268-0112
Alloy C-276 Ceramic ball drain/vent kit	03151-9268-0113
Alloy 400/K-500 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 PTFE	03151-9042-0001
Process flange, graphite-filled PTFE	03151-9042-0002
Flange adapter, glass-filled PTFE	03151-9043-0001
Flange adapter, graphite-filled PTFE	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
Alloy K-500 (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
Alloy K-500 (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
Alloy K-500 (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

Appendix B Product Certifications

Rev 1.12

This section contains hazardous location certifications for Rosemount™ 3051S HART® protocol.

B.1 European Directive Information

A copy of the EU Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EU Declaration of Conformity can be found at Emerson.com/Rosemount.

B.2 Ordinary Location Certification

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

B.3 Installing Equipment in North America

The US National Electrical Code (NEC®) and the Canadian Electrical Code (CEC) permit the use of Division marked equipment in Zones and Zone marked equipment in Divisions. The markings must be suitable for the area classification, gas, and temperature class. This information is clearly defined in the respective codes.

B.4 USA

E5 FM Explosionproof (XP) and Dust-Ignitionproof (DIP)
Certificate: FM16US0090
Standards: FM Class 3600 - 2011, FM Class 3615 - 2006, FM Class 3616 - 2011, FM Class 3810 - 2005, ANSI/NEMA 250 - 2003
Markings: XP CL I, DIV 1, GP B, C, D; DIP CL II, DIV 1, GP E, F, G; CL III; T5(−50 °C ≤ T_a ≤ +85 °C); Factory Sealed; Type 4X

I5 FM Intrinsic Safety (IS) and Nonincendive (NI)
Certificate: FM16US0089X
Standards: FM Class 3600 - 2011, FM Class 3610 - 2010, FM Class 3611 - 2004, FM Class 3810 - 2005, NEMA® 250 - 2003
Markings: IS CL I, DIV 1, GP A, B, C, D; CL II, DIV 1, GP E, F, G; Class III; Class 1, Zone 0 AEx ia IIC T4; NI CL 1, DIV 2, GP A, B, C, D; T4(−50 °C ≤ T_a ≤ +70 °C) [HART]; T4(−50 °C ≤ T_a ≤ +60 °C) [Fieldbus]; when connected per Rosemount drawing 03151-1006; Type 4X

Special Condition for Safe Use:

1. The Rosemount 3051S/3051S-ERS Pressure Transmitter contains aluminum and is considered to constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact and friction.

Note

Transmitters marked with NI CL 1, DIV 2 can be installed in Division 2 locations using general Division 2 wiring methods or Nonincendive Field Wiring (NIFW). See Drawing 03151-1006.

IE FM FISCO
Certificate: FM16US0089X
Standards: FM Class 3600 - 2011, FM Class 3610 - 2010, FM Class 3611 - 2004, FM Class 3810 - 2005, NEMA 250 - 2003
Markings: IS CL I, DIV 1, GP A, B, C, D; T4(–50 °C ≤ T_a ≤ +60 °C); when connected per Rosemount drawing 03151-1006; Type 4X

Special Condition for Safe Use (X):

1. The Model 3051S/3051S-ERS Pressure Transmitter contains aluminum and is considered to constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact and friction.

B.5 Canada

E6 CSA Explosionproof, Dust-Ignitionproof, and Division 2
Certificate: 1143113
Standards: CAN/CSA C22.2 No. 0-10, CSA Std C22.2 No. 25-1966, CSA Std C22.2 No. 30-M1986, CAN/CSA C22.2 No. 94-M91, CSA Std C22.2 No. 142-M1987, CSA Std C22.2 No. 213-M1987, ANSI/ISA 12.27.01-2003, CSA Std C22.2 No. 60529:05
Markings: Explosionproof Class I, Division 1, Groups B, C, D; Dust-Ignitionproof Class II, Division 1, Groups E, F, G; Class III; suitable for Class I, Zone 1, Group IIB+H2, T5; suitable for Class I, Division 2, Groups A, B, C, D; suitable for Class I, Zone 2, Group IIC, T5; when connected per Rosemount drawing 03151-1013; Type 4X

I6 Canada Intrinsically Safe
Certificate: 143113
Standards: CAN/CSA C22.2 No. 0-10, CSA Std C22.2 No. 25-1966, CSA Std C22.2 No. 30-M1986, CAN/CSA C22.2 No. 94-M91, CSA Std C22.2 No. 142-M1987, CSA Std C22.2 No. 213-M1987, ANSI/ISA 12.27.01-2003, CSA Std C22.2 No. 60529:05
Markings: Exploected per Rosemount drawing 03151-1016 [3051S] 03151-1313 [ERS]; Type 4X

IF CSA FISCO
Certificate: 1143113
Standards: CAN/CSA C22.2 No. 0-10, CSA Std C22.2 No. 30-M1986, CAN/CSA C22.2 No. 94-M91, CSA Std C22.2 No. 142-M1987, CSA Std C22.2 No. 157-92, ANSI/ISA 12.27.01-2003, CSA Std C22.2 No. 60529:05
Markings: FISCO Intrinsically Safe Class I, Division 1; Groups A, B, C, D; suitable for Class 1, Zone 0, IIC, T3C; when connected per Rosemount drawing 03151-1016 [3051S] 03151-1313 [ERS]; Type 4X

B.6 Europe

E1 ATEX Flameproof
Certificate: KEMA 00ATEX2143X
Standards: EN 60079-0:2012+A11:2013, EN 60079-1:2014, EN 60079-26:2015
Markings: ⟨Ex⟩II 1/2 G Ex db IIC T6...T4 Ga/Gb, T6(–60 °C ≤ T_a ≤ +70 °C), T5/T4(–60 °C ≤ T_a ≤ +80 °C)

Table B-1. Process Temperature

Temperature class	Process temperature
T6	–60 °C to +70 °C
T5	–60 °C to +80 °C
T4	–60 °C to +120 °C

Special Conditions for Safe Use (X):

1. This device contains a thin wall diaphragm less than 1 mm thickness that forms a boundary between EPL Ga (process connection) and EPL Gb (all other parts of the equipment). The model code and datasheet are to be consulted for details of the diaphragm material. 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.
2. Flameproof joints are not intended for repair.
3. Non-standard paint options may cause risk from electrostatic discharge. Avoid installations that could cause electrostatic build-up on painted surfaces, and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.
4. Appropriate cable, glands and plugs need to be suitable for a temperature of 5 °C greater than maximum specified temperature for location where installed.

I1 ATEX Intrinsic Safety
Certificate: Baseefa08ATEX0064X
Standards: EN 60079-0: 2012, EN 60079-11: 2012
Markings: ⟨Ex⟩ II 1 G Ex ia IIC T4 Ga, T4(–60 °C ≤ T_a ≤ +70 °C)

Table B-2. Input Parameters

	U_i	I_i	P_i	C_i	L_i
SuperModule	30 V	300 mA	1.0 W	30 nF	0
3051S...A; 3051SF...A; 3051SAL...C	30 V	300 mA	1.0 W	12 nF	0
3051S...F; 3051SF...F	30 V	300 mA	1.0 W	0	0
3051S ...A...M7, M8, or M9; 3051SF ...A...M7, M8, or M9; 3051SAL...C... M7, M8, or M9	30 V	300 mA	1.0 W	12 nF	60 µH
3051SAL or 3051SAM	30 V	300 mA	1.0 W	12 nF	33 µH
3051SAL...M7, M8, or M9 3051SAM...M7, M8, or M9	30 V	300 mA	1.0 W	12 nF	93 µH
RTD Option for 3051SF	5 V	500 mA	0.63 W	N/A	N/A

Special Conditions for Safe Use (X):

1. The Model 3051S Transmitters fitted with transient protection are not capable of withstanding the 500 V test as defined in Clause 6.3.13 of EN 60079-11:2012. This must be taken into account during installation.
2. The terminal pins of the Model 3051S SuperModule must be provided with a degree of protection of at least IP20 in accordance with IEC/EN 60529.
3. The Model 3051S enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in a zone 0 area.

IA ATEX FISCO
Certificate: BAS01ATEX1303X
Standards: EN 60079-0: 2012+A11:2013, EN 60079-11: 2012
Markings: Ⓔx II 1 G Ex ia IIC T4 Ga, T4(–60 °C ≤ T_a ≤ +70 °C)

Table B-3. Input Parameters

Parameter	FISCO
Voltage U_i	17.5 V
Current I_i	380 mA
Power P_i	5.32 W
Capacitance C_i	0
Inductance L_i	0

Special Conditions for Safe Use (X):

1. The Model 3051S Transmitters fitted with transient protection are not capable of withstanding the 500 V test as defined in Clause 6.3.13 of EN 60079-11:2012. This must be taken into account during installation.
2. The terminal pins of the Model 3051S SuperModule must be provided with a degree of protection of at least IP20 in accordance with IEC/EN 60529.
3. The Model 3051S enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in a zone 0 area.

ND ATEX Dust
Certificate: BAS01ATEX1374X
Standards: EN 60079-0: 2012+A11:2013, EN 60079-31: 2009
Markings: Ⓔx II 1 D Ex ta IIIC T105 °C T50095 °C Da, (–20 °C ≤ T_a ≤ +85 °C), V_{max} = 42.4 V

Special Conditions for Safe Use (X):

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient temperature range of the apparatus and capable of withstanding a 7J impact test.
4. The SuperModule(s) must be securely screwed in place to maintain the ingress protection of the enclosure(s).

N1 ATEX Type n
Certificate: BAS01ATEX3304X
Standards: EN 60079-0: 2012+A11:2013, EN 60079-15: 2010
Markings: Ⓔx II 3 G Ex nA IIC T4 Gc, (–40 °C ≤ T_a ≤ 85°C), V_{max} = 45 V

Special Condition for Safe Use (X):

1. The equipment is not capable of withstanding the 500V insulation test required by clause 6.5 of EN 60079-15:2010. This must be taken into account when installing the equipment.

Note
RTD Assembly is not included with the 3051SFx Type n Approval.

B.7 International

E7 IECEx Flameproof and Dust
Certificate: IECEx KEM 08.0010X (Flameproof)
Standards: IEC 60079-0:2011, IEC 60079-1:2014, IEC 60079-26:2014
Markings: Ex db IIC T6...T4 Ga/Gb, T6(–60 °C ≤ T_a ≤ +70° C), T5/T4(–60 °C ≤ T_a ≤ +80 °C)

Table B-4. Process Temperature

Temperature class	Process temperature
T6	–60 °C to +70 °C
T5	–60 °C to +80 °C
T4	–60 °C to +120 °C

Special Conditions for Safe Use (X):

1. This device contains a thin wall diaphragm less than 1 mm thickness that forms a boundary between EPL Ga (process connection) and EPL Gb (all other parts of the equipment). The model code and datasheet are to be consulted for details of the diaphragm material. 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.
2. Flameproof joints are not intended for repair.
3. Non-standard paint options may cause risk from electrostatic discharge. Avoid installations that could cause electrostatic build-up on painted surfaces, and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.
4. Appropriate cable, glands and plugs need to be suitable for a temperature of 5 °C greater than maximum specified temperature for location where installed.

Certificate: IECEx BAS 09.0014X (Dust)
Standards: IEC 60079-0:2011, IEC 60079-31:2008
Markings: Ex ta IIIC T105 °C T_{500}95 °C Da, (–20 °C ≤ T_a ≤ +85 °C), V_{max} = 42.4 V

Special Conditions for Safe Use (X):

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient temperature range of the apparatus and capable of withstanding a 7J impact test.
4. The 3051S- SuperModule must be securely screwed in place to maintain the ingress protection of the enclosure.

I7 IECEx Intrinsic Safety
Certificate: IECEx BAS 04.0017X
Standards: IEC 60079-0: 2011, IEC 60079-11: 2011
Markings: Ex ia IIC T4 Ga, T4(–60 °C ≤ T_a ≤ +70 °C)

Table B-5. Input Parameters

	U_i	I_i	P_i	C_i	L_i
SuperModule	30 V	300 mA	1.0 W	30 nF	0
3051S...A; 3051SF...A; 3051SAL...C	30 V	300 mA	1.0 W	12 nF	0
3051S...F; 3051SF...F	30 V	300 mA	1.0 W	0	0
3051S ...A...M7, M8, or M9; 3051SF ...A...M7, M8, or M9; 3051SAL...C... M7, M8, or M9	30 V	300 mA	1.0 W	12 nF	60 µH
3051SAL or 3051SAM	30 V	300 mA	1.0 W	12 nF	33 µH
3051SAL...M7, M8, or M9 3051SAM...M7 , M8, or M9	30 V	300 mA	1.0 W	12 nF	93 µH
RTD Option for 3051SF	5 V	500 mA	0.63 W	N/A	N/A

Special Conditions for Safe Use (X):

1. The Model 3051S Transmitters fitted with transient protection are not capable of withstanding the 500 V test as defined in Clause 6.3.13 of EN 60079-11:2012. This must be taken into account during installation.
2. The terminal pins of the Model 3051S SuperModule must be provided with a degree of protection of at least IP20 in accordance with IEC/EN 60529.
3. The Model 3051S enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in a zone 0 area.

I7 IECEx Intrinsic Safety - Group I - Mining (I7 with Special A0259)
Certificate: IECEx TSA 14.0019X
Standards: IEC 60079-0: 2011, IEC 60079-11: 2011
Markings: Ex ia I Ma (–60 °C ≤ T_a ≤ +70 °C)

Table B-6. Input Parameters

	U_i	I_i	P_i	C_i	L_i
SuperModule	30 V	300 mA	1.0 W	30 nF	0
3051S...A; 3051SF...A; 3051SAL...C	30 V	300 mA	1.0 W	12 nF	0
3051S...F; 3051SF...F	30 V	300 mA	1.0 W	0	0
3051S ...A...M7, M8, or M9; 3051SF ...A...M7, M8, or M9; 3051SAL...C... M7, M8, or M9	30 V	300 mA	1.0 W	12 nF	60 µH
3051SAL or 3051SAM	30 V	300 mA	1.0 W	12 nF	33 µH
3051SAL...M7, M8, or M9 3051SAM...M7, M8, or M9	30 V	300 mA	1.0 W	12 nF	93 µH
RTD Option for 3051SF	5 V	500 mA	0.63 W	N/A	N/A

Special Conditions for Safe Use (X):

1. If the apparatus is fitted with optional 90 V transient suppressor, it is not capable of withstanding the 500 V insulation test required by Clause 6.3.13 of IEC60079-11. This must be taken into account when installing the apparatus.
2. It is a condition of safe use that the above input parameters shall be taken into account during installation.
3. It is a condition of manufacture that only the apparatus fitted with housing, covers and sensor module housing made out of stainless steel are used in Group I applications.

IG IECEx FISCO
Certificate: IECEx BAS 04.0017X
Standards: IEC 60079-0: 2011, IEC 60079-11: 2011
Markings: Ex ia IIC T4 Ga, T4(–60 °C ≤ T_a ≤ +70 °C)

Table B-7. Input Parameters

Parameter	FISCO
Voltage U_i	17.5 V
Current I_i	380 mA
Power P_i	5.32 W
Capacitance C_i	0
Inductance L_i	0

Special Conditions for Safe Use (X):

1. The Model 3051S Transmitters fitted with transient protection are not capable of withstanding the 500 V test as defined in Clause 6.3.13 of EN 60079-11:2012. This must be taken into account during installation.
2. The terminal pins of the Model 3051S SuperModule must be provided with a degree of protection of at least IP20 in accordance with IEC/EN 60529.
3. The Model 3051S enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in a zone 0 area.

IG IECEx Intrinsic Safety - Group I - Mining (IG with Special A0259)
Certificate: IECEx TSA 04.0019X
Standards: IEC 60079-0: 2011, IEC 60079-11: 2011
Markings: FISCO FIELD DEVICE Ex ia I Ma , (–60 °C ≤ T_a ≤ +70 °C)

Table B-8. Input Parameters

Parameter	FISCO
Voltage U_i	17.5 V
Current I_i	380 mA
Power P_i	5.32 W
Capacitance C_i	0
Inductance L_i	0

Special Conditions for Safe Use (X):

1. If the apparatus is fitted with optional 90V transient suppressor, it is not capable of withstanding the 500V insulation test required by Clause 6.3.13 of IEC60079-11. This must be taken into account when installing the apparatus.
2. It is a condition of safe use that the above input parameters shall be taken into account during installation.
3. It is a condition of manufacture that only the apparatus fitted with housing, covers and sensor module housing made out of stainless steel are used in Group I applications.

N7 IECEx Type n
Certificate: IECEx BAS 04.0018X
Standards: IEC 60079-0: 2011, IEC 60079-15: 2010
Markings: Ex nA IIC T5 Gc, (–40 °C ≤ T_a ≤ +85 °C)

Special Condition for Safe Use (X):

1. The equipment is not capable of withstanding the 500V insulation test required by clause 6.5 of EN 60079-15:2010. This must be taken into account when installing the equipment.

B.8 Brazil

E2 INMETRO Flameproof
Certificate: UL-BR15.0393X
Standards: ABNT NBR IEC 60079-0:2008 + Corrigendum 1:2011, ABNT NBR IEC 60079-1:2009 + Corrigendum 1:2011, ABNT NBR IEC 60079-26:2008 + Corrigendum 1: 2008
Markings: Ex d IIC T* Ga/Gb, T6(–60 °C ≤ T_a ≤ +70 °C), T5/T4(–60 °C ≤ T_a ≤ +85 °C), IP66

Special Conditions for Safe Use (X):

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

I2/IB INMETRO Intrinsic Safety/FISCO
Certificate: UL-BR 15.0392X
Standards: ABNT NBR IEC 60079-0:2008 + Corrigendum 1:2011, ABNT NBR IEC 60079-11:2009
Markings: Ex ia IIC T4 Ga, T4(-60 °C ≤ T_a ≤ +70 °C), IP66

Special Condition for Safe Use (X):

1. The 3051S enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in areas that requires EPL Ga.

Table B-9. Input Parameters

	U_i	I_i	P_i	C_i	L_i
SuperModule	30 V	300 mA	1.0 W	30 nF	0
3051S...A; 3051SF...A; 3051SAL...C	30 V	300 mA	1.0 W	12 nF	0
3051S...F; 3051SF...F	30 V	300 mA	1.0 W	0	0
3051S ...A...M7, M8, or M9; 3051SF ...A...M7, M8, or M9; 3051SAL...C... M7, M8, or M9	30 V	300 mA	1.0 W	12 nF	60 µH
3051SAL or 3051SAM	30 V	300 mA	1.0 W	12 nF	33 µH
3051SAL...M7, M8, or M9 3051SAM...M7 , M8, or M9	30 V	300 mA	1.0 W	12 nF	93 µH
RTD Option for 3051SF	5 V	500 mA	0.63 W	N/A	N/A

B.9 China

E3 China Flameproof and Dust Ignition-proof
Certificate: 3051S: GYJ16.1249X
3051SFx: GYJ16.1466X
3051S-ERS: GJY15.1406X
Standards: 3051S: GB3836.1-2010, GB3836.2-2010, GB3836.20-2010, GB12476.1-2013, GB12476.5-2013
3051SFx: GB3836.1-2010, GB3836.2-2010, GB3836.20-2010, GB12476.1-2013, GB 12476.5-2013
3051S-ERS: GB3836.1-2010, GB3836.2-2010, GB3836.20-2010
Markings: 3051S: Ex d IIC T6...T4; Ex tD A20 T105 °C T50095 °C; IP66
3051SFx: Ex d IIC T5/T6 Ga/Gb; DIP A20 TA105 °C; IP66
3051S-ERS: Ex d IIC T4~T6 Ga/Gb

Special Conditions for Safe Use (X):

1. Only the pressure transmitters, consisting of 3051SC Series, 3051ST Series, 3051SL Series and 300S Series, are certified.
2. Flameproof joints are not intended for repair.
3. The ambient temperature range for the 3051S and 3051SFx in a dust environment is $-20\ °C \le T_a \le 85\ °C$.
4. The relation between temperature class and maximum temperature of process medium is as follows:

T code	Ambient temperature (°C)	Process temperature (°C)
T6	$-60\ °C \le T_a \le +70\ °C$	$-60\ °C \le T_a \le +70\ °C$
T5	$-60\ °C \le T_a \le +80\ °C$	$-60\ °C \le T_a \le +80\ °C$
T4	$-60\ °C \le T_a \le +80\ °C$	$-60\ °C \le T_a \le +120\ °C$

5. The earth connection facility in the enclosure should be connected reliably.
6. During installation, use and maintenance of transmitter, observe the warning "Don't open the cover when the circuit is alive."
7. During installation, there should be no mixture harm to flameproof housing.
8. Cable entry, certified by NEPSI with type of protection Ex d IIC in accordance with GB3836.1-2000 and GB3836.2-2000, should be applied when installation in hazardous location. 5 full threads should be in engagement when the cable entry is assembled onto the transmitter. When pressure transmitter is used in the presence of combustible dust, the ingress of protection of the cable entry should be IP66.
9. The diameter of cable should observe the instruction manual of cable entry. The compressing nut should be fastened. The aging of seal ring should be changed in time.
10. Maintenance should be done in non-hazardous location.
11. End users are not permitted to change any components inside.
12. When installation, use and maintenance of transmitter, observe following standards:
    GB3836.13-2013 "Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres"
    GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)"
    GB3836.16-2006 "Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)"
    GB50257-2014 "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering"
    GB15577-20071995 "Safe regulation for explosive dust atmospheres".
    GB12476.2-2010 "Electrical apparatus for use in the presence of combustible dust - Part 1-2: Electrical apparatus protected by enclosures and surface temperature limitation - Selection, installation and maintenance".

I3 China Intrinsic Safety
Certificate: 3051S: GYJ16.1250X[Mfg USA, China, Singapore]
3051SFx: GYJ16.1465X [Mfg USA, China, Singapore]
3051S-ERS: GYJ16.1248X [Mfg USA, China, Singapore]
Standards: 3051S: GB3836.1-2010, GB3836.4-2010, GB3836.20-2010
3051SFx: GB3836.1/4-2010, GB3836.20-2010, GB12476.1-2013, GB12476.5-2013
3051S-ERS: GB3836.1-2010, GB3836.4-2010, GB3836.20-2010
Markings: 3051S, 3051SFx: Ex ia IIC T4 Ga
3051S-ERS: Ex ia IIC T4

Special Conditions for Safe Use (X):

1. Symbol "X" is used to denote specific conditions of use: For output code A and F: This apparatus is not capable of withstanding the 500V r.m.s. insulation test required by Clause 6.4.12 of GB3836.4-2000.
2. The ambient temperature range is:

Output code	Ambient temperature
A	$-50\ °C \le T_a \le +70\ °C$
F	$-50\ °C \le T_a \le +60\ °C$

3. Intrinsically safe parameters:

Output Code	Housing Code	Display Code	Maximum input voltage: Ui (V)	Maximum input current: Ii (mA)	Maximum input power: Pi (W)	Maximum internal parameters: Ci (nF)	Maximum internal parameter: Li (uH)
A	=00	/	30	300	1	38	0
A	□00	/	30	300	1	11.4	2.4
A	□00	M7/M8/M9	30	300	1	0	58.2
F	□00	/	30	300	1.3	0	0
F FISCO	□00	/	17.5	500	5.5	0	0

4. The product should be used with Ex-certified associated apparatus to establish explosion protection system that can be used in explosive gas atmospheres. Wiring and terminals should comply with the instruction manual of the product and associated apparatus.
5. The cable between this product and associated apparatus should be shielded cables (the cables must have insulated shield). The shield has to be grounded reliably in non-hazardous area.
6. The product complies to the requirements for FISCO field devices specified in IEC60079-27:2008. For the connection of an intrinsically safe circuit in accordance FISCO model, FISCO parameters of this product are as above.
7. End users are not permitted to change any components inside, but to settle the problem in conjunction with manufacturer to avoid damage to the product.
8. When installation, use and maintenance of this product, observe the following standards:
   GB3836.13-2013 "Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres".
   GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)".
   GB3836.16-2006 "Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)".
   GB3836.18-2010 "Intrinsically Safe System".
   GB50257-20141996 "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering".

N3 China Type n
Certificate: 3051S: GYJ15.1106X [Mfg China]
3051SF: GYJ15.1107X [Mfg China
Markings: Ex nA IIC T5 Gc

Special Conditions for Safe Use (X):

1. The ambient mperature range is: -40°C ≤ T_a ≤ 85°C.
2. Maximum input voltage: 45 V.
3. Cable glands, conduit or blanking plugs, certified by NEPSI with Ex e or Ex n protection type and IP66 degree of protection provided by enclosure, should be used on external connections and redundant cable entries.
4. Maintenance should be done in non-hazardous location.
5. End users are not permitted to change any components inside, but to settle the problem in conjunction with manufacturer to avoid damage to the product.
6. When installation, use and maintenance of this product, observe following standards:
7. GB3836.13-2013 "Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres".
   GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)".
   GB3836.16-2006 "Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)".

B.10 EAC - Belarus, Kazakhstan, Russia

EM Technical Regulation Customs Union (EAC) Flameproof
Certificate: : RU C-US.AA87.B.00378
Markings: Ga/Gb Ex d IIC T6...T4 X
Ex tb IIIC T105 °C T50095 °C Db X
Ex ta IIIC T105 °C T50095 °C Da X

IM Technical Regulation Customs Union (EAC) Intrinsic Safety

Certificate: RU C-US.AA87.B.00094

Markings: 0Ex ia IIC T4 Ga X

B.11 Japan

E4 Japan Flameproof

Certificate:TC15682, TC15683, TC15684, TC15685, TC15686, TC15687, TC15688, TC15689, TC15690, TC17099, TC17100, TC17101, TC17102, TC18876
3051ERS: TC20215, TC20216, TC20217, TC20218, TC20219, TC20220, TC20221

Markings: Ex d IIC T6

B.12 Republic of Korea

EP Republic of Korea Flameproof

Certificate: 12-KB4BO-0180X [Mfg USA], 11-KB4BO-0068X [Mfg Singapore]

Markings: Ex d IIC T5 or T6

IP Republic of Korea Intrinsic Safety

Certificate: 12-KB4BO-0202X [HART - Mfg USA],12-KB4BO-0204X [Fieldbus - Mfg USA], 12-KB4BO-0203X [HART - Mfg Singapore], 13-KB4BO-0296X [Fieldbus - Mfg Singapore]

Markings: Ex ia IIC T4

B.13 Combinations

K1 Combination of E1, I1, N1, and ND

K2 Combination of E2 and I2

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, E6, and I6

KC Combination of E1, I1, E5, and I5

KD Combination of E1, I1, E5, I5, E6, and I6

KG Combination of IA, IE, IF, and IG

KM Combination of EM and IM

KP Combination of EP and IP

B.14 Additional Certifications

SBS American Bureau of Shipping (ABS) Type Approval

Certificate: 00-HS145383

Intended Use: Measure gauge or absolute pressure of liquid, gas or vapor applications on ABS classed vessels, marine, and offshore installations. [HART Only]

SBV Bureau Veritas (BV) Type Approval

Certificate: 31910 BV

Requirements: Bureau Veritas Rules for the Classification of Steel Ships

Application: Class Notations: AUT-UMS, AUT-CCS, AUT-PORT and AUT-IMS. [HART Only]

SDN Det Norske Veritas (DNV) Type Approval

Certificate: A-14186

Intended Use: Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft, and Det Norske Veritas' Offshore Standards. [HART Only]

Application:

Location classes	
Type	3051S
Temperature	D
Humidity	B
Vibration	A
EMC	A
Enclosure	D/IP66/IP68

SLL Lloyds Register (LR) Type Approval

Certificate: 11/60002

Application: Environmental categories ENV1, ENV2, ENV3, and ENV5. [HART Only]

B.15 Installation Drawings

B.15.1 Factory Mutual (FM)

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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
	AC	UPDATE DRAWING	RTC1030895	A.J.W.	5/12/10

NOTES:

1. WIRING METHOD SUITABLE FOR CLASS I, DIV I or CLASS I, 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. 3051S SERIES SENSOR MODULE MUST BE INSTALLED WITH FM FLAMEPROOF / EXPLOSIONPROOF APPROVED 300S SERIES 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. 300S SERIES HOUSING MUST BE INSTALLED WITH FM FLAMEPROOF / EXPLOSIONPROOF APPROVED 3051S SERIES 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

-TOLERANCES-
.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 8/28/00
CHK'D . .
APP'D Paul C. Sundet 9/11/00
APP'D GOVT.

EMERSON. Process Management
ROSEMOUNT®
8200 Market Boulevard • Chanhassen, MN 55317 USA

TITLE MODEL 3051 / 300 EXPLOSIONPROOF / FLAMEPROOF INSTALLATION DRAWING, FM

SIZE A | FSCM NO. | DRAWING NO. 03151-1003
SCALE 1:4 | WT. | SHEET 1 OF 3

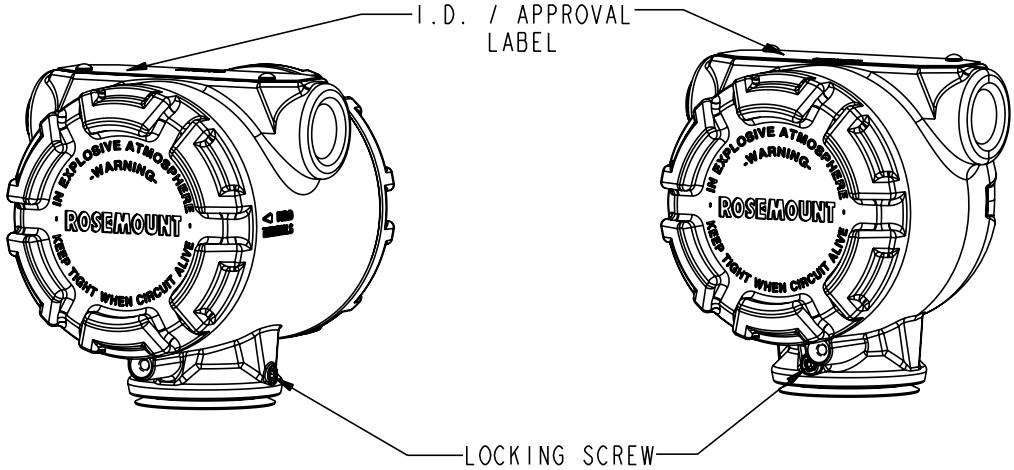
Form Rev AC

REVISIONS					
ZONE	REV	DESCRIPTION	CHG. NO.	APP'D	DATE
	AC				

COMPONENT IDENTIFICATION

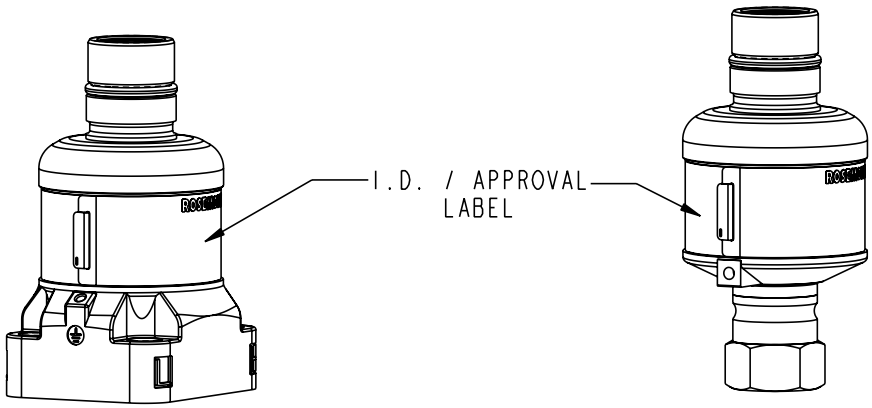
300S SERIES PLANTWEB
(DUAL COMPARTMENT HOUSING)

300S SERIES JUNCTION BOX
(SINGLE COMPARTMENT)



305IS SERIES
SCALABLE COPLANAR
PRESSURE TRANSMITTER

305IS SERIES
SCALABLE IN-LINE
PRESSURE TRANSMITTER

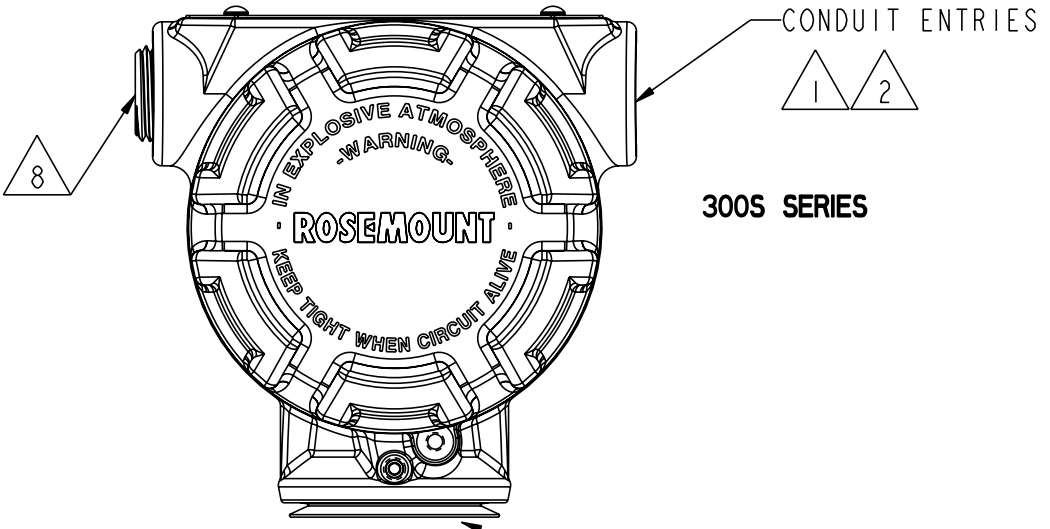


Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD Maintained, (Pro/E)	
DR. *Myles Lee Miller*	8/28/00	SIZE A	FSCM NO	DWG NO. 03151-1003
ISSUED		SCALE 1:2	WT.	SHEET 2 OF 3

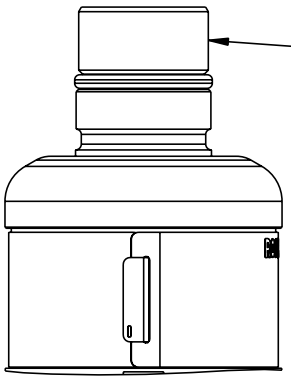
Form Rev AC

REVISIONS					
ZONE	REV	DESCRIPTION	CHG. NO.	APP'D	DATE
	AC				

HOUSING TO MODULE ASSEMBLY



300S SERIES



3051S SERIES

Rosemount Inc. 8200 Market Boulevard 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

Form Rev AC

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REVISIONS

REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AM	ADD DIAGNOSTICS FEATURE BOARD	RTC1020856	J.D.V.	3/23/06
AN	REMOVE T5	RTC1024820	H.G.	10/23/07
AP	UPDATE CURRENT FOR HART DIAGNOSTICS SUITE AND 300S; REMOVE OUTPUT 'B'; UPDATE FISCO CURRENT AND POWER	RTC1027772	T.T.S.	2/6/09

ENTITY APPROVALS FOR MODELS 3051S & 300S

OUTPUT CODE A (4-20 mA HART) I.S. SEE SHEETS 2-4
REMOTE DISPLAY (4-20 mA HART) I.S. SEE SHEET 5
OUTPUT CODE F/W (FIELDBUS/PROFIBUS) I.S. SEE SHEET 6
FISCO SEE SHEETS 7-8
ALL OUTPUT CODES NONINCENDIVE SEE SHEET 9

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

-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 2/23/01

CHK'D

APP'D. Paul C. Sundet 3/9/01

APP'D. GOVT.

EMERSON. Process Management

ROSEMOUNT®
8200 Market Boulevard • Chanhassen, MN 55317 USA

TITLE
INDEX OF I.S. & NONINCENDIVE F.M. FOR 3051S

SIZE	FSCM NO	DWG NO.	
A		03151-1006	

SCALE	N/A	WT.	SHEET	1 OF 10

Form: Rev AC

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AP				

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 (C_a) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE CAPACITANCE AND THE UNPROTECTED INTERNAL CAPACITANCE (C_i) OF THE INTRINSICALLY SAFE APPARATUS, AND THE APPROVED MAX. ALLOWABLE CONNECTED INDUCTANCE (L_a) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE INDUCTANCE AND THE UNPROTECTED INTERNAL INDUCTANCE (L_i) OF THE INTRINSICALLY SAFE APPARATUS.

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

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	$(\frac{V_T \times I_T}{4})$ 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)	

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	$(\frac{V_T \times I_T}{4})$ or $(\frac{Voc \times Ios}{4})$ IS LESS THAN OR EQUAL TO 1.0 WATT
C_i = 11.4nF	C_A IS GREATER THAN 11.4nF
L_i = 2.4 μH	L_A IS GREATER THAN 2.4 μH
T4 (Ta=-50°C to +70°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} = 300mA	Io, I_T or I_{SC} IS LESS THAN OR EQUAL TO 300mA
P_i or P_{MAX} = 1.0 WATT	$(\frac{V_T \times I_T}{4})$ or $(\frac{Voc \times Ios}{4})$ 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)	

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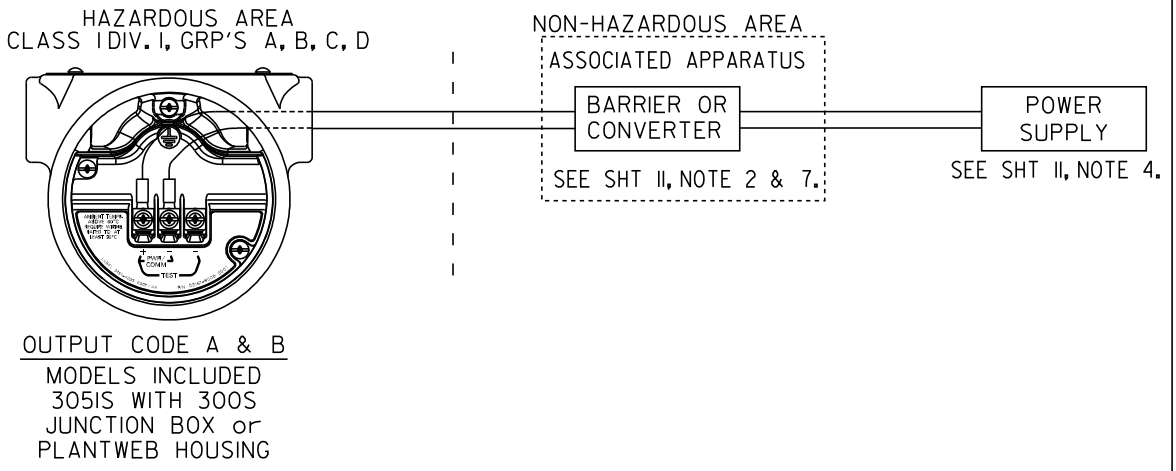
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03151-1006
ISSUED	SCALE N/A	WT. ———	SHEET 2 OF 10

Form Rev AC

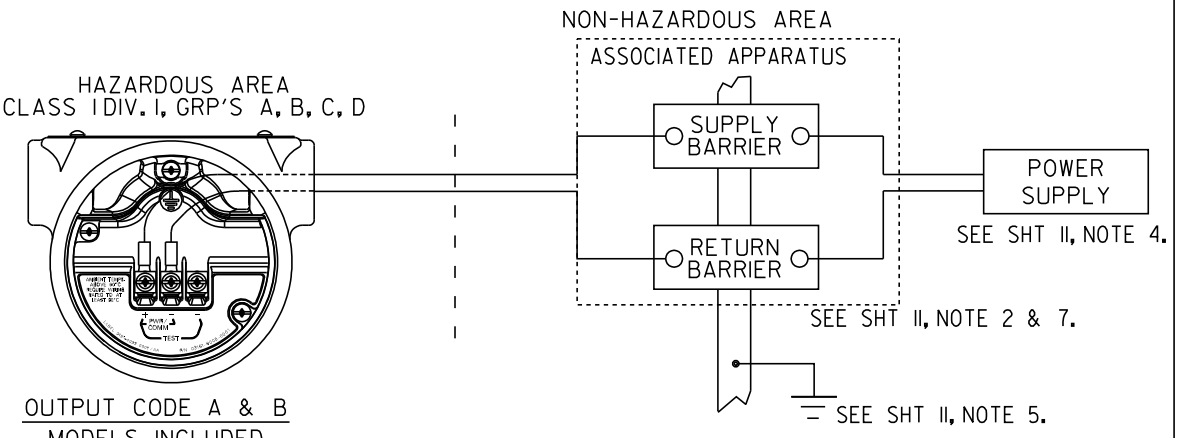
REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AP				

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

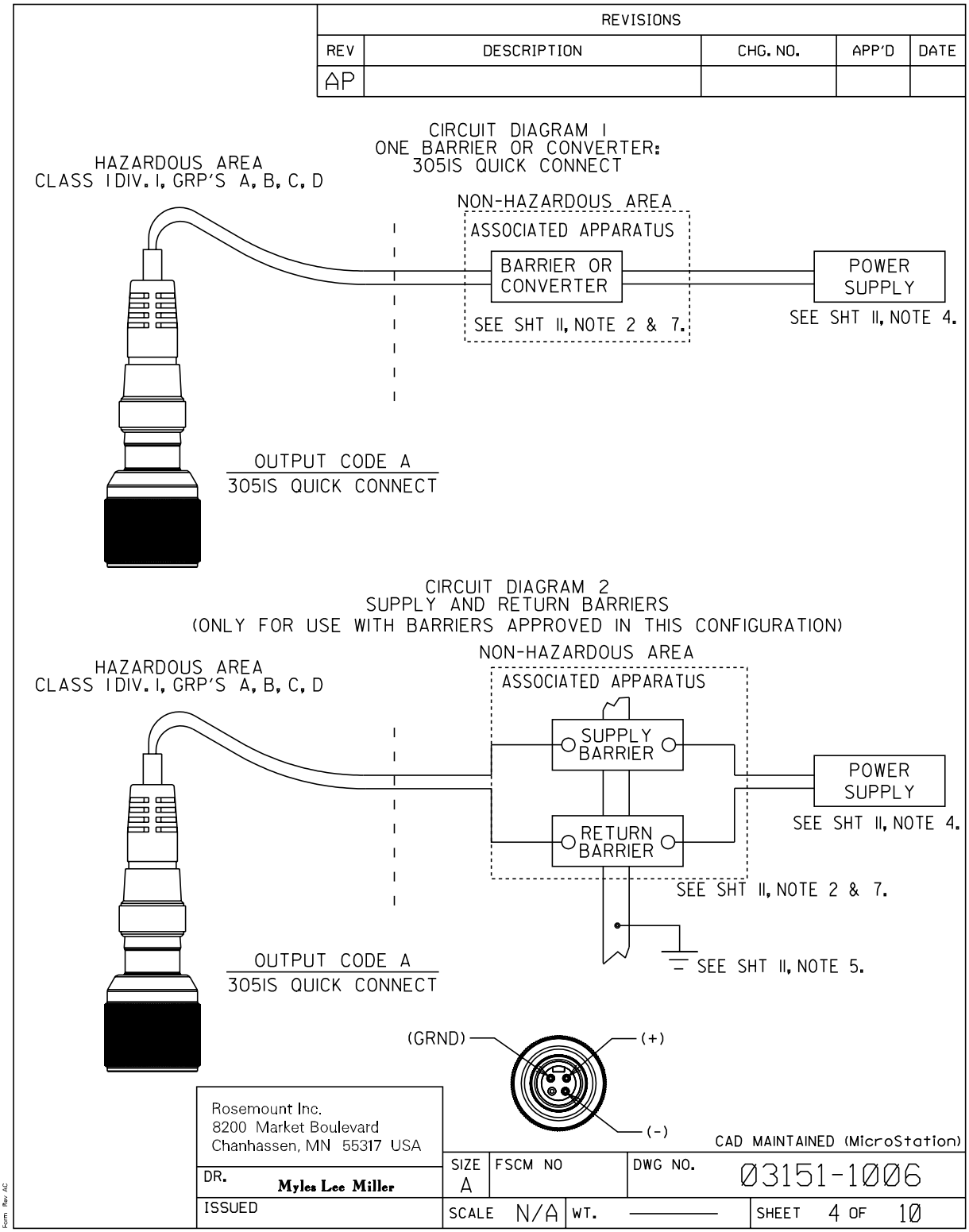
CIRCUIT DIAGRAM 2
SUPPLY AND RETURN BARRIERS
(ONLY FOR USE WITH BARRIERS APPROVED IN THIS CONFIGURATION)



OUTPUT CODE A & B
MODELS INCLUDED
305IS WITH 300S
JUNCTION BOX or
PLANTWEB HOUSING

Rosemount Inc. 8200 Market Boulevard 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 10

Form Rev AC


REVISIONS
REV
DESCRIPTION
CHG. NO.
APP'D
DATE
AP
CIRCUIT DIAGRAM 1
ONE BARRIER OR CONVERTER:
305IS QUICK CONNECT
HAZARDOUS AREA
CLASS I DIV. 1, GRP'S A, B, C, D
NON-HAZARDOUS AREA
ASSOCIATED APPARATUS
BARRIER OR CONVERTER
SEE SHT II, NOTE 2 & 7.
POWER SUPPLY
SEE SHT II, NOTE 4.
OUTPUT CODE A
305IS QUICK CONNECT
CIRCUIT DIAGRAM 2
SUPPLY AND RETURN BARRIERS
(ONLY FOR USE WITH BARRIERS APPROVED IN THIS CONFIGURATION)
HAZARDOUS AREA
CLASS I DIV. 1, GRP'S A, B, C, D
NON-HAZARDOUS AREA
ASSOCIATED APPARATUS
SUPPLY BARRIER
RETURN BARRIER
POWER SUPPLY
SEE SHT II, NOTE 4.
SEE SHT II, NOTE 2 & 7.
SEE SHT II, NOTE 5.
OUTPUT CODE A
305IS QUICK CONNECT
(GRND)
(+)
(-)
Rosemount Inc.
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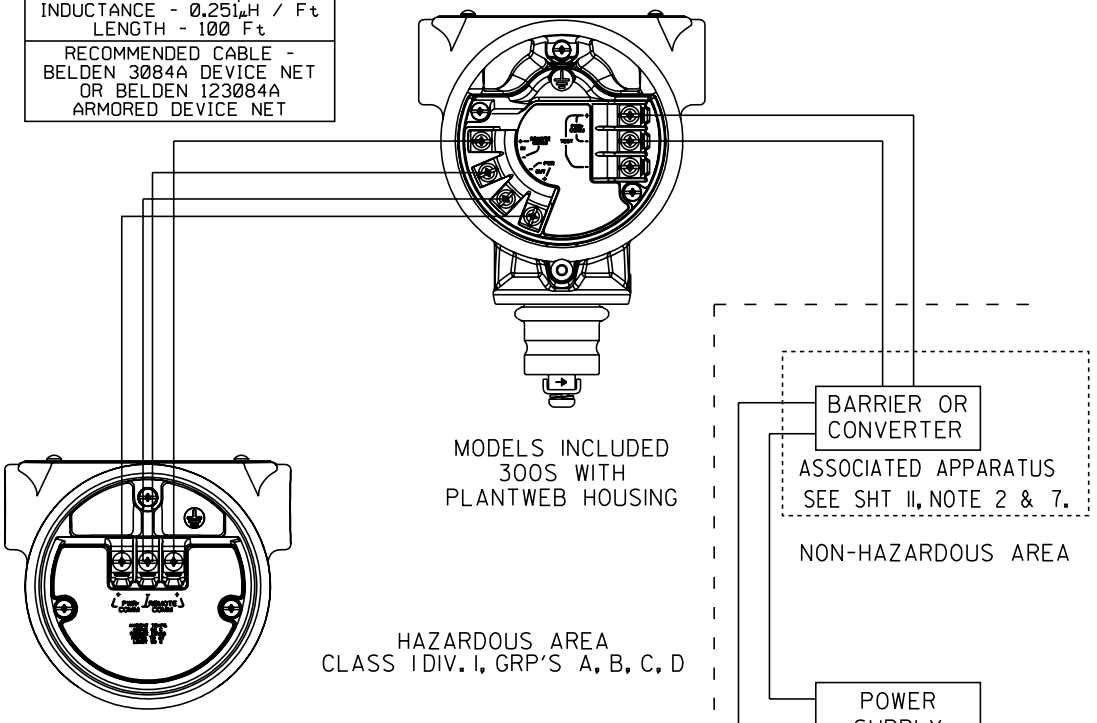
Chanhassen, MN 55317 USA
DR. Myles Lee Miller
ISSUED
CAD MAINTAINED (MicroStation)
SIZE A
FSCM NO
DWG NO. 03151-1006
SCALE N/A
WT.
SHEET 4 OF 10

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AP				

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 μH
T4 (Ta=-50°C to +70°C)

MAXIMUM CABLE PARAMETERS
CAPACITANCE - 50 pf / Ft INDUCTANCE - 0.251μH / Ft LENGTH - 100 Ft
RECOMMENDED CABLE - BELDEN 3084A DEVICE NET OR BELDEN 123084A ARMORED DEVICE NET



REMOTE MOUNT METER

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DR. Myles Lee Miller
ISSUED

CAD MAINTAINED (MicroStation)

SIZE	FSCM NO	DWG NO.	
A		03151-1006	
SCALE N/A	WT. ———	SHEET 5 OF 10	

Form Rev AC

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
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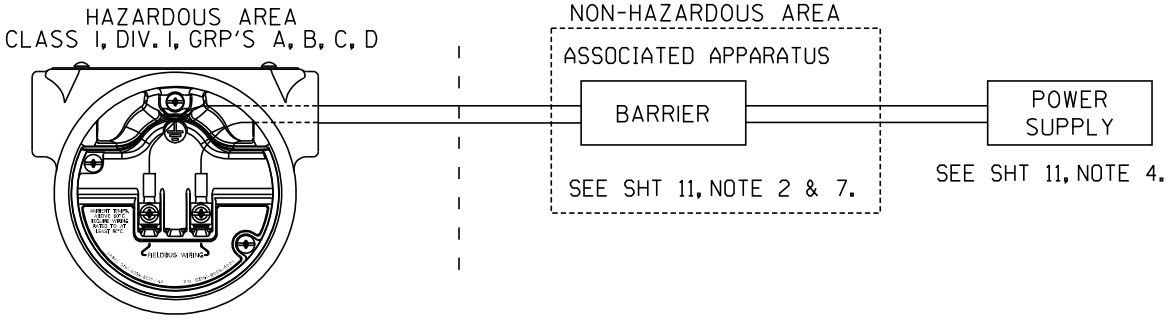
FOR OUTPUT CODE F or W (MODEL 300S)

CLASS I, DIV. 1, GROUPS A, B, C AND D

U_i or V_{MAX} = 30V	U_o, V_T, OR V_{OC} IS LESS THAN OR EQUAL TO 30V
I_i OR I_{MAX} = 300mA	I_o, I_T, OR I_{SC} IS LESS THAN OR EQUAL TO 300mA
P_i OR P_{MAX} = 1.3 WATT	P_i ($\frac{V_T \times I_T}{4}$) OR ($\frac{V_{OC} \times I_{SC}}{4}$) IS LESS THAN OR EQUAL TO 1.3 WATT
C_I = 0 μf	C_A IS GREATER THAN 0 μf
L_I = 0 μH	L_A IS GREATER THAN 0 μH
T4 (Ta = -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

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SIZE	FSCM NO	DWG NO.	
A		03151-1006	
SCALE N/A	WT.	SHEET 6 OF 10	

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AP				

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.

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DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03151-1006	
ISSUED	SCALE N/A	WT. ———	SHEET 7 OF 10	

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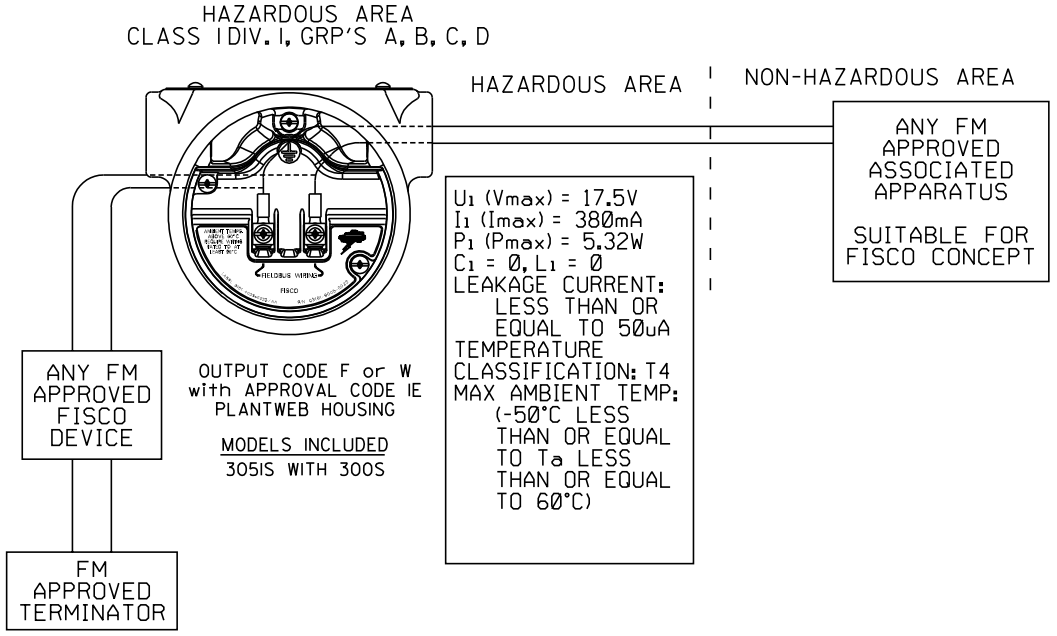

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CAD MAINTAINED (MicroStation)

DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03151-1006
ISSUED	SCALE N/A	WT. ———	SHEET 8 OF 10

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REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
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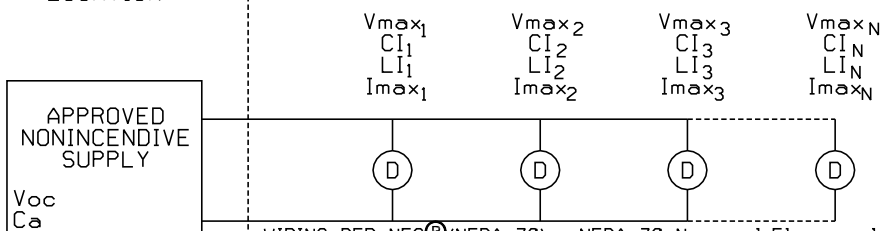
NONINCENDIVE FIELD CIRCUIT
CLASS I, DIV. 2 LOCATIONS

NON-CLASSIFIED LOCATION

HAZARDOUS (CLASSIFIED) LOCATION
CLASS I, DIV. 2, GRP'S A, B, C, D



SEE SHT 11, NOTES 2, 4, & 11

WIRING PER NEC® (NFPA 70) 501-4 (b) EXCEPTION (NONINCENDIVE FIELD CIRCUIT)

NFPA 70 National Electrical Code® ARTICLE 501-4(b) EXCEPTION: "WIRING IN NONINCENDIVE CIRCUITS SHALL BE PERMITTED USING ANY OF THE METHODS SUITABLE FOR WIRING IN ORDINARY 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
Ci	38nF	0nF	11.4nF	11.4nF	11.4nF	0uF
Li	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.

REFERENCE: APPENDIX A7 (FM3611 1999)

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)

Operating Imax = $Iq_1 + Iq_2 + ... + Iq_N + I_{signal\ max}$

$I_{signal\ max}$ = Max. of ($Isignal_1$, $Isignal_2$ ..... $Isignal_N$)

TEMP CODE: T4 (Ta = -50°C TO +70°C

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DR. Myles Lee Miller

ISSUED

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SIZE	FSCM NO	DWG NO.	
A		03151-1006	
SCALE N/A	WT. ———	SHEET 9 OF 10	

Form Rev AC

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AP				

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.
11. THE ASSOCIATED APPARATUS MUST BE A RESISTIVELY LIMITED SINGLE OR MULTIPLE CHANNEL FM APPROVED BARRIER HAVING PARAMETERS LESS THAN THOSE QUOTED, AND FOR WHICH THE OUTPUT AND THE COMBINATIONS OF OUTPUTS IS NON-IGNITION CAPABLE FOR THE CLASS, DIVISION AND GROUP OF USE.
12. FIELD WIRING SHOULD BE RATED TO 70°C.

Rosemount Inc.
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CAD MAINTAINED (MicroStation)

DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03151-1006
ISSUED	SCALE N/A	WT. ———	SHEET 10 OF 10

Form Rev AC

CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY.	REVISIONS				
	REV	DESCRIPTION	ECO NO.	APP'D	DATE
	AB	ADD NOTES 5 & 6	RTC1027013	T.T.S.	10/15/08

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.

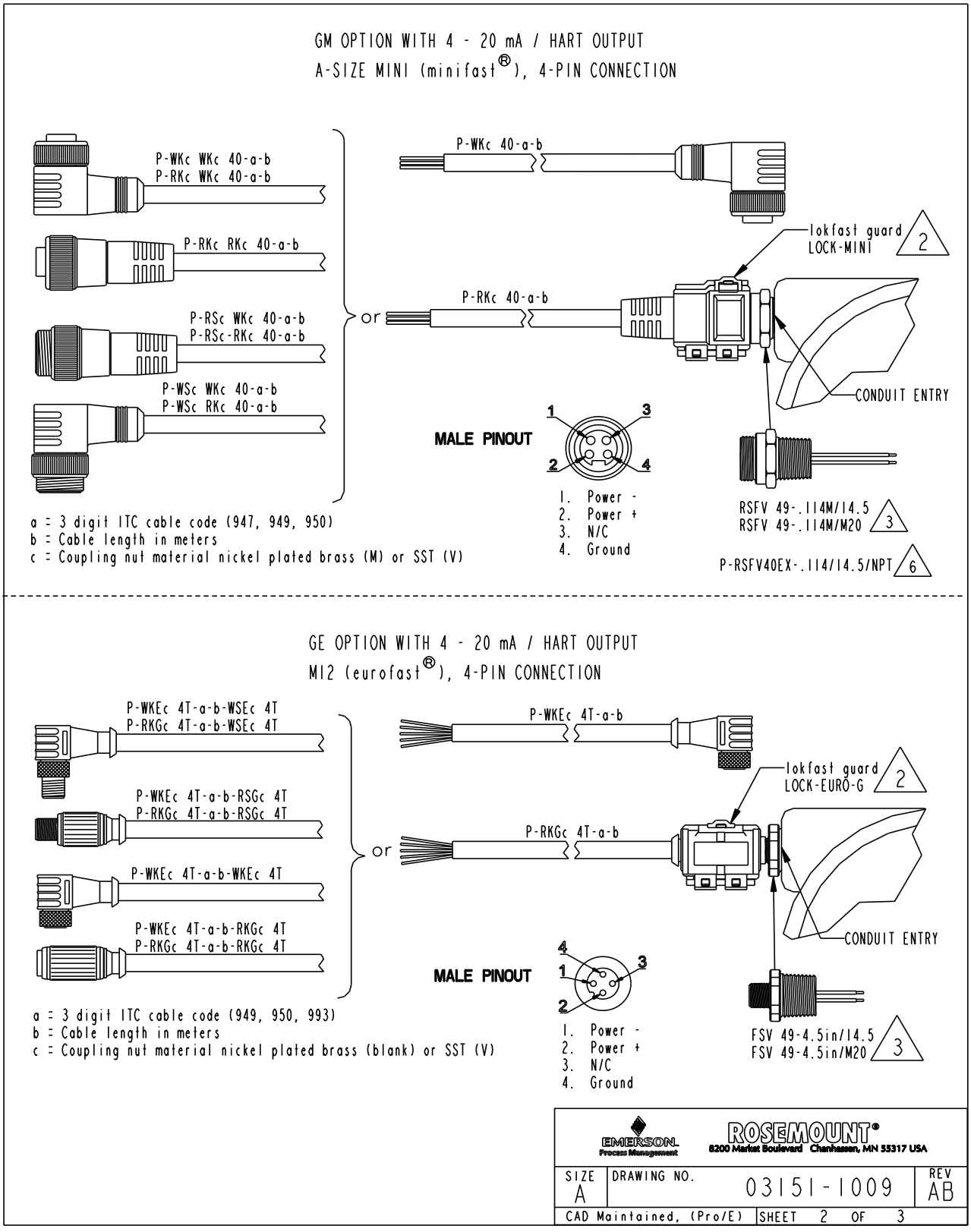
3. (X)XXV 49-.114M/14.5 IS INSTALLED INTO 1/2-14 NPT CONDUIT ENTRY THREADS. (X)XXV 49-.114M/M20 IS INSTALLED INTO CM20 CONDUIT ENTRY THREADS.

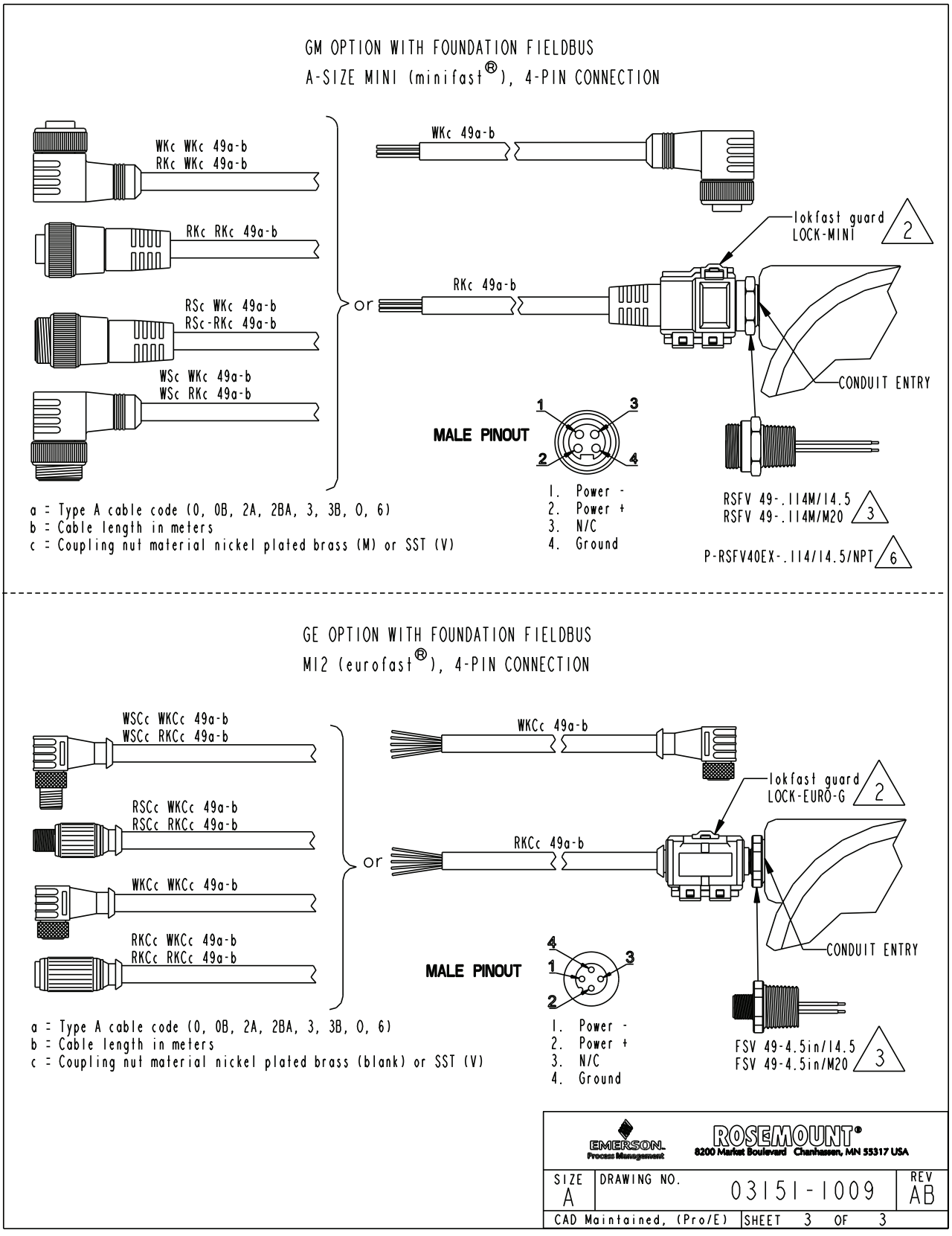
4. eurofast® AND minifast® ARE REGISTERED TRADEMARKS OF TURCK INC.

5. SEE TURCK CONTROL DRAWING QCF-00147 (FM) OR NI-2.404 (CSA) FOR GUIDANCE ON INSTALLATION OF CORDSETS IN HAZARDOUS LOCATIONS.

6. RECEPTACLE REQUIRED FOR USE WITH EQUIPMENT APPROVED AS EXPLOSION-PROOF FOR CLASS I, DIV I LOCATIONS.

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125	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°	TITLE: GE / GM OPTION NEMA 4X INSTALLATION, FM					
	DR. Myles Lee Miller 8/29/06	SIZE A	DRAWING NO. 03151-1009	REV AB		
	APP'D Bryce Hagbom 8/30/06					
DO NOT SCALE PRINT	CAD MAINTAINED, (PRO/E)			SHEET 1 OF 3		


GM OPTION WITH 4 - 20 mA / HART OUTPUT
A-SIZE MINI (minifast®), 4-PIN CONNECTION
P-WKc WKc 40-a-b
P-RKc WKc 40-a-b
P-RKc RKc 40-a-b
P-RSc WKc 40-a-b
P-RSc-RKc 40-a-b
P-WSc WKc 40-a-b
P-WSc RKc 40-a-b
or
P-WKc 40-a-b
lokfast guard
LOCK-MINI
2
P-RKc 40-a-b
CONDUIT ENTRY
MALE PINOUT
1
2
3
4
1. Power -
2. Power +
3. N/C
4. Ground
RSFV 49-.114M/14.5
RSFV 49-.114M/M20
3
P-RSFV40EX-.114/14.5/NPT
6
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
P-WKEc 4T-a-b-WSEc 4T
P-RKGc 4T-a-b-WSEc 4T
P-WKEc 4T-a-b-RSGc 4T
P-RKGc 4T-a-b-RSGc 4T
P-WKEc 4T-a-b-WKEc 4T
P-WKEc 4T-a-b-RKGc 4T
P-RKGc 4T-a-b-RKGc 4T
or
P-WKEc 4T-a-b
lokfast guard
LOCK-EURO-G
2
P-RKGc 4T-a-b
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 = 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 A
DRAWING NO. 03151-1009
REV AB
CAD Maintained, (Pro/E)
SHEET 2 OF 3


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-.114M/14.5
RSFV 49-.114M/M20
3
P-RSFV40EX-.114/14.5/NPT
6
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
M12 (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 AB
CAD Maintained, (Pro/E)
SHEET 3 OF 3

B.15.2 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
	AF	CORRECT TYPO IN NOTE 10	RTC1026088	T.T.S.	4/30/08
	AG	UPDATE DRAWING	RTC1030895	A.J.W.	5/12/10

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. 3051S SERIES SENSOR MODULE MUST BE INSTALLED WITH CSA FLAMEPROOF / EXPLOSIONPROOF APPROVED 300S SERIES 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. 300S SERIES HOUSING MUST BE INSTALLED WITH CSA FLAMEPROOF / EXPLOSIONPROOF APPROVED 3051S SERIES 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.
10. THIS PRODUCT MEETS THE DUAL SEAL REQUIREMENTS OF ANSI/ISA 12.27.01. NO ADDITIONAL PROCESS SEALING IS REQUIRED. THE DUAL SEAL PROCESS TEMPERATURE RANGE IS -50°C TO 315°C. FOR THE IN-SERVICE LIMITS APPLICABLE TO A SPECIFIC MODEL, SEE "PROCESS TEMPERATURE LIMITS" IN APPENDIX "A" OF THE PRODUCT MANUAL.

CAD Maintained, (Pro/E)

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

Form Rev AC

CONTRACT NO.

DR. Myles Lee Miller 8/28/00
CHK'D . .
APP'D Paul C. Sundet 10/19/00
APP'D GOVT.

EMERSON. Process Management
ROSEMOUNT®
8200 Market Boulevard • Chanhassen, MN 55317 USA

TITLE MODEL 3051 / 300 EXPLOSIONPROOF / FLAMEPROOF INSTALLATION DRAWING, CSA

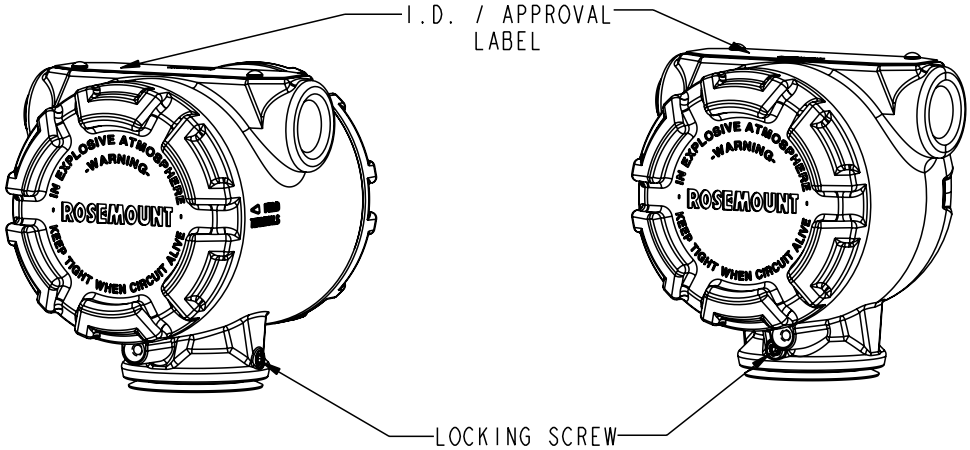
SIZE A | FSCM NO. | DRAWING NO. 03151-1013
SCALE 1:4 | WT. | SHEET 1 OF 3

REVISIONS					
ZONE	REV	DESCRIPTION	CHG. NO.	APP'D	DATE
	AG				

COMPONENT IDENTIFICATION

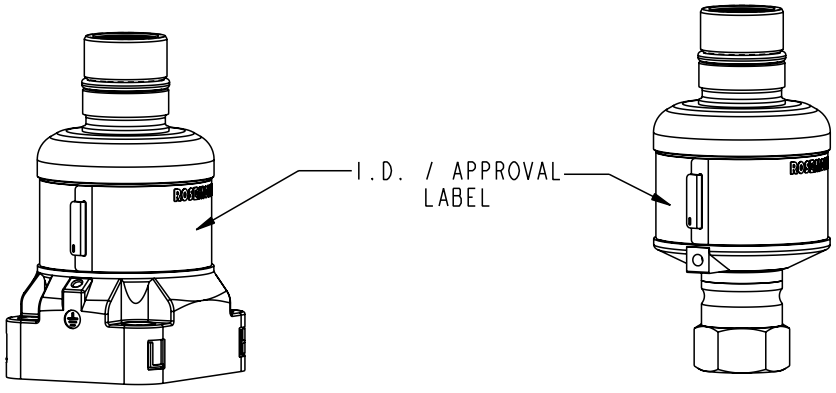
300S SERIES PLANTWEB
(DUAL COMPARTMENT HOUSING)

300S SERIES JUNCTION BOX
(SINGLE COMPARTMENT)



3051S SERIES
SCALABLE COPLANAR
PRESSURE TRANSMITTER

3051S SERIES
SCALABLE IN-LINE
PRESSURE TRANSMITTER

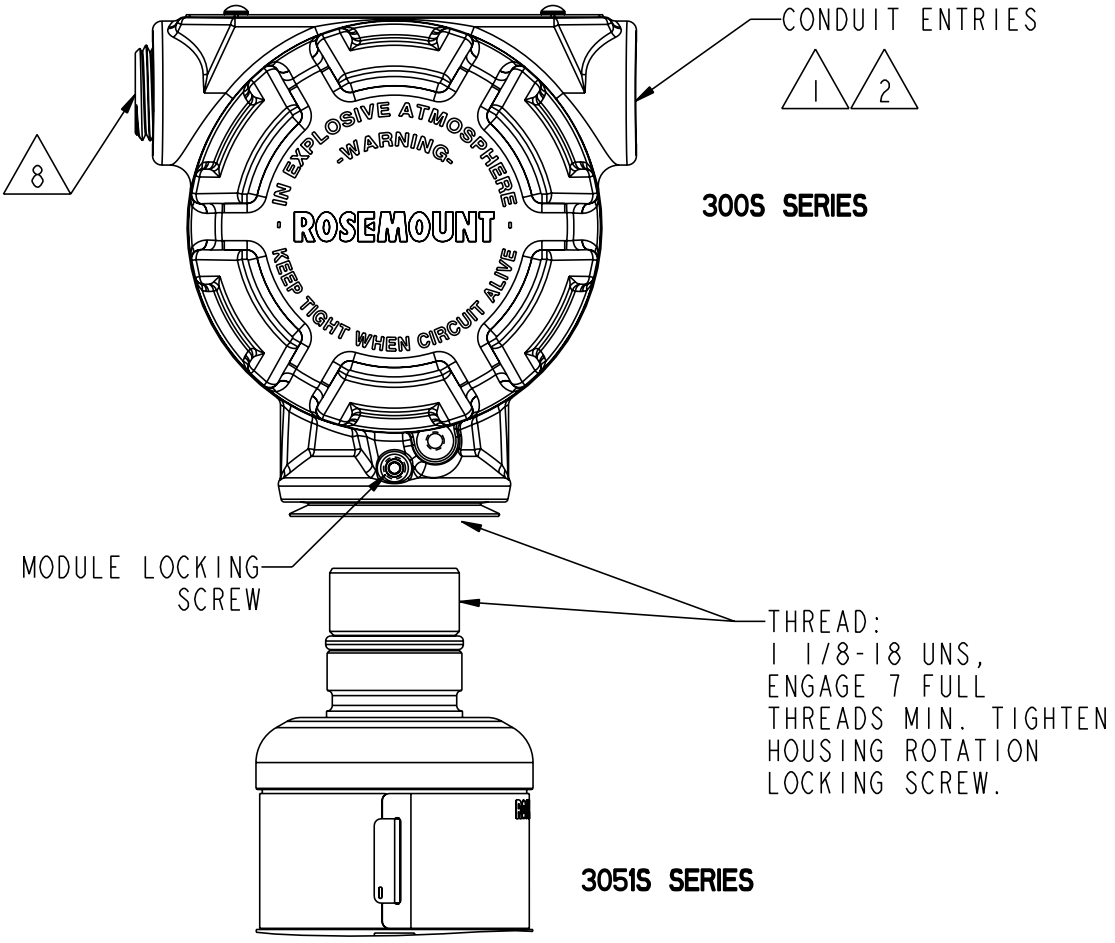


Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA				CAD Maintained, (Pro/E)
DR. *Myles Lee Miller*	8/28/00	SIZE A	FSCM NO	DWG NO. 03151-1013
ISSUED		SCALE 1:2	WT.	SHEET 2 OF 3

Form Rev AC

REVISIONS					
ZONE	REV	DESCRIPTION	CHG. NO.	APP'D	DATE
	AG				

HOUSING TO MODULE ASSEMBLY



Rosemount Inc. 8200 Market Boulevard 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

Form Rev AC

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

REVISIONS

REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AJ	ADD QUICK CONNECT	RTC1020189	T.S.	8/31/05
AK	ADD DIAGNOSTICS FEATURE BOARD	RTC1020856	J.D.V.	3/23/06
AL	ADD NOTE 7 FOR DUAL SEAL	RTC1025955	T.T.S.	4/23/08
AM	CORRECT TYPE IN NOTE 7	RTC1026088	T.T.S.	4/30/08

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
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) 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 μH	L_A IS GREATER THAN 2.4 μH + 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 = 58.2μH	L_A IS GREATER THAN 58.2μH + 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.
8200 Market Boulevard
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
AM				

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_i = 11.4nF	C_A IS GREATER THAN 11.4nF + Ccable
L_i = 570μH	L_A IS GREATER THAN 570μH + 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 = 0μf	C_A IS GREATER THAN 0μf + Ccable
L_I = 0μH	L_A IS GREATER THAN 0μH + Lcable

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

Rosemount Inc.
8200 Market Boulevard
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

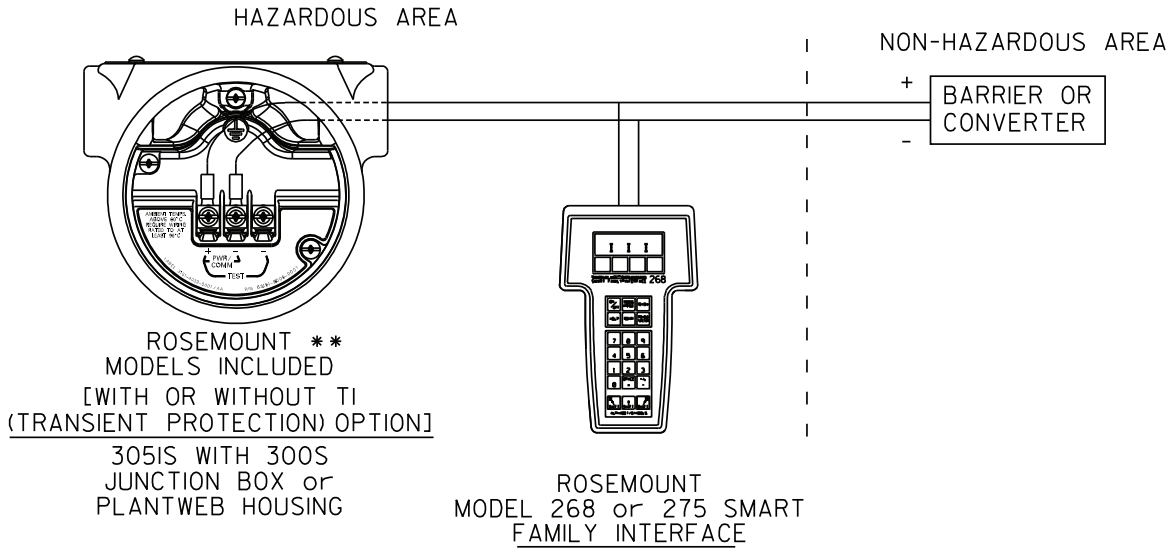
REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AM				

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. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. Myles Lee Miller 3/7/001	SIZE A	FSCM NO	DWG NO. Ø3151-1Ø16
ISSUED	SCALE N/A	WT. ———	SHEET 4 OF 1Ø

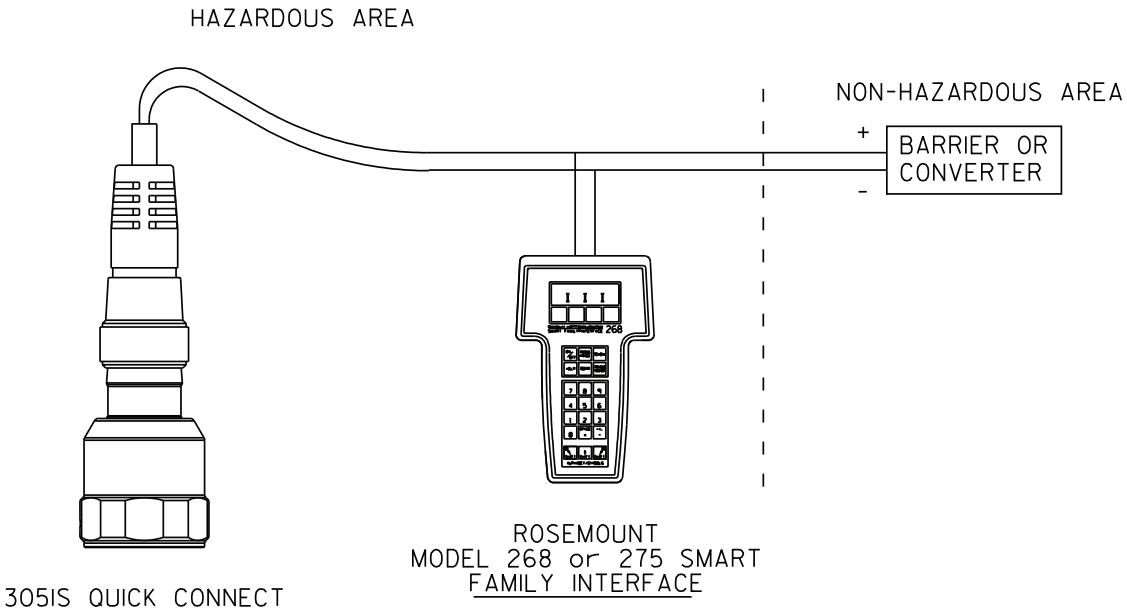
REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AM				

CSA INTRINSIC SAFETY APPROVALS

CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE
4-20 mA, ("A" OUTPUT CODE)



Rosemount Inc. 8200 Market Boulevard 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
AM				

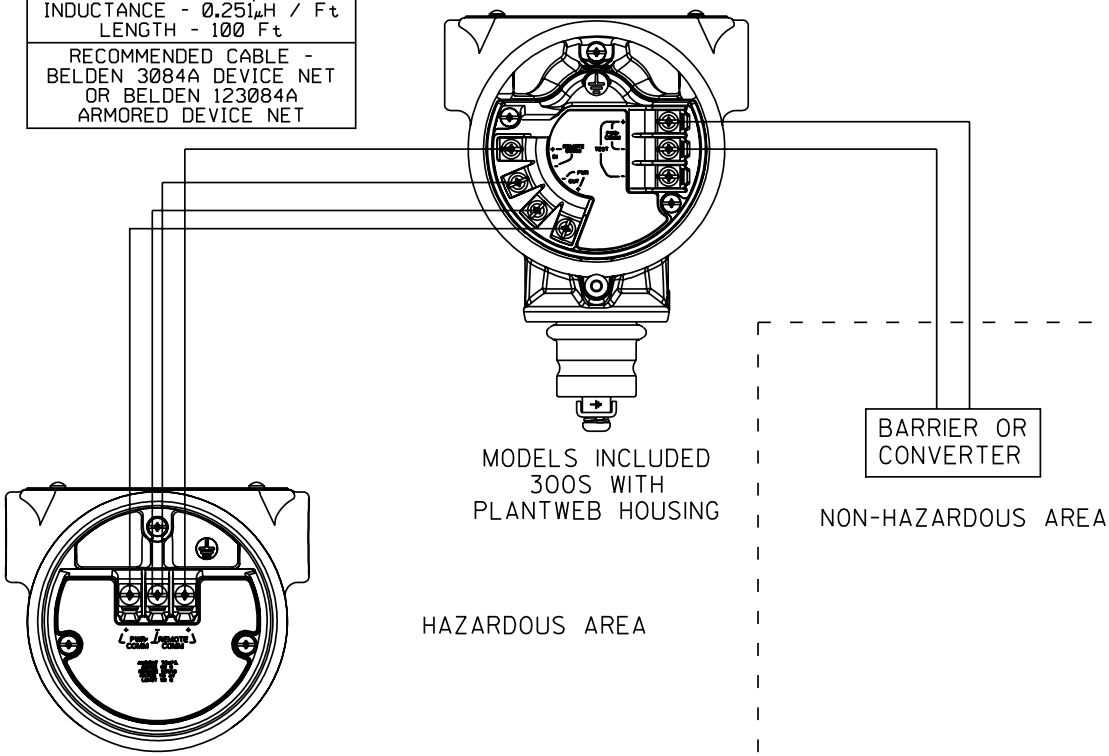
CSA INTRINSIC SAFETY APPROVALS

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 INDUCTANCE - 0.251$_{\mu}$H / Ft LENGTH - 100 Ft
RECOMMENDED CABLE - BELDEN 3084A DEVICE NET OR BELDEN 123084A ARMORED DEVICE NET



MODELS INCLUDED
300S WITH
PLANTWEB HOUSING

BARRIER OR
CONVERTER

NON-HAZARDOUS AREA

HAZARDOUS AREA

MODELS INCLUDED
305IS WITH 300S
JUNCTION BOX

REMOTE MOUNT METER

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

DR.	SIZE	FSCM NO	DWG NO.
Myles Lee Miller	A		03151-1016

ISSUED	SCALE	N/A	WT.	SHEET	6 OF 10

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AM				

4-20 mA, ("A" or "B" OUTPUT CODE)

DEVICE	PARAMETERS	APPROVED FOR CLASS I, DIV.I
CSA APPROVED SAFETY BARRIER	30 V OR LESS *330 OHMS OR MORE * 28 V OR LESS 300 OHMS OR MORE 25 V OR LESS 200 OHMS OR MORE * 22 V OR LESS 180 OHMS OR MORE	GROUPS A, B, C, D
FOXBORO CONVERTER 2AI-I2V-CGB, 2AI-I3V-CGB, 2AS-I3I-CGB, 3A2-I2D-CGB, 3A2-I3D-CGB, 3AD-I3I-CGB, 3A4-I2D-CGB, 2AS-I2I-CGB, 3F4-I2DA		GROUPS B, C, D
CSA APPROVED SAFETY BARRIER	30 V OR LESS 150 OHMS OR MORE	GROUPS C, D

Rosemount Inc.
8200 Market Boulevard
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
AM				

FIELDBUS, ("F" or "W" OUTPUT CODE)

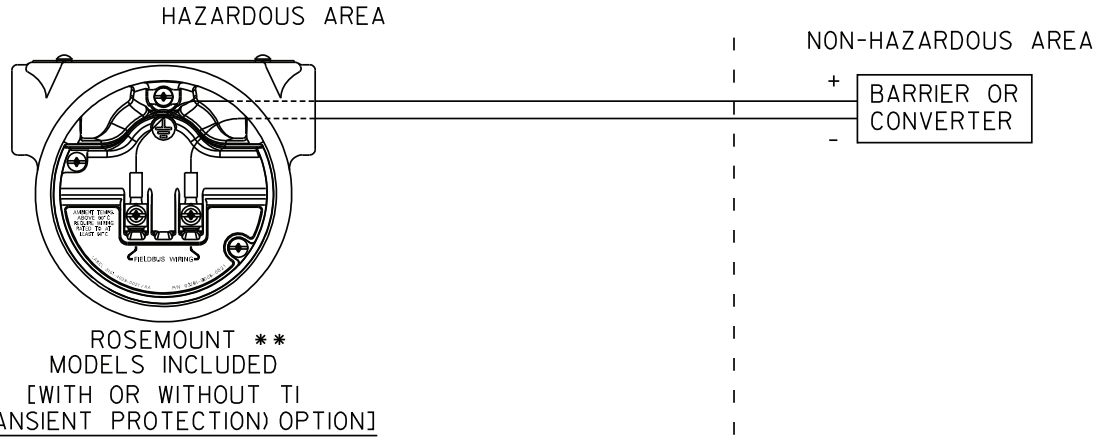
DEVICE	PARAMETERS	APPROVED FOR CLASS I, DIV.I
CSA APPROVED SAFETY BARRIER	30 V OR LESS 300 OHMS OR MORE 28 V OR LESS 235 OHMS OR MORE 25 V OR LESS 160 OHMS OR MORE 22 V OR LESS 100 OHMS OR MORE	GROUPS A, B, C, D

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. 8200 Market Boulevard 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
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 (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

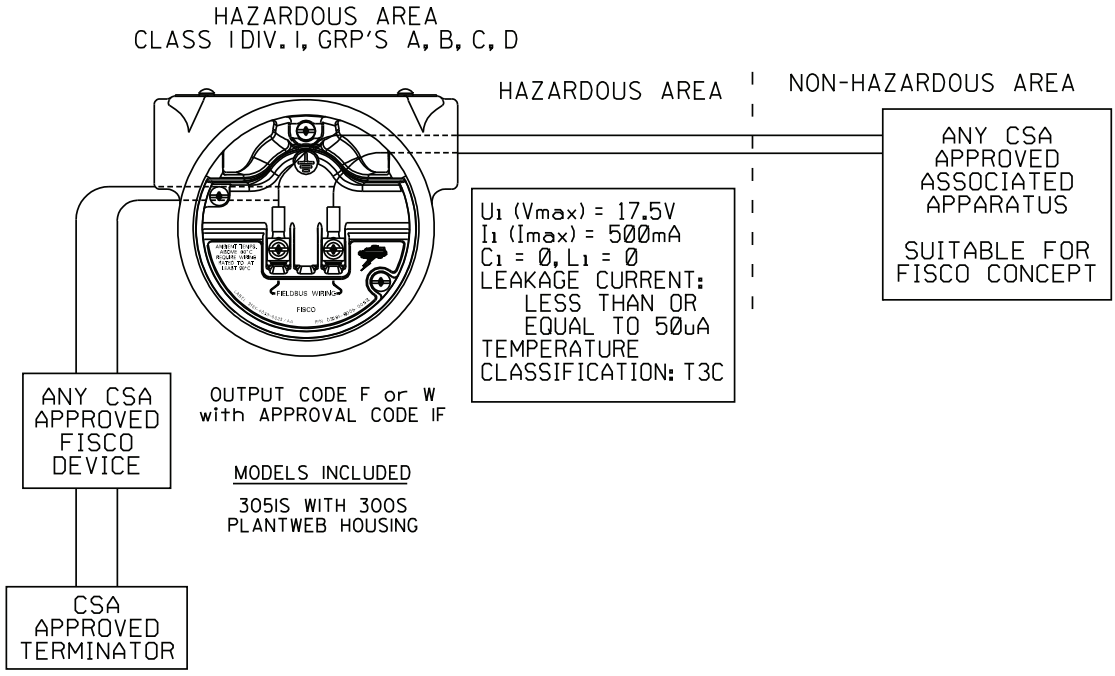
ONE OF THE ALLOWED TERMINATIONS MIGHT ALREADY BE INTEGRATED IN THE ASSOCIATED APPARATUS. THE NUMBER OF PASSIVE APPARATUS CONNECTED TO THE BUS SEGMENT IS NOT LIMITED DUE TO I. S. REASONS. IF THE ABOVE RULES ARE RESPECTED, UP TO A TOTAL LENGTH OF 1000 m (SUM OF TRUNK AND ALL SPUR CABLES) OF CABLE IS PERMITED.
THE INDUCTANCE AND THE CAPACITANCE OF THE CABLE WILL NOT IMPAIR THE INTRINSIC SAFETY OF THE INSTALLATION.

Rosemount Inc. 8200 Market Boulevard 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
AM				

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.
7. THIS PRODUCT MEETS THE DUAL SEAL REQUIREMENTS OF ANSI/ISA 12.27.01. NO ADDITIONAL PROCESS SEALING IS REQUIRED. THE DUAL SEAL PROCESS TEMPERATURE RANGE IS -50°C TO 315°C. FOR THE IN-SERVICE LIMITS APPLICABLE TO A SPECIFIC MODEL, SEE "PROCESS TEMPERATURE LIMITS" IN APPENDIX "A" OF THE PRODUCT MANUAL.



Rosemount Inc. 8200 Market Boulevard 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 10 OF 10

B.15.3 KEMA

CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY.	REVISIONS					
	ZONE	REV	DESCRIPTION	CHG. NO.	APP'D	DATE
		AB	ADD 3051SL AND TRADITIONAL HOUSING	RTC1015145	B.L.H.	4/7/03
		AC	UPDATE NOTE 8	RTC1025701	T.T.S.	3/5/08
		AD	UPDATE NOTE 8 AND THREAD DESCRIPTION	RTC1026395	T.T.S.	6/30/08

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 EN/IEC 60079-1 FLAMEPROOF APPROVED BLANKING ELEMENT.

CAD Maintained, (Pro/E)

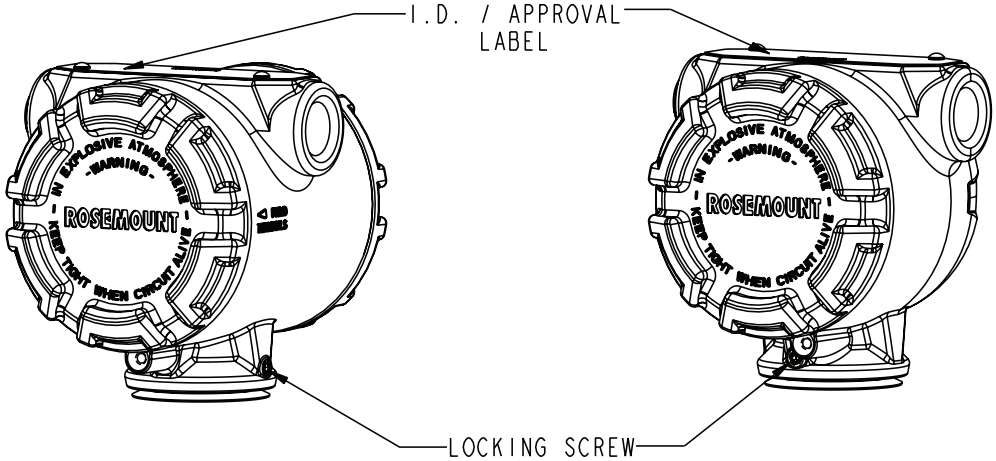
UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125 -TOLERANCES- .X ± .1 [2,5] .XX ± .02 [0,5] .XXX ± .010 [0,25] FRACTIONS ± 1/32 ANGLES ± 2° DO NOT SCALE PRINT	CONTRACT NO. DR. Myles Lee Miller 8/28/00 CHK'D . . APP'D Paul C. Sundet 9/11/00 APP'D GOVT.	EMERSON. Process Management ROSEMOUNT® 8200 Market Boulevard • Chanhassen, MN 55317 USA TITLE MODEL 3051 / 300 FLAMEPROOF INSTALLATION DRAWING, KEMA SIZE A FSCM NO. DRAWING NO. 03151-1023 SCALE 1:4 WT. SHEET 1 OF 3	Form Rev AC

REVISIONS					
ZONE	REV	DESCRIPTION	CHG. NO.	APP'D	DATE
	AD				

COMPONENT IDENTIFICATION

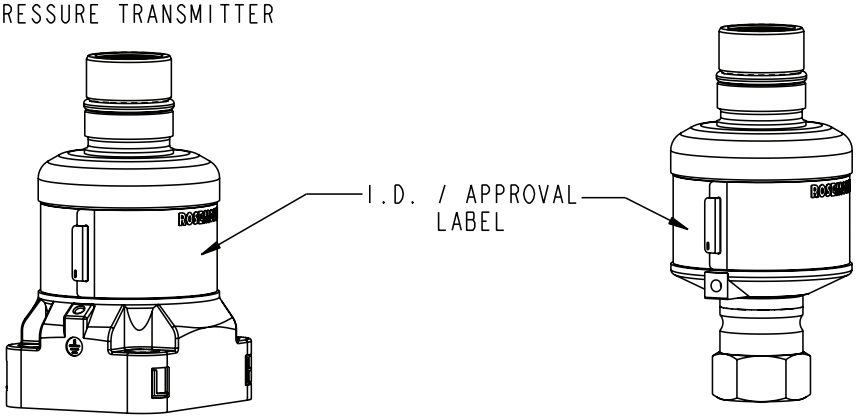
300S1____, PLANTWEB
300S4____, TRADITIONAL
(DUAL COMPARTMENT HOUSING)

300S2____
JUNCTION BOX HOUSING
(SINGLE COMPARTMENT)



305IS_C____
305IS_L____
SCALABLE COPLANAR
PRESSURE TRANSMITTER

305IS_T____
SCALABLE IN-LINE
PRESSURE TRANSMITTER

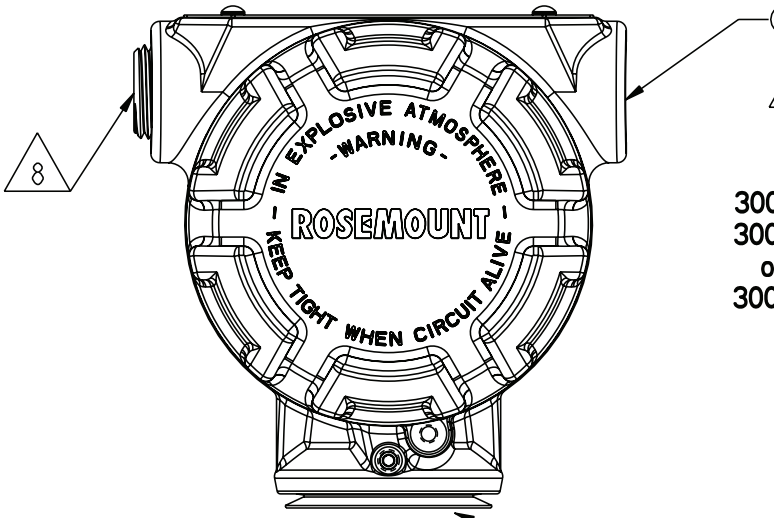


Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA				CAD Maintained, (Pro/E)	
DR. Myles Lee Miller	8/28/00	SIZE A	FSCM NO	DWG NO. 03151-1023	
ISSUED		SCALE 1:2	WT.	SHEET 2 OF 3	

Form Rev AC

REVISIONS					
ZONE	REV	DESCRIPTION	CHG. NO.	APP'D	DATE
	AD				

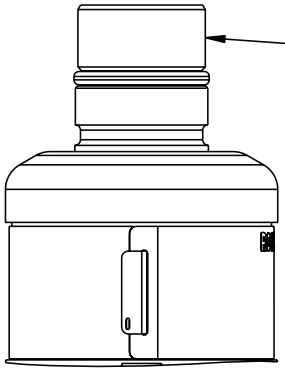
HOUSING TO MODULE ASSEMBLY



CONDUIT ENTRIES

1 2

3005I,
3005Z
or
3005Y



THREAD:
1 1/8-18 UNEF-2,
ENGAGE 7 FULL
THREADS MIN. TIGHTEN
HOUSING ROTATION
LOCKING SCREW.

3051S_C,
3051S_T
or
3051S_L

Rosemount Inc. 8200 Market Boulevard 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

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00809-0100-4801, Rev GA
September 2017

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