

# Rosemount™ 3051SMV MultiVariable™ Transmitter

with FOUNDATION™ Fieldbus Protocol



## Safety messages

### NOTICE

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

For technical assistance, contacts are listed below:

#### Customer Central

Technical support, quoting, and order-related questions. United States - 1-800-999-9307  
(7:00 am to 7:00 pm CST) Asia Pacific- 65 777 8211 Europe/Middle East/Africa - 49 (8153) 9390

#### North American Response Center

Equipment service needs.

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

Outside of these areas, contact your local Emerson representative.

### ⚠ CAUTION

The products described in this document are NOT designed for nuclear-qualified applications. Using non-nuclear qualified products in applications that require nuclear-qualified hardware or products may cause inaccurate readings. For information on Rosemount nuclear-qualified products, contact your local Emerson Sales Representative.

### ⚠ WARNING

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

Installation of this transmitter in an explosive environment must be in accordance with the appropriate local, national, and international standards, codes, and practices. Review the approvals section of this manual for any restrictions associated with a safe

- Before connecting a Field Communicator in an explosive atmosphere, ensure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- In an explosion-proof/flameproof installation, do not remove the transmitter covers when power is applied to the unit.

#### Process leaks may cause harm or result in death.

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

#### 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.
- Before connecting a handheld communicator in an explosive atmosphere, ensure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- In an Explosion-Proof/Flameproof installation, do not remove the transmitter covers when power is applied to the unit.

#### Process leaks may cause harm or result in death.

- Install and tighten process connectors before applying pressure.

## **⚠ 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 sensor module.**

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

### **Physical access**

- Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.
  - Physical security is an important part of any security program and fundamental to protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.
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# 1 Introduction

## 1.1 Using this manual

The sections in this manual provide information on installing, operating, and maintaining the Rosemount™ 3051S MultiVariable™ FOUNDATION™ Fieldbus Transmitter (3051SMV). The sections are organized as follows:

- [Configuration](#) provides instruction on commissioning and operating the Rosemount 3051SMV and information on flow configuration and device configuration.
- [Installation](#) contains mechanical and electrical installation instructions.
- [Operation and Maintenance](#) contains operation and maintenance techniques.
- [Troubleshooting](#) provides troubleshooting techniques for the most common operating problems.
- [Reference Data](#) supplies reference and specification data, as well as ordering information and contains intrinsic safety approval information, European ATEX directive information, and approval drawings.

## 1.2 Product overview

This manual covers the Rosemount 3051SMV FOUNDATION Fieldbus Transmitter. The device measures differential pressure, static pressure, and process temperature and has the capability to calculate mass flow.

The following transmitters are covered in this manual:

**Table 1-1: Rosemount 3051SMV Fully Compensated Mass Flow (M) Transmitter**

Measurement type	Description
1	Differential pressure, static pressure, temperature
2	Differential pressure and static pressure

**Table 1-2: Rosemount 3051SMV Process Variables Only (P) Transmitter**

Measurement type	Description
1	Differential pressure, static pressure, temperature
2	Differential pressure and static pressure

**Table 1-3: Device Driver Information**

Release date	Device identification			Device driver identification		Review instructions	Review functionality
	NAMUR hardware revision <sup>(1)</sup>	NAMUR software revision <sup>(1)</sup>	FOUNDATION Fieldbus software revision	FOUNDATION Fieldbus universal revision	Device revision <sup>(2)</sup> <sup>(3)</sup>	00809-0100-4853	

**Table 1-3: Device Driver Information (continued)**

Release date	Device identification			Device driver identification		Review instructions	Review functionality
May-16	1.0.xx	1.0.xx	1.0.2	6.1.2	1	00809-0100-4853	None: Initial Product Release

- (1) NAMUR Revision is located on the hardware tag of the device. Differences in level 3 changes, signified above by xx, represent minor product changes as defined per NE53. Compatibility and functionality are preserved and product can be used interchangeably.
- (2) FOUNDATION Fieldbus device revision can be read using a FOUNDATION Fieldbus capable configuration tool. Value shown is minimum revision that could correspond to NAMUR Revisions.
- (3) Device driver file names use device and DD revision. To access new functionality, the new Device Driver must be downloaded. It is recommended to download new Device Driver files to ensure full functionality.

**Figure 1-1: Transmitter Data Flow**



## 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.

## 2 Configuration

### 2.1 Section overview

This section contains information for the flow and device configuration of the Rosemount™ 3051S MultiVariable™ FOUNDATION™ Fieldbus Transmitter (3051SMV). Each FOUNDATION Fieldbus host or configuration tool has different ways of displaying and performing operations. Some hosts will use Device Descriptions (DD) and DD methods to complete device configuration and will display data consistently across platforms.

The DD can be found on the FieldComm Group website at [FieldCommGroup.org](http://FieldCommGroup.org). There is no requirement that a host or configuration tool support the features in the DD. For DeltaV™ users, the DD can be found at [Emerson.com/DeltaV](http://Emerson.com/DeltaV). This section will describe how to use the basic methods.

### 2.2 Safety messages

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

#### **⚠ WARNING**

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

- Do not remove the transmitter cover in explosive atmospheres when the circuit is live.
- Before connecting a handheld communicator in an explosive atmosphere, ensure that the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- Verify that the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.
- Both housing covers must be fully engaged to meet flameproof/explosion-proof requirements.

**Failure to follow these installation guidelines could result in death or serious injury.** Make sure the device is installed by qualified personnel and in accordance with applicable code of practice. **Electrical shock could cause death or serious injury.**

- If the sensor is installed in a high-voltage environment and a fault or installation error occurs, high voltage may be present on transmitter leads and terminals.
  - Use extreme caution when making contact with the leads and terminals.
-

## 2.3 Flow configuration

### 2.3.1 Engineering Assistant 5.5.1

Engineering Assistant 5.5.1 is PC-based software that performs flow configuration for the Rosemount 3051SMV with the fully compensated mass flow feature board. It is available as a standalone application or as an AMS SNAP-ON™, and is required to complete the flow configuration for the Rosemount 3051SMV Transmitter.

The following are the minimum system requirements to install the Engineering Assistant 5.5.1 software:

- Intel® Core™ Duo, 2.4 GHz
- 600 MB of available hard disk space
- 2GB RAM
- Microsoft® Windows™ 7 (32 or 64 bit) or Microsoft Windows 10 (64 bit)
- FOUNDATION Fieldbus interface Learn more about the Emerson USB Fieldbus Interface device and its configuration here: [Emerson.com/AMS/USB-Fieldbus-Interface](http://Emerson.com/AMS/USB-Fieldbus-Interface).

### 2.3.2 Installing Engineering Assistant 5.5.1 with AMS 13.5 Stand-Alone

#### Procedure

1. Insert Rosemount Engineering Assistant (EA) Software disk into the DVD-ROM.
2. Right-click Setup.exe, select **Run as Administrator**.

---

#### Note

If installation does not fully complete, manually enable .NET 3.5 by clicking **Turn Windows features on or off** located at *Control Panel\All Control Panel Items\Programs and Features*, and rerun the installation

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3. If there are old versions of EA 5, uninstall them by selecting **Remove** when prompted.

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#### Note

Do NOT uninstall Engineering Assistant 6. Engineering Assistant 5 is not a replacement for Engineering Assistant 6.

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4. In the AMS Network Configuration select **Add...** to add **FF HSE Network**, then follow the prompts.
5. Right-click **Config.bat**, select **Run as Administrator**.
6. Using the Fieldbus Interface and its Configuration Utility software, it is possible to set power to the device if the loop power is not available.
7. If the connected Fieldbus device is at a noncommissioned address, with the Emerson USB Fieldbus interface connected, use its configuration utility to commission the device.

8. Close the Fieldbus interface configuration utility.

### 2.3.3 Launching Engineering Assistant 5.5.1 and connecting to the transmitter

Connect the FOUNDATION Fieldbus interface from the PC to the Rosemount 3051SMV Fieldbus Transmitter.

#### Procedure

1. Open the transmitter cover on the side marked “Field Terminals”.
2. Connect the communication wires to the terminals labeled “Fieldbus Wiring”.
3. If the device is at a noncommissioned address, use the Emerson USB Fieldbus Interface’s Configuration Utility to commission the device.

---

#### Note

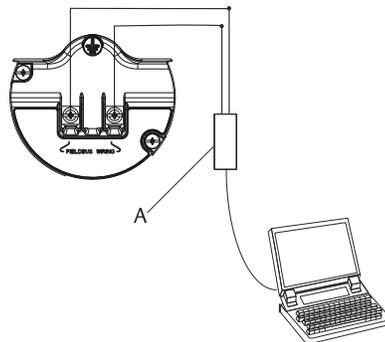
The Emerson USB Fieldbus Interface can be configured to power the connected Fieldbus device. Never attempt to use two power sources at the same time. Doing so can disrupt communications and may compromise automation safety. Refer to the Emerson USB Fieldbus Interface [User Manual](#) (AW7060MNL) for further information.

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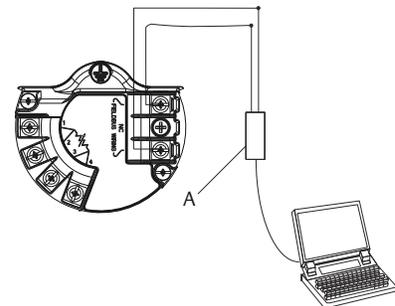
4. Connect the Rosemount 3051SMV Transmitter to a computer (see [Figure 2-1](#)).

**Figure 2-1: Connecting a PC to the Rosemount 3051SMV Using the USB Fieldbus Interface**

Rosemount 3051SMV without optional process temperature connection



Rosemount 3051SMV with optional process temperature connection

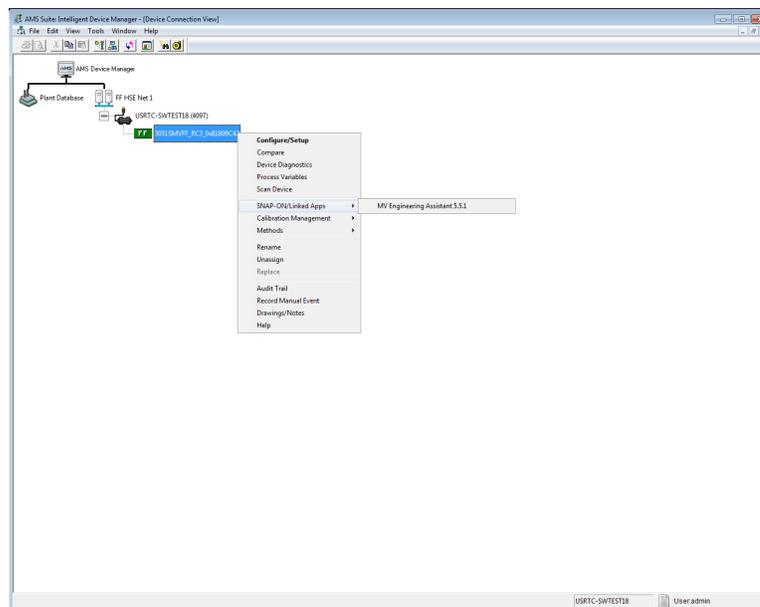


A. USB Fieldbus Interface

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5. Launch the Rosemount 3051SMV Engineering Assistant for FOUNDATION Fieldbus program by selecting MV Engineering Assistant from the Start menu.  
OR
6. Launch AMS Device Manager if using the SNAP-ON Engineering Assistant.
  - a) Right click the device to be configured.

b) Select SNAP-ON/Linked Apps > MV Engineering Assistant 5.5.1.



7. Start a new configuration or load a saved configuration from a file.



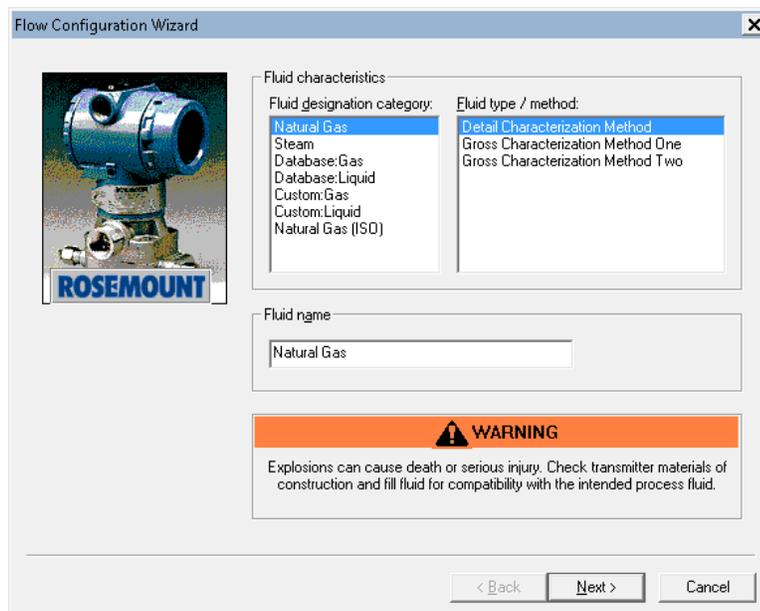
8. Perform the steps outlined in the [Creating a flow configuration](#) section.
9. Once the configuration is complete, disconnect MV Engineering Assistant and the USB Fieldbus Interface. Then, attach the housing cover and tighten so that metal contacts metal to meet flame-proof/explosion-proof requirements.

## 2.3.4 Creating a flow configuration

Engineering Assistant 5.5.1 is designed to guide the user through the setup of the flow configuration for the Rosemount 3051SMV. This information will be used by the Engineering Assistant to create the flow configuration parameters that can be sent to the transmitter or saved for future use.

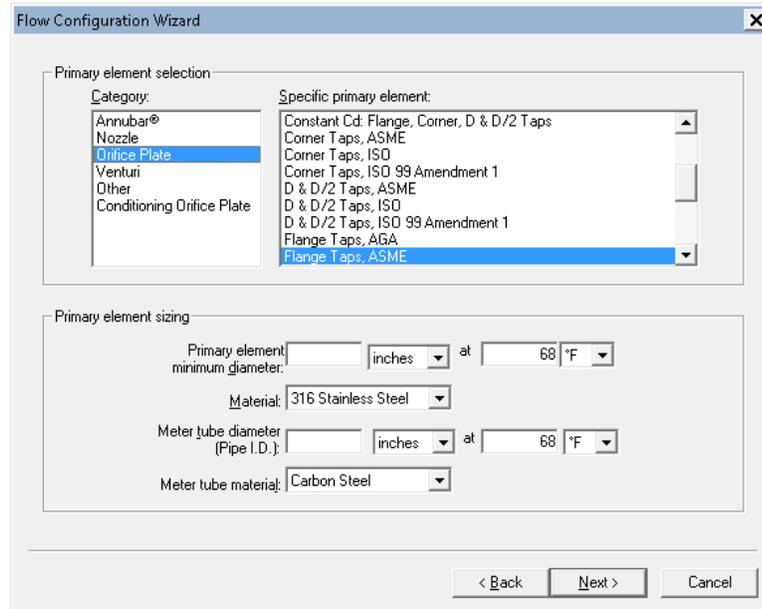
### Procedure

1. Select the fluid designation category.
2. Select the fluid type.
3. Select **Next**.



Depending on the fluid selected, Engineering Assistant 5.5.1 may bring up a screen for entering additional fluid information.

4. Select a primary element type, then enter the sizing information in the fields provided.
5. Select **Next**.



6. Enter the operating conditions for the fluid.
  - a) Select the pressure and temperature range based on the operating conditions of the process, not the sensor range of the transmitter.

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**Note**

An extremely large or small operating range may increase the uncertainty of the flow calculation.

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The units used for flow configuration are only used in the Engineering Assistant software. For configuration of device variable units, see [Units configuration](#).

7. Enter the atmospheric pressure.

The transmitter needs absolute pressure to calculate flow. If gage pressure is measured, the transmitter will calculate absolute pressure based on the user-defined atmospheric pressure. Atmospheric pressure can be changed in the screen below. This setting may also be configured per the atmospheric offset configuration (see [Static pressure](#) on page 11) in the Sensor Transducer Block.
8. Select **Next**.

**Flow Configuration Wizard**

Operating conditions:

Pressure range: [ ] to [ ] psia

Temperature range: [ ] to [ ] °F

Additional information:

Flow units: Lbs/hr

Atmospheric pressure: 14.696 psia

Reference conditions:

Pressure: 14.696 psia

Temperature: 60 °F

< Back   Next >   Cancel

9. Review fluid properties of the configuration.
10. Select Finish.

**Flow Configuration Wizard**

Density properties:

Data points: 63 points   Units: Lbs/CuFt

Pressure (psia)	Temperature (°F)	Density (Lbs/CuFt)
10	100	0.0482131000
21.25	100	0.1024779000
32.5	100	0.1567693000
43.75	100	0.2110873000
55	100	0.2654319000
66.25	100	0.3198033000
77.5	100	0.3742014000
88.75	100	0.4286262000
100	100	0.4830779000
10	116.6667	0.0468170300
21.25	116.6667	0.0995061300
32.5	116.6667	0.1522164000

Reference density (Lbs/CuFt): 0.07632801

Viscosity properties:

Units: Centipoise

	Temperature (°F)	Viscosity (Centipoise)
1	100	0.0190603400
2	133.3333	0.0199108800
3	166.6667	0.0207378900
4	200	0.0215429500

Additional fluid characteristics:

Isentropic exponent: 1.400003

Molecular weight: 28.951

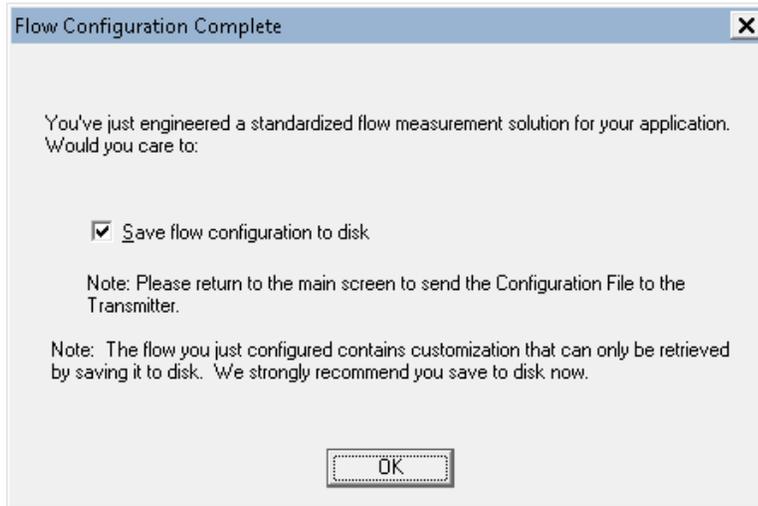
Please match typed-in density (or viscosity) values with the correct pressure/temperature

< Back   Finish   Cancel

11. When prompted, save the flow configuration to the computer. The file must be saved for review or to edit the mass flow configuration in the future.

**Note**

FOUNDATION Fieldbus mass flow configuration files cannot be uploaded from the Rosemount 3051SMV. If the file is not saved, it cannot be retrieved.



## 2.3.5 Sending a flow configuration to the transmitter

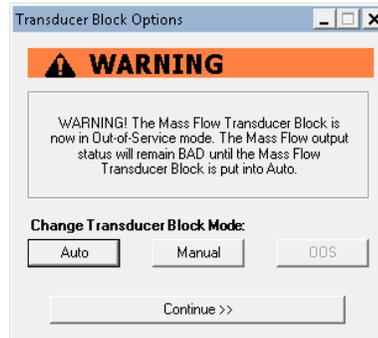
Select **Send** button to download the mass flow configuration file to the transmitter. Sending the mass flow configuration file will overwrite the existing configuration in the transmitter. Engineering Assistant will put the Mass Flow Transducer Block out of service when sending the mass flow configuration.

### Procedure

1. Select **Send** button. A confirmation message will display.



2. At the end of the download, choose which mode to put the Mass Flow Transducer Block into, and then select **Continue**.



## 2.3.6 Mass flow test calculation

The mass flow test calculation method allows the user to verify the flow configuration of the Rosemount 3051SMV by entering expected values for the differential pressure, absolute pressure, and process temperature variables. Test calculation units are always in inH<sub>2</sub>O at 68 °F for differential pressure, psi for static pressure and °F for temperature.

To perform a test calculation, select **Actions > Methods > Methods > Mass Flow Test Calculation** and follow the on-screen prompts.

---

### Note

The device must be in Automatic Mode in order to successfully perform a mass flow test calculation. If the resource block is not in automatic mode, the test calculation method will still run, but the method will report the last live values, rather than the test calculation outputs.

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## 2.4 Variable configuration

### 2.4.1 Units configuration

Units for transmitter variables are configured in the XD Scale parameter in each AI Block. Each AI Block is connected to a transmitter variable according to the Channel parameter in the AI Block. When the units in an AI Block are changed, the units of the connected channel variable will be changed in the Sensor Transducer Block or the Mass Flow Transducer Block accordingly. If multiple AI Blocks are set to the same channel, the XD Scale units must be manually synchronized to resolve configuration errors.

### 2.4.2 Mass flow

The following configuration items are found in the Mass Flow Transducer Block.

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### Note

These configuration items only apply to the Fully Compensated Mass Flow transmitter.

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## Low flow cutoff

If the measured Differential Pressure value is less than the Low Flow Cutoff value, the transmitter will calculate the Flow Rate value as zero.

The unit for this value is always inH<sub>2</sub>O at 68 °F.

## Process temperature mode

The mass flow calculation can use a live process temperature reading or a fixed value based on the selected Process Temperature Mode. To configure it, select **Actions > Methods > Methods > Mass Flow PT Mode Setup** and follow the on-screen prompts.

Mode	Description
Normal	The transmitter will only use the actual measured process temperature value. If the temperature sensor fails, the Flow output will go to Bad status.
Backup	The transmitter will use the actual measured Process Temperature value. If the temperature sensor fails, the transmitter will use the value shown in Fixed PT.
Fixed	The transmitter will always use the temperature value shown in Fixed PT.

### Note

The unit for the Fixed Process Temperature value always matches the Process Temperature primary value unit. To change this unit setting, see [Units configuration](#).

## 2.4.3 Differential pressure

The following configuration items are found in the Sensor Transducer Block.

### Damping

The damping setting changes the response time of the transmitter; higher values can smooth variations in output readings caused by rapid input changes. Determine the appropriate damping setting based on the necessary response time, signal stability, and other requirements.

The setting for Differential Pressure Damping also affects the Mass Flow.

## 2.4.4 Static pressure

The following configuration items are found in the Sensor Transducer Block.

### Damping

The damping setting changes the response time of the transmitter; higher values can smooth variations in output readings caused by rapid input changes. Determine the appropriate damping setting based on the necessary response time, signal stability, and other requirements.

The setting for static pressure damping affects both absolute and gage pressure measurements.

## Atmospheric offset

Both absolute and gage pressure are available as variables. The type of transmitter ordered will determine which variable is measured. The transmitter will calculate either absolute or gage pressure based on the user-defined atmospheric offset.

## 2.4.5 Process temperature

The following configuration items are found in the Sensor Transducer Block.

### Damping

The damping setting changes the response time of the transmitter; higher values can smooth variations in output readings caused by rapid input changes. Determine the appropriate damping setting based on the necessary response time, signal stability, and other requirements.

### Callendar-Van Dusen Coefficients

The Rosemount 3051SMV accepts Callendar-Van Dusen constants from a calibrated RTD schedule and generates a special custom curve to match that specific sensor Resistance vs. Temperature performance. Matching the specific sensor curve with the transmitter configuration enhances the temperature measurement accuracy. Under **Actions > Methods > Methods**, the Callendar-Van Dusen constants R0, A, B, and C can be viewed. If the Callendar-Van Dusen constants are known for the user's specific Pt 100 RTD sensor, the constants R0, A, B, and C may be edited by selecting the Callendar-Van Dusen Setup method and following the on-screen prompts. The user may also view the  $\alpha$ ,  $\beta$ , and  $\delta$  coefficients by selecting the View Alpha, Beta, Delta button. The constants R0,  $\alpha$ ,  $\beta$ , and  $\delta$  may be edited by selecting the Callendar-Van Dusen Setup and following the on-screen prompts. To reset the transmitter to the IEC 751 Defaults, select the Reset to IEC 751 Defaults method.

### User-defined process temperature sensor limits

Process temperature sensor limits can be changed to allow early detection of RTD failures. When the limits are exceeded, the transmitter will display a Process Temperature Out of Limits alert in the transmitter status, set the PT measurement status to uncertain, and will stop using the measured temperature value in the flow calculation. See [Mass flow](#) on page 10 for more information on configuring the process temperature mode for mass flow.

### Enable/disable process temperature

Using the PT Measurement parameter, the Process Temperature measurement can be disabled to prevent undesired diagnostic alarms and local display screens. This feature may be useful if the Process Temperature option was ordered but will not be used or if the RTD in use has failed and a replacement is not readily available.

When the Process Temperature measurement is disabled, the Process Temperature measurement status will be "bad". If using mass flow calculations, set the Mass Flow's Process Temperature Mode to Fixed to allow calculations to continue. Once an RTD is available and wired, set the PT Measurement to Enabled and the Process Temperature Mode to Normal to allow the live reading to be used for mass flow calculations.

## 2.4.6 Variable simulation

The following configuration items are found in the AI Block.

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

### Manual mode

Complete the steps below to change only the OUT\_VALUE and not the OUT\_STATUS of the AI Block.

#### Procedure

1. Set the block mode to Manual.
2. Change the Output Value to the desired value.
3. Restore the original block mode when finished.

### Simulate

#### Procedure

1. If the simulate switch on the electronics board is in the Disabled position, move it to the Enabled position. See [Set the switches](#) for more information.
2. Set the Simulate En/Disable parameter to Active.
3. Enter the desired Simulate Value and Status. Make sure the block mode is Auto to see the value propagate through the block.
4. Set the Simulate En/Disable parameter back to Disabled when finished simulating.

## 2.5 Device configuration

### 2.5.1 Display configuration

The following configuration items are found in the LCD display Transducer Block.

The transmitter features a three-line display. The first line of five characters displays the output description, the second line of seven digits displays the actual value, and the third line of six characters displays engineering units. The LCD display meter can also display diagnostic messages.

Each parameter configured for display will appear on the LCD display for a brief period before the next parameter is displayed. Up to four different variables may be shown on the display.

The LCD display meter is preconfigured to show the measured variables that correspond to the transmitter configuration. It can be configured to display any measured or calculated value that has a status parameter with it (i.e. FOUNDATION Fieldbus DS-65 parameter type). Configure each parameter for display as stated below.

## Display parameter select

The display of each configured parameter can be turned on or off by editing the Display Parameter Select parameter.

## Block type

Enter the Block Type for the block that contains the parameter to be displayed.

## Block tag

Enter the Block Tag of the block that contains the parameter to be displayed.

## Parameter index

Enter the Block Index of the parameter to be displayed.

## Custom tag

Enter up to five characters to be displayed on the top line of the LCD display when this parameter is displayed.

## Units type

Select auto when the parameter to be displayed is pressure, temperature, mass flow, or percent. The units of the parameter will be read and automatically displayed on the LCD display.

Select custom to display up to six characters as configured in the Custom Units parameter.

Select none if the parameter is to be displayed without associated units.

## Custom units

If the Units type is set to custom specify up to six characters here to be displayed with the configured parameter.

## 2.5.2 Write lock

The following configuration items are found in the Resource Block.

The Rosemount 3051SMV Transmitter supports both hardware and software write lock. Locking the transmitter will prevent configuration changes until it is unlocked again.

### Software write lock

To configure software write lock, select **Actions > Methods > Methods > Write Lock Setup** and follow the on-screen prompts for Software Write Lock. The security switch on the electronics board must be in the unlocked position to use software write lock.

To unlock the transmitter, run the Write Lock Setup method again and follow the on-screen prompts.

## Hardware write lock

To configure Hardware Write Lock, select **Actions > Methods > Methods > Write Lock Setup** and follow the on-screen prompts for Hardware Write Lock. This method must be run twice if software write lock is already configured, first to unlock the device, then to switch to hardware write lock.

To lock or unlock the transmitter, set the security switch on the electronics board as shown in [Figure 3-9](#). Note that the hardware security switch is only followed if the transmitter has been configured to use hardware write lock as described above.

The state of the security switch can be read in the Device Switches State parameter.

## 2.6 Device capabilities

### 2.6.1 General block information

Reference information on the process control function blocks can be found in the [Function Block Reference Manual](#).

### 2.6.2 Link active scheduler

The Rosemount 3051SMV can be designated to act as the backup Link Active Scheduler (LAS) in the event that the LAS is disconnected from the segment. As the backup LAS, the Rosemount 3051SMV will take over the management of communications until the host is restored. The host system may provide a configuration tool specifically designed to designate a particular device as a backup LAS.

### 2.6.3 Capabilities

There are a total of 20 Virtual Communication Relationships (VCRs). Two are permanent and 18 are fully configurable by the host system. Twenty-five link objects are available.

**Table 2-1: Network Parameters**

Network parameter	Value
Slot Time	6
Maximum Response Delay	4
Maximum Inactivity to Claim LAS Delay	5
Minimum Inter DLPDU Delay	7
Time Sync class	4 (1ms)
Maximum Scheduling Overhead	10
Per CLPDU PhL Overhead	4
Maximum Inter-channel Signal Skew	0
Required Number of Post-transmission-gap-ext Units	0
Required Number of Preamble-extension Units	1

## Host timer recommendations

T1 = 96000 T2 = 9600000 T3 = 480000

**Table 2-2: Block Execution Times**

Block	Time (in ms)
Analog Input	20
PID	25
Arithmetic	20
Input Selection	20
Signal Characterizer	20
Integrator	20
Output Splitter	20
Control Selector	20

### 2.6.4 Node address

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

### 2.6.5 Block instantiation

The Rosemount 3051SMV supports the use of function block instantiation. When a device supports block instantiation, the number of blocks and block types can be defined to match specific application needs. The number of blocks that can be instantiated is only limited by the amount of memory within the device and the block types that are supported by the device. Instantiation does not apply to standard device blocks like the Resource or Transducer Blocks. Block instantiation is done by the host control system or configuration tool, but not all hosts are required to implement this functionality. Refer to the specific host or configuration tool manual for more information.



## 3 Installation

### 3.1 Section overview

The information in this section covers installation considerations for the Rosemount™ 3051S MultiVariable™ FOUNDATION™ Fieldbus Transmitter (3051SMV). A Quick Start Guide is shipped with every transmitter to describe basic installation, wiring, and startup procedures. Dimensional drawings for each transmitter variation and mounting configuration are included in Rosemount 3051SMV [Product Data Sheet](#).

### 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 could result in death or serious injury.

- Do not remove the transmitter cover in explosive atmospheres 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 segment 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 could cause 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.

Use only bolts supplied or sold by Emerson as spare parts.

- 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.

Improper assembly of manifolds to traditional flange can damage sensor module.

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

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

- When upgrading, verify sensor module 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 sensor module is a T4 rated transmitter.)

## **3.3 Considerations**

### **3.3.1 General**

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

---

**Important**

Install the enclosed pipe conduit plug (found in the box) in the unused conduit plug opening. For straight threads, a minimum of seven threads must be engaged. For tapered threads, a minimum of five threads must be engaged; install the plug wrench-tight. For material compatibility considerations, see the [Material Selection Technical Note](#).

---

## 3.3.2 Mechanical

### 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.

### 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 [Mount the transmitter](#), keeping drain/vent connections on the bottom for gas service and on the top for liquid service.

## 3.3.3 Environmental

Best practice is to mount the transmitter in an environment that has minimal ambient temperature change. The transmitter electronics temperature operating limits are -40 to 185 °F (-40 to 85 °C). Rosemount 3051S [Product Data Sheet](#) lists the sensing element operating limits. Mount the transmitter so it is not susceptible to vibration and mechanical shock and does not have external contact with corrosive materials.

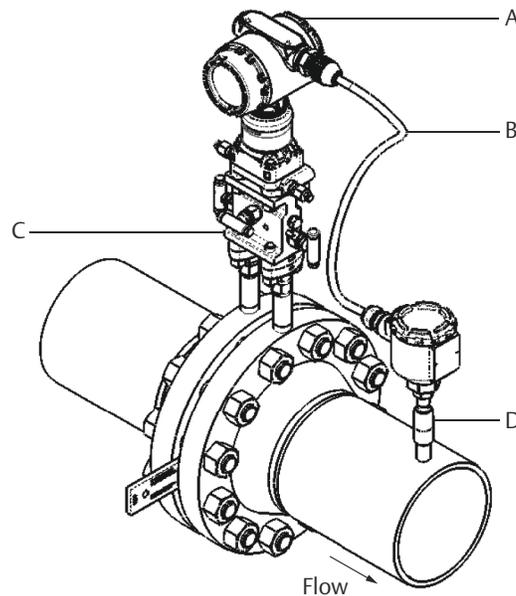
## 3.4 Steps required for quick installation

- **Start >**
- [Mount the transmitter](#)
- [Commissioning \(paper\) tag](#)
- [Set the switches](#)
- [Wire, ground, and power](#)
- **> Finish**

### 3.4.1 Mount the transmitter

[Figure 3-1](#) illustrates a typical Rosemount 3051SMV installation site measuring dry gas with an orifice plate.

**Figure 3-1: Typical Rosemount 3051SMV Installation Site**



- A. Rosemount 3051SMV
- B. RTD cable
- C. Pt 100 RTD sensor
- D. Process connections

## Mounting brackets

The Rosemount 3051SMV can be mounted to a 2-in. (50.88 mm) pipe or to a panel using an optional mounting bracket. The B4 Bracket (SST [Stainless steel]) option is for use with the Coplanar flange process connection. [Table 3-1](#) shows bracket dimensions and mounting configurations for the B4 option. Other bracket options are listed in [Table 3-1](#). When installing the transmitter to one of the optional mounting brackets, torque the bolts to 125 in-lb (0.9 N-m).

**Table 3-1: Mounting Brackets**

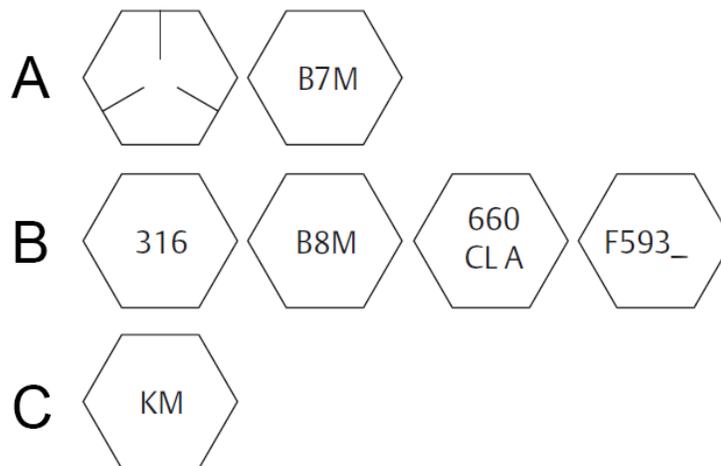
Options	Description	Mounting type	Bracket material	Bolt material
B4	Coplanar flange bracket	2-in. pipe/panel	SST	SST
B1	Traditional flange bracket	2-in. pipe	Painted CS (Carbon steel)	CS

**Table 3-1: Mounting Brackets (continued)**

Options	Description	Mounting type	Bracket material	Bolt material
B2	Traditional flange bracket	Panel	Painted CS	CS
B3	Traditional flange flat bracket	2-in. pipe	Painted CS	CS
B7	Traditional flange bracket	2-in. pipe	Painted CS	SST
B8	Traditional flange bracket	Panel	Painted CS	SST
B9	Traditional flange flat bracket	2-in. pipe	Painted CS	SST
BA	Traditional flange bracket	2-in. pipe	SST	SST
BC	Traditional flange flat bracket	2-in. pipe	SST	SST

## Flange bolts

The Rosemount 3051SMV can be shipped with a Coplanar flange or a traditional flange installed with four 1.75-in. (44.4 mm) flange bolts. Mounting bolts and bolting configurations for the Coplanar and traditional flanges can be found in [Cover installation](#). SST bolts supplied by Emerson are coated with a lubricant to ease installation. CS 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:



- A. Carbon Steel (CS) Head Markings
- B. Stainless Steel (SST) Head Markings
- C. Alloy K-500 Head Marking

### Note

The last digit in the F593\_ head marking may be any letter between A and M.

## Bolt installation

Only use bolts supplied with the 2051 or provided by Emerson as spare parts. When installing the transmitter to one of the optional mounting brackets, torque the bolts to 125 in-lb. (0,9 N-m). Use the following bolt installation procedure:

### 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.

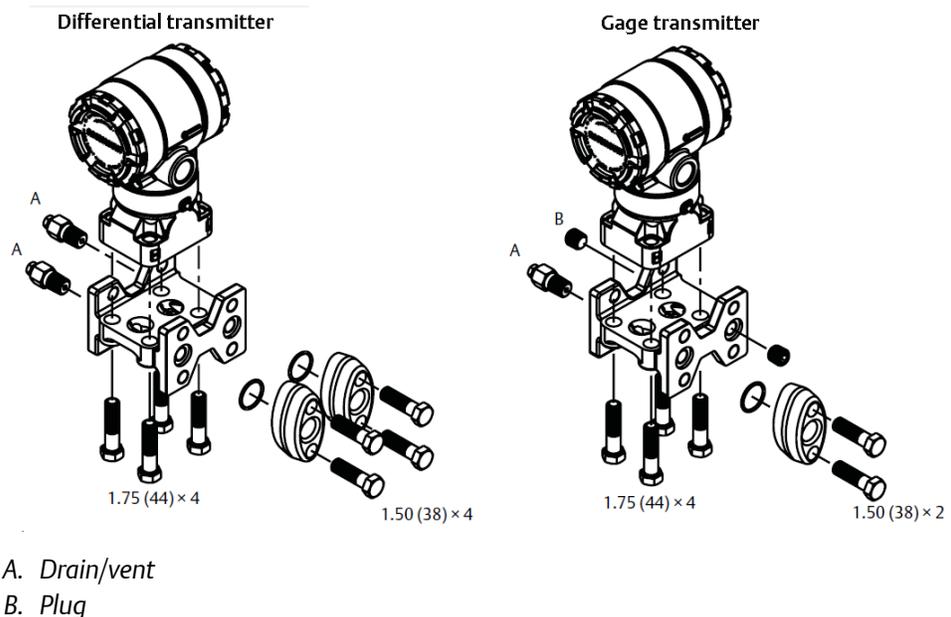
### Example

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

**Table 3-2: Bolt Installation Torque Values**

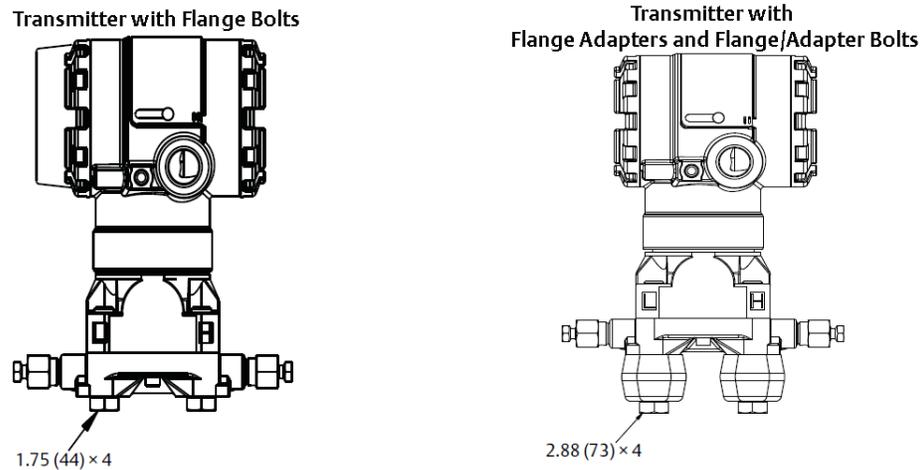
Bolt material	Initial torque value	Final torque value
CS-ASTM-A449 Standard	300 in-lb (34 N-m)	650 in-lb (73 N-m)
316 SST—Option L4	150 in-lb (17 N-m)	300 in-lb (34 N-m)
ASTM-A-193-B7M—Option L5	300 in-lb (34 N-m)	650 in-lb (73 N-m)
ASTM-A-193 Class 2, Grade B8M—Option L8	150 in-lb (17 N-m)	300 in-lb (34 N-m)

**Figure 3-2: Traditional Flange Bolt Configurations**



Dimensions are in inches (millimeters).

**Figure 3-3: Mounting Bolts and Bolt Configurations for Coplanar Flange**



Dimensions are in inches (millimeters).

**Table 3-3:**

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

**Note**

Rosemount 2051T transmitters are direct mount and do not require bolts for process connection.

**Mounting requirements**

Impulse piping configurations depend on specific measurement conditions. Refer to [Figure 3-4](#) for examples of the following mounting configurations:

**Liquid flow measurement**

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

**Gas flow measurement**

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

**Steam flow measurement**

- Place taps to the side of the line.

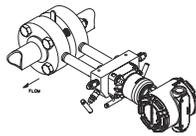
- Mount the transmitter below the taps to ensure that impulse piping will remain filled with condensate.
- In steam service above 250 °F (121 °C), fill impulse lines with water to prevent steam from contacting the transmitter directly and to ensure accurate measurement start-up.

**Note**

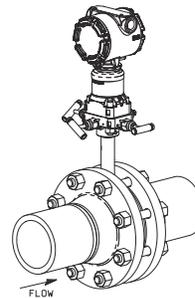
For steam or other elevated temperature services, it is important that temperatures at the transmitter process connection do not exceed the transmitter's operating limits.

**Figure 3-4: Installation Examples**

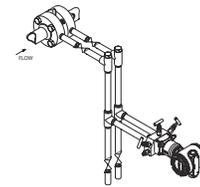
Liquid service



Gas service



Steam service



### 3.4.2

## O-rings

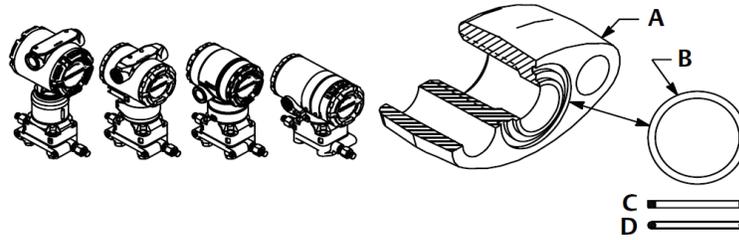
The two styles of Rosemount flange adapters (Rosemount 1151 and Rosemount 3051/2051/2024/3095) each require a unique O-ring (see [Figure 3-5](#)). Use only the O-ring designed for the corresponding flange adapter.

**⚠ WARNING**

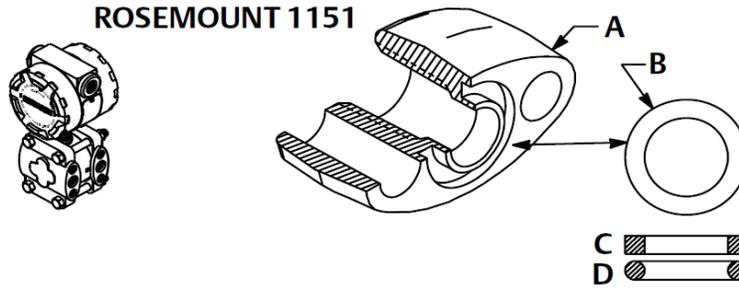
Failure to install proper flange adapter O-rings may cause process leaks, which can result in death or serious injury. The two flange adapters are distinguished by unique O-ring grooves. Only use the O-ring that is designed for its specific flange adapter, as shown below. When compressed, PTFE O-rings tend to *cold flow*, which aids in their sealing capabilities.

**Figure 3-5: O-rings**

ROSEMOUNT 3051S/3051/2051/3001/3095/2024



ROSEMOUNT 1151



- A. Flange adapter
- B. O-ring
- C. PFTF based
- D. Elastomer

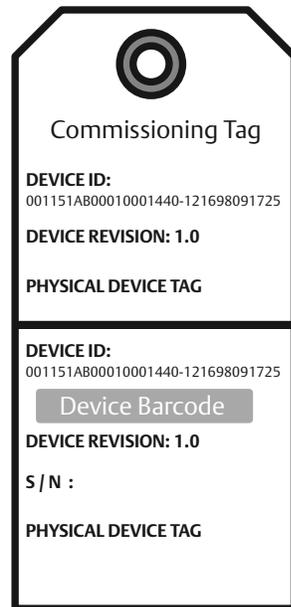
**Note**

You should replace PTFE O-rings if you remove the flange adapter.

### 3.4.3 Commissioning (paper) tag

To identify which device is at a particular location, use the removable tag provided with the transmitter. Ensure the physical device tag (PD tag field) is properly entered in both places on the removable commissioning tag and tear off the bottom portion for each transmitter.

**Figure 3-6: Commissioning Tag**



### 3.4.4 Rotate housing

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

#### Procedure

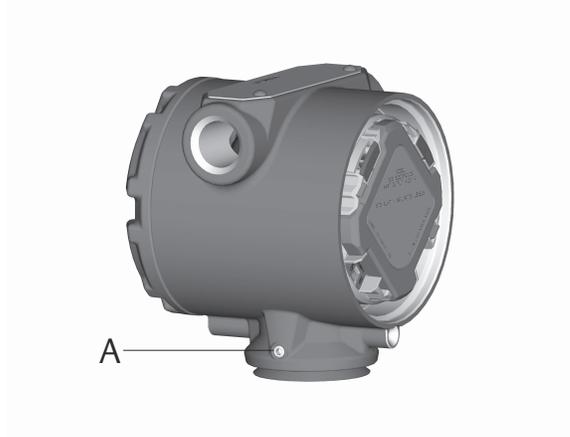
1. Loosen the housing rotation set screw.
2. Rotate the housing clockwise to the desired location. If the desired location cannot be achieved due to thread limit, rotate the housing counterclockwise to the desired location (up to 360° from thread limit).

#### **⚠ CAUTION**

Do not rotate the housing more than 180° without first performing a disassembly procedure. Over-rotation may sever the electrical connection between the sensor module and the feature board electronics.

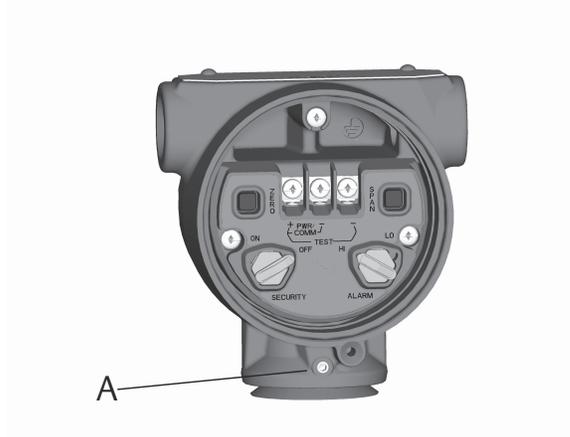
3. Retighten the housing rotation set screw up to 30 in-lb.
4. For wireless, consider access to the power module when selecting housing rotation.

**Figure 3-7: Transmitter Housing Set Screw (Plantweb)**



*A. Housing rotation set screw (3/32-in.)*

**Figure 3-8: Transmitter Housing Set Screw (Junction Box)**



*A. Housing rotation set screw (3/32-in.)*

### 3.4.5 LCD display rotation

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

**Note**

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

## 3.4.6 Set the switches

Set Simulate and Security switch position before installation (location of switches shown in [Figure 3-9](#)), as desired.

- The Simulate switch enables or disables the ability to set simulated alerts or simulated measured value and status.
- The Security switch allows (unlocked symbol) or prevents (locked symbol) any configuration of the transmitter.

Further security settings are available in the software, including settings which use a software lock. Additionally, these settings can be used to disable both hardware and software locks.

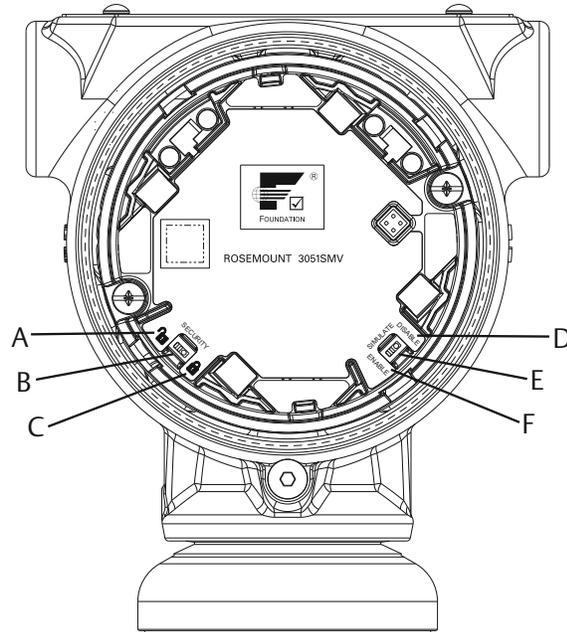
Use the following procedure to change the switch configuration:

### Procedure

1. If the transmitter is installed, secure the segment, and remove power.
2. Remove the housing cover opposite the field terminal side. Do not remove the instrument cover in explosive atmospheres when the circuit is live.
3. Slide the security and simulate switches into the preferred position.
4. Reinstall the housing cover and tighten so the cover is fully seated with metal to metal contact between the housing and cover in order to meet explosion proof requirements.
5. If the transmitter was installed, reapply power.

### Example

**Figure 3-9: Simulate and Security Switches**



- A. Security unlocked position
- B. Security switch
- C. Security locked position
- D. Simulate disabled position
- E. Simulate switch
- F. Simulate enabled position

## 3.4.7 Wire, ground, and power

Use a copper wire of sufficient size to ensure the voltage across the transmitter power terminals does not drop below 9 Vdc. Power supply voltage can be variable, especially under abnormal conditions such as when operating on battery backup. A minimum of 12 Vdc under normal operating conditions is recommended. Shielded twisted pair Type A cable is recommended.

### Note

The power terminals are polarity insensitive, which means the electrical polarity of the power leads does not matter when connecting to the power terminals. If polarity sensitive devices are connected to the segment, terminal polarity should be followed.

## 3.4.8 Signal wiring and shield 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 outside of the electronics housing and inside the terminal compartment. These grounds are used when transient protection terminal blocks are installed or to fulfill local regulations.

### Procedure

1. Remove the field terminals housing cover.
2. To power the transmitter, connect the power leads to the terminals indicated on the terminal block label.
3. Tighten the terminal screws to ensure adequate contact.
4. Trim the cable shield as short as practical and insulate from touching the transmitter housing as indicated in [Figure 1](#) and [Figure 2](#).

---

#### Note

Do NOT ground the cable shield at the transmitter; if the cable shield touches the transmitter housing, it can create ground loops and interfere with communications. To protect the fieldbus segment from noise, grounding techniques for shield wire require a single grounding point for shield wire to avoid creating a ground loop.

- a) Ensure the cable shield maintains a continuous connection to the power supply ground.
- b) Connect the cable shields for the entire segment to a single good earth ground at the power supply.

---

#### Note

Improper grounding is the most frequent cause of poor segment communications.

5. Reinstall the housing cover and tighten so the cover is fully seated with metal to metal contact between the housing and cover in order to meet explosion proof requirements.
6. Plug and seal unused conduit connections.

### NOTICE

When the enclosed threaded plug is utilized in the conduit opening, it must be installed with a minimum thread engagement in order to comply with explosion-proof requirements. For straight threads, a minimum of seven threads must be engaged. For tapered threads, a minimum of five threads must be engaged.

---

### 3.4.9 Power supply

The transmitter requires between 9 and 32 Vdc (9 and 30 Vdc for intrinsic safety, and 9 and 17.5 Vdc for FISCO intrinsic safety) to operate and provide complete functionality.

### 3.4.10 Power conditioner

A Fieldbus segment requires a power conditioner to isolate the power supply, filter, and decouple the segment from other segments attached to the same power supply.

### 3.4.11 Grounding

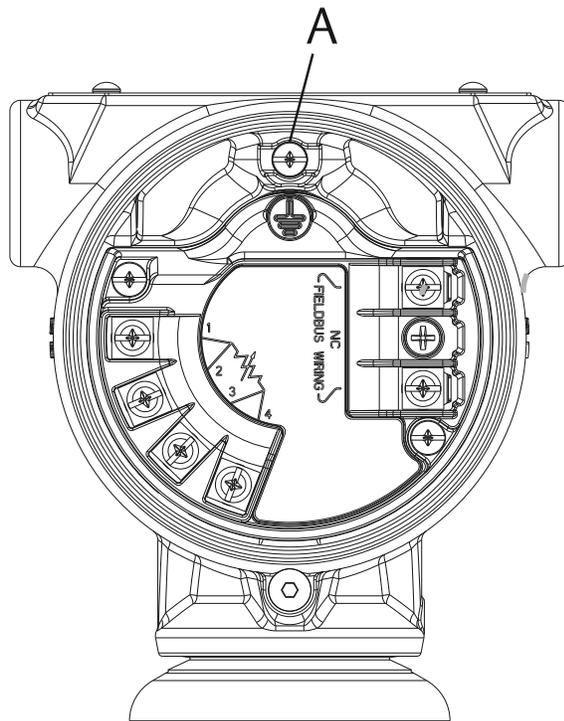
Signal wiring of the fieldbus segment can not be grounded. Grounding one of the signal wires will shut down the entire fieldbus segment.

#### **Transmitter case grounding**

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 are listed below.

##### **Internal ground connection**

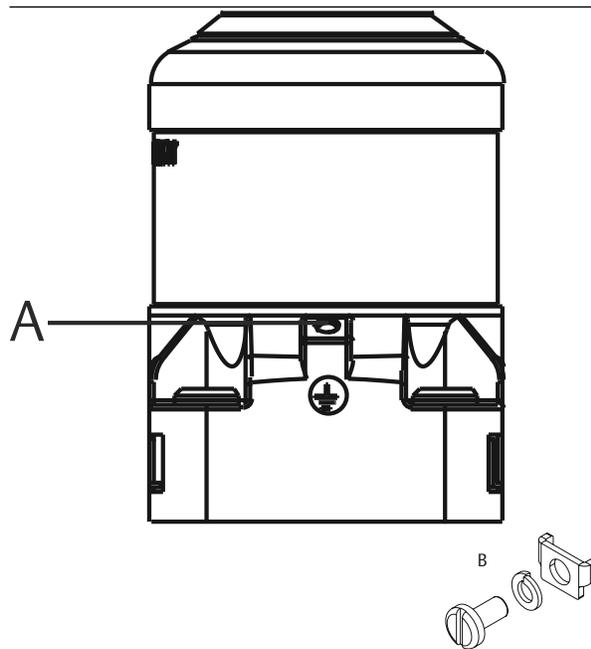
The internal ground connection screw is inside the FIELD TERMINALS side of the electronics housing. This screw is identified by a ground symbol (⊕). The ground connection screw is standard on all Rosemount 3051SMV Transmitters.



A. Ground lug

### External ground connection

The external ground connection is located on the exterior of the transmitter housing. This connection is only available with option D4 and T1.



- A. External ground lug
- B. External ground assembly (03151-9060-0001)

---

**Note**

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

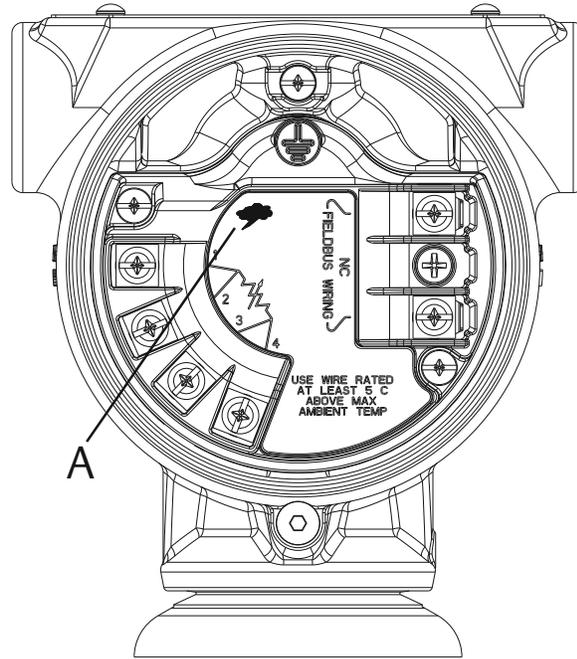
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### Transient protection terminal block grounding

The transmitter can 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.

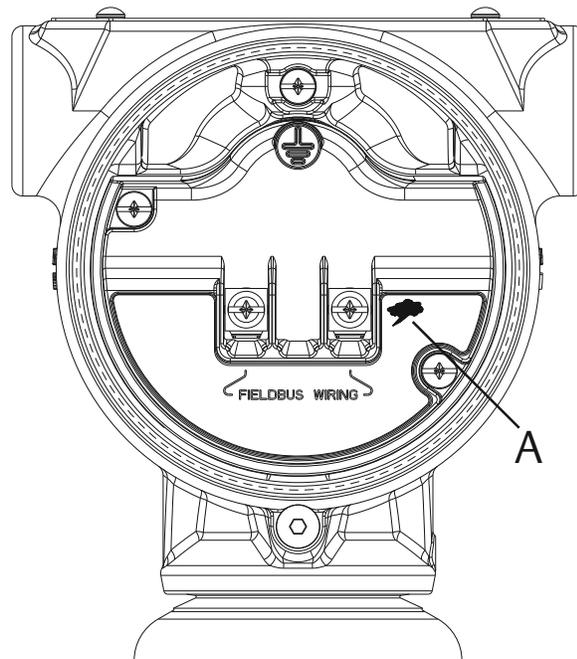
The transient protection terminal block can be ordered as an installed option (option code T1) or as a spare part to retrofit existing Rosemount 3051SMV Transmitters in the field. The lightning bolt symbol shown in [Figure 3-10](#) identifies the transient protection terminal block.

**Figure 3-10: Transient Protection Terminal Block with RTD**



*A. Lightning bolt symbol location*

**Figure 3-11: Transient Protection Terminal Block without RTD**



*A. Lightning bolt symbol location*

---

**Note**

The transient protection terminal block does not provide transient protection unless the transmitter case is properly grounded. Use the guidelines to ground the transmitter case (see [Grounding](#)).

---

### 3.4.12 Signal termination

A terminator should be installed at the beginning and end of every fieldbus segment.

### 3.4.13 Install optional process temperature input (Pt 100 RTD Sensor)

---

**Note**

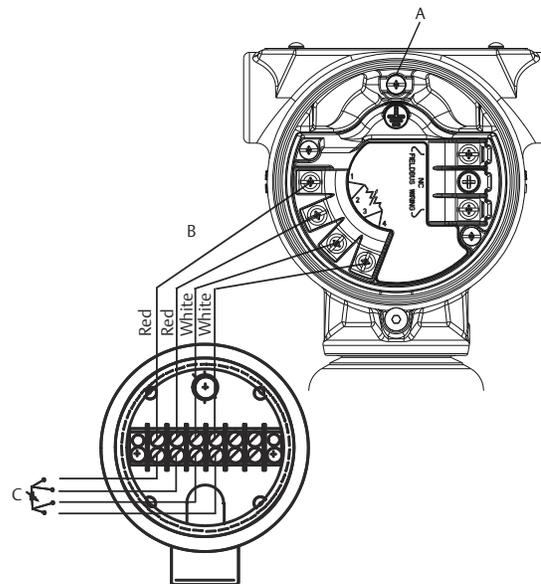
To meet ATEX/IECEX Flameproof certification, only ATEX/IECEX Flameproof cables (temperature input code C30, C32, C33, or C34) may be used.

---

**Procedure**

1. Mount the Pt 100 RTD Sensor in the appropriate location.  
Use shielded four-wire cable for the process temperature connection.
2. Connect the RTD cable to the Rosemount 3051S MultiVariable Transmitter by inserting the cable wires through the unused housing conduit and connect to the four screws on the transmitter terminal block. An appropriate cable gland should be used to seal the conduit opening around the cable.
3. Connect the RTD cable shield wire to the ground lug in the housing.

**Figure 3-12: Transmitter RTD Wiring Connection**



- A. Ground lug
- B. RTD cable assembly wires
- C. Pt 100 RTD sensor

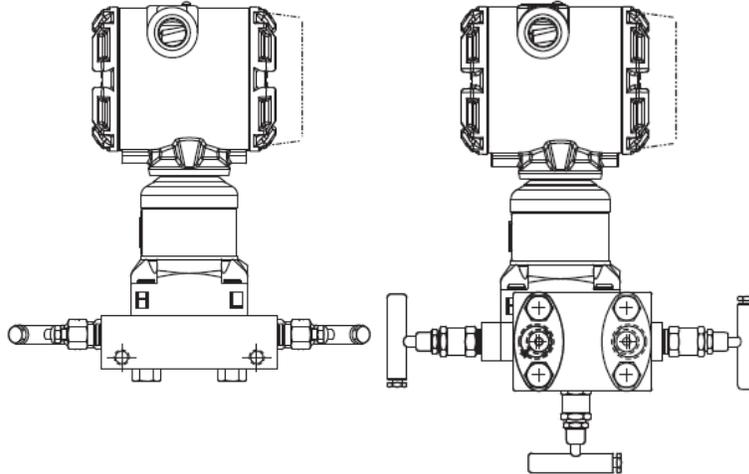
### Three-wire RTD

A four-wire Pt 100 RTD is required to maintain published performance specifications. A three-wire Pt 100 RTD may be used with degraded performance. If connecting to a three-wire RTD, use a four-wire cable to connect the Rosemount 3051SMV terminal block to the RTD connection head. Within the RTD connection head, connect two of the same colored wires from the Rosemount 3051SMV to the single colored wire of the RTD sensor.

## 3.5 Rosemount 305 and 304 Manifolds

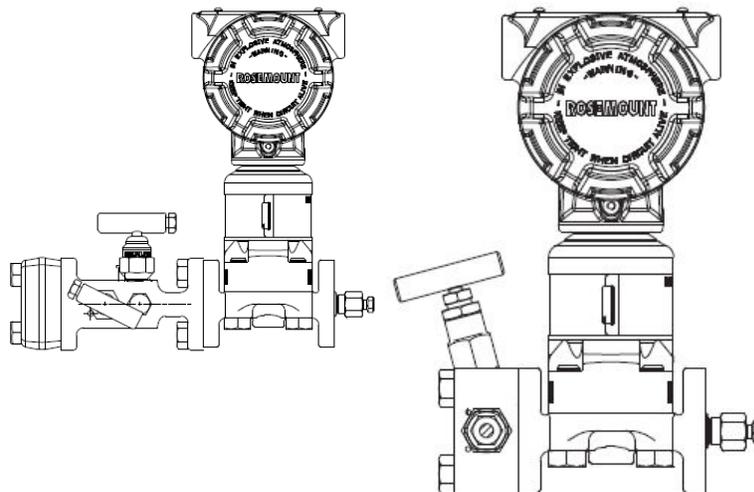
The Rosemount 305 Integral Manifold is available in two designs: Coplanar and traditional. The traditional Rosemount 305 can be mounted to most primary elements with mounting adapters.

Rosemount 305 Integral Coplanar      Rosemount 305 Integral Traditional



The Rosemount 304 comes in two basic styles: traditional (flange X flange and flange X 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.

Rosemount 304 Traditional      Rosemount 304 Wafer



## 3.5.1 Install Rosemount 305 Integral Manifold

### Procedure

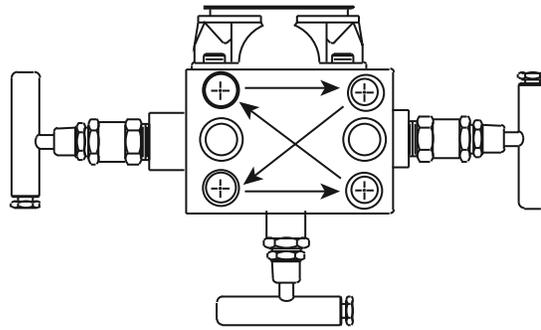
1. Inspect the PTFE sensor module O-rings.  
You may reuse undamaged O-rings. If the O-rings are damaged (if they have nicks or cuts, for example), replace with O-rings designed for Rosemount transmitters.

#### Important

If replacing the O-rings, take care not to scratch or deface the O-ring grooves or the surface of the isolating diaphragm while you remove the damaged O-rings.

2. Install the Integral Manifold on the sensor module. Use the four 2.25-in. (57.2 mm) manifold bolts for alignment. Finger tighten the bolts; then tighten the bolts incrementally in a cross pattern as seen in [Figure 3-13](#) to final torque value.  
See [Flange bolts](#) for complete bolt installation information and torque values. When fully tightened, the bolts should extend through the top of the sensor module housing.

**Figure 3-13: Bolt Tightening Pattern**



3. If you have replaced the PTFE sensor module O-rings, re-tighten the flange bolts after installation to compensate for cold flow of the O-rings.

## 3.5.2 Install Rosemount 304 Conventional Manifold

See [Safety messages](#) for complete warning information.

### Procedure

1. Align the Conventional Manifold with the transmitter flange. Use the four manifold bolts for alignment.
2. Finger tighten the bolts; then tighten the bolts incrementally in a cross pattern to final torque value.  
See [Flange bolts](#) for complete bolt installation information and torque values. When fully tightened, the bolts should extend through the top of the sensor module housing.
3. Leak-check assembly to maximum pressure range of transmitter.

### 3.5.3 Manifold operation

#### **⚠ WARNING**

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

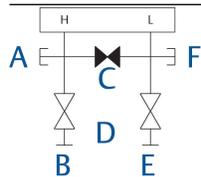
Always perform a zero trim on the transmitter/manifold assembly after installation to eliminate any shift due to mounting effects. See [Sensor trim overview](#).

#### Coplanar transmitters

##### Operate three and five-valve manifolds

Performing zero trim at static line pressure

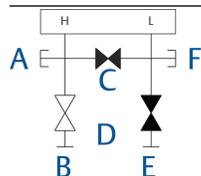
In normal operation, the two isolate (block) valves between the process ports and the transmitter will be open, and the equalize valve will be closed.



- A. Drain/vent valve
- B. Isolate (open)
- C. Equalize (closed)
- D. Process
- E. Isolate (open)
- F. Drain/vent valve

#### Procedure

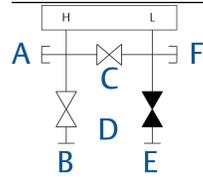
1. To zero trim the transmitter, close the isolate valve on the low side (downstream) side of the transmitter.



- A. Drain/vent valve
- B. Isolate (open)
- C. Equalize (closed)
- D. Process
- E. Isolate (closed)
- F. Drain/vent valve

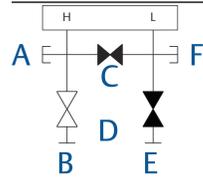
2. Open the equalize valve to equalize the pressure on both sides of the transmitter.

The manifold is now in the proper configuration for performing a zero trim on the transmitter.



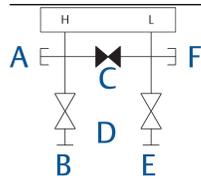
- A. Drain/vent valve
- B. Isolate (open)
- C. Equalize (open)
- D. Process
- E. Isolate (closed)
- F. Drain/vent valve

3. After zeroing the transmitter, close the equalize valve.



- A. Drain/vent valve
- B. Isolate (open)
- C. Equalize (closed)
- D. Process
- E. Isolate (closed)
- F. Drain/vent valve

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



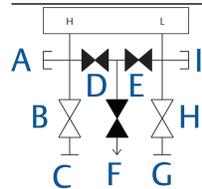
- A. Drain/vent valve
- B. Isolate (open)
- C. Equalize (closed)
- D. Process
- E. Isolate (open)
- F. Drain/vent valve

## Operate five-valve natural gas manifold

Performing zero trim at static line pressure

Five-valve natural gas configurations shown:

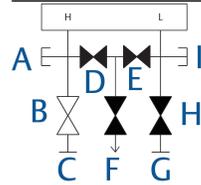
In normal operation, the two isolate (block) valves between the process ports and the transmitter will be open, and the equalize valves will be closed. Vent valves may be open or closed.



- A. (Plugged)
- B. Isolate (open)
- C. Process
- D. Equalize (closed)
- E. Equalize (closed)
- F. Drain vent (closed)
- G. Process
- H. Isolate (open)
- I. (Plugged)

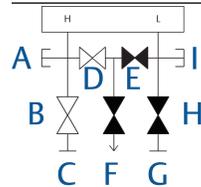
### Procedure

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



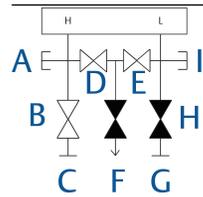
- A. (Plugged)
- B. Isolate (open)
- C. Process
- D. Equalize (closed)
- E. Equalize (closed)
- F. Drain vent (closed)
- G. Process
- H. Isolate (closed)
- I. (Plugged)

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



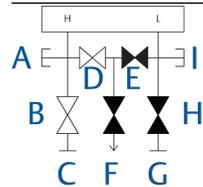
- A. (Plugged)
- B. Isolate (open)
- C. Process
- D. Equalize (open)
- E. Equalize (closed)
- F. Drain vent (closed)
- G. Process
- H. Isolate (closed)
- I. (Plugged)

- 
3. Open the equalize valve on the low pressure (downstream) side of the transmitter.  
The manifold is now in the proper configuration for zeroing the transmitter.



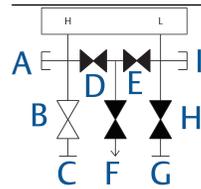
- A. (Plugged)
- B. Isolate (open)
- C. Process
- D. Equalize (open)
- E. Equalize (open)
- F. Drain vent (closed)
- G. Process
- H. Isolate (closed)
- I. (Plugged)

4. After zeroing the transmitter, close the equalize valve on the low pressure (downstream) side of the transmitter.



- A. (Plugged)
- B. Isolate (open)
- C. Process
- D. Equalize (open)
- E. Equalize (closed)
- F. Drain vent (closed)
- G. Process
- H. Isolate (closed)
- I. (Plugged)

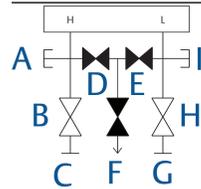
5. Close the equalize valve on the high pressure (upstream) side.



- A. (Plugged)
- B. Isolate (open)
- C. Process
- D. Equalize (closed)
- E. Equalize (closed)
- F. Drain vent (closed)
- G. Process
- H. Isolate (closed)
- I. (Plugged)

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.

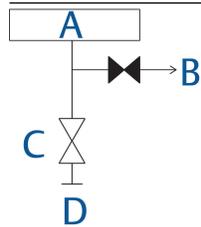


- A. (Plugged)
- B. Isolate (open)
- C. Process
- D. Equalize (closed)
- E. Equalize (closed)
- F. Drain vent (closed)
- G. Process
- H. Isolate (open)
- I. (Plugged)

## 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.

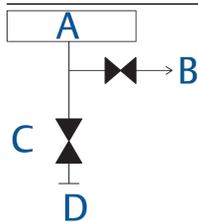


- A. Transmitter
- B. Vent (closed)
- C. Isolate
- D. Process (open)

---

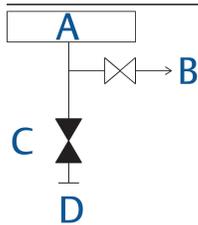
### Procedure

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



- A. Transmitter
- B. Vent (closed)
- C. Isolate
- D. Process (closed)

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



- A. Transmitter
- B. Vent (open)
- C. Isolate
- D. Process (closed)

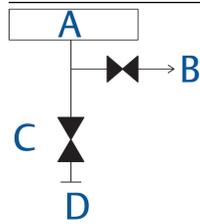
---

### Note

A 1/4-in (6.35 mm). male NPT pipe plug may be installed in the test/vent port; you will need to remove it with a wrench in order to vent the manifold properly. Always use caution when venting directly to atmosphere.

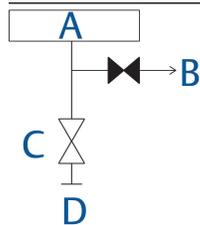
---

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



- A. Transmitter
  - B. Vent (closed)
  - C. Isolate
  - D. Process (closed)
- 

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



- A. Transmitter
  - B. Vent (closed)
  - C. Isolate
  - D. Process (open)
- 

## Adjust 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:

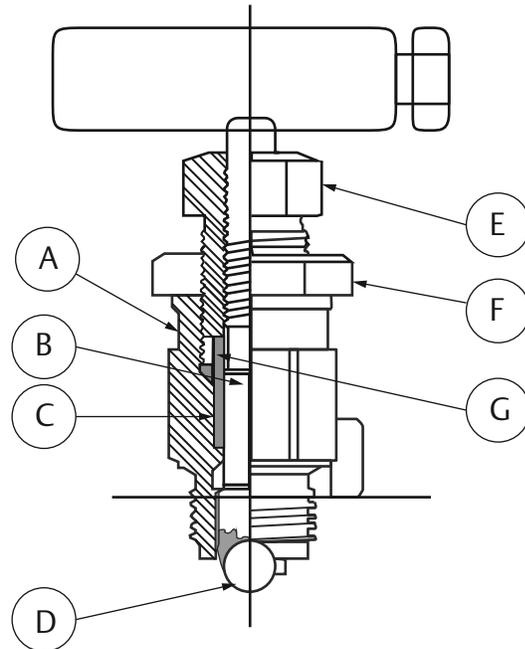
### Procedure

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

### Postrequisites

Repeat the above steps if necessary. If the above procedure does not result in proper pressure retention, replace the complete manifold.

**Figure 3-14: Valve Components**



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



# 4 Operation and Maintenance

## 4.1 Section overview

This section contains information on operating and maintaining the Rosemount™ 3051S MultiVariable™ FOUNDATION™ Fieldbus Transmitter (3051SMV). Each Foundation Fieldbus host or configuration tool has different ways of displaying and performing operations. Some hosts will use Device Descriptions (DD) and DD Methods to complete device configuration and will display data consistently across platforms. The DD can be found on the FieldComm Group website at [FieldCommGroup.org](http://FieldCommGroup.org). There is no requirement that a host or configuration tool support the features in the DD. For DeltaV™ users, the DD can be found at [Emerson.com/DeltaV](http://Emerson.com/DeltaV). The information in this section will describe how to use the basic methods.

Based on the configuration ordered, some measurements (e.g. process temperature) and/or calculation types (e.g. fully compensated mass flow, process variables only) may not be available. Available measurements and/or calculation types are determined by the multivariable type and measurement type codes ordered. See Rosemount 3051S [Product Data Sheet](#) for more information.

## 4.2 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**

**Failure to follow these installation guidelines could result in death or serious injury.** Ensure only qualified personnel perform the installation.

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

- Do not remove the transmitter cover in explosive atmospheres when the circuit is live.
- Before connecting a communicator in an explosive atmosphere, make sure the instruments in the segment are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- Both housing covers must be fully engaged to meet flameproof/explosion-proof requirements.
- Verify that the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.

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

- If the sensor is installed in a high-voltage environment and a fault or installation error occurs, high voltage may be present on transmitter leads and terminals.
- Use extreme caution when making contact with the leads and terminals.

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

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

**Replacement equipment or spare parts not approved by 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 the device.**

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

**Static electricity can damage sensitive components.**

- Observe safe handling precautions for static-sensitive components.

## **4.3 Calibration**

### **4.3.1 Calibration overview**

Before calibrating the sensor complete configuration of the device in [Configuration](#). Calibration of the Rosemount 3051SMV involves the following tasks.

- Sensor trim
- Zero or lower sensor trim

## 4.3.2 Sensor trim overview

Trim the sensors using either upper or lower sensor or zero trim functions. Trim functions vary in complexity and are application-dependent.

---

### Note

When performing a sensor trim on a pressure sensor, it is possible to degrade the performance of the sensor if inaccurate calibration equipment is used. Use calibration equipment that is at least three times as accurate as the pressure sensor of the Rosemount 3051SMV Transmitter.

---

## 4.3.3 Determining necessary sensor trims

Bench calibration is not recommended for new instruments. The transmitter can be set back to factory settings using the Restore Factory Calibration.

For transmitters that are field installed, the manifolds discussed in [Manifold operation](#) allow the differential transmitter to be zeroed using the zero trim function. Both 3-valve and 5-valve manifolds are discussed. This field calibration will eliminate any pressure offsets caused by mounting effects and static pressure effects of the process. Determine the necessary trims with the following steps.

### Procedure

1. Complete a zero trim.
2. Apply pressure.
3. Check the pressure, if the pressure does not match the applied pressure, perform a sensor trim (see [Full trim](#)).

## 4.3.4 Types of pressure trim

### Zero trim

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. When performing a zero trim with a manifold, refer to [Rosemount 305 and 304 Manifolds](#).

---

### Note

To perform a zero trim function, the measured value of transmitter can be no larger than five percent of the upper sensor limit from zero. The transmitter will not allow the user to perform a zero trim on an absolute static pressure sensor. To correct mounting position effects on the absolute static pressure sensor, perform a sensor trim. The lower sensor trim function provides an offset correction similar to the zero trim function, but it does not require zero-based input.

---

### Full trim

Full sensor trim is a two-point sensor calibration where two end-point pressures are applied, and all output is linearized between them. Always adjust the lower sensor trim value first to establish the correct offset. Adjustment of the upper sensor trim value

provides a slope correction to the characterization curve based on the lower sensor trim value. The trim values allow the user to optimize performance over a specified measuring range at the calibration temperature.

### 4.3.5 Restore factory calibration

The factory calibration recall feature will restore the transmitter to the original factory calibration. This feature can be useful for recovering from an inadvertent zero trim or inaccurate pressure source. When this feature is used, the transmitter's upper and lower trim values are set to the values configured at the factory. If custom trim values were specified when the transmitter was ordered, the device will recall those values. If custom trim values were not specified, the device will recall the default upper and lower sensor limits.

### 4.3.6 Differential pressure sensor calibration

Navigate to the differential pressure calibration to complete a zero trim procedure or a full DP sensor trim. Differential pressure sensor calibration units can be set in the Sensor Transducer Block.

#### Zero trim

To perform a DP sensor zero trim, select **Actions > Methods > Methods > Zero Differential Pressure Trim** and follow the on-screen prompts. To perform a zero trim function, the measured value of transmitter can be no larger than five percent of the upper sensor limit from zero.

---

#### Note

When performing a DP sensor zero trim, ensure that the equalizing valve is open and all wet legs are filled to the correct levels.

---

#### Upper and lower sensor trim

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#### Note

When performing a sensor trim on a pressure sensor, it is possible to degrade the performance of the sensor if inaccurate calibration equipment is used. Use calibration equipment that is at least three times as accurate as the pressure sensor of the Rosemount 3051SMV Transmitter.

---

A reference pressure device is required to perform a full sensor trim. Allow the pressure input to stabilize for ten seconds before entering any values. To perform a DP full trim, select **Actions > Methods > Methods > Lower Differential Pressure Trim**, follow the on-screen prompts, and then select **Actions > Methods > Methods > Upper Differential Pressure Trim** and follow the on-screen prompts.

---

#### Note

The transmitter allows approximately five percent URL deviation from the characterized curve established at the factory.

---

## 4.3.7 Static pressure sensor calibration

The static pressure calibration allows the user to complete either a zero trim procedure or a full SP sensor trim. Static pressure sensor calibration units can be set in the Sensor Transducer Block.

### Zero trim and lower sensor trim

A zero trim can be performed on a gage sensor and a lower sensor trim can be performed on an absolute sensor to correct for mounting position effects. To perform a zero trim on a gage static pressure sensor, select **Actions > Methods > Methods > Zero Static Pressure Trim** and follow the on-screen prompts.

To correct for mounting position effects on transmitters equipped with an absolute static pressure sensor, perform a lower sensor trim. This is accomplished by selecting **Actions > Methods > Methods > Lower Static Pressure Trim** and follow the on-screen prompts. The lower sensor trim function provides an offset correction similar to the zero trim function, but it does not require a zero-based input.

### Upper and lower sensor trim

---

#### Note

When performing a sensor trim on a pressure sensor, it is possible to degrade the performance of the sensor if inaccurate calibration equipment is used. Use calibration equipment that is at least three times as accurate as the pressure sensor of the Rosemount 3051SMV Transmitter.

---

A reference pressure device is required to perform a full sensor trim. Allow the pressure input to stabilize for ten seconds before entering any values. To perform a SP full trim select **Actions > Methods > Methods > Lower Static Pressure Trim** and follow the on-screen prompts then select **Actions > Methods > Methods > Upper Static Pressure Trim** and follow the on-screen prompts.

## 4.3.8 Process temperature sensor calibration

The Temperature Calibration allows the user to perform a sensor trim of a process temperature sensor. Process temperature sensor calibration units can be set in the Sensor Transducer Block.

### Process temperature trim

To calibrate the Process Temperature Input using the sensor trim, use the following procedure.

---

#### Note

When performing a sensor trim on a sensor, it is possible to degrade the performance of the sensor if inaccurate calibration equipment is used. Use calibration equipment that is at least three times as accurate as the sensor of the Rosemount 3051SMV Transmitter.

---

### Procedure

1. Set up a Temperature Calibrator to simulate a Pt 100 (100-ohm platinum, alpha 385 RTD) per manufacture recommendations. See [Install optional process temperature input \(Pt 100 RTD Sensor\)](#) for wiring information.
2. **Select Actions > Methods > Methods > Trim Process Temperature** and select the type of calibration. Adjust the calibrator/RTD simulator to a test point temperature value that represents a minimum process temperature (for example, 32 °F or 0 °C) if completing a lower sensor trim. Adjust the calibrator/RTD simulator to a test point temperature value that represents the maximum process temperature (for example, 140 °F or 60 °C) if completing an upper sensor trim.

## 4.4 Field upgrades and replacements

### 4.4.1 Disassembly considerations

#### **⚠ CAUTION**

During disassembly, do not remove the instrument cover in explosive atmospheres when the circuit is live as this may result in serious injury or death. Also, 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.
  - Disconnect optional process temperature sensor leads and cable.
  - Remove all other 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, then rinse with clear water.
  - Whenever the process flange or flange adapters are removed, visually inspect the PTFE O-rings. Emerson recommends reusing O-rings if possible. If the O-rings show any signs of damage, such as nicks or cuts, they should be replaced.
-

## 4.4.2 Housing assembly including electronics board

### Field device labels

The sensor module label reflects the replacement model code for reordering a complete transmitter. Replacement model codes are also viewable in the host by selecting **Overview > Device Information > Identification**.

### Replacing housing assembly including electronics board Removing the electronics board

During disassembly, do not remove the instrument cover in explosive atmospheres when the circuit is live as this may result in serious injury or death.

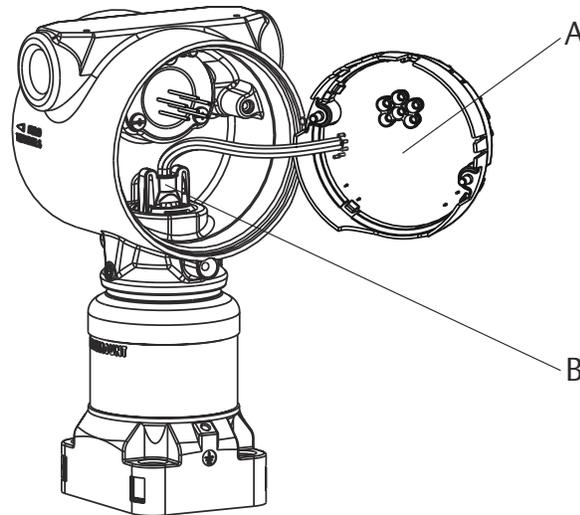
The Rosemount 3051SMV Transmitter electronics board is located opposite the field terminal side in the housing. To remove the electronics board, perform the following procedure:

#### Procedure

1. Remove the housing cover opposite the field terminal side.
2. Remove the LCD display, if applicable. Hold in the two clips and pull outward. This will provide better access to the two screws located on the electronics board.
3. Loosen the two captive screws located on the electronics board.
4. Pull out the electronics board to expose and locate the sensor module connector, ([Figure 4-1](#)).
5. Press the locking tabs and pull the sensor module connector upwards (avoid pulling wires). Housing rotation may be required to access locking tabs. See [Rotate housing](#) for more information.

### Example

**Figure 4-1: Sensor Module Connector View**



- A. Electronics board
- B. Sensor module connector

### Separate the sensor module assembly from the housing

To prevent damage to the sensor module connector, remove the electronics board from the sensor module assembly and remove the connector before separating the sensor module assembly from the housing.

#### Procedure

1. Loosen the housing rotation set screw by one full turn with a 3/32-in. (2.38 mm). hex wrench (see [Figure 4-2](#)).
2. Unscrew the housing from the sensor module threads.

### Example

**Figure 4-2: Set Screw**



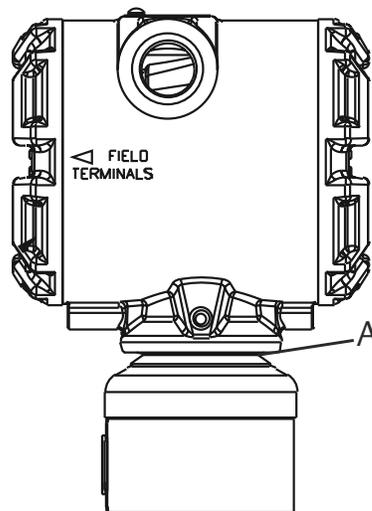
- A. Housing rotation set screw (3/32-in.)

## Attach the sensor module assembly to the housing

### Procedure

1. Apply a light coat of low temperature silicon grease to the sensor module threads and O-ring.
2. Install the V-Seal (03151-9061-0001) at the bottom of the housing (Figure 4-3).
3. Thread the housing completely onto the sensor module assembly. The housing must be no more than one full turn from flush with the sensor module assembly to comply with flame-proof/explosion-proof requirements.
4. Tighten the housing rotation set screw using a 3/32-in. (2.38 mm) hex wrench to a recommended torque of 30 in-lbs (3.4 N-m).

Figure 4-3: V-Seal



A. Black rubber V-seal

## Install electronics board in the housing

### Procedure

1. Apply a light coat of low temperature silicon grease to the sensor module connector O-ring.
2. Insert the sensor module connector into the top of the sensor module assembly. Ensure the locking tabs are fully engaged.
3. Gently slide the electronics board into the housing, making sure the pins from the housing properly engage the receptacles on the electronics board.
4. Tighten the captive screws. If using an LCD display, see [LCD display](#).
5. Attach the housing cover and tighten so that metal contacts metal to meet flame-proof/explosion-proof requirements.

### 4.4.3 Terminal block

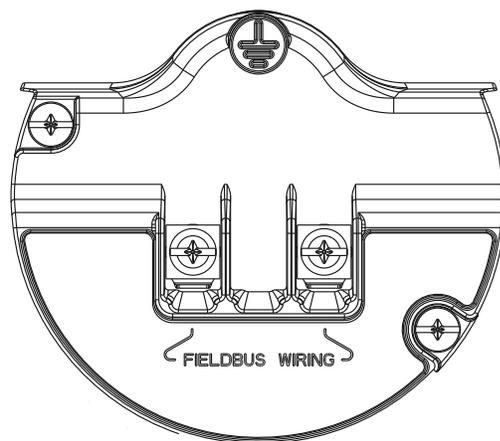
Electrical connections are located on the terminal block in the compartment labeled “FIELD TERMINALS.” The terminal block may be replaced or upgraded to add transient protection. If the device has a transient terminal block, the terminal block must be replaced with another transient terminal block. When installing a transient terminal block refer to grounding procedures in [Installation](#). Part numbers can be found in [Spare parts list](#). Loosen the two captive screws ([Figure 4-4](#)), and pull the entire terminal block out.

#### Note

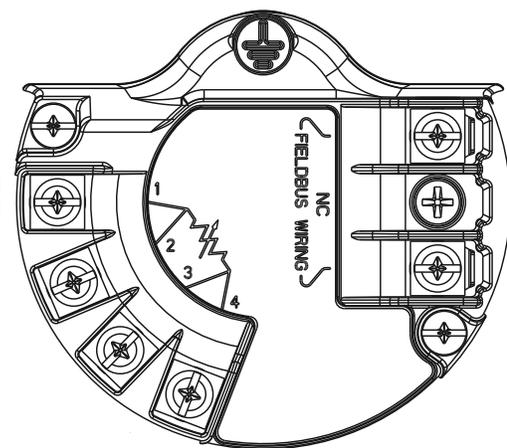
The terminal block does not identify FISCO.

**Figure 4-4: Terminal Blocks**

Without optional process temperature connections



With optional process temperature connections



#### Procedure

1. Gently slide the terminal block into the housing, making sure the pins from the Rosemount 3051SMV housing properly engage the receptacles on the terminal block.
2. Tighten the captive screws on the terminal block.
3. Attach the Rosemount 3051SMV housing cover and tighten so metal contacts metal to meet flame-proof/explosion-proof requirements.

### 4.4.4 LCD display

Transmitters ordered with the LCD display will be shipped with the display installed. Installing the display on an existing transmitter requires the LCD display kit (part number 00753-9004-0001 for aluminum housing and 00753-9004-0004 for stainless steel housing).

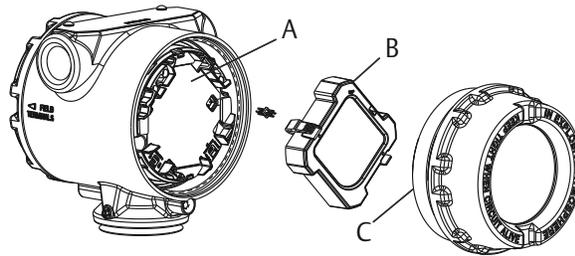
Use the following procedure and [Figure 4-5](#) to install the LCD display:

### Procedure

1. If the transmitter is installed on a segment, then secure the segment and disconnect power.
2. Remove the transmitter cover on the electronics board side (opposite the field terminals side). Do not remove instrument covers in explosive environments when circuit is live.
3. Engage the four-pin connector into the electronics board and snap LCD display into place.
4. To meet explosion-proof requirements, reinstall the housing cover and tighten so the cover is fully seated with metal to metal contact between the housing and cover.

### Example

**Figure 4-5: Optional LCD Display**



- A. Electronics board
- B. LCD display
- C. Display cover

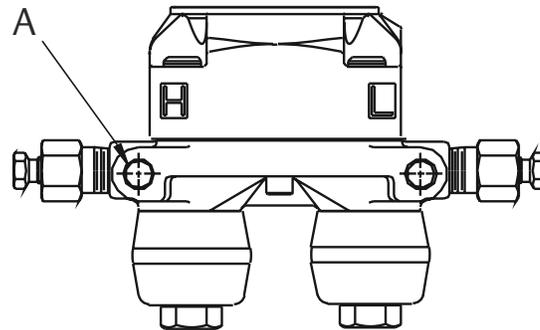
## 4.4.5 Flange and drain vent

The Rosemount 3051SMV Transmitter is attached to the process connection flange by four bolts and two alignment cap screws.

### Procedure

1. Remove the two alignment cap screws.

**Figure 4-6: Alignment Cap Screws**



A. Alignment cap screw

2. Remove the four bolts and separate the transmitter from the process connection, but leave the process connection flange in place and ready for re-installation.

**Note**

If installation uses a manifold, see [Manifold operation](#).

3. Inspect the sensor module PTFE O-rings. If the O-rings are undamaged, they may be reused. Emerson recommends reusing O-rings if possible. If the O-rings show any signs of damage, such as nicks or cuts, they should be replaced (part number 03151-9042-0001 for glass-filled PTFE and part number 03151-9042-0002 for graphite-filled PTFE).

**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.

4. Install the process flange on the sensor module process connection. To hold the process flange in place, install the two alignment cap screws finger tight (these screws are not pressure retaining). Do not overtighten; this will affect module-to-flange alignment.
5. Install the appropriate flange bolts.
  - a) If the installation requires a ½-18 NPT connection(s), use four 1.75-in. (44.4 mm) flange bolts. Finger tighten the bolts. Go to Step d.
  - b) If the installation requires a ½-14 NPT connection(s), use flange adapters and four 2.88-in. (73.2 mm) process flange/adaptor bolts.
  - c) Hold the flange adapters and adapter O-rings in place while finger-tightening the bolts.
  - d) Tighten the bolts to the initial torque value using a crossed pattern. See [Table 4-1](#) for appropriate torque values.
  - e) Tighten the bolts to the final torque value using a crossed pattern. See [Table 4-1](#) for appropriate torque values. When fully tightened, the bolts should extend through the top of the module housing.

- f) Torque alignment screws to 30 in-lbs. (3.4 N-m). If the installation uses a conventional manifold, then install flange adapters on the process end of the manifold using the 1.75-in. (44.4 mm) flange bolts supplied with the transmitter.

**Table 4-1: 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)

6. If the sensor module PTFE O-rings are replaced, re-torque the flange bolts and alignment cap screws after installation to compensate for seating of the PTFE O-ring.
7. 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).
  - d) Tighten the stem to 70 in-lb (8 N-m).

**Note**

Due to the Range 1 DP Sensor's high accuracy at low pressures, extra steps are required to optimize performance. It is necessary to temperature soak the assembly using the following procedure.

8. After replacing O-rings on DP Range 1 transmitters and re-installing the process flange, expose the transmitter to a temperature of 185 °F (85 °C) for two hours.
9. Re-tighten the flange bolts in a cross pattern.
10. Again, expose the transmitter to a temperature of 185 °F (85 °C) for two hours before calibration.



# 5 Troubleshooting

## 5.1 Section overview

This section provides summarized troubleshooting suggestions for the most common operating problems on the Rosemount™ 3051S MultiVariable™ FOUNDATION™ Fieldbus Transmitter (3051SMV).

If a malfunction is suspected despite the absence of any diagnostic messages on the communicator display, follow the procedures described to verify transmitter hardware and process connections are in good working order. Always deal with the most likely and easiest-to-check conditions 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 could result in death or serious injury.

- Do not remove the transmitter cover in explosive atmospheres when the circuit is live.
- Before connecting a communicator in an explosive atmosphere, make sure the instruments in the segment are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- Verify that the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.
- Both housing covers must be fully engaged to meet flameproof/explosion-proof requirements.

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

- Ensure only qualified personnel perform the installation.

Electrical shock could cause death or serious injury.

- If the sensor is installed in a high-voltage environment and a fault or installation error occurs, high voltage may be present on transmitter leads and terminals.
- Use extreme caution when making contact with the leads and terminals.

Static electricity can damage sensitive components.

- Observe safe handling precautions for static-sensitive components.

## 5.3 Measurement troubleshooting

The transmitter provides a means to display the current process variables and flow calculations. If the process variable reading is unexpected, this section provides the symptoms and possible corrective actions.

**Table 5-1: Unexpected Process Variable (PV) Readings**

Symptom	Corrective action
High PV Reading, Erratic PV Reading, Low or no PV reading	Primary element <ul style="list-style-type: none"> <li>• Check for restrictions at the primary element.</li> <li>• Check the installation and condition of the primary element.</li> <li>• Note any changes in process fluid properties that may affect output.</li> </ul>
	Impulse piping <ul style="list-style-type: none"> <li>• Check to ensure the pressure connection is correct.</li> <li>• Check for leaks or blockage.</li> <li>• Check to ensure that blocking valves are fully open.</li> <li>• Check for entrapped gas in liquid lines or for liquid in gas lines.</li> <li>• Check to ensure the density of fluid in impulse lines is unchanged.</li> <li>• Check for sediment in the transmitter process flange.</li> <li>• Make sure that process fluid has not frozen within the process flange.</li> </ul>
	Power supply <ul style="list-style-type: none"> <li>• Check the output voltage of the power supply at the transmitter. It should be 9 to 30 V dc (9 to 17.5 V dc for FISCO)</li> </ul>
	Flow configuration (fully compensated mass flow feature board only) <ul style="list-style-type: none"> <li>• Verify flow configuration is correct for current application</li> </ul>
	Process temperature RTD input <ul style="list-style-type: none"> <li>• Verify the PT Mode (Normal, Fixed, Back-up)</li> <li>• Verify the correct Callendar-Van Dusen coefficients</li> <li>• Verify all wire terminations</li> <li>• Verify sensor is a Pt 100 RTD</li> <li>• Replace Pt 100 sensor</li> </ul>
	Sensor module <ul style="list-style-type: none"> <li>• Check for obvious defects, such as a punctured isolating diaphragm or fill fluid loss, and if replacement is needed, contact the nearest Emerson Service Center.</li> <li>• Check for proper fill fluid characteristics (see <a href="#">Fill fluid</a> for more information).</li> </ul>

### 5.3.1 Fill fluid

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

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

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

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

## 5.4 Communication troubleshooting

### Note

Use this section if other devices appear on the segment, communicate, and remain on the segment. If other devices don't appear on the segment, communicate, or stay on the segment the electrical characteristics of the segment should be checked.

**Table 5-2: Troubleshooting Guide**

Symptom	Recommended actions <sup>(1)</sup>
Device does not show up on segment	Device power <ul style="list-style-type: none"> <li>• Cycle power to device.</li> <li>• Ensure the device is connected to the segment.</li> <li>• Check voltage at terminals. There should be 9–30 V or 17.5 V for FISCO.</li> <li>• Check to ensure the device is drawing current. There should be approximately 17 mA.</li> </ul>
	Segment <ul style="list-style-type: none"> <li>• Remove other devices from segment to check for interfering devices.</li> </ul>

**Table 5-2: Troubleshooting Guide (continued)**

Symptom	Recommended actions <sup>(1)</sup>
	Incompatible network settings <ul style="list-style-type: none"> <li>• Change host network parameters. Refer to host documentation for procedure.</li> </ul>
	Electronics failing <ul style="list-style-type: none"> <li>• Electronics board loose in housing.</li> <li>• Replace electronics.</li> </ul>
Device does not stay on segment	Signal levels <sup>(2)</sup> <ul style="list-style-type: none"> <li>• Check for two terminators.</li> <li>• Check for excess cable length.</li> <li>• Check for bad power supply or conditioner.</li> </ul>
	Segment noise <sup>(2)</sup> <ul style="list-style-type: none"> <li>• Check for incorrect grounding.</li> <li>• Check for correct shielded wire.</li> <li>• Tighten all wiring and shield connections on the affected part of the segment.</li> <li>• Check for corrosion or moisture on terminals.</li> <li>• Check for bad power supply.</li> <li>• Check for electrically noisy equipment attached to the instrument ground.</li> </ul>
	Electronics failure <ul style="list-style-type: none"> <li>• Check for loose electronics board in housing.</li> <li>• Replace electronics.</li> <li>• Check for water in the terminal housing.</li> </ul>

(1) The corrective actions should be done with consultation of the system integrator.

(2) Refer to wiring and installation 31.25 knit/s, voltage mode, wire medium application guide AG-140 available from the FieldComm Group.

## 5.4.1 Alarms and conditions

Detailed tables of the possible messages that will appear on either the LCD display, a Field Communicator, or a PC-based configuration and maintenance system are listed in the section below. Use the table below to diagnose particular status messages:

**Table 5-3: Failed–Fix Now**

Alert label	LCD display message	Description	Recommended action
Electronic Circuit Board Failure	FAIL BOARD ERROR	Failure has been detected in the electronic circuit board	Replace the electronic circuit board.
Sensor Module Failure	FAIL SENSOR ERROR	Failure has been detected in the sensor module	Replace the sensor module.
Sensor Module Communication Failure	SNSR COMM ERROR	Electronic circuit board has stopped receiving updates from the sensor module	<ul style="list-style-type: none"> <li>• Verify the device is receiving adequate supply voltage.</li> <li>• Remove front housing cover (considering hazardous location requirements) and check the cable and cable connection between sensor module and electronic circuit board.</li> <li>• Replace LCD display.</li> <li>• Replace the sensor module.</li> <li>• Replace the electronic circuit board.</li> </ul>
Sensor Module Incompatibility	SNSR INCOMP ERROR	Sensor module is not compatible with the electronic circuit board	Replace the sensor with a multivariable sensor module.
Process Temperature Sensor Failure	FAIL PT ERROR	Failure has been detected in the process temperature sensor	<ul style="list-style-type: none"> <li>• Verify the conditions of the process where the transmitter is installed.</li> </ul> <hr/> <p><b>Note</b> If a junction box is installed/utilized, check the connections for the RTD sensor.</p> <hr/> <ul style="list-style-type: none"> <li>• Remove back housing cover (considering hazardous location requirements) and check the cable and cable connection between terminal block and RTD sensor.</li> <li>• Replace the RTD sensor.</li> <li>• Replace the electronic circuit board.</li> </ul>

**Table 5-4: Out of Specification–Fix Soon**

Alert label	LCD display message	Description	Recommended action
Differential Pressure Out of Limits	DP LIMIT	Differential pressure has exceeded the transmitter's maximum measurement range	<ul style="list-style-type: none"> <li>Verify conditions of the process where the transmitter is installed.</li> <li>Check transmitter pressure connection to make sure it is not plugged and isolating diaphragms are not damaged.</li> <li>Replace the sensor module.</li> </ul>
Static Pressure Out of Limits	AP GP LIMIT	Static pressure has exceeded the transmitter's maximum measurement range	<ul style="list-style-type: none"> <li>Verify conditions of the process where the transmitter is installed.</li> <li>Check transmitter pressure connection to make sure it is not plugged and isolating diaphragms are not damaged.</li> <li>Replace the sensor module.</li> </ul>
Process Temperature Out of Limits	PT LIMIT	Process temperature has exceeded the transmitter's maximum configured measurement range	<ul style="list-style-type: none"> <li>Verify conditions of the process where the transmitter is installed.</li> </ul> <p>Note: If a junction box is installed/utilized, check the connections for the RTD sensor.</p> <ul style="list-style-type: none"> <li>Remove back housing cover (considering hazardous location requirements) and check the cable and cable connection between terminal block and the RTD sensor.</li> <li>Replace the RTD sensor.</li> <li>Replace the electronic circuit board.</li> </ul>
Module Temperature Out of Limits	SNSRT LIMIT	Module temperature sensor has exceeded its normal range	<ul style="list-style-type: none"> <li>Check process and ambient temperatures where the transmitter is installed to ensure they are within specifications.</li> <li>Replace the sensor module.</li> </ul>

**Table 5-5: Maintenance Required**

Alert label	LCD display message	Description	Recommended action
Mass Flow Missing Process Temperature	PT CONFIG ERROR	Process temperature measurement is not available for mass flow calculations	<ul style="list-style-type: none"> <li>If using a temperature sensor in the process, enable the process temperature measurement.</li> <li>Otherwise, configure mass flow to use backup or fixed process temperature.</li> </ul>

**Table 5-5: Maintenance Required (continued)**

Alert label	LCD display message	Description	Recommended action
Mass Flow Out of Limits	FLOW LIMIT	Mass flow has exceeded the transmitter's maximum measurement range	<ul style="list-style-type: none"> <li>• Verify conditions of the process where the transmitter is installed.</li> <li>• Verify operating ranges used in the flow configuration.</li> <li>• Check transmitter pressure connection to make sure it is not plugged and isolating diaphragms are not damaged.</li> </ul>
Display Update Error	LCD UPDATE ERROR	Electronic circuit board has lost communication with the display	<ul style="list-style-type: none"> <li>• Remove front housing cover (considering hazardous location requirements) and check the 4-pin connector between the display and electronic circuit board.</li> <li>• Check cable and cable connection between the sensor module and electronic circuit board.</li> <li>• Replace the display.</li> <li>• Replace electronic circuit board.</li> </ul>

**Table 5-6: Function Check**

Alert label	LCD display message	Description	Recommended action
Check Function	N/A	Transducer block mode is not in auto	<ul style="list-style-type: none"> <li>• Check if any transducer block is currently under maintenance.</li> <li>• If no transducer block is under maintenance, follow site procedures to change affected transducer block's actual mode to auto.</li> </ul>

## 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 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.

# A Reference Data

## A.1 Product Certifications

To view current Product Certifications, follow these steps:

### Procedure

1. Go to [Emerson.com/Rosemount/3051SMV](https://emerson.com/Rosemount/3051SMV).
2. Scroll as needed to the green menu bar and click Documents & Drawings.
3. Click Manuals & Guides.
4. Select the appropriate Quick Start Guide.

## A.2 Ordering Information, Specifications, and Dimensional Drawings

To view current Rosemount™ 3051SMV Ordering Information, Specifications, and Dimensional Drawings, follow these steps:

### Procedure

1. Go to [Emerson.com/Rosemount/3051SMV](https://emerson.com/Rosemount/3051SMV).
2. Scroll as needed to the green menu bar and click **Documents & Drawings**.
3. Click **Data Sheets & Bulletins**.
4. Select the appropriate Product Data Sheet.

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