Reference Manual
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November 2016

Rosemount™ 2051 Pressure Transmitter

with PROFIBUS® PA Protocol

EMERSON™

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Rosemount™ 2051 Pressure Transmitter

NOTICE

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

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™ Process Management 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 Process Management 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 Reference Manual for any restrictions associated with a safe installation.

- 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.

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.

Section 1 Introduction

1.1 Using this manual

The sections in this manual provide information on installing, operating, and maintaining the Rosemount™ 2051 Pressure Transmitter with PROFIBUS® PA Protocol. The sections are organized as follows:

Section 2: Configuration provides instruction on commissioning and operating Rosemount 2051. Information on software functions, configuration parameters, and online variables is also included.

Section 3: Hardware Installation contains mechanical installation instructions, and field upgrade options.

Section 4: Electrical Installation contains electrical installation instructions, and field upgrade options.

Section 5: Calibration contains operation and maintenance techniques.

Section 6: Troubleshooting provides troubleshooting techniques for the most common operating problems.

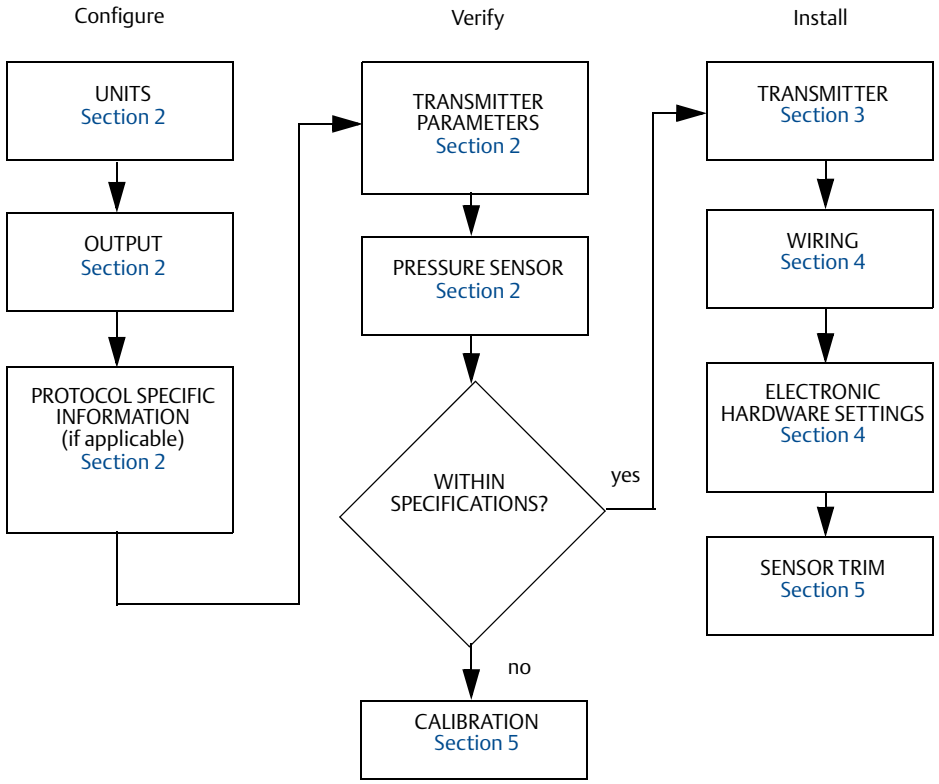
Appendix A: Specifications and Reference Data supplies reference and specification data, as well as ordering information.

Appendix B: Product Certifications contains intrinsic safety approval information, European ATEX directive information, and approval drawings.

Appendix C: Local Operator Interface (LOI) Menu contains the complete Local Operator Interface menu.

Appendix D: PROFIBUS® PA Block Information contains PROFIBUS PA block and parameter information.

Figure 1-1. Commissioning and Installation Flowchart



1.2 Models covered

The following Rosemount 2051 Pressure Transmitters are covered by this manual:

- Rosemount 2051C Coplanar™ Pressure Transmitter
- Rosemount 2051CD Differential Pressure Transmitter
  - Measures differential pressure up to 2000 psi (137,9 bar)
- Rosemount 2051CG Gage Pressure Transmitter
  - Measures gage pressure up to 2000 psi (137,9 bar)
- Rosemount 2051T In-line Pressure Transmitter
- Rosemount 2051T Gage and Absolute Pressure Transmitter
  - Measures gage pressure up to 10000 psi (689,5 bar)
- Rosemount 2051L Liquid Level Transmitter
  - Provides precise level and specific gravity measurements up to 300 psi (20,7 bar) for a wide variety of tank configurations.

Note
For Rosemount 2051 with HART® Protocol, see Rosemount 2051 Reference Manual.
For Rosemount 2051 with FOUNDATION™ Fieldbus, see Rosemount 2051 Reference Manual.

1.3 Device revisions

Table 1-1. Device Revisions

Date	Software revision	PROFIBUS profile	Compatible files	Manual revision
10/16	2.6.1	3.02	2051 GSD: rmt3333.gsd Profile 3.02 GSD: pa139700.gsd DD: ROPA3__TP_2051.ddl DTM: Pressure_Profibus_3.02_DTM_v1.0.8.exe	BB

1.4 Transmitter overview

The Rosemount 2051C Coplanar design is offered for differential pressure (DP), gage pressure (GP) and absolute pressure (AP) measurements. The Rosemount 2051C utilizes Emerson™ Process Management capacitance sensor technology for DP and GP measurements. Piezoresistive sensor technology is utilized in the Rosemount 2051T.

The major components of the Rosemount 2051 are the sensor module and the electronics housing. The sensor module contains the oil filled sensor system (isolating diaphragms, oil fill system, and sensor) and the sensor electronics. The sensor electronics are installed within the sensor module and include a temperature sensor (RTD), a memory module, and the capacitance to digital signal converter (C/D converter). The electrical signals from the sensor module are transmitted to the output electronics in the electronics housing. The electronics housing contains the output electronics board, the optional local operator interface (LOI) buttons, and the terminal block.

For the Rosemount 2051C design pressure is applied to the isolating diaphragms, the oil deflects the center diaphragm, which then changes the capacitance. This capacitance signal is then changed to a digital signal in the C/D converter. The microprocessor then takes the signals from the RTD and C/D converter calculates the correct output of the transmitter.

1.5 Product recycling/disposal

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

Section 2 Configuration

2.1 Section overview

This section contains information on commissioning the Rosemount™ 2051 Pressure Transmitter with PROFIBUS® PA Protocol using either the Local Operator Interface (LOI) or Class 2 Master.

2.2 Safety messages

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

⚠WARNING

Explosions 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 Reference Manual for any restrictions associated with a safe installation.

- 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.

Electrical shock can result in death or serious injury.

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

2.3 Hazardous locations certifications

⚠ Individual transmitters are clearly marked with a tag indicating the approvals they carry. Transmitters must be installed in accordance with all applicable codes and standards to maintain these certified ratings. Refer to “Product Certifications” on page 131 for information on these approvals.

2.4 Configuration guidelines

The Rosemount 2051 can be configured either before or after installation. Configuring the transmitter on the bench using the LOI or Class 2 Master ensures that all transmitter components are in working order prior to installation.

To configure on the bench, required equipment includes a power supply, an LOI (option M4) or a Class 2 Master with DP/PA coupler, proper cable and terminators.

Verify the security hardware jumper is set to the *OFF* position in order to proceed with configuration. See Figure 4-2 for jumper location.

2.4.1 Profile 3.02 identification number adaptation mode

Rosemount 2051 PROFIBUS Profile 3.02 devices are set to identification number adaptation mode (0127) when shipped from the factory. This mode allows the transmitter to communicate with any PROFIBUS Class 1 Master with either the generic profile GSD (9700) or Rosemount 2051 specific GSD (3333).

2.4.2 Block modes

When configuring a device with the LOI, the output status will change to *Good – Function Check* to alert hosts that the transmitter is not in standard operation mode.

When configuring a device with a Class 2 Master, blocks must be set to *Out of Service (OOS)* in order to download parameters that could affect the output. This prevents the Class 1 Master from seeing a jump in output without a status change. Setting the blocks *OOS* and back into *Auto* might be done automatically using the Class 2 Master when using the Rosemount 2051 DD or DTM, if no additional action is required when configuring the device. Verify the block mode is set back to *Auto*.

2.4.3 Configuration tools

The Rosemount 2051 can be configured using two tools: LOI and/or Class 2 Master.

The LOI requires option code M4 to be ordered. To activate the LOI, push either configuration button located under the top tag of the transmitter. See Table 2-1 and Figure 2-1 for operation and menu information. See Appendix C: Local Operator Interface (LOI) Menu for a complete LOI menu tree.

Class 2 Masters require either DD or DTM files for configuration. These files can be found at EmersonProcess.com/Rosemount or by contacting your local Emerson Process representative.

Some configurations steps may need to be completed in offline mode or using the LOI.

The remainder of this section will cover the configuration tasks using the applicable configuration tool.

Note
Instructions in this section use the language found in the Class 2 Master or LOI. See Appendix D: PROFIBUS® PA Block Information to cross reference parameters between the Class 2 Master, LOI and PROFIBUS specification.

2.5 Basic setup tasks

The following tasks are recommended for initial configuration of the Rosemount 2051 PROFIBUS device.

2.5.1 Assign address

The Rosemount 2051 is shipped with a temporary address of 126. This must be changed to a unique value between 0 and 125 in order to establish communication with the Class 1 Master. Usually, addresses 0–2 are reserved for masters, therefore transmitter addresses between 3 and 125 are recommended for the device.

Address can be set using either:

- LOI – see Table 2-1 and Figure 2-1
- Class 2 Master – see respective Class 2 Master manual for setting instrument addresses

2.5.2 Pressure configuration

The Rosemount 2051 ships with the following settings:

- Measurement type: Pressure
- Engineering units: Inches H_2O
- Linearization: None
- Scaling: None

Each of these parameters can be set using,

- LOI – see Table 2-1 and Figure 2-1
- Class 2 Master – see "Pressure configuration using Class 2 Master" on page 8

Pressure unit parameters

The LOI was designed to automatically set the following parameters when selecting a pressure unit:

- Measurement type: Pressure
- Linearization (Transducer Block): None
- Scaling: None

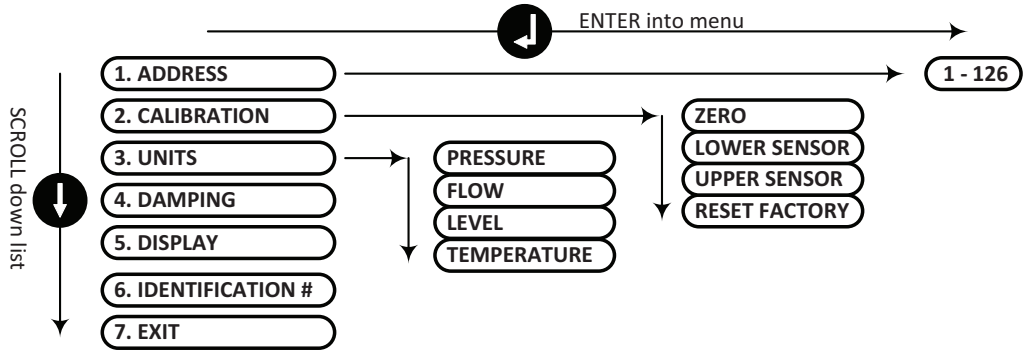
See Flow configuration or Square Root of DP Configuration for defaults when configuring with the LOI.

Table 2-1. LOI Operation

Button	Action	Navigation	Character entry	Save?
	Scroll	Moves down menu categories	Changes character value(1)	Changes between Save and Cancel
	Enter	Select menu category	Enters character and advances	Saves

1. Characters flash when they can be changed.

Figure 2-1. LOI Menu



Note
See Appendix C: Local Operator Interface (LOI) Menu for a more detailed LOI menu and unit list.

Pressure configuration using Class 2 Master

1. From the *Basic Setup >> Units >> Primary Value >> Primary Value Type* dropdown, select **Pressure**.
2. Select units.

Note
Pressure units in steps 2a, 2b, and 2c must match.

   a. From the *Basic Setup >> Units >> Primary Value >> Scale In (Transducer Block) >> Unit (Secondary Value 1)* dropdown, select engineering unit.
   b. From the *Basic Setup >> Units >> Primary Value >> Unit (PV)* dropdown, select engineering unit.
   c. From the *Basic Setup >> Units >> Output Signal (Analog Input Block) >> Unit (Out Scale)* dropdown, select engineering unit.

3. Enter scaling.

Note
Scaling is done in the Transducer Block.

   a. In the *Basic Setup >> Units >> Primary Value >> Scale In (Transducer Block)* field, enter upper and lower values (this value should correspond to the unit selected in step 2a).
   b. In the *Basic Setup >> Units >> Primary Value >> Scale Out (Transducer Block)* field, enter upper and lower values (this value should correspond to the unit selected in step 2b).

4. Verify Analog Input (AI) Block.

Note
Scaling should not be repeated in the AI Block. To ensure no additional scaling is being done on the Al Block, set the lower values in steps 4a and 4b to 0 and the upper values to 100.

   a. In the *Basic Setup >> Units >> Process Value Scale (Analog Input Block)* field, enter upper and lower values (this value should correspond to the unit selected in step 2b).
   b. In the *Basic Setup >> Units >> Output Signal (Analog Input Block)* field, enter upper and lower values (this value should correspond to the unit selected in step 2c).
   c. From the *Basic Setup >> Units >> Output Signal (Analog Input Block) >> Linearization Type* dropdown, select **No Linearization**.

2.6 Detailed setup tasks

The following tasks explain how to configure the Rosemount 2051 for Flow or Level measurement and how to configure additional parameters found in the device.

2.6.1 Flow configuration

LOI

To configure the Rosemount 2051 for flow measurement with the LOI, select **UNITS >> FLOW**. When configuring flow units, the following parameters are set:

- Measurement type: Flow
- Linearization (Transducer Block): Square Root

During unit configuration, the user defines scaling, units and low flow cutoff per the application requirements. See Appendix C: Local Operator Interface (LOI) Menu for detailed menu for further scaling help.

Note
The LOI assumes a zero based scaling (minimum pressure = minimum flow = zero) for Flow applications in order to improve configuration efficiency. Class 2 Masters can be used if non-zero based scaling is required. Low Flow Cutoff has a default value of 5.0%. Low Flow Cutoff can be set to 0% if required.

Class 2 Master

To configure the transmitter for a flow application, use the flow output in the Transducer Block. See Flow configuration using Class 2 Master.

Flow configuration using Class 2 Master

1. From the *Basic Setup >> Units >> Primary Value >> Primary Value Type* dropdown, select **Flow**.
2. Select units.

Note
Flow units in steps 2b and 2c must match.

   a. From the *Basic Setup >> Units >> Primary Value >> Scale In (Transducer Block) >> Unit (Secondary Value 1)* dropdown, select engineering unit.
   b. From the *Basic Setup >> Units >> Primary Value >> Unit (PV)* dropdown, select engineering unit.
   c. From the *Basic Setup >> Units >> Output Signal (Analog Input Block) >> Unit (Out Scale)* dropdown, select engineering unit.

3. Enter scaling.

Note
Scaling is done in the Transducer Block.

   a. In the *Basic Setup >> Units >> Primary Value >> Scale In (Transducer Block)* field, enter upper and lower values (this value should correspond to the unit selected in step 2a).
   b. In the *Basic Setup >> Units >> Primary Value >> Scale Out (Transducer Block)* field, enter upper and lower values (this value should correspond to the unit selected in step 2b).

4. Verify Analog Input (AI) Block.

Note
Scaling should always be done in the Transducer Block. Ensure the AI Block is always set to no linearization for flow applications. To ensure no additional scaling is being done on the AI Block, set the lower values in steps 4a and 4b to 0 and the upper values to 100.

   a. In the *Basic Setup >> Units >> Process Value Scale (Analog Input Block)* field, enter upper and lower values (this value should correspond to the unit selected in step 2b).
   b. In the *Basic Setup >> Units >> Output Signal (Analog Input Block)* field, enter upper and lower values (this value should correspond to the unit selected in Step 2c).
   c. From the *Basic Setup >> Units >> Output Signal (Analog Input Block) >> Linearization Type* dropdown, select **No Linearization**.

2.6.2 Square Root of DP Configuration

The Rosemount 2051 has two Pressure output settings: Linear and Square Root. Activate the square root output option to make output proportional to flow.

To configure the transmitter to output square root of differential pressure, a Class 2 Master must be used.

Square Root configuration using Class 2 Master

1. From the *Basic Setup >> Units >> Primary Value >> Primary Value Type* dropdown menu, select pressure.
2. Select Units.

Note
Pressure units in steps 2a, 2b, and 2c must match.

   a. From the *Basic Setup >> Units >> Primary Value >> Scale In (Transducer Block) >> Unit (Secondary Value 1)* dropdown, select engineering unit.
   b. From the *Basic Setup >> Units >> Primary Value >> Unit (PV)* dropdown, select engineering unit.
   c. From the *Basic Setup >> Units >> Output Signal (Analog Input Block) >> Unit (Out Scale)* dropdown, select engineering unit.

3. Enter scaling.

Note
Scaling is done in the Transducer Block. No scaling required for pressure measurement.

   a. In the *Basic Setup >> Units >> Primary Value >> Scale In (Transducer Block)* field, enter upper and lower values (this value should correspond to the unit selected in step 2a).
   b. In the *Basic Setup >> Units >> Primary Value >> Scale Out (Transducer Block)* field, enter upper and lower values (this value should correspond to the unit selected in step 2b).

4. Verify Analog Input (AI) Block.

Note
Scaling should not be repeated in the Analog Input Block. To ensure no additional scaling is being done on the Al Block, set the lower values in steps 4a and 4b to 0 and the upper values to 100.

   a. In the *Basic Setup >> Units >> Process Value Scale (Analog Input Block)* field, enter upper and lower values (this value should correspond to the unit selected in step 2b).
   b. In the *Basic Setup >> Units >> Output Signal (Analog Input Block)* field, enter upper and lower values (this value should correspond to the unit selected in step 2c).
   c. From the *Basic Setup >> Units >> Output Signal (Analog Input Block) >> Linearization Type* dropdown, select **Square Root.**

2.6.3 Level configuration

LOI

To configure the Rosemount 2051 for Level measurement with the LOI, select **UNITS** >> **LEVEL**. When configuring level units, the following parameters are set:

- Measurement type: Level
- Linearization (Transducer Block): None

During unit configuration, the user defines scaling and units per the application requirements. See Appendix C: Local Operator Interface (LOI) Menu for detailed menu for further scaling help.

Class 2 Master

To configure the transmitter for a level application, use the level output in the Transducer Block. See Level configuration using Class 2 Master.

Level configuration using Class 2 Master

1. From the *Basic Setup >> Units >> Primary Value >> Primary Value Type* dropdown, select **Level**.
2. Select units.

Note
Level units in steps 2b, and 2c must match.

   a. From the *Basic Setup >> Units >> Primary Value >> Scale In (Transducer Block) >> Unit (Secondary Value 1)* dropdown, select engineering unit.
   b. From the *Basic Setup >> Units >> Primary Value >> Unit (PV)* dropdown, select engineering unit.
   c. From the *Basic Setup >> Units >> Output Signal (Analog Input Block) >> Unit (Out Scale)* dropdown, select engineering unit.

3. Enter scaling.

Note
Scaling is done in the Transducer Block.

   a. In the *Basic Setup >> Units >> Primary Value >> Scale In (Transducer Block)* field, enter upper and lower values (this value should correspond to the unit selected in step 2a).
   b. In the *Basic Setup >> Units >> Primary Value >> Scale Out (Transducer Block)* field, enter upper and lower values (this value should correspond to the unit selected in step 2b).

4. Verify Analog Input (AI) Block.

Note
Scaling should not be repeated in the AI Block. To ensure no additional scaling is being done on the AI Block, set the lower values in steps 4a and 4b to 0 and the upper values to 100.

   a. In the *Basic Setup >> Units >> Process Value Scale (Analog Input Block)* field, enter upper and lower values (this value should correspond to the unit selected in step 2b).
   b. In the *Basic Setup >> Units >> Output Signal (Analog Input Block)* field, enter upper and lower values (this value should correspond to the unit selected in step 2c).
   c. From the *Basic Setup >> Units >> Output Signal (Analog Input Block) >> Linearization Type* dropdown, select **No Linearization**.

2.6.4 Damping

User-selected damping will affect the transmitters ability to respond to changes in the applied process. The Rosemount 2051 has a default damping value of 0.0 seconds applied in the AI Block.

Damping can be set using,

- LOI – see Table 2-1 and Figure 2-1
- Class 2 Master – see Damping configuration using Class 2 Master

Damping configuration using Class 2 Master

1. In the *Basic Setup >> Damping >> Filter Time Const* field, enter value (in seconds).

2.6.5 Process alerts

Process alerts activate an output alert status when the configured alert point is exceeded. A process alert will be transmitted continuously if the output set points are exceeded. The alert will reset once the value returns within range.

Process alert parameters are defined as follows:

- Upper alarm: Changes Output Status to Good – Critical Alarm – Hi Limit
- Upper warning: Changes Output Status to Good – Advisory Alarm – Hi Limit
- Lower warning: Changes Output Status to Good – Advisory Alarm – Lo Limit
- Lower alarm: Changes Output Status to Good – Critical Alarm – Lo Limit
- Alarm hysteresis: Amount the output value must pass back into range before alarm is cleared.

Example

Upper alarm = 100 psi. Alarm Hysteresis = 0.5%. After activation at 100 psi, the alarm will clear once the output goes below 99.5 psi = 100 – 0.5 psi.

Process alerts can be set using a Class 2 Master.

Process alert configuration using Class 2 Master

1. Enter process alerts.

a. In the *Basic Setup >> Output >> Output Limits >> Upper Limit Alarm Limits* field, enter upper alarm value.
b. In the *Basic Setup >> Output >> Output Limits >> Upper Limit Warning Limits* field, enter upper warning value.
c. In the *Basic Setup >> Output >> Output Limits >> Lower Limit Alarm Limits* field, enter lower alarm value.
d. In the *Basic Setup >> Output >> Output Limits >> Lower Limit Warning Limits* field, enter lower warning value.
e. In the *Basic Setup >> Output >> Output Limits >> Limit Hysteresis* field, enter a percent of range value.

2.6.6 LCD display

The LCD display connects directly to the electronics board which maintains direct access to the signal terminals. A display cover is provided to accommodate the display.

The display always indicates the transmitter output (Pressure, Flow or Level) as well as abbreviated diagnostic status when applicable. Sensor temperature and pressure are optional variables that can be configured using LOI or Class 2 Master. When turned on, the display will alternate between the selected variables.

For LCD display configuration using,

- LOI – see Table 2-1 and Figure 2-1
- Class 2 Master – see LCD display configuration using Class 2 Master

LCD display configuration using Class 2 Master

In *Basic Setup >> Display Variables >> Local Operator Interface (LOI) >> Display Selection*, select the process variables to be shown on the local display.

2.6.7 Security

The Rosemount 2051 has a hierarchy of security features. The security jumper on the electronics board (or optional LCD display) provides the highest level of security. With the jumper in the *ON* position, all writes to the transmitter will be disabled (including writes from the LOI or a Class 2 Master).

See Figure 4-2 on page 39 for details on jumper configuration.

2.6.8 LOI security

To prevent unauthorized changes, either set the security jumper to *ON* and/or set an LOI password (Refer to "Configure security and simulation" on page 38). The LOI password requires a user to enter a non-zero four digit password at the transmitter in order to operate the LOI.

These parameters can be set using a Class 2 Master.

LOI security configuration using Class 2 Master

1. To turn on the LOI password, enter value in the *Basic Setup >> Display Variables >> Local Operator Interface (LOI) >> Password* field.
2. To turn off the LOI password, enter 0 in the *Basic Setup >> Display Variables >> Local Operator Interface (LOI) >> Password* field.

Note
Security jumper must be in the off position for the LOI to operate. The password appears after the LOI is activated using the local configuration buttons.

2.6.9 Simulation

The Rosemount 2051 has a simulation jumper located on the electronics board (or optional LCD display) that must be set to the *ON* position in order to simulate.

With the AI block simulation enabled, the actual measurement value has no impact on the *OUT* value or the status.

Simulation configuration using Class 2 Master

1. Set the simulation jumper to on.
2. To enable simulation, select the following in *Basic Setup* >> *Simulation*:
   a. Select **Enabled**.
   b. Enter *Simulation Value*.
   c. Select **Simulation Status**.
   d. Select **Transfer**.
3. To disable simulation, select the following in *Basic Setup* >> *Simulation*:
   a. Select **Disabled**.
   b. Select **Transfer**.
4. Set the simulation jumper to off.

Section 3 Hardware Installation

3.1 Overview

The information in this section covers installation considerations for the Rosemount™ 2051 Pressure Transmitter with PROFIBUS® PA Protocol. A Quick Start Guide is shipped with every transmitter to describe pipe-fitting, wiring procedures and basic configuration for initial installation.

3.2 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.

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 Reference Manual for any restrictions associated with a safe installation.

- 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.

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.

3.3 Installation considerations

Measurement accuracy depends upon proper installation of the transmitter and impulse piping. Mount the transmitter close to the process and use a minimum of piping to achieve best accuracy. Keep in mind 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 plug (found in the box) in unused conduit opening. Engage a minimum of five threads to comply with explosion-proof requirements. See "Conduit entry threads" on page 19 for additional requirements.

For material compatibility considerations, see Material Selection Technical Note.

3.3.1 Mechanical considerations

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 mounted

When the transmitter is mounted on its side, position the coplanar flange to ensure proper venting or draining. Mount the flange as shown in Figure 3-8 on page 24, keeping drain/vent connections on the bottom for gas service and on the top for liquid service.

3.3.2 Environmental considerations

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). Refer to Appendix A: Specifications and Reference Data that lists the sensing element operating limits. Mount the transmitter so that it is not susceptible to vibration and mechanical shock and does not have external contact with corrosive materials.

3.4 Installation procedures

3.4.1 Mount the transmitter

For dimensional drawing information refer to "Dimensional drawings" on page 74.

Process flange orientation

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

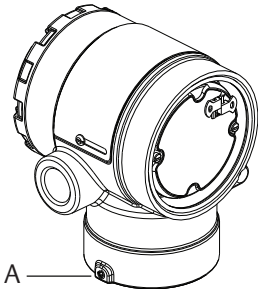
Housing rotation

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

1. Loosen the housing rotation set screw using a $^{5}/_{64}$-in. hex wrench.
2. Turn the housing left or right maximum up to 180° from its original position[(1)]. Over rotating can damage the transmitter.
3. Re-tighten the housing rotation set screw to no more than 7 in-lb when desired location is reached.

1. *The Rosemount 2051C original position aligns with "H" side; Rosemount 2051T original position is the opposite side of bracket holes.*

Figure 3-1. Housing Rotation



A. Housing rotation set screw ($^5/_{64}$-in.)

Terminal side of electronics housing

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

Circuit side of electronics housing

Provide 0.75-in. (19 mm) of clearance for units with out an LCD display. If LCD display is installed, mount for clear visibility. Three inches of clearance is required for LCD display cover removal.

Conduit entry threads

For NEMA® 4X, IP66, and IP68 requirements, use thread seal (PTFE) tape or paste on male threads to provide a watertight seal.

Environmental seal for housing

Thread sealing (PTFE) tape or paste on male threads of conduit is required to provide a water/dust tight conduit seal and meets requirements of NEMA Type 4X, IP66, and IP68. Consult factory if other ingress protection ratings are required.

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

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

Mounting brackets

Rosemount 2051 may be panel-mounted or pipe-mounted through an optional mounting bracket. Refer to Table 3-1 for the complete offering and see Figure 3-2 through Figure 3-6 on pages 20 and 22 for dimensions and mounting configurations.

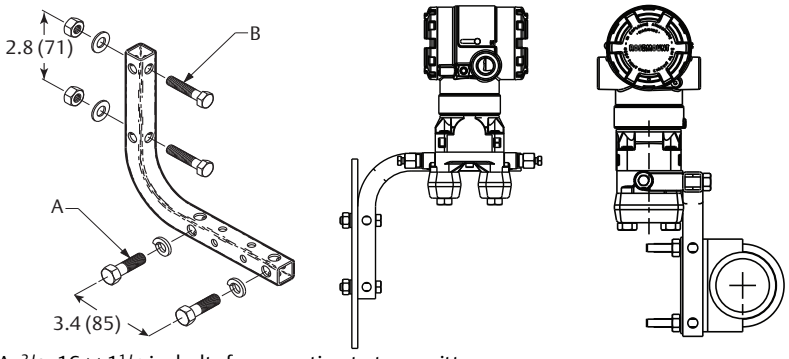
Table 3-1. Mounting Brackets

Rosemount 2051 Brackets										
Option code	Process connections			Mounting			Materials			
	Coplanar	In-line	Traditional	Pipe	Panel	Flat panel	CS bracket	SST bracket	CS bolts	SST bolts
B4	X	X	N/A	X	X	X	N/A	X	N/A	X
B1	N/A	N/A	X	X	N/A	N/A	X	N/A	X	N/A
B2	N/A	N/A	X	N/A	X	N/A	X	N/A	X	N/A

Table 3-1. Mounting Brackets

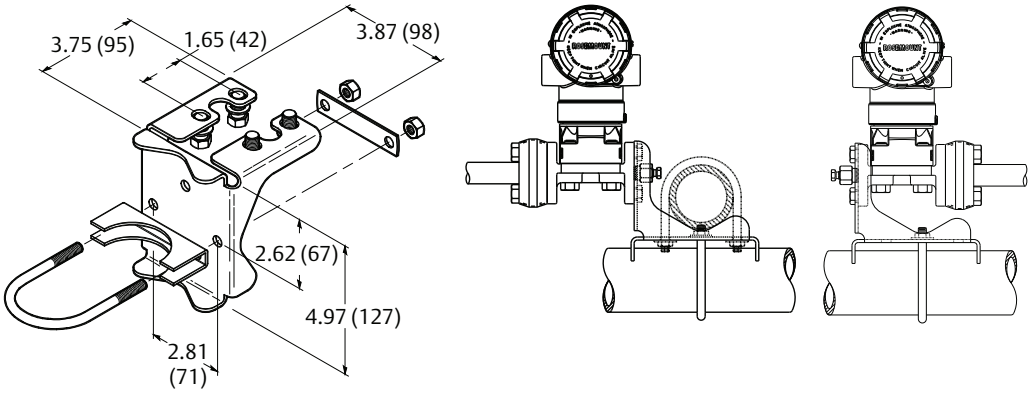
Rosemount 2051 Brackets										
Option code	Process connections			Mounting			Materials			
	Coplanar	In-line	Traditional	Pipe	Panel	Flat panel	CS bracket	SST bracket	CS bolts	SST bolts
B3	N/A	N/A	X	N/A	N/A	X	X	N/A	X	N/A
B7	N/A	N/A	X	X	N/A	N/A	X	N/A	N/A	X
B8	N/A	N/A	X	N/A	X	N/A	X	N/A	N/A	X
B9	N/A	N/A	X	N/A	N/A	X	X	N/A	N/A	X
BA	N/A	N/A	X	X	N/A	N/A	N/A	X	N/A	X
BC	N/A	N/A	X	N/A	N/A	X	N/A	X	N/A	X

Figure 3-2. Mounting Bracket Option Code B4



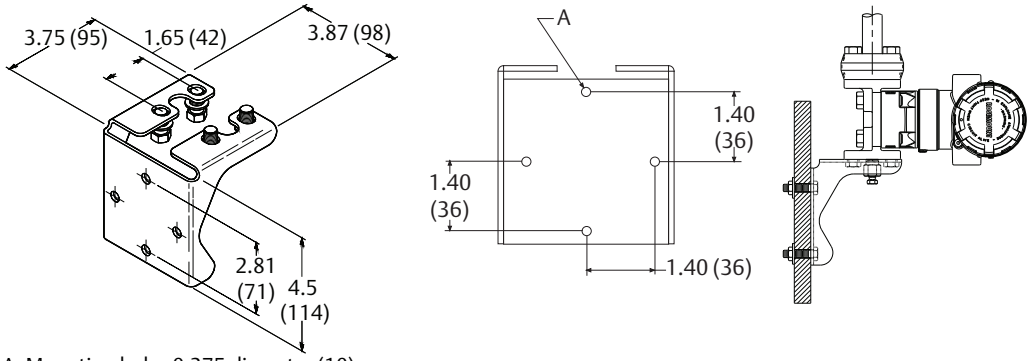
A. $^{3}/_{8}$–16 × $1^{1}/_{4}$-in. bolts for mounting to transmitter
B. $^{5}/_{16}$ × $1^{1}/_{2}$-in. bolts for panel mounting (not supplied)
Dimensions are in inches (millimeters).

Figure 3-3. Mounting Bracket Option Codes B1, B7, and BA



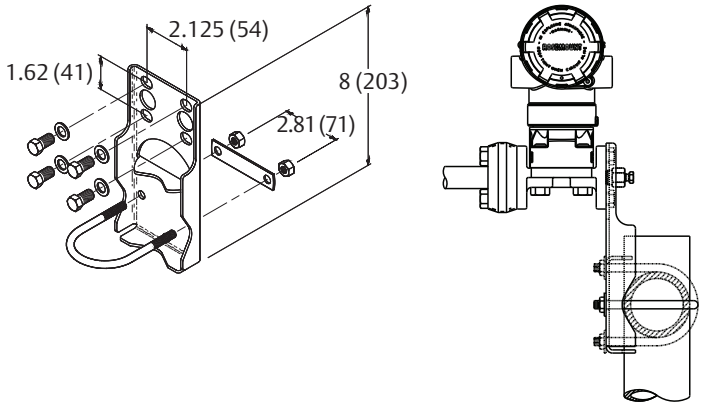
Dimensions are in inches (millimeters).

Figure 3-4. Panel Mounting Bracket Option Codes B2 and B8



A. Mounting holes 0.375 diameter (10)
Dimensions are in inches (millimeters).

Figure 3-5. Flat Mounting Bracket Option Codes B3 and BC



Dimensions are in inches (millimeters).

Flange bolts

The Rosemount 2051 can be shipped with a coplanar flange or a traditional flange installed with four 1.75-inch flange bolts. Mounting bolts and bolting configurations for the coplanar and traditional flanges can be found on page 22. Stainless steel bolts supplied by Emerson™ Process Management are coated with a lubricant to ease installation. Carbon steel bolts do not require lubrication. No additional lubricant should be applied when installing either type of bolt. Bolts supplied by Emerson Process Management are identified by their head markings:

Carbon Steel (CS) Head Markings

Stainless Steel (SST) Head Markings

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

Bolt installation

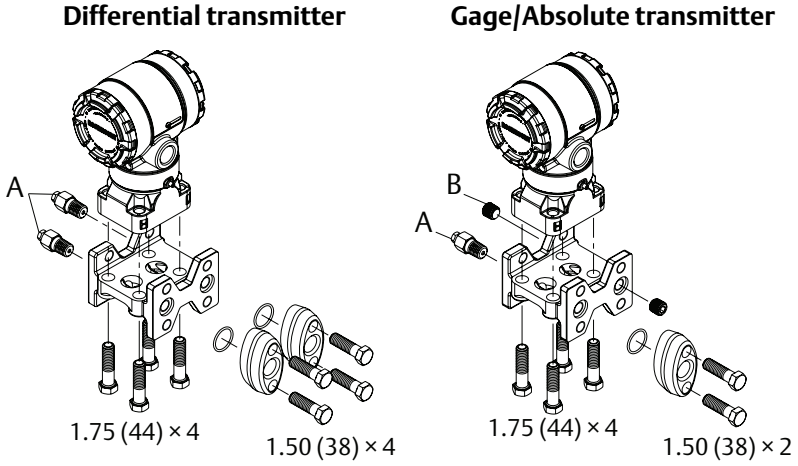
⚠ Only use bolts supplied with the Rosemount 2051 or sold by Emerson Process Management as spare parts for the Rosemount 2051 Transmitter. Use the following bolt installation procedure:

1. Finger-tighten the bolts.
2. Torque the bolts to the initial torque value using a crossing pattern (see Table 3-2 for torque values).
3. Torque the bolts to the final torque value using the same crossing pattern.

Table 3-2. Bolt Installation Torque Values

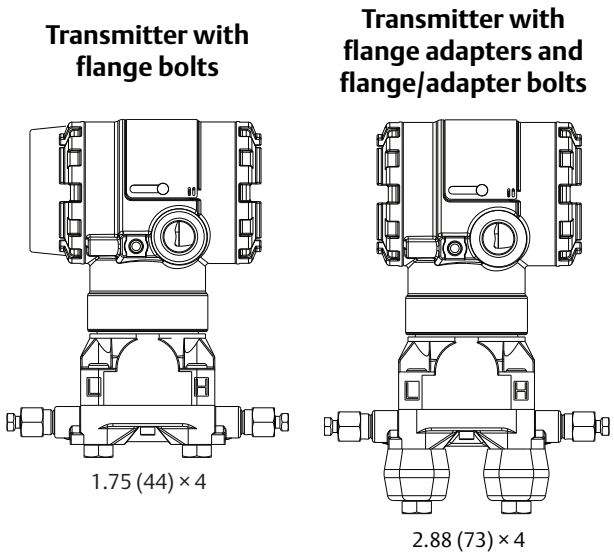
Bolt material	Initial torque value	Final torque value
CS-ASTM-A445 Standard	300 in-lb (34 N-m)	650 in-lb (73 N-m)
316 SST—Option L4	150 in-lb (17 N-m)	300 in-lb (34 N-m)
ASTM-A-193-B7M—Option L5	300 in-lb (34 N-m)	650 in-lb (73 N-m)
Alloy 400—Option L6	300 in-lb (34 N-m)	650 in-lb (73 N-m)

Figure 3-6. Traditional Flange Bolt Configurations



A. Drain/vent
B. Plug
Dimensions are in inches (millimeters).

Figure 3-7. Mounting Bolts and Bolt Configurations for Coplanar Flange



Dimensions are in inches (millimeters).

Description	Size in. (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.

3.4.2 Impulse piping

Mounting requirements

Impulse piping configurations depend on specific measurement conditions. Refer to Figure 3-8 for examples of the following mounting configurations:

Liquid flow measurement

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

Gas flow measurement

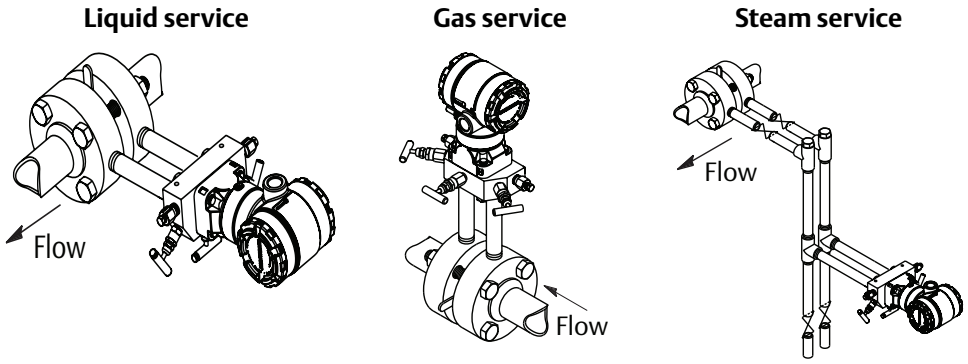
1. Place taps in the top or side of the line.
2. Mount the transmitter beside or above the taps so liquid will drain into the process line.

Steam flow measurement

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

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

Figure 3-8. Installation Examples



Best practices

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

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

- Keep impulse piping as short as possible.
- For liquid service, slope the impulse piping at least 1-in/ft (8 cm/m) upward from the transmitter toward the process connection.
- For gas service, slope the impulse piping at least 1-in/ft (8 cm/m) downward from the transmitter toward the process connection.
- Avoid high points in liquid lines and low points in gas lines.
- Make sure both impulse legs are the same temperature.
- Use impulse piping large enough to avoid friction effects and blockage.
- Vent all gas from liquid piping legs.
- When using a sealing fluid, fill both piping legs to the same level.
- When purging, make the purge connection close to the process taps and purge through equal lengths of the same size pipe. Avoid purging through the transmitter.

- Keep corrosive or hot (above 250 °F [121 °C]) process material out of direct contact with the sensor module and flanges.
- Prevent sediment deposits in the impulse piping.
- Maintain equal leg of head pressure on both legs of the impulse piping.
- Avoid conditions that might allow process fluid to freeze within the process flange.

3.4.3 Process connections

Coplanar or traditional process connection

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

⚠ Flange adapters

Rosemount 2051DP and GP process connections on the transmitter flanges are $^{1}/_{4}$–18 NPT. Flange adapters are available with standard $^{1}/_{2}$–14 NPT class 2 connections. The flange adapters allow users to disconnect from the process by removing the flange adapter bolts. Use plant-approved lubricant or sealant when making the process connections. Refer to "Dimensional drawings" on page 74 for the distance between pressure connections. This distance may be varied $\pm^{1}/_{8}$-in. (3.2 mm) by rotating one or both of the flange adapters.

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

1. Remove the flange bolts.
2. Leaving the flange in place, move the adapters into position with the O-ring installed.
3. Clamp the adapters and the coplanar flange to the transmitter sensor module using the larger of the bolts supplied.
4. Tighten the bolts. Refer to "Flange bolts" on page 21 for torque specifications.

Whenever you remove flanges or adapters, visually inspect the PTFE O-rings. Replace with O-ring designed for Rosemount transmitter if there are any signs of damage, such as nicks or cuts. Undamaged O-rings may be reused. If you replace the O-rings, retorque the flange bolts after installation to compensate for cold flow. Refer to the process sensor body reassembly procedure in Section 5: Calibration.

⚠ When compressed, PTFE O-rings tend to "cold flow," which aids in their sealing capabilities.

Note
PTFE O-rings should be replaced if the flange adapter is removed.

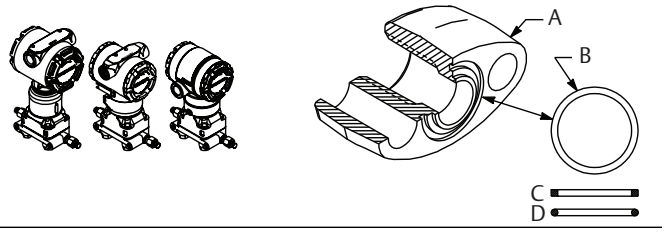
O-rings

The two styles of Rosemount flange adapters (Rosemount 1151 and Rosemount 3051S/3051/2051) each require a unique O-ring. Use only the O-ring designed for the corresponding flange adapter.

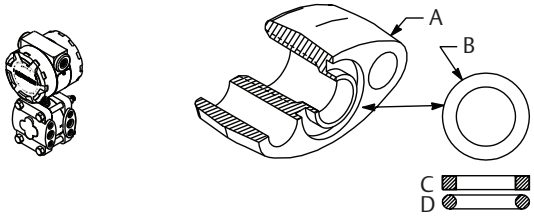
⚠WARNING

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 designed for its specific flange adapter, as shown below:

Rosemount 3051S/3051/2051



Rosemount 1151



A. Flange adapter
B. O-ring
C. PTFE-based profile (square)
D. Elastomer profile (round)

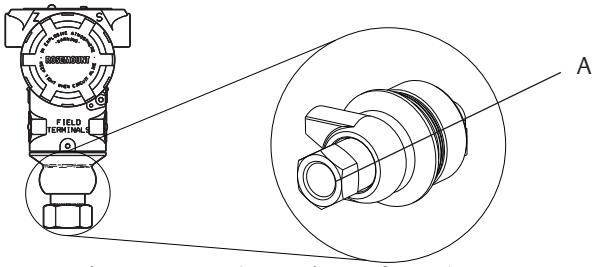
3.4.4 In-line process connection

In-line gage transmitter orientation

The low side pressure port on the in-line gage transmitter is located in the neck of the transmitter, behind the housing. The vent path is 360 degrees around the transmitter between the housing and sensor (See Figure 3-9).

Keep the vent path free of any obstruction, such as paint, dust, and lubrication by mounting the transmitter so that the process can drain away.

Figure 3-9. In-line Gage Low Side Pressure Port



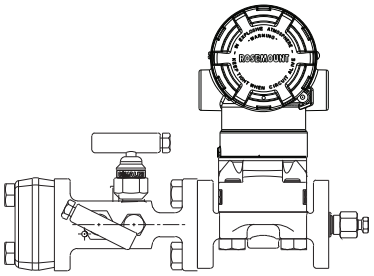
A. Low side pressure port (atmospheric reference)

3.5 Rosemount 305, 306, and 304 Manifolds

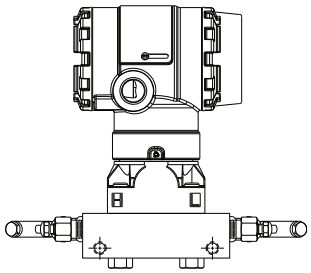
The Rosemount 305 Integral Manifold is available in two designs: traditional and coplanar. The traditional Rosemount 305 Integral Manifold can be mounted to most primary elements with mounting adapters in the market today. The Rosemount 306 Integral Manifold is used with the Rosemount 2051T In-line Transmitters to provide block-and-bleed valve capabilities of up to 10000 psi (690 bar).

Figure 3-10. Manifolds

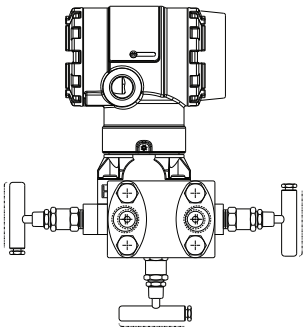
Rosemount 2051C and Rosemount 304 Conventional



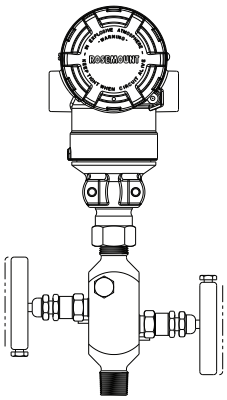
Rosemount 2051C and Rosemount 305 Integral Coplanar



Rosemount 2051C and Rosemount 305 Integral Traditional



Rosemount 2051T and Rosemount 306 In-line



3.5.1 Rosemount 305 Integral Manifold installation procedure

To install a Rosemount 305 Integral Manifold to a Rosemount 2051 Transmitter:

⚠ 1. Inspect the PTFE sensor module O-rings. Undamaged O-rings may be reused. If the O-rings are damaged (if they have nicks or cuts, for example), replace with O-rings designed for Rosemount transmitter.

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 1/4-in. manifold bolts for alignment. Finger tighten the bolts, then tighten the bolts incrementally in a cross pattern to final torque value. See "Flange bolts" on page 21 for complete bolt installation information and torque values. When fully tightened, the bolts should extend through the top of the sensor module housing.

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

Note
Always perform a zero trim on the transmitter/manifold assembly after installation to eliminate mounting effects.

3.5.2 Rosemount 306 Integral Manifold installation procedure

The Rosemount 306 Manifold is for use only with a Rosemount 2051T In-line Transmitter.

⚠ Assemble the Rosemount 306 Manifold to the Rosemount 2051T In-line Transmitter with a thread sealant.

3.5.3 Rosemount 304 Conventional Manifold installation procedure

To install a Rosemount 304 Conventional Manifold to a Rosemount 2051 Transmitter:

1. Align the conventional manifold with the transmitter flange. Use the four manifold bolts for alignment.
2. Finger tighten the bolts, then tighten the bolts incrementally in a cross pattern to final torque value. See "Flange bolts" on page 21 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.

3.5.4 Manifold operation

⚠WARNING

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

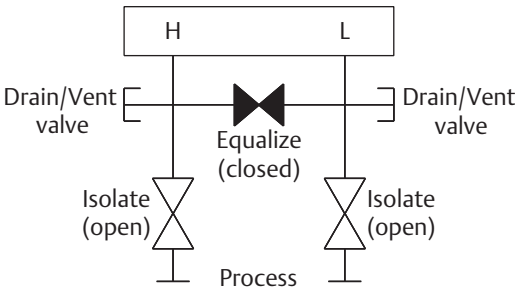
Always perform a zero trim on the transmitter/manifold assembly after installation to eliminate any shift due to mounting effects. See "Sensor trim" on page 46.

Coplanar transmitters

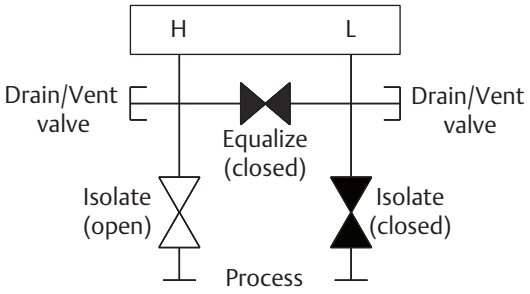
3-valve and 5-valve manifolds

Performing zero trim at static line pressure

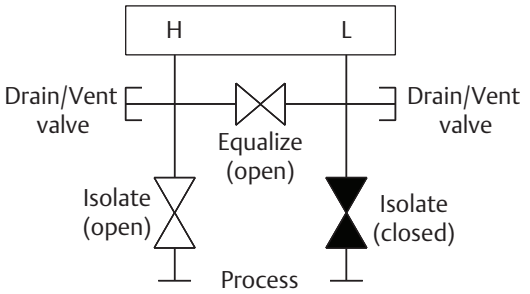
In normal operation the two isolate (block) valves between the process ports and transmitter will be open and the equalize valve will be closed.



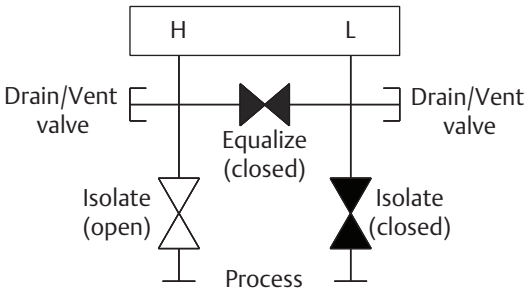
1. To zero trim the transmitter, close the isolate valve on the low side (downstream) side of the transmitter.



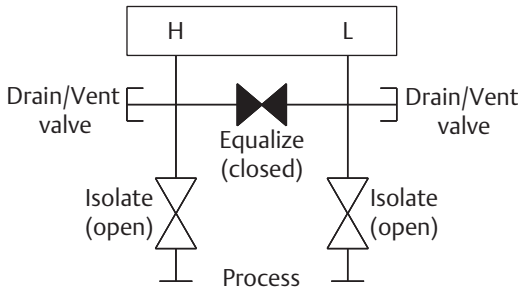
2. Open the equalize valve to equalize the pressure on both sides of the transmitter. The manifold is now in the proper configuration for performing a zero trim on the transmitter.



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



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

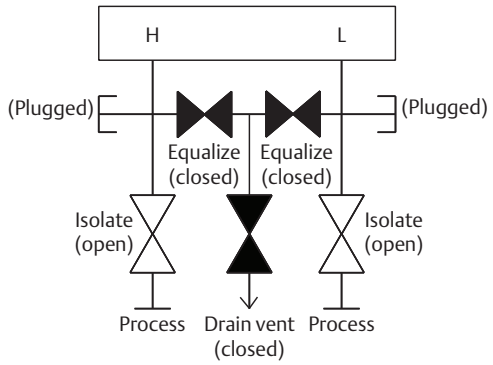


5-valve natural gas manifold

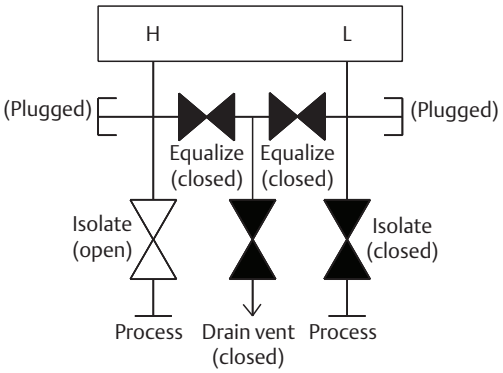
Performing zero trim at static line pressure

5-valve natural gas configurations shown:

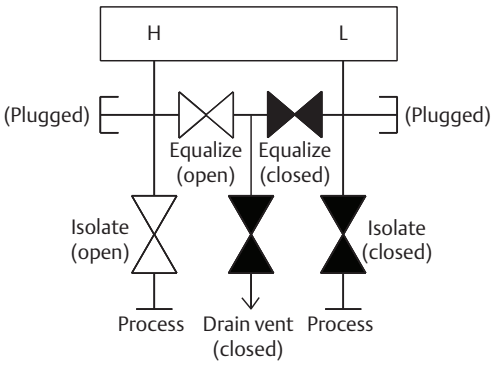
In normal operation, the two isolate (block) valves between the process ports and transmitter will be open, and the equalize valves will be closed. Vent valves may be opened or closed.



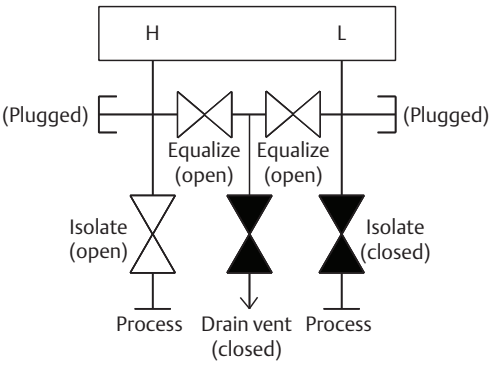
1. To zero trim the transmitter, first close the isolate valve on the low pressure (downstream) side of the transmitter and the vent valve.



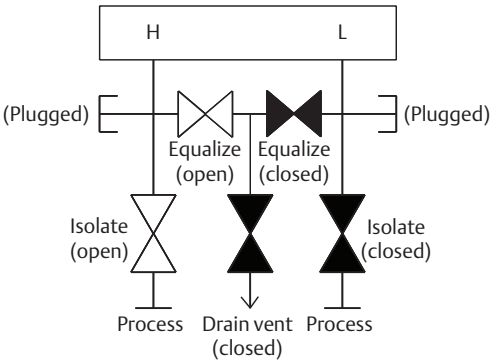
2. Open the equalize valve on the high pressure (upstream) side of the transmitter.



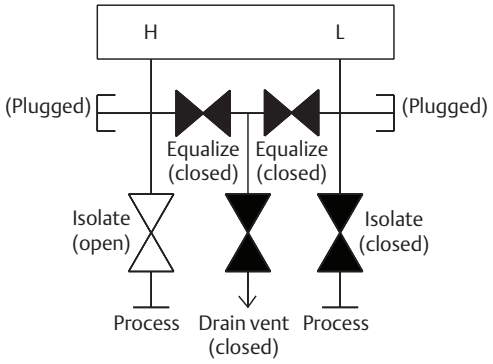
3. Open the equalize valve on the low pressure (downstream) side of the transmitter. The manifold is now in the proper configuration for performing a zero trim on the transmitter.



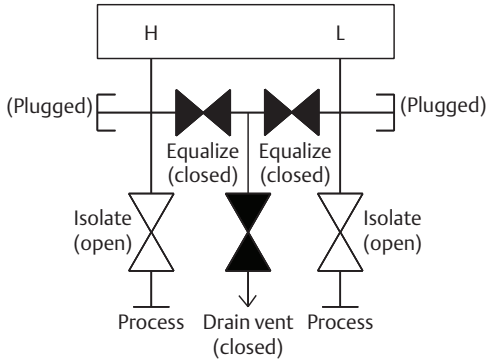
4. After performing a zero trim on the transmitter, close the equalize valve on the low pressure (downstream) side of the transmitter.



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



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

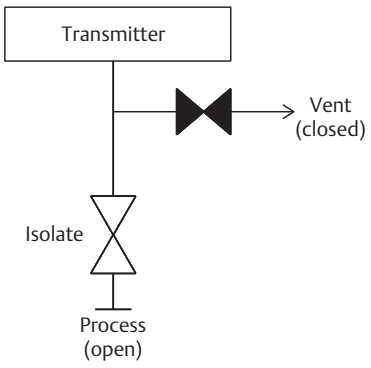


In-line transmitters

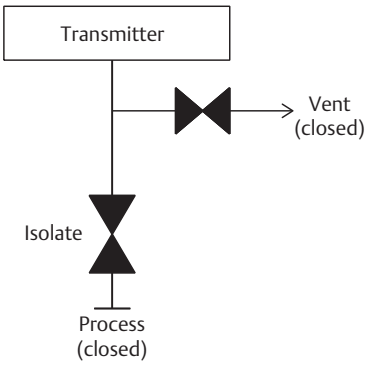
2-valve and block and bleed style manifolds

Isolating the transmitter

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



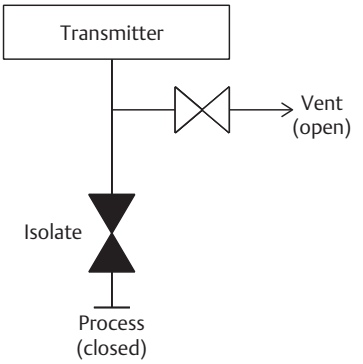
1. To isolate the transmitter, close the isolate valve.



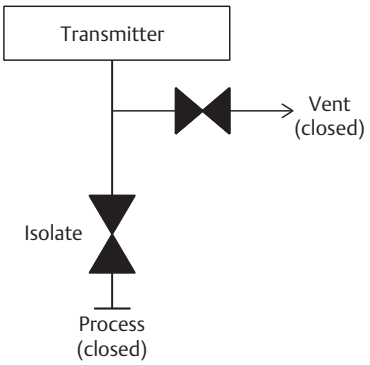
2. To bring the transmitter to atmospheric pressure, open the vent valve or bleed screw.

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

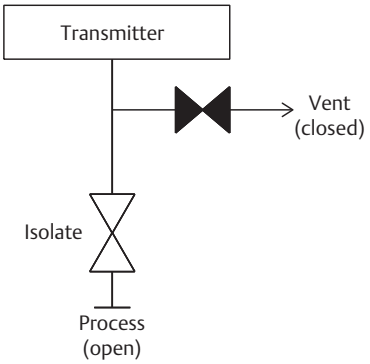
⚠ Always use caution when venting directly to atmosphere.



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



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



Adjusting valve packing

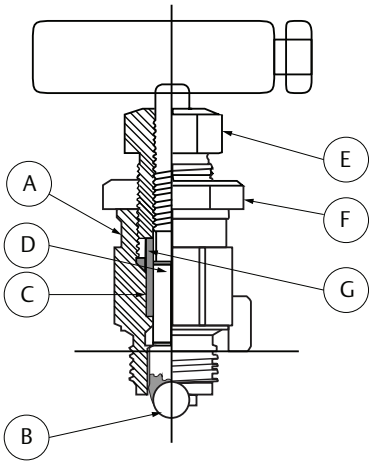
Over time, the packing material inside a Rosemount manifold may require adjustment in order to continue to provide proper pressure retention. Not all Rosemount manifolds have this adjustment capability. The Rosemount manifold model number will indicate what type of stem seal or packing material has been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

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

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

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

Figure 3-11. Valve Components



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

3.6 Liquid level measurement

Differential pressure transmitters used for liquid level applications measure hydrostatic pressure head. Liquid level and specific gravity of a liquid are factors in determining pressure head. This pressure is equal to the liquid height above the tap multiplied by the specific gravity of the liquid. Pressure head is independent of volume or vessel shape.

3.6.1 Open vessels

A pressure transmitter mounted near a tank bottom measures the pressure of the liquid above.

Make a connection to the high pressure side of the transmitter, and vent the low pressure side to the atmosphere. Pressure head equals the liquid's specific gravity multiplied by the liquid height above the tap.

Zero range suppression is required if the transmitter lies below the zero point of the desired level range. Figure 3-12 shows a liquid level measurement example.

3.6.2 Closed vessels

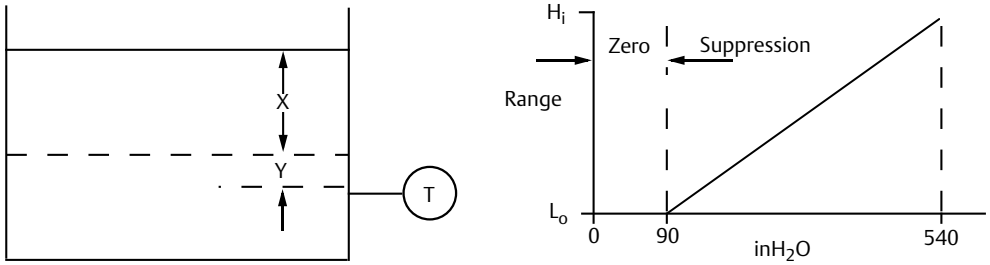
Pressure above a liquid affects the pressure measured at the bottom of a closed vessel. The liquid specific gravity multiplied by the liquid height plus the vessel pressure equals the pressure at the bottom of the vessel.

To measure true level, the vessel pressure must be subtracted from the vessel bottom pressure. To do this, make a pressure tap at the top of the vessel and connect this to the low side of the transmitter. Vessel pressure is then equally applied to both the high and low sides of the transmitter. The resulting differential pressure is proportional to liquid height multiplied by the liquid specific gravity.

Dry leg condition

Low-side transmitter piping will remain empty if gas above the liquid does not condense. This is a dry leg condition. Range determination calculations are the same as those described for bottom-mounted transmitters in open vessels, as shown in Figure 3-12.

Figure 3-12. Liquid Level Measurement Example



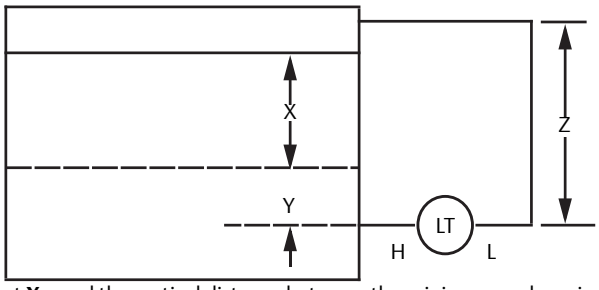
Let **X** equal the vertical distance between the minimum and maximum measurable levels (500-in.).
Let **Y** equal the vertical distance between the transmitter datum line and the minimum measurable level (100-in.).
Let **SG** equal the specific gravity of the fluid (0.9).
Let **h** equal the maximum head pressure to be measured in inches of water.
Let **e** equal head pressure produced by **Y** expressed in inches of water.
Let **Range** equal **e** to **e + h**.
Then h = **(X)(SG)**
= 500 × 0.9
= 450 inH_2O
e = **(Y)(SG)**
=100 × 0.9
= 90 inH_2O
Range = 90 to 540 inH_2O

Wet leg condition

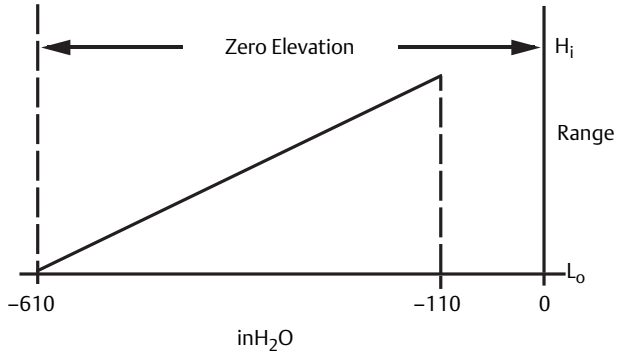
Condensation of the gas above the liquid slowly causes the low side of the transmitter piping to fill with liquid. The pipe is purposely filled with a convenient reference fluid to eliminate this potential error. This is a wet leg condition.

The reference fluid will exert a head pressure on the low side of the transmitter. Zero elevation of the range must then be made. See Figure 3-13.

Figure 3-13. Wet Leg Example



Let **X** equal the vertical distance between the minimum and maximum measurable levels (500-in.).
Let **Y** equal the vertical distance between the transmitter datum line and the minimum measurable level (50-in.).
Let **z** equal the vertical distance between the top of the liquid in the wet leg and the transmitter datum line (600-in.).
Let $\mathbf{SG_1}$ equal the specific gravity of the fluid (1.0).
Let $\mathbf{SG_2}$ equal the specific gravity of the fluid in the wet leg (1.1).
Let **h** equal the maximum head pressure to be measured in inches of water.
Let **e** equal the head pressure produced by **Y** expressed in inches of water.
Let **s** equal head pressure produced by z expressed in inches of water.
Let **Range** equal **e – s** to **h + e – s**.
Then h = $\mathbf{(X)(SG_1)}$
= 500 × 1.0
= 500 in H_2O
e = $\mathbf{(Y)(SG_1)}$
= 50 × 1.0
= 50 inH_2O
s = $\mathbf{(z)(SG_2)}$
= 600 × 1.1
= 660 inH_20
Range = **e – s** to **h + e – s**.
= 50 – 660 to 500 + 50 – 660
= –610 to –110 inH_20

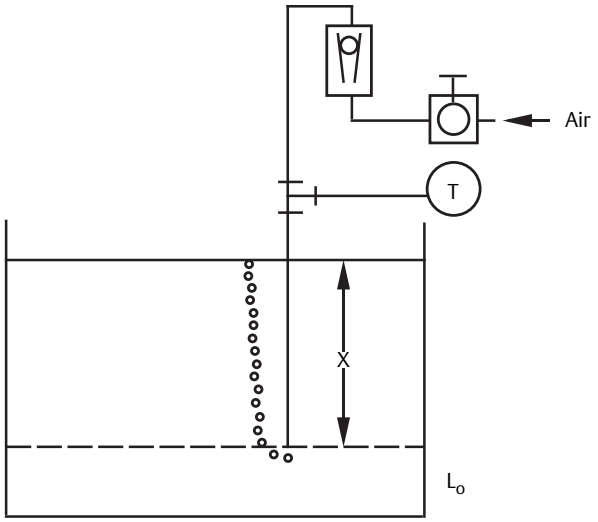


Bubbler system in open vessel

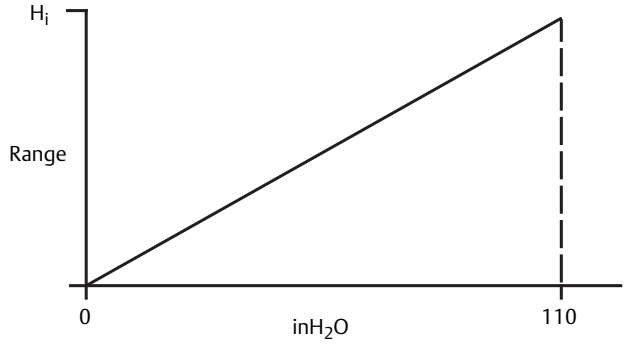
A bubbler system that has a top-mounted pressure transmitter can be used in open vessels. This system consists of an air supply, pressure regulator, constant flow meter, pressure transmitter, and a tube that extends down into the vessel.

Bubble air through the tube at a constant flow rate. The pressure required to maintain flow equals the liquid's specific gravity multiplied by the vertical height of the liquid above the tube opening. Figure 3-14 shows a bubbler liquid level measurement example.

Figure 3-14. Bubbler Liquid Level Measurement Example



Let **X** equal the vertical distance between the minimum and maximum measurable levels (100-in.).
Let **SG** equal the specific gravity of the fluid (1.1).
Let **h** equal the maximum head pressure to be measured in inches of water.
Let **Range** equal **zero** to **h**.
Then h = **(X)(SG)**
= 100 × 1.1
= 110 inH_2O
Range = 0 to 110 inH_2O



Section 4 Electrical Installation

4.1 Overview

The information in this section covers installation considerations for the Rosemount™ 2051 Pressure Transmitter with PROFIBUS® PA Protocol. A Quick Start Guide is shipped with every transmitter to describe pipe-fitting, wiring procedures and basic configuration for initial installation.

4.2 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.

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 Reference Manual for any restrictions associated with a safe installation.

- 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.

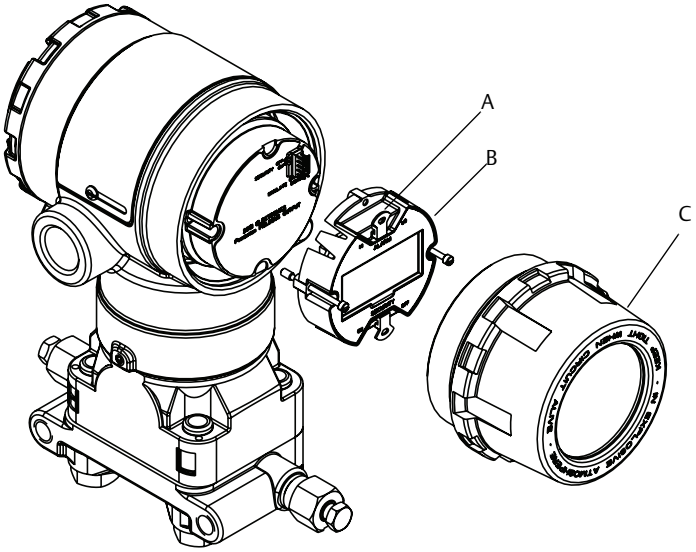
Electrical shock can result in death or serious injury.

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

4.3 LCD display

Transmitters ordered with the LCD display option (M5) are shipped with the display installed. Installing the display on an existing Rosemount 2051 requires a small instrument screwdriver.

Figure 4-1. LCD Display



A. Jumpers (top and bottom)
B. LCD display
C. Extended cover

4.4 LCD display with local operator interface (LOI)

Transmitters ordered with the LCD display with LOI option (M4) are shipped with the display and local configuration buttons installed. The configuration buttons are located under the top tag as indicated by the sticker. See Table 2-1 for LOI operation. Upgrading to an LOI transmitter requires installation of a new electronics board, configuration buttons and LCD display (if not previously ordered).

4.5 Configure security and simulation

4.5.1 Security (write protect)

There are four security methods with the Rosemount 2051 Transmitter:

1. Security jumper: prevents all writes to transmitter configuration including use of the LOI.
2. Software Write Protection: prevents all writes to the transmitter configuration using a Class 2 Master.
3. Disable Local Operator Interface: prevents changes to transmitter range points using local configuration buttons.
4. LOI password: Requires a four-digit password before changes can be made locally.

You can prevent changes to the transmitter configuration data with the write protection jumper. Security is controlled by the security (write protect) jumper located on the electronics board or LCD display. Position the jumper on the transmitter circuit board in the *ON* position to prevent accidental or deliberate change of configuration data.

If the transmitter write protection jumper is in the *ON* position, the transmitter will not accept any “writes” to its memory.

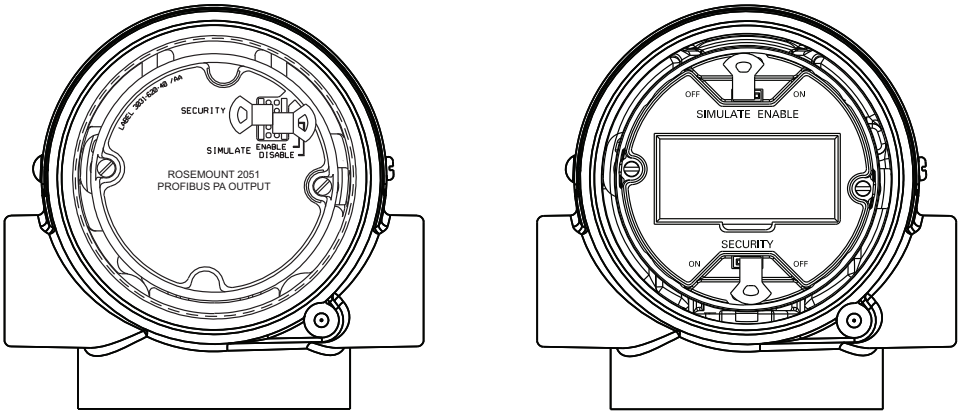
Note
If the security jumper is not installed, the transmitter will continue to operate in the security *OFF* configuration.

4.5.2 Simulate

The Rosemount 2051 has a simulate jumper located on the electronics board (or optional LCD display) that must be set to the *ON* position in order to activate simulate mode using a Class 2 Master.

See Section 2: Configuration for details on simulate mode.

Figure 4-2. Transmitter Jumper Locations



4.6 Electrical considerations

Note
Make sure all electrical installation is in accordance with national and local code requirements.

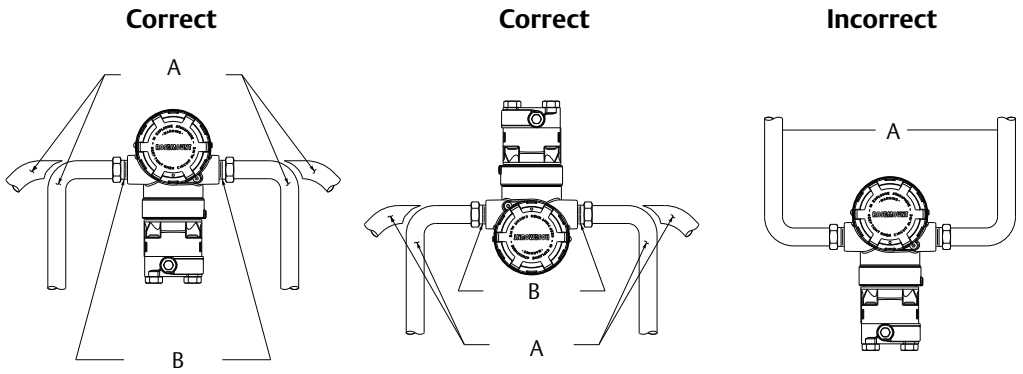
4.6.1 Conduit installation

Recommended conduit connections are shown in Figure 4-3.

⚠ CAUTION

If all connections are not sealed, excess moisture accumulation can damage the transmitter. Make sure to mount the transmitter with the electrical housing positioned downward for drainage. To avoid moisture accumulation in the housing, install wiring with a drip loop, and ensure the bottom of the drip loop is mounted lower than the conduit connections or the transmitter housing.

Figure 4-3. Conduit Installation



A. Possible conduit line positions
B. Sealing compound

4.6.2 Wiring

See Figure 4-5 for a basic PROFIBUS PA system configuration.

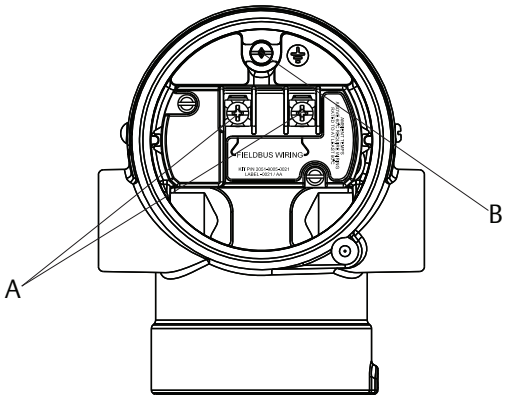
Use the following steps to wire the transmitter:

1. Remove the housing cover on the FIELD TERMINALS side.
2. Connect the power leads to the terminals indicated on the terminal block label. See Figure 4-4 Rosemount 2051 PROFIBUS terminal block.
3. Tighten terminal screws to ensure full contact with the terminal block screw and washer. When using a direct wiring method, wrap wire clockwise to ensure it is in place when tightening the terminal block screw.

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

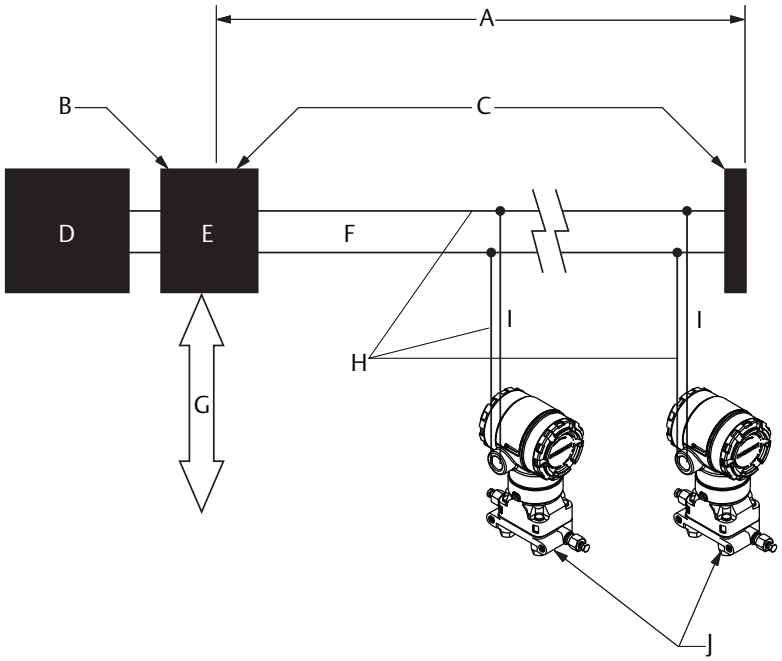
   - Power terminals are polarity insensitive - connect positive or negative to either terminal.
4. Ensure proper grounding (See Figure 4-6). It is important that the instrument cable shield:
   - be trimmed close and insulated from touching the transmitter housing
   - be connected to the next shield if cable is routed through a junction box
   - be connected to a good earth ground at the power supply end
5. Plug and seal unused conduit connections.
6. If applicable, install wiring with a drip loop. See Figure 4-3.
7. Replace the housing cover.

Figure 4-4. Rosemount 2051 PROFIBUS Terminal Block



A. Terminals
B. Ground terminal

Figure 4-5. Basic PROFIBUS PA System Configuration



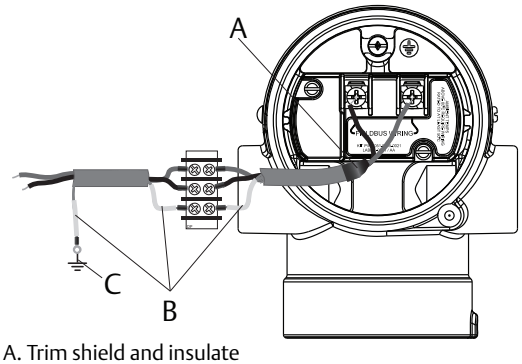
A. 6234 ft (1900 m) max (depending upon cable characteristics)
B. Integrated power conditioner and filter
C. Terminators
D. Power supply
E. DP/PA coupler/link
F. Trunk
G. DP network
H. Signal wiring
I. Spur
J. PROFIBUS PA device

4.6.3 Signal wiring grounding

Do not run signal wiring in conduit or open trays with power wiring, or near heavy electrical equipment. Grounding terminations are provided on the outside of the electronics housing and inside the terminal compartment. These grounds are used when transient protect terminal blocks are installed or to fulfill local regulations. See Step 2 below for more information on how the cable shield should be grounded.

1. Remove the field terminals housing cover.
2. Connect the wiring pair and ground as indicated in Figure 4-6. The cable shield should:
   - be trimmed close and insulated from touching the transmitter housing
   - continuously connect to the termination point
   - be connected to a good earth ground at the power supply end

Figure 4-6. Wiring



A. Trim shield and insulate
B. Insulate shield
C. Connect shield back to the power supply ground

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

Power supply

The dc power supply should provide power with less than two percent ripple. The transmitter requires between 9 and 32 Vdc (between 9 and 17.5 Vdc for FISCO) at the terminals to operate and provide complete functionality.

Power conditioner

The DP/PA coupler/link often includes an integrated power conditioner.

Grounding

Transmitters are electrically isolated to 500 Vac rms. Signal wiring can not be grounded.

Shield wire ground

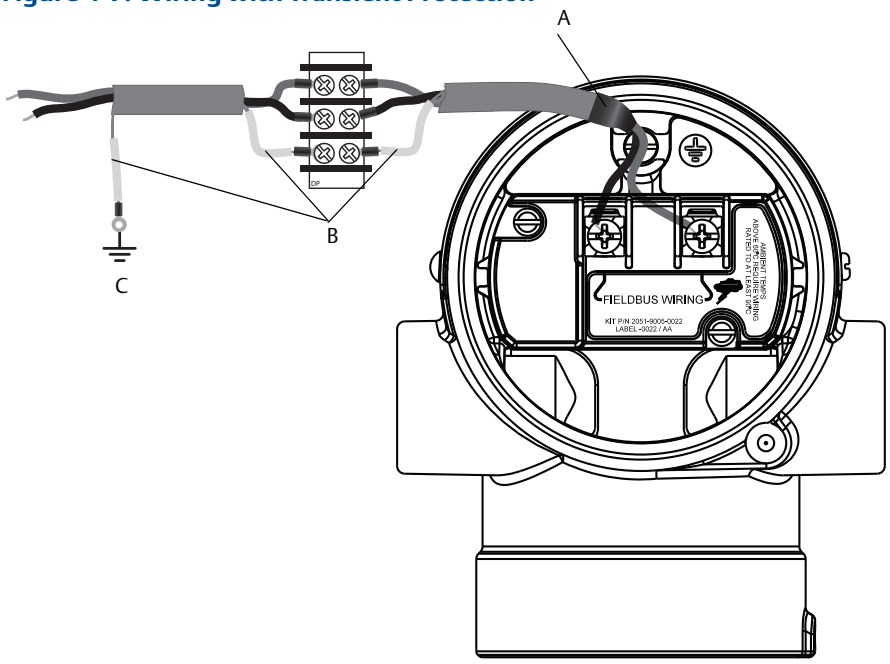
Grounding techniques for shield wire usually require a single grounding point for shield wire to avoid creating a ground loop. The ground point is typically at the power supply.

4.6.4 Transient protection terminal block

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

The transient protection terminal block can be ordered as an installed option (Option Code T1 in the transmitter model number) or as a spare part to retrofit existing Rosemount 2051 Transmitters in the field. See "Other spare parts" on page 126 for spare part numbers. The lightning bolt symbol shown in Figure 4-7 identifies the transient protection terminal block.

Figure 4-7. Wiring with Transient Protection



A. Trim shield and insulate
B. Insulate shield
C. Connect shield back to the power supply ground

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. Refer to "Grounding" on page 44.

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

4.6.5 Grounding

⚠ Use the following techniques to properly ground the transmitter signal wiring and case:

Signal wiring

Do not run signal wiring in conduit or open trays with power wiring or near heavy electrical equipment. It is important that the instrument cable shield:

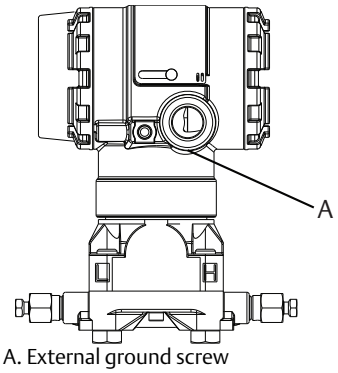
- be trimmed close and insulated from touching the transmitter housing
- be connected to the next shield if cable is routed through a junction box
- be connected to a good earth ground at the power supply end

Transmitter case

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

- Internal ground connection: The internal ground connection screw is inside the FIELD TERMINALS side of the electronics housing. This screw is identified by a ground symbol (⏚). The ground connection screw is standard on all Rosemount 2051Transmitters. Refer to Figure 4-4.
- External ground assembly: This assembly is included with the optional transient protection terminal block (option code T1), and it is included with various hazardous location certifications. The external ground assembly can also be ordered with the transmitter (option code V5), or as a spare part. See “Other spare parts” on page 126. Refer to Figure 4-8 for location of the external ground screw.

Figure 4-8. External Ground Assembly



A. External ground screw

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

Section 5 Calibration

5.1 Overview

This section contains information on calibrating the Rosemount™ 2051 Pressure Transmitter with PROFIBUS® PA Protocol using either the local operator interface (LOI) or a Class 2 Master.

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.

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 Reference Manual for any restrictions associated with a safe installation.

- 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.

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.

5.3 Calibration overview

Calibration is defined as the process required to optimize transmitter accuracy over a specific range by adjusting the factory sensor characterization curve located in the micro-processor. This is done by performing one of the following procedures,

5.3.1 Zero trim

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 "Manifold operation" on page 28.

Note
Do not perform a zero trim on absolute pressure transmitters. Zero trim is zero based, and absolute pressure transmitters reference absolute zero. To correct mounting position effects on absolute pressure transmitters, perform a lower trim within the sensor trim function. The lower trim function provides an offset correction similar to the zero trim function, but it does not require zero-based input.

5.3.2 Sensor trim

A two-point sensor calibration where two end-point pressures are applied, and all output is linearized between them. Always adjust the lower trim value first to establish the correct offset. Adjustment of the upper trim value provides a slope correction to the characterization curve based on the lower trim value. The trim values allow you to optimize performance over your specified measuring range at the calibration temperature. Sensor trimming requires an accurate pressure input – at least four times more accurate than the transmitter – in order to optimize performance over a specific pressure range.

Note
The Rosemount 2051 has been carefully calibrated at the factory. Trimming adjusts the position of the factory characterization curve. It is possible to degrade performance of the transmitter if any trim is done improperly or with inaccurate equipment.

Note
Rosemount 2051C Range 4 and Range 5 Transmitters require a special calibration procedure when used in differential pressure applications under high static line pressure. See "Compensating for line pressure" on page 50.

5.3.3 Recall factory trim

A command that allows the restoration of the as-shipped factory settings of the sensor trim. This command can be useful for recovering from an inadvertent zero trim of an absolute pressure unit or inaccurate pressure source.

5.4 Determining calibration frequency

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

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

Sample calculation for a standard Rosemount 2051C

Step 1: Determine the performance required for your application.

Required performance:	0.30% of span

Step 2: Determine the operating conditions.

Transmitter:	Rosemount 2051CD, Range 2 (URL= 250 inH_2O [623 mbar])
Calibrated span:	150 inH_2O (374 mbar)
Ambient temperature change:	±50 °F (28 °C)
Line pressure:	500 psig (34,5 bar)

Step 3: Calculate total probable error (TPE).

$$TPE = \sqrt{(ReferenceAccuracy)^2 + (TemperatureEffect)^2 + (StaticPressureEffect)^2} = 0.189\% \text{ of span}$$

where:

Reference accuracy = ± 0.065% of span

Ambient temperature effect = $\pm\left(\frac{0.025\% \text{ URL}}{\text{Span}} + 0.125\right)$ per 50 °F = ±0.1666% of span

Span static pressure effect[1] = 0.1% reading per 1000 psi (69 bar) = ±0.05% of span at maximum span

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

Step 4: Calculate the stability per month.

Stability = $\pm\left(\frac{0.100\% \text{ URL}}{\text{Span}}\right)$ % of span for 3 years = ±0.0046% span per month

Step 5: Calculate calibration frequency.

$$\text{Calibration frequency} = \frac{(\text{Required performance} - TPE)}{\text{Stability per month}} = \frac{(0.3\% - 0.189\%)}{0.0069\%} = 25 \text{months}$$

5.5 Zero trim

Note
The transmitter PV at zero pressure must be within 10% × upper sensor limit (USL) of zero in order to calibrate using the zero trim function.

5.5.1 LOI

1. Enter *Calibration* >> *Zero.*
   a. Verify measurement is within 10% × USL of zero.
   b. Save.

5.5.2 Class 2 Master

1. To set the Transducer Block to Out of Service, select the following:
   a. From the *Basic Setup* >> *Mode* >> *Transducer Block* >> *Target* dropdown, select **Out of Service**.
   b. Select **Transfer**.
2. To calibrate the sensor, select the following in *Basic Setup* >> *Calibration*:
   a. In the *Lower Calibration Point* field, enter **0**.
   b. Adjust pressure source to zero pressure.
   c. Verify Pressure Trimmed Value is stable and within 10% × LSL of zero.
   d. Select **Transfer**.
3. To set Transducer Block to **Auto**, select the following:
   a. From the *Basic Setup* >> *Mode* >> *Transducer Block* >> *Target* dropdown, select **Auto**.
   b. Select **Transfer**.

5.6 Sensor trim

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

5.6.1 LOI

1. Enter ***Calibration*** >> ***Lower*** menu.
   a. Enter trim unit and value.
   b. Verify measurement is stable.
   c. Save.
2. Enter ***Calibration*** >> ***Upper*** menu.
   a. Enter trim unit and value.
   b. Verify measurement is stable.
   c. Save.

5.6.2 Class 2 Master

1. To set the Transducer Block to **Out of Service**, select the following:
   a. From the *Basic Setup* >> *Mode* >> *Transducer Block* >> *Target Mode* dropdown, select **Out of Service**.
   b. Select **Transfer**.
2. Set the lower sensor calibration, select the following in *Basic Setup* >> *Calibration*:
   a. In the *Lower Calibration Point* field, enter value.
   b. Adjust pressure source to desired pressure.
   c. Verify Pressure Trimmed Value is stable.
   d. Select **Transfer**.
3. Set the upper sensor calibration, select the following in *Basic Setup* >> *Calibration*:
   a. In the *Upper Calibration Point* field, enter value.
   b. Adjust pressure source to desired pressure.
   c. Verify Pressure Trimmed Value is stable.
   d. Select **Transfer**.
4. To set Transducer Block to **Auto**, select the following:
   a. From the *Basic Setup* >> *Mode* >> *Transducer Block* >> *Target Mode* dropdown, select **Auto**.
   b. Select **Transfer**.

5.7 Recall factory trim

5.7.1 LOI

1. Enter **Calibration** >> **Reset**.
2. Save.

5.7.2 Class 2 Master

1. To set the Transducer Block to Out of Service, select the following:
   a. From the *Basic Setup* >> *Mode* >> *Transducer Block* >> *Target* dropdown, select **Out of Service**.
   b. Select **Transfer.**
2. To Recall the Factory Trim select the following in *Basic Setup* >> *Calibration* >> *Factory Recall*:
   a. Select **Factory Settings**.
   b. Select **Transfer**.
3. To set Transducer Block to *AUTO*, select the following:
   a. From the *Basic Setup* >> *Mode* >> *Transducer Block* >> *Target* dropdown, select **Auto**.
   b. Select **Transfer**.

5.8 Compensating for line pressure

5.8.1 Range 2 and 3

The following specifications show the static pressure effect for the Rosemount 2051 Range 2 and 3 Pressure Transmitters used in differential pressure applications where line pressure exceeds 2000 psi (138 bar).

Zero effect

±0.1% of the upper range limit plus an additional ±0.1% of upper range limit error for each 1000 psi (69 bar) of line pressure above 2000 psi (138 bar).

Example

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

$\pm(0.01 + 0.1 \times [3 \text{ kpsi} - 2 \text{ kpsi}]) = \pm 0.2\%$ of the upper range limit

Span effect

Refer to "Line pressure effect per 1000 psi (6,9 MPa)" on page 63.

5.8.2 Range 4 and 5

Rosemount 2051 Range 4 and 5 Pressure Transmitters require a special calibration procedure when used in differential pressure applications. The purpose of this procedure is to optimize transmitter performance by reducing the effect of static line pressure in these applications. The Rosemount 2051 Differential Pressure Transmitters (Ranges 1, 2, and 3) do not require this procedure because optimization occurs in the sensor.

Applying high static pressure to Rosemount 2051 Range 4 and 5 Pressure Transmitters causes a systematic shift in the output. This shift is linear with static pressure; correct it by performing the "Sensor trim" on page 46.

The following specifications show the static pressure effect for Rosemount 2051 Range 4 and 5 Transmitters used in differential pressure applications:

Zero effect

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

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

Example

Line pressure is 3000 psi (3 kpsi). Zero effect error calculation:

$\pm(0.2 + 0.2 \times [3 \text{ kpsi} - 2 \text{ kpsi}]) = \pm 0.4\%$ of the upper range limit

Span effect

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

Section 6 Troubleshooting

6.1 Overview

This section contains information on how to troubleshoot the Rosemount™ 2051 Pressure Transmitter with PROFIBUS® PA Protocol.

6.2 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.

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 Reference Manual for any restrictions associated with a safe installation.

- 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.

Electrical shock can result in death or serious injury.

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

6.3 Service support

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

Within the United States, call the Emerson Process Management Instrument and Valve Response Center using the 1-800-654-RSMT (7768) toll-free number. This center, available 24 hours a day, will assist you with any needed information or materials.

The center will ask for product model and serial numbers, and will provide a Return Material Authorization (RMA) number. The center will also ask for the process material to which the product was last exposed.

⚠ CAUTION

Individuals who handle products exposed to a hazardous substance can avoid injury if they are informed of and understand the hazard. The product being returned will require a copy of the required Material Safety Data Sheet (MSDS) for each substance must be included with the returned goods.

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

6.4 Diagnostics identification and recommended action

The Rosemount 2051 PROFIBUS device diagnostics can be used to warn a user about a potential transmitter error. There is a transmitter error if the Output Status reads anything but *Good* or *Good - Function Check*, or the LCD display reads *SNSR* or *ELECT*. Use Table 6-1 to identify what diagnostic condition exists based on the combination of errors under the *How to Identify* columns. Start with the *Physical block diagnostic extension* and use *Primary value* and *Temperature status* to identify the diagnostic condition. If a box is blank, it is not necessary to identify that diagnostic condition. Once condition is identified, use the *What to do* column to remedy the error.

Table 6-1. Diagnostics Identification and Recommended Action

Diagnostics condition	How to identify			What to do
	Class 1 or 2 Master	Class 2 Master		
Diagnostics condition	**Physical block diagnostic extension**	**Primary value status**	**Temperature status**	**Recommended action**
PV Simulation Enabled	Simulate Active	N/A	N/A	1. Check the simulation switch. 2. Replace the electronics.
Pressure beyond sensor limits	Sensor Transducer Block Error	Bad, sensor failure, underflow/ overflow	N/A	1. Verify the applied pressure is within the range of the pressure sensor. 2. Check for impulse line plugging or leaks. 3. Replace the sensor module.

Diagnostics condition	How to identify			What to do
	Class 1 or 2 Master	Class 2 Master		
Diagnostics condition	**Physical block diagnostic extension**	**Primary value status**	**Temperature status**	**Recommended action**
Module Temperature Beyond limits	Sensor Transducer Block Error	N/A	Uncertain	1. Verify the sensor temperature is between –45 and 90 °C. 2. Replace the sensor module.
Sensor Module Memory Failure		Bad, out of service (OOS)	N/A	1. Replace sensor module.
No Sensor Module Pressure Updates		Bad, sensor failure, constant	N/A	1. Check cable connection between sensor module and electronics. 2. Replace electronics. 3. Replace sensor module.
No Device Temperature Updates		N/A	Bad	1. Check cable connection between sensor module and electronics. 2. Replace electronics. 3. Replace sensor module.
Circuit Board Memory Failure	Memory Failure or Non Volatile Memory Integrity Error	N/A	N/A	1. Replace electronics.
LOI button stuck	LOI Button Malfunction	N/A	N/A	1. Check if button is stuck under housing. 2. Replace buttons. 3. Replace electronics.

6.4.1 Extended diagnostics identification with Class 1 Master

If using a Class 1 Master to identify *Physical Block Diagnostic Extensions*, see Figure 6-1 and Figure 6-2 for diagnostic bit information. Table 6-2 and Table 6-3 list the diagnostic description for each bit.

Note
A Class 2 Master will automatically decode bits and provide diagnostic names.

Figure 6-1. Extended Diagnostics Identification

Standard diagnostic response 6 bytes	Extended Diagnostic Data
	Device Related

Header byte	Status, slot number, status specifier	Diagnosis	Extended diagnosis (vendor specific)
0 0 x x x x x x	3 Bytes	4 Bytes	3 Bytes

Figure 6-2. Diagnoses and Extended Diagnoses Bit Identification

Diagnosis

	Byte 1								Byte 2							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Unit_Diag_Bit(1)	31	30	29	28	27	26	25	24	39	38	37	36	35	34	33	32

Byte 3								Byte 4							
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
47	46	45	44	43	42	41	40	55	54	53	52	51	50	49	48

Extended Diagnosis

	Byte 1								Byte 2							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Unit_Diag_Bit(1)	63	62	61	60	59	58	57	56	71	70	69	68	67	66	65	64

Byte 3							
7	6	5	4	3	2	1	0
79	78	77	76	75	74	73	72

1. Unit_Diag_Bit is located in GSD file.

Table 6-2. Diagnosis Descriptions

Device related diagnosis		
Byte-bit	**Unit_Diag_Bit (1)**	**Diagnostic description**
2-4	36	Cold Start
2-3	35	Warm Start
3-2	42	Function Check
3-0	40	Maintenance Alarm
4-7	55	More Information Available

1. Unit_Diag_Bit is located in GSD file.

Table 6-3. Extended Diagnosis Descriptions(1)

Diagnostic extension Byte-Bit		
Byte-bit	**Unit_Diag_Bit (1)**	**Diagnostic description**
1-4	28	Simulate Active
1-7	63	Other
2-0	64	Out-of-Service
2-1	65	Power-Up
2-2	66	Device Needs Maintenance now
2-4	68	Lost NV Data

Diagnostic extension Byte-Bit		
Byte-bit	**Unit_Diag_Bit (1)**	**Diagnostic description**
2-5	69	Lost Static Data
2-6	70	Memory Failure
3-1	73	ROM Integrity Error
3-3	75	Non-Volatile Memory Integrity Error
3-4	76	Hardware/Software Incompatible
3-5	77	Manufacturing Block Integrity Error
3-6	78	Sensor Transducer Block Error
3-7	79	LOI Button Malfunction is detected

1. Unit_Diag_Bit is located in GSD file.

6.5 PlantWeb™ and NE107 diagnostics

Table 6-4 describes the recommended status of each diagnostic condition based on PlantWeb and NAMUR NE107 recommendations.

Table 6-4. Output Status

Name	PlantWeb alert category	NE107 category
PV Simulation Enabled	Advisory	Check
LOI button pressed	Advisory	Good
Pressure beyond sensor limits	Maintenance	Failure
Module Temperature Beyond limits	Maintenance	Out of spec
Sensor Module Memory Failure	Failure	Failure
No Sensor Module Pressure Updates	Failure	Failure
No Device Temperature Updates	Failure	Out of spec
Circuit Board Memory Failure	Failure	Failure
LOI button stuck	Failure	Failure

6.6 Alert messages and fail safe type selection

Table 6-5 defines the output status and LCD display messages that will be driven by a diagnostic condition. This table can be used to determine what type of fail safe value setting is preferred. Fail safe type can be set with a Class 2 Master under *Fail Safe >> Fail Safe Mode*.

Table 6-5. Alert Messages

Diagnostic	Output status (based on fail safe type)			LCD display status
Name	Use fail safe value	Use last good value	Use wrong calculated value	
PV Simulation Enabled	Depends on simulated value/status	Depends on simulated value/status	Depends on simulated value/status	N/A
LOI button pressed	Good, function check	Good, function check	Good, function check	N/A
Pressure beyond sensor limits	Uncertain, substitute set	Uncertain, substitute set	Bad, process related, maintenance alarm	SNSR
Module Temperature Beyond limits	Uncertain, substitute set	Uncertain, process related, no maintenance	Uncertain, process related, no maintenance	SNSR
Sensor Module Memory Failure	Bad, passivated	Uncertain, substitute set	Bad, maintenance alarm	SNSR
No Sensor Module Pressure Updates	Uncertain, substitute set	Uncertain, substitute set	Bad, process related, maintenance alarm	SNSR
No Device Temperature Updates	Uncertain, process related, no maintenance	Uncertain, process related, no maintenance	Uncertain, process related, no maintenance	SNSR
Circuit Board Memory Failure	Bad, passivated	Bad, passivated	Bad, passivated	ELECT
LOI button stuck	Bad, passivated	Bad, passivated	Bad, passivated	ELECT

Table 6-6. Output Status Bit Definition

Description	HEX	DECIMAL
Bad - passivated	0x23	35
Bad, maintenance alarm, more diagnostics available	0x24	36
Bad, process related - no maintenance	0x28	40
Uncertain, substitute set	0x4B	75
Uncertain, process related, no maintenance	0x78	120
Good, ok	0x80	128
Good, update event	0x84	132
Good, advisory alarm, low limit	0x89	137
Good, advisory alarm, high limit	0x8A	138
Good, critical alarm, low limit	0x8D	141
Good, critical alarm, high limit	0x8E	142
Good, function check	0xBC	188

6.7 Disassembly procedures

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

6.7.1 Remove from service

Follow these steps:

1. Follow all plant safety rules and procedures.
2. Isolate and vent the process from the transmitter before removing the transmitter from service.
3. Remove all electrical leads and disconnect conduit.
4. Remove the transmitter from the process connection.
   - The Rosemount 2051C Transmitter is attached to the process connection by four bolts and two cap screws. Remove the bolts and separate the transmitter from the process connection. Leave the process connection in place and ready for re-installation.
   - The Rosemount 2051T Transmitter is attached to the process by a single hex nut process connection. Loosen the hex nut to separate the transmitter from the process. Do not wrench on neck of transmitter.
   - Do not scratch, puncture, or depress the isolating diaphragms.
5. Clean isolating diaphragms with a soft rag and a mild cleaning solution, and rinse with clear water.
   - For the Rosemount 2051C, whenever removing the process flange or flange adapters, visually inspect the PTFE O-rings. Replace the O-rings if they show any signs of damage, such as nicks or cuts. Undamaged O-rings may be reused.

6.7.2 Remove terminal block

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

1. Remove the housing cover from the field terminal side.
2. Loosen the two small screws located on the assembly in the 9 o’clock and 5 o’clock positions.
3. Pull the entire terminal block out to remove it.

6.7.3 Remove the electronics board

The transmitter electronics board is located in the compartment opposite the terminal side. To remove the electronics board perform the following procedure:

1. Remove the housing cover opposite the field terminal side.
2. If you are disassembling a transmitter with a LCD display, loosen the two captive screws that are visible on the right and left side of the meter display.

⚠ 3. Loosen the two captive screws that anchor the board to the housing. The electronics board is electrostatically sensitive; observe handling precautions for static-sensitive components. Use caution when removing the LCD display as there is an electronic pin connector that interfaces between the LCD display and electronics board. The two screws anchor the LCD display to the electronics board and the electronics board to the housing.

4. Using the two captive screws, slowly pull the electronics board out of the housing. The sensor module ribbon cable holds the electronics board to the housing. Disengage the ribbon cable by pushing the connector release.

6.7.4 Remove the sensor module from the electronics housing

1. Remove the electronics board. Refer to "Remove the electronics board" on page 57.

Important
To prevent damage to the sensor module ribbon cable, disconnect it from the electronics board before you remove the sensor module from the electrical housing.

2. Carefully tuck the cable connector completely inside of the internal black cap.

Note
Do not remove the housing until after you tuck the cable connector completely inside of the internal black cap. The black cap protects the ribbon cable from damage that can occur when you rotate the housing.

3. Loosen the housing rotation set screw with a $^{5}/_{64}$-in. hex wrench, and loosen one full turn.
4. Unscrew the module from the housing, making sure the black cap and sensor cable do not catch on the housing.

6.8 Reassembly procedures

1. Inspect all cover and housing (non-process wetted) O-rings and replace if necessary. Lightly grease with silicone lubricant to ensure a good seal.
2. Carefully tuck the cable connector completely inside the internal black cap. Turn the black cap and cable counterclockwise one rotation to tighten the cable.
3. Lower the electronics housing onto the module. Guide the internal black cap and cable through the housing and into the external black cap.
4. Turn the module clockwise into the housing.

Important
Make sure the sensor ribbon cable and internal black cap remain completely free of the housing as you rotate it. Damage can occur to the cable if the internal black cap and ribbon cable become hung up and rotate with the housing.

⚠ 5. Thread the housing completely onto the sensor module. The housing must be no more than one full turn from flush with the sensor module to comply with explosion proof requirements.
6. Tighten the housing rotation set screw using a $^{5}/_{64}$-in. hex wrench.

6.8.1 Attach the electronics board

1. Remove the cable connector from its position inside of the internal black cap and attach it to the electronics board.
2. Using the two captive screws as handles, insert the electronics board into the housing. Make sure the posts from the electronics housing properly engage the receptacles on the electronics board. Do not force. The electronics board should slide gently on the connections.
3. Tighten the captive mounting screws.
4. ⚠ Replace the electronics housing cover. The transmitter covers must be engaged metal-to-metal to ensure a proper seal and to meet Explosion-Proof requirements.

6.8.2 Install the terminal block

1. Gently slide the terminal block into place, making sure the two posts from the electronics housing properly engage the receptacles on the terminal block.
2. Tighten the captive screws.
3. Replace the electronics housing cover. The transmitter covers must be fully engaged to meet explosion-proof requirements.

6.8.3 Reassemble the Rosemount 2051C process flange

1. Inspect the sensor module PTFE O-rings. Undamaged O-rings may be reused. Replace O-rings that show any signs of damage, such as nicks, cuts, or general wear.

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

2. Install the process connection. Possible options include:
   - Coplanar process flange:
     a. Hold the process flange in place by installing the two alignment screws to finger tightness (screws are not pressure retaining). Do not overtighten as this will affect module-to-flange alignment.
     b. Install the four 1.75-in. flange bolts by finger tightening them to the flange.
   - Coplanar process flange with flange adapters:
     a. Hold the process flange in place by finger tightening the two alignment screws (screws are not pressure retaining). Do not overtighten as this will affect module-to-flange alignment.
     b. Hold the flange adapters and adapter O-rings in place while installing the four configurations, use four 2.88-in. bolts. For gage pressure configurations, use two 2.88-in. bolts and two 1.75-in. bolts.
   - Manifold:
     a. Contact the manifold manufacturer for the appropriate bolts and procedures.
3. Tighten the bolts to the initial torque value using a crossed pattern. See Table 6-7 for appropriate torque values.

Table 6-7. Bolt Installation Torque Values

Bolt material	Initial torque value	Final torque value
CS-ASTM-A445 Standard	300 in-lb (34 N-m)	650 in-lb (73 N-m)
316 SST—Option L4	150 in-lb (17 N-m)	300 in-lb (34 N-m)
ASTM-A-193-B7M—Option L5	300 in-lb (34 N-m)	650 in-lb (73 N-m)
ASTM-A-193 class 2, Grade B8M—Option L8	150 in-lb (17 N-m)	300 in-lb (34 N-m)

Note
If replacing the PTFE sensor module O-rings, re-torque the flange bolts after installation to compensate for cold flow.

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

6.8.4 Install the drain/vent valve

1. 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.
2. Tighten the drain/vent valve to 250 in-lb (28.25 N-m).
3. 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.

Appendix A Specifications and Reference Data

A.1 Performance specifications

This section covers HART®, Wireless, FOUNDATION™ Fieldbus, and PROFIBUS® PA Protocols unless specified.

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

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

A.1.2 Reference accuracy

Stated reference accuracy equations include terminal based linearity, hysteresis, and repeatability. For Wireless, FOUNDATION Fieldbus, and PROFIBUS PA devices, use calibrated range in place of span.

Models	Standard	High performance option, P8[1]	
2051C			
Range 1	±0.10% of span For spans less than 15:1, accuracy = $\pm\left(0.025 + 0.005\left[\frac{URL}{Span}\right]\right)$ % of span	N/A	N/A
Ranges 2–4	±0.065% of span For spans less than 10:1, accuracy = $\pm\left(0.025 + 0.005\left[\frac{URL}{Span}\right]\right)$ % of span	Ranges 2–4	High accuracy option, P8 ±0.05% of span For spans less than 10:1[2], accuracy = $\pm\left(0.015 + 0.005\left[\frac{URL}{Span}\right]\right)$ % of span
Range 5	±0.075% of span For spans less than 10:1, accuracy= $\pm\left(0.025 + 0.005\left[\frac{URL}{Span}\right]\right)$ % of span	Range 5	High performance option, P8 ±0.065% of span For spans less than 10:1, accuracy= $\pm\left(0.015 + 0.005\left[\frac{URL}{Span}\right]\right)$ % of span

Models	Standard	High performance option, P8[1]	
2051T			
Ranges 1–4	±0.065% of span For spans less than 10:1, accuracy = $\pm\left(0.0075\left[\frac{URL}{Span}\right]\right)$ % of span	Ranges 1–4	High accuracy option, P8 ±0.05% of span For spans less than 10:1[2], accuracy = $\pm\left(0.0075\left[\frac{URL}{Span}\right]\right)$ % of span
Range 5	±0.075% of span For spans less than 10:1, accuracy = $\pm\left(0.0075\left[\frac{URL}{Span}\right]\right)$ % of span	N/A	N/A
2051L			
Ranges 2–4	±0.075% of span For spans less than 10:1, accuracy = $\pm\left(0.025 + 0.005\left[\frac{URL}{Span}\right]\right)$ % of span	N/A	N/A

1. Not available with output code W.
2. For protocol code F, accuracy specification is for spans less than 7:1.

A.1.3 Flow performance

Flow reference accuracy

Rosemount 2051CFA Annubar Flowmeter		
Ranges 2–3		±2.00% of flow rate at 5:1 flow turndown
Rosemount 2051CFC_A Compact Annubar Flowmeter — Annubar option A		
Ranges 2–3	Standard	±2.60% of flow rate at 5:1 flow turndown
	Calibrated	±2.30% of flow rate at 5:1 flow turndown
Rosemount 2051CFC Compact Orifice Flowmeter — conditioning option C		
Ranges 2–3	β = 0.4	±2.25% of flow rate at 5:1 flow turndown
	β = 0.65	±2.45% of flow rate at 5:1 flow turndown
Rosemount 2051CFC Compact Orifice Flowmeter — orifice type option P[1]		
Ranges 2–3	β =0.4	±2.50% of flow rate at 5:1 flow turndown
	β =0.65	±2.50% of flow rate at 5:1 flow turndown
Rosemount 2051CFP Integral Orifice Flowmeter		
Ranges 2–3	Bore < 0.1	±3.10% of flow rate at 5:1 flow turndown
	0.1 < Bore < 0.2	±2.75% of flow rate at 5:1 flow turndown
	0.2 < Bore < 0.6	±2.25% of flow rate at 5:1 flow turndown
	0.6 < Bore < 0.8	±3.00% of flow rate at 5:1 flow turndown

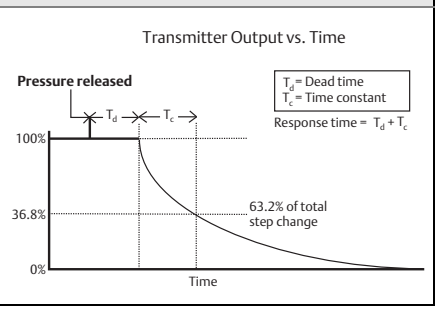
1. For smaller line sizes, see Rosemount Compact Orifice.

Long-term stability

±50 °F (28 °C) temperature changes and up to 1000 psi (6,9 MPa) line pressure.

Models	Standard	High performance option, P8
2051C		
Range 1 (CD)	±0.2% of URL for 1 year	±0.125% of URL for 5 years
Ranges 2–5	±0.1% of URL for 3 years	
2051T		
Ranges 1–5	±0.1% of URL for 3 years	±0.125% of URL for 5 years

A.1.4 Dynamic performance

	4–20 mA HART[1] 1–5 Vdc HART Low Power	FOUNDATION Fieldbus and PROFIBUS PA Protocols [2]	Typical HART transmitter response time
Total response time (T_d + T_c)[3]:			
2051C, Range 3–5: Range 1: Range 2: 2051T: 2051L:	115 ms 270 ms 130 ms 100 ms See Instrument Toolkit™	152 ms 307 ms 152 ms 152 ms See Instrument Toolkit	
Dead time (T_d)	60 ms (nominal)	97 ms	
Update rate[4]	22 times per second	22 times per second	

1. Dead time and update rate apply to all models and ranges; analog output only.
2. Transducer Block response time, Analog Input block execution time not included.
3. Nominal total response time at 75 °F (24 °C) reference conditions.
4. Does not apply to wireless (output code X). See "Wireless (output code X)" on page 67 for wireless update rate.

Line pressure effect per 1000 psi (6,9 MPa)

For line pressures above 2000 psi (13,7 MPa) and Ranges 4–5, see Rosemount 2051 Reference Manual for HART, Rosemount 2051 Reference Manual for *Wireless*HART, Rosemount 2051 Reference Manual for FOUNDATION Fieldbus, and Rosemount 2051 Reference Manual PROFIBUS PA.

Models	Line pressure effect	
2051CD, 2051CF	**Zero Error**[1]	**Span Error**
Range 1	±0.25% of URL/ 1000 psi (68,9 bar)	±0.4% of reading/ 1,000 psi (68,9 bar)
Ranges 2–3	±0.05% of URL/ 1000 psi (68,9 bar) for line pressures from 0 to 2000 psi (0 to 13,7 MPa)	±0.1% of reading/ 1,000 psi (68,9 bar)

1. Can be calibrated out at line pressure.

Ambient temperature effect per 50 °F (28 °C)

Models	Ambient temperature effect
2051C, 2051CF	
Ranges 2–5	±(0.025% URL + 0.125% span) from 1:1 to 5:1 ±(0.05% URL + 0.25% span) from 5:1 to 100:1
Range 1	±(0.1% URL + 0.25% span) from 1:1 to 30:1
2051T	
Range 2–4	±(0.05% URL + 0.25% span) from 1:1 to 30:1 ±(0.07% URL + 0.25% span) from 30:1 to 100:1
Range 1	±(0.05% URL + 0.25% span) from 1:1 to 10:1 ±(0.10% URL + 0.25% span) from 10:1 to 100:1
Range 5	±(0.1% URL + 0.15% span)
2051L	See Instrument Toolkit

Mounting position effects

Models	Mounting position effects
2051C	Zero shifts up to ±1.25 inH_2O (3,1 mbar), which can be calibrated out. No span effect.
2051T	Zero shifts up to ±2.5 inH_2O (6,2 mbar), which can be calibrated out. No span effect.
2051L	With liquid level diaphragm in vertical plane, zero shift of up to 1 inH_2O (2,49 mbar). With diaphragm in horizontal plane, zero shift of up to 5 inH_2O (12,43 mbar) plus extension length on extended units. Zero shifts can be calibrated out. No span effect.

Vibration effect

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

Power supply effect

Less than ±0.005% of calibrated span per volt.(1)

Electromagnetic compatibility (EMC)

Meets all relevant requirements of EN 61326 and NAMUR NE-21.(2)

Maximum deviation < 1% Span during EMC disturbance.(3)

1. Does not apply to wireless (output code X).
2. NAMUR NE-21 does not apply to wireless output code X.
3. During surge event device may exceed maximum EMC deviation limit or reset; however, device will self-recover and return to normal operation within specified start-up time.

Transient protection (option code T1)

Meets IEEE C62.41, category location B

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

A.2 Functional specifications

A.2.1 Range and sensor limits

Table A-1. Range and Sensor Limits for Rosemount 2051CD, 2051CF, 2051CG, 2051L models

Range	Minimum span	Upper (URL)	Lower (LRL)			
			2051C Differential and 2051CF Flowmeters	2051C Gage(1)	2051L Differential	2051L Gage(1)
1	0.5 inH_2O (1,2 mbar)	25 inH_2O (62,3 mbar)	–25 inH_2O (–62,1 mbar)	–25 inH_2O (–62,1 mbar)	N/A	N/A
2	2.5 inH_2O (6,2 mbar)	250 inH_2O (0,62 bar)	–250 inH_2O (–0,62 bar)	–250 inH_2O (–0,62 bar)	–250 inH_2O (–0,62 bar)	–250 inH_2O (–0,62 bar)
3	10 inH_2O (24,9 mbar)	1000 inH_2O (2,49 bar)	–1000 inH_2O (–2,49 bar)	–393 inH_2O (–979 mbar)	–1000 inH_2O (–2,49 bar)	–393 inH_2O (–979 mbar)
4	3 psi (0,207 bar)	300 psi (20,7 bar)	–300 psi (–20,7 bar)	–14.2 psig (–979 mbar)	–300 psi (–20,7 bar)	–14.2 psig (–979 mbar)
5	20 psi (1,38 bar)	2000 psi (137,9 bar)	–2000 psi (–137,9 bar)	–14.2 psig (–979 mbar)	N/A	N/A

1. Assumes atmospheric pressure of 14.7 psig.

Table A-2. Range and Sensor Limits for Rosemount 2051T model

Range	Minimum span	Upper (URL)	Lower (LRL)(Abs)	Lower(1) (LRL)(Gage)
1	0.3 psi (20,7 mbar)	30 psi (2,07 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)
2	1.5 psi (0,103 bar)	150 psi (10,3 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)
3	8 psi (0,55 bar)	800 psi (55,2 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)
4	40 psi (2,76 bar)	4000 psi (275,8 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)
5	2,000 psi (137,9 bar)	10,000 psi (689,5 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)

1. Assumes atmospheric pressure of 14.7 psig.

A.2.2 Service

Liquid, gas, and vapor applications

A.2.3 4–20 mA HART (output code A)

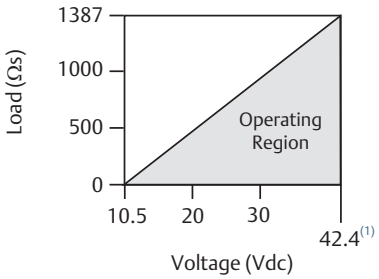
Power supply

External power supply required. Standard transmitter operates on 10.5 to 42.4 Vdc with no load.

Load limitations

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

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



Communication requires a minimumloop resistance of 250 ohms.

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

Indication

Optional two line LOI/LCD display

Zero and span adjustment requirements

Zero and span values can be set anywhere within the range limits stated in Table A-1 and Table A-2.

Span must be greater than or equal to the minimum span stated in Table A-1 and Table A-2.

Output

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

Rosemount 2051

Digital communications based on HART Revision 5 Protocol.

Rosemount2051 with Selectable HART

The Rosemount 2051 with Selectable HART comes with Selectable HART Revisions. Digital communications based on HART Revision 5 (default) or Revision 7 (option code HR7) Protocol can be selected. The HART revision can be switched in the field using any HART based configuration tool or the optional LOI.

LOI

The LOI utilizes a two-button menu with internal and external configuration buttons. Internal buttons are always configured for LOI. External buttons can be configured for either LOI, (option code M4), analog zero and span (option code D4) or digital zero trim (option code DZ). See Rosemount 2051 with Selectable HART Reference Manual for LOI configuration menu.

A.2.4 FOUNDATION Fieldbus (output code F)

Power supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter terminal voltage for non-I.S. applications, 9.0 to 30 Vdc for entity model intrinsically safe applications and 9.0 to 17.5 Vdc for FISCO intrinsically safe applications.

Current draw

17.5 mA for all configurations (including LCD display option)

Indication

Optional two-line LCD display

FOUNDATION Fieldbus function block Execution times

Block	Execution time
Resource	N/A
Transducer	N/A
LCD display block	N/A
Analog input 1, 2	20 milliseconds
PID	25 milliseconds
Arithmetic	20 milliseconds
Input selection	20 milliseconds
Signal characterizer	20 milliseconds
Integrator	20 milliseconds
Output splitter	20 milliseconds
Control selector	20 milliseconds

FOUNDATION Fieldbus parameters

Schedule entries	7 (max.)
Links	25 (max.)
Virtual communications relationships (VCR)	20 (max.)

Standard function blocks

Resource block

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

Sensor Transducer Block

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

LCD display Transducer Block

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

Analog input block

The analog input (AI) function block processes the measurements from the sensor and makes them available to other function blocks. The output value from the AI Block is in engineering units and contains a status indicating the quality of the measurement. The AI Block is widely used for scaling functionality.

Note
The channel, Set XD_Scale, Set L_Type, and sometimes Set Out_Scale are typically configured by instrument personnel. Other AI Block parameters, block links, and schedule are typically configured by the control systems configuration engineer.

Input selector block

The input selector (ISEL) function block can be used to select the first good, Hot Backup™, maximum, minimum, or average of as many as eight input values and place it at the output. The block supports signal status propagation.

Integrator block

The integrator (INT) function block integrates one or two variables over time. The block compares the integrated or accumulated value to pre-trip and trip limits and generates discrete output signals when the limits are reached.
The Integrator Block is used as a totalizer. This block will accept up to two inputs, has six options how to totalize the inputs, and two trip outputs.

Arithmetic block

The arithmetic (ARTH) function block provides the ability to configure a range extension function for a primary input. It can also be used to compute nine different arithmetic functions including flow with partial density compensation, electronic remote seals, hydrostatic tank gauging, ratio control and others.

Signal characterizer block

The signal characterizer (SGCR) function block characterizes or approximates any function that defines an input/output relationship. The function is defined by configuring as many as twenty X,Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates. Two separate analog input signals can be processed simultaneously to give two corresponding separate output values using the same defined curve.

PID block

The PID function block combines all of the necessary logic to perform proportional/integral/derivative (PID) control. The block supports mode control, signal scaling and limiting, feed forward control, override tracking, alarm limit detection, and signal status propagation.

Control selector block

The control selector function block selects one of two or three inputs to be the output. The inputs are normally connected to the outputs of PID or other function blocks. One of the inputs would be considered Normal and the other two overrides.

Output splitter block

The output splitter function block provides the capability to drive two control outputs from a single input. It takes the output of one PID or other control block to control two valves or other actuators.

A.2.5 Backup link active scheduler (LAS)

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

A.2.6 PROFIBUS PA (output code W)

Profile version

3.02

Power supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter terminal voltage for non-I.S. applications, 9.0 to 30 Vdc for entity model intrinsically safe applications and 9.0 to 17.5 Vdc for FISCO intrinsically safe applications.

Current draw

17.5 mA for all configurations (including LCD display option)

Output update rate

Four times per second

Standard function blocks

Analog Input (AI Block)

The AI function block processes the measurements and makes them available to the host device. The output value from the AI Block is in engineering units and contains a status indicating the quality of the measurement.

Physical block

The physical block defines the physical resources of the device including type of memory, hardware, electronics, and diagnostic information.

Transducer Block

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

Indication

Optional two-line LCD display

LOI

Optional external configuration buttons

A.2.7 Wireless (output code X)

Output

IEC 62591 (*Wireless*HART), 2.4 GHz DSSS

Wireless radio (internal antenna, WP5 option)

- Frequency: 2.400–2.485 GHz
- Channels: 15
- Modulation: IEEE 802.15.4 compliant DSSS
- Transmission: maximum of 10 dBm EIRP

Local display

The optional three-line, seven-digit LCD display can display user-selectable information such as primary variable in engineering units, scaled variable, percent of range, sensor module temperature, and electronics temperature. The display updates based on the wireless update rate.

Digital zero trim

Digital zero trim (option DZ) is an offset adjustment to compensate for mounting position effects, up to 5% of URL.

Update rate

User selectable 1 second to 60 minutes

Wireless sensor module for in-line transmitters

The Rosemount 2051 Wireless Transmitter requires the engineered polymer housing to be selected. The standard sensor module will come with aluminum material. If stainless steel is required, the option WSM must be selected.

Power module

Field replaceable, keyed connection eliminates the risk of incorrect installation, Intrinsically Safe Lithium-thionyl chloride Power Module with PBT/PC enclosure. Ten-year life at one minute update rate.(1)

1. Reference conditions are 70 °F (21 °C), and routing data for three additional network devices.

   Note: Continuous exposure to ambient temperature limits of –40 °F to 185 °F (–40 °C to 85 °C) may reduce specified life by less than 20%.

A.2.8 HART 1–5 Vdc Low Power (output code M)

Output

Three-wire 1–5 Vdc output, user-selectable for linear or square root output. Digital process variable superimposed on voltage signal, available to any host conforming to the HART Protocol.

Rosemount 2051

Digital communications based on HART Revision 5 Protocol.

Rosemount 2051 with Selectable HART

The Rosemount 2051 with Selectable HART comes with Selectable HART Revisions. Digital communications based on HART Revision 5 (default) or Revision 7 (option code HR7) Protocol can be selected. The HART revision can be switched in the field using any HART based configuration tool or the optional LOI.

LOI

The LOI utilizes a two-button menu with internal and external configuration buttons. Internal buttons are always configured for LOI. External buttons can be configured for either LOI, (option code M4), analog zero and span (option code D4) or digital zero trim (option code DZ). See Rosemount 2051 with Selectable HART Reference Manual for LOI configuration menu.

Power supply

External power supply required. Standard transmitter operates on 9 to 28 Vdc with no load.

Power consumption

3.0 mA, 27–84 mW

Output load

100 kΩ or greater (meter input impedance)

Turn-on time

Performance within specifications less than two seconds after power is applied to the transmitter.

A.2.9 Overpressure limits

Transmitters withstand the following limits without damage:

Rosemount 2051C, 2051CF

- Ranges 2–5: 3,626 psig (250 bar)
  4,500 psig (310,3 bar) for option code P9
- Range 1: 2,000 psig (137,9 bar)

Rosemount 2051T

- Range 1: 750 psi (51,7 bar)
- Range 2: 1,500 psi (103,4 bar)
- Range 3: 1,600 psi (110,3 bar)
- Range 4: 6,000 psi (413,7 bar)
- Range 5: 15,000 psi (1034,2 bar)

Rosemount 2051L

Limit is flange rating or sensor rating, whichever is lower (See Table A-3).

Table A-3. Rosemount 2051L Flange Rating

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

A.2.10 Static pressure limit

Rosemount 2051CD, 2051CF

- Operates within specifications between static line pressures of –14.2 psig (0,034 bar) and 3626 psig (250 bar)
- For Option Code P9, 4500 psig (310,3 bar)
- Range 1: 0.5 psia to 2000 psig (34 mbar and 137,9 bar)

A.2.11 Burst pressure limits

Rosemount 2051C, 2051CF coplanar or traditional process flange

10,000 psig (689.5 bar)

Rosemount 2051T in-line

- Ranges 1–4: 11000 psi (758,4 bar)
- Range 5: 26000 psi (1792,6 bar)

A.2.12 Temperature limits

Ambient

–40 to 185 °F (–40 to 85 °C)
With LCD display[1][2]: –40 to 175 °F (–40 to 80 °C)

Storage[1]

–50 to 230 °F (–46 to 110 °C)
With LCD display: –40 to 185 °F (–40 to 85 °C)
With Wireless output: –40 °F to 185 °F (–40 °C to 85 °C)

1. Rosemount 2051 LCD display may not be readable and LCD display updates may be slower at temperatures below –22 °F (–30 °C).
2. Wireless LCD display may not be readable and LCD display updates will be slower at temperatures below –4 °F (–20 °C).

A.2.13 Process

At atmospheric pressures and above. See Table A-4.

Table A-4. Process Temperature Limits

Rosemount 2051C, 2051CF	
Silicone fill sensor[1]	
with coplanar flange	–40 to 250 °F (–40 to 121 °C)[2]
with traditional flange	–40 to 300 °F (–40 to 149 °C)[2][3]
with level flange	–40 to 300 °F (–40 to 149 °C)[2]
with Rosemount 305 Integral Manifold	–40 to 300 °F (–40 to 149 °C)[2]
Inert fill sensor[1]	–40 to 185 °F (–40 to 85 °C)[3]
Rosemount 2051T (process fill fluid)	
Silicone fill sensor[1]	–40 to 250 °F (–40 to 121 °C)[2]
Inert fill sensor[1]	–22 to 250 °F (–30 to 121 °C)[2]

Table A-4. Process Temperature Limits

Rosemount 2051L low side temperature limits	
Silicone fill sensor[1]	–40 to 250 °F (–40 to 121 °C)[2]
Inert fill Sensor[1]	–40 to 185 °F (–40 to 85 °C)[2]
Rosemount 2051L high side temperature limits (process fill fluid)	
SYLTHERM XLT	–102 to 293 °F (–75 to 145°C)
Silicone 704	32 to 401 °F (0 to 205 °C)
Silicone 200	–49 to 401 °F (–45 to 205 °C)
Inert	–49 to 320 °F (–45 to 160 °C)
Glycerin and water	5 to 203 °F (–15 to 95 °C)
Neobee M-20	5 to 401 °F (–15 to 205 °C)
Propylene glycol and water	5 to 203 °F (–15 to 95 °C)

1. Process temperatures above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio.
2. 220 °F (104 °C) limit in vacuum service; 130 °F (54 °C) for pressures below 0.5 psia.
3. 160 °F (71 °C) limit in vacuum service.

A.2.14 Humidity limits

0–100% relative humidity

A.2.15 Volumetric displacement

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

A.2.16 Damping

4–20 mA HART

Rosemount 2051 with selectable HART

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

Rosemount 2051

Analog output response to a step input change is user-selectable from 0.4 to 60 seconds for one time constant. This software damping is in addition to sensor module response time.

FOUNDATION Fieldbus

Transducer Block: User configurable
AI Block: User configurable

PROFIBUS PA

AI Block only: User configurable

A.2.17 Failure mode alarm

HART 4–20 mA (output code A)

If self-diagnostics detect a sensor or microprocessor failure, the analog signal is driven either high or low to alert the user. High or low failure mode is user-selectable with a jumper on the transmitter. The values to which the transmitter drives its output in failure mode depend on whether it is factory-configured to standard or NAMUR-compliant operation. The values for each are as follows:

Table A-5. Standard Operation

Output code	Linear output	Fail high	Fail low
A	$3.9 \le I \le 20.8$	$I \ge 21.75$ mA	$I \le 3.75$ mA
M	$0.97 \le V \le 5.2$	$V \ge 5.4$ V	$V \le 0.95$ V

Table A-6. NAMUR-Compliant Operation

Output code	Linear output	Fail high	Fail low
A	$3.8 \le I \le 20.5$	$I \ge 22.5$ mA	$I \le 3.6$ mA

Output code F and X

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

A.3 Physical specifications

A.3.1 Material selection

Emerson provides a variety of Rosemount product with various product options and configurations including materials of construction that can be expected to perform well in a wide range of applications. The Rosemount product information presented is intended as a guide for the purchaser to make an appropriate selection for the application. It is the purchaser's sole responsibility to make a careful analysis of all process parameters (such as all chemical components, temperature, pressure, flow rate, abrasives, contaminants, etc.), when specifying product, materials, options and components for the particular application. Emerson Process Management is not in a position to evaluate or guarantee the compatibility of the process fluid or other process parameters with the product, options, configuration or materials of construction selected.

A.3.2 Electrical connections

1/2–14 NPT, G1/2, and M20 × 1.5 conduit

A.3.3 Process connections

Rosemount 2051C

- 1/4–18 NPT on 2 1/8-in. centers
- 1/2–14 NPT and RC 1/2 on 2-in.(50,8 mm), 2 1/8-in. (54,0 mm), or 2 1/4-in. (57,2 mm) centers (process adapters)

Rosemount 2051T

- 1/2–14 NPT female
- G1/2 A DIN 16288 male
  (available in SST for Range 1–4 transmitters only)
- Autoclave type F-250-C (pressure relieved 9/16–18 gland thread; 1/4 O.D. high pressure tube 60° cone; available in SST for Range 5 transmitters only)

Rosemount 2051L

- High pressure side: 2-in.(50,8 mm), 3-in. (72 mm), or 4-in. (102 mm), ASME B 16.5 (ANSI) Class 150 or 300 flange;
  50, 80, or 100 mm, DIN 2501 PN 40 or 10/16 flange
- Low pressure side: 1/4–18 NPT on flange, 1/2–14 NPT on process adapter

Rosemount 2051CF

- For Rosemount 2051CFA wetted parts, see Rosemount DP Flowmeters and Primary Elements Product Data Sheet in the 485 section
- For Rosemount 2051CFC wetted parts, see Rosemount DP Flowmeters and Primary Elements Product Data Sheet in the 405 section
- For Rosemount 2051CFP wetted parts, see Rosemount DP Flowmeters and Primary Elements Product Data Sheet in the 1195 section

A.3.4 Rosemount 2051C process wetted parts

Drain/vent valves

316 SST or Alloy C-276

Process flanges and adapters

Plated carbon steel, SST CF-8M (cast version of 316 SST, material per ASTM-A743), or CW2M (cast version of Alloy C)

Wetted O-rings

Glass-filled PTFE or graphite-filled PTFE

Process isolating diaphragms

316L SST, Alloy C-276, or Tantalum

A.3.5 Rosemount 2051T process wetted parts

Process connections

316L SST or Alloy C-276

Process Isolating diaphragms

316L SST or Alloy C-276

A.3.6 Rosemount 2051L Process wetted parts

Flanged process connection (transmitter high side)

Process diaphragms, including process gasket surface

316L SST, Alloy C-276, or Tantalum

Extension

CF-3M (Cast version of 316L SST, material per ASTM-A743), or Cast C-276. Fits schedule 40 and 80 pipe.

Mounting flange

Zinc-cobalt plated CS or SST

Reference process connection (transmitter low side)

Isolating diaphragms

316L SST or Alloy C-276

Reference flange and adapter

CF-8M (cast version of 316 SST, material per ASTM-A743)

A.3.7 Non-wetted parts for Rosemount 2051C/T/L

Electronics housing

Low-copper aluminum or CF-8M (cast version of 316 SST).
Enclosure type 4X, IP 65, IP 66, IP68
Housing material code P: PBT/PC with NEMA 4X and IP66/67/68

Paint for aluminum housing

Polyurethane

Coplanar sensor module housing

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

Bolts

ASTM A449, Type 1 (zinc-cobalt plated carbon steel)
ASTM F593G, Condition CW1 (Austenitic 316 SST)
ASTM A193, Grade B7M (zinc plated alloy steel)
Alloy K-500

Sensor module fill fluid

Silicone or inert halocarbon
In-line series uses Fluorinert® FC-43

Process fill fluid (2051L only)

SYLTHERM XLT, Silicone 704, Silicone 200, inert, glycerin and water, Neobee M-20, or propylene glycol and water

Cover O-rings

Buna-N
Silicone (for wireless option code X)

Power module

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

A.3.8 Shipping weights

Table A-7. Transmitter Weights without Options[1]

Transmitter	Standard 2051 lb (kg)	Wireless lb (kg)
2051C	4.9 (2.2)	3.9 (1,8)
2051L	See Table A-8	See Table A-8
2051T	3.1 (1.4)	1.9 (0,86)

1. Transmitter weights include the sensor module and housing only (aluminum for standard 2051 and polymer for wireless).

Table A-8. Rosemount 2051L Weights without Options

Flange	Flush lb (kg)	2-in. Ext. lb (kg)	4-in. Ext. lb (kg)	6-in. Ext. lb (kg)
2-in., 150	12.5 (5,7)	N/A	N/A	N/A
3-in., 150	17.5 (7,9)	19.5 (8,8)	20.5 (9,3)	21.5 (9,7)
4-in., 150	23.5 (10,7)	26.5 (12,0)	28.5 (12,9)	30.5 (13,8)
2-in., 300	17.5 (7,9)	N/A	N/A	N/A
3-in., 300	22.5 (10,2)	24.5 (11,1)	25.5 (11,6)	26.5 (12,0)
4-in., 300	32.5 (14,7)	35.5 (16,1)	37.5 (17,0)	39.5 (17,9)
DN 50/ PN 40	13.8 (6,2)	N/A	N/A	N/A

Table A-8. Rosemount 2051L Weights without Options

Flange	Flush lb (kg)	2-in. Ext. lb (kg)	4-in. Ext. lb (kg)	6-in. Ext. lb (kg)
DN 80/ PN 40	19.5 (8,8)	21.5 (9,7)	22.5 (10,2)	23.5 (10,6)
DN 100/ PN 10/16	17.8 (8,1)	19.8 (9,0)	20.8 (9,5)	21.8 (9,9)
DN 100/ PN 40	23.2 (10,5)	25.2 (11,5)	26.2 (11,9)	27.2 (12,3)

Table A-9. Transmitter Options Weights

Code	Option	Add lb (kg)
J, K, L, M	Stainless steel housing	3.9 (1,8)
M5	LCD display for aluminum housing	0.5 (0,2)
M5	LCD display for wireless output	0.1 (0,04)
B4	SST mounting bracket for coplanar flange	1.0 (0,5)
B1, B2, B3	Mounting bracket for traditional flange	2.3 (1,0)
B7, B8, B9	Mounting bracket for traditional flange	2.3 (1,0)
BA, BC	SST bracket for traditional flange	2.3 (1,0)
H2	Traditional flange	2.6 (1,2)
H3	Traditional flange	3.0 (1,4)
H4	Traditional flange	3.0 (1,4)
H7	Traditional Flange	2.7 (1,2)
FC	Level flange—3-in., Class 150	12.7 (5,8)
FD	Level flange—3-in., Class 300	15.9 (7,2)
FA	Level flange—2-in., Class 150	8.0 (3,6)
FB	Level flange—2-in., Class 300	8.4 (3,3)
FP	DIN Level flange, SST, DN 50, PN 40	7.8 (3,5)
FQ	DIN Level flange, SST, DN 80, PN 40	12.7 (5,8)
WSM	SST sensor module	1.0 (0,45)
	Power module (701PGNKF)	0.4 (0,18)

A.4 Options

A.4.1 Standard configuration

Unless otherwise specified, transmitter is shipped as follows:

Engineering units	inH_2O (Ranges 1, 2, and 3)
Differential/Gage	psi (Ranges 4–5)
2051TA	psi (all ranges)
4 mA (1 Vdc)(1)	0 (engineering units)
20 mA (5 Vdc)(1)	Upper range limit
Output:	Linear
Flange type	Specified model code option
Flange material	Specified model code option
O-ring material	Specified model code option
Drain/vent:	Specified model code option
LCD display	Installed or none
Alarm(1)	High
Software tag	(Blank)

1. Not applicable to FOUNDATION Fieldbus, PROFIBUS PA, or Wireless.

A.4.2 Custom configuration(1)

If option code C1 is ordered, the customer may specify the following data in addition to the standard configuration parameters.

- Output information
- Transmitter information
- LCD display configuration
- Hardware selectable information
- Signal selection
- Wireless information
- Scaled variable
- and more

Refer to the Rosemount 2051 Configuration Data Sheet and the Rosemount 2051 Wireless Configuration Data Sheet.

1. Not applicable to FOUNDATION Fieldbus or PROFIBUS PA Protocols.

A.4.3 Tagging (3 options available)

Standard SST hardware tag is permanently affixed on transmitter. Tag character height is 0.125-in. (3,18 mm), 84 characters maximum.

Tag may be wired to the transmitter nameplate upon request, 85 characters maximum.

Tag may be stored in transmitter memory. Character limit is dependent on Protocol.

- HART Revision 5: 8 characters
- HART Revision 7 and Wireless: 32 characters
- FOUNDATION Fieldbus: 32 characters
- PROFIBUS PA: 32 characters

A.4.4 Commissioning tag(1)

A temporary commissioning tag is attached to all transmitters. The tag indicates the device ID and allows an area for writing the location.

1. Only applicable to FOUNDATION Fieldbus.

A.4.5 Optional Rosemount 304, 305, or 306 Integral manifolds

Factory assembled to Rosemount 2051C and Rosemount 2051T transmitters. Refer to the Rosemount Manifolds Product Data Sheet for additional information.

A.4.6 Other seals

Refer to the Rosemount DP Level Transmitters and 1199 Seal Systems Product Data Sheet for additional information.

A.4.7 Output information

Output range points must be the same unit of measure. Available units of measure include:

Pressure		
atm	mmH_2O @ 4 °C(1)	ftH_2O @ 4 °C(1)
mbar	ftH_2O	psi
bar	inH_2O @ 60 °F(1)	torr
inH_2O	Psf(1)	cmH_2O @ 4 °C(1)
inHg	g/cm^2	cmHg @ 0 °C(1)
hPa(1)	kg/cm^2	ftH_2O @ 60 °F(1)
mHg @ 0 °C(1)	Pa	mH_2O @ 4 °C(1)
inH_2O @ 4 °C(1)	kPa	mHg @ 0 °C(1)
mmH_2O	MPa(1)(2)	hPa(1)
mmHg	kg/m^2(1)	
Flow(2)(3)		
bbl	kg	cm^3
ft^3	lb	m^3
gal	L	ton

Level[3]		
%	ft	cm
in	mm	

1. Available with enhanced 2051 and wireless.
2. Available on PROFIBUS PA.
3. All flow units are available per second, minute, hour or day.

A.4.8 Display and interface options

M4 Digital display with LOI

- Available for 4–20 mA HART, 4–20 mA HART Low Power, and PROFIBUS PA

M5 Digital display

- 2-line, 5-digit LCD display for 4–20 mA HART
- 2-line, 5-digit LCD display for 1–5 Vdc HART Low Power
- 2-line, 8-digit LCD display for FOUNDATION Fieldbus and PROFIBUS PA
- 3-line, 7-digit LCD display for wireless
- Direct reading of digital data for higher accuracy
- Displays user-defined flow, level, volume, or pressure units
- Displays diagnostic messages for local troubleshooting
- 90-degree rotation capability for easy viewing

A.4.9 Configuration buttons[1]

Rosemount 2051 requires option **D4** (analog zero and span), **DZ** (digital trim), **M4** (LOI) for local configuration buttons.

A.4.10 Transient protection

T1 Integral transient protection terminal block
Meets IEEE C62.41, category location B

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

A.4.11 Bolts for flanges and adapters

Standard material is plated carbon steel per ASTM A449, type 1

L4 Austenitic 316 stainless steel bolts

L5 ASTM A 193, Grade B7M bolts

L6 Alloy K-500 bolts

L8 ASTM A 193 Class 2, Grade B8M bolts

A.4.12 Conduit plug

DO 316 SST conduit plug
Single 316 SST conduit plug replaces carbon steel plug

A.4.13 Rosemount 2051C coplanar Flange and 2051T bracket option

B4 Bracket for 2-in. pipe or panel mounting

- For use with the standard coplanar flange configuration
- Bracket for mounting of transmitter on 2-in. pipe or panel
- Stainless steel construction with stainless steel bolts

A.4.14 Rosemount 2051C traditional flange bracket options

B1 Bracket for 2-in. pipe mounting

- For use with the traditional flange option
- Bracket for mounting on 2-in. pipe
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B2 Bracket for panel mounting

- For use with the traditional flange option
- Bracket for mounting transmitter on wall or panel
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B3 Flat bracket for 2-in. pipe mounting

- For use with the traditional flange option
- Bracket for vertical mounting of transmitter on 2-in. pipe
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B7 B1 bracket with SST bolts

- Same bracket as the B1 option with Series 300 stainless steel bolts

B8 B2 bracket with SST bolts

- Same bracket as the B2 option with Series 300 stainless steel bolts

B9 B3 bracket with SST bolts

- Same bracket as the B3 option with Series 300 stainless steel bolts

BA Stainless steel B1 bracket with SST bolts

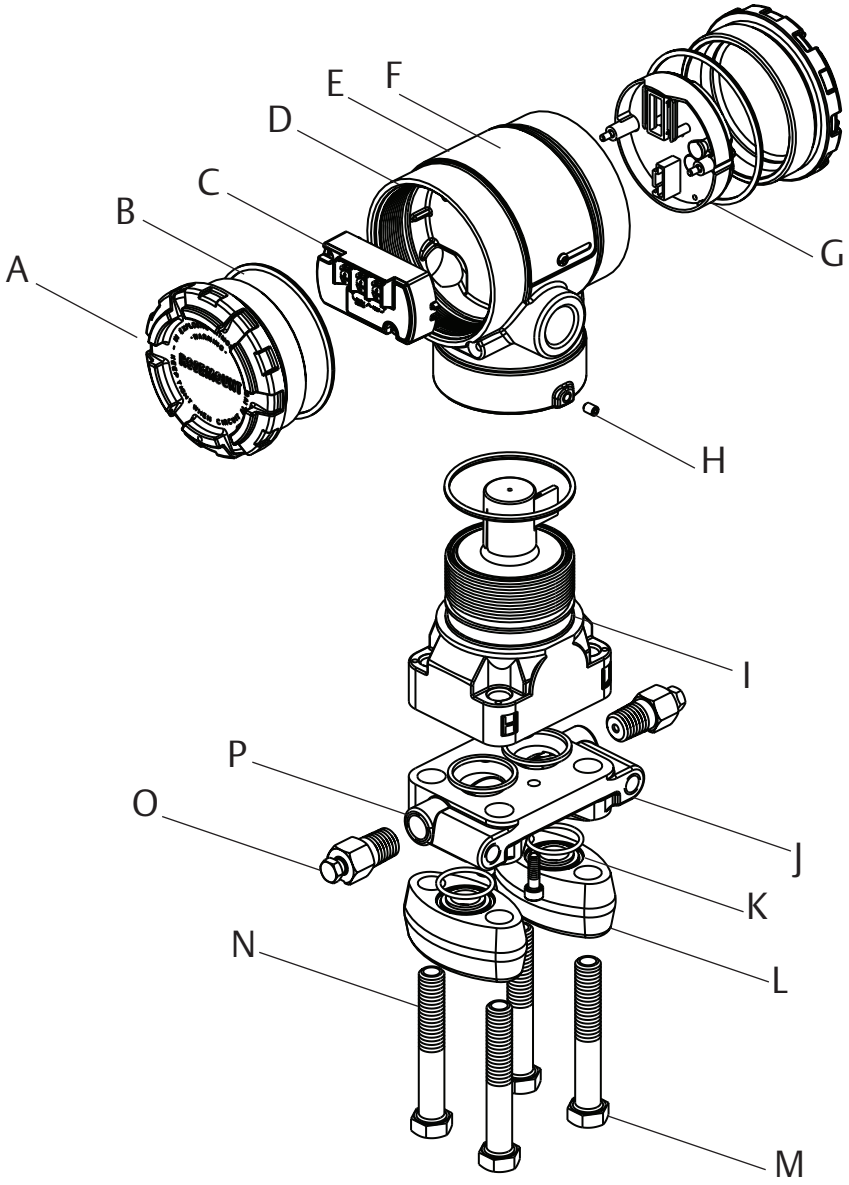
- B1 bracket in stainless steel with Series 300 stainless steel bolts

BC Stainless steel B3 bracket with SST bolts

- B3 bracket in stainless steel with Series 300 stainless steel bolts

A.5 Dimensional drawings

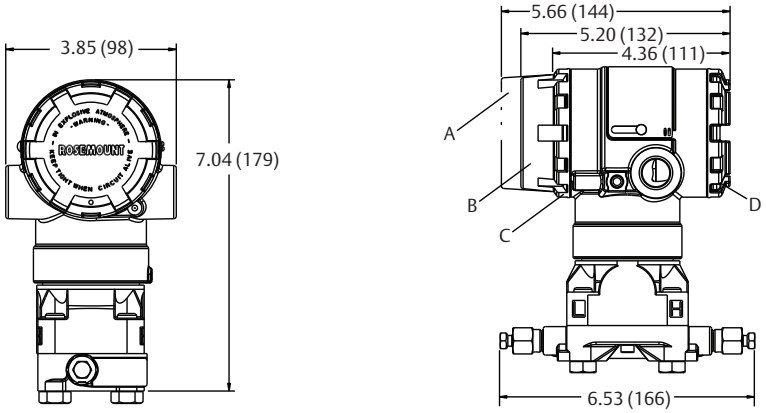
Figure A-1. Rosemount 2051C Exploded View



A. Cover
B. Cover O-ring
C. Terminal block
D. Electronics housing
E. Local configuration buttons(1)
F. Nameplate
G. Electronics board
H. Housing rotation set screw (180° maximum housing rotation without further disassembly)
I. Sensor module
J. Process O-ring
K. Flange adapter O-ring
L. Flange alignment screw (not pressure retaining)
M. Flange bolts
N. Flange adapters
O. Drain/vent valve
P. Coplanar flange

1. Span and zero adjustment buttons are optional with 4–20 mA and 1–5 Vdc HART protocol. Local operator interface buttons are optional for PROFIBUS PA Protocol. Local configuration buttons are not available with FOUNDATION Fieldbus.

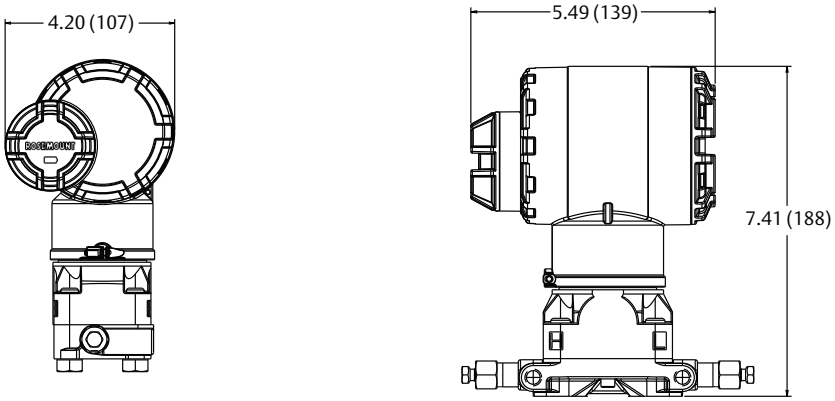
Figure A-2. Rosemount 2051C Coplanar Flange



A. Fieldbus display cover
B. HART display cover
C. Transmitter circuitry
D. Terminal connections

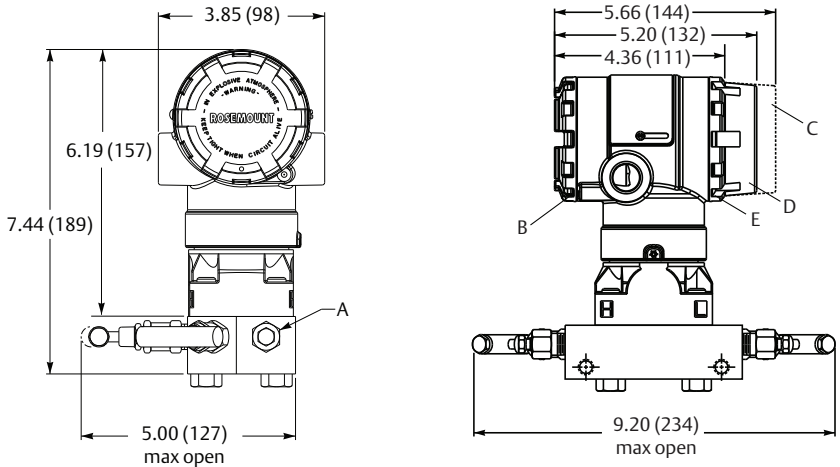
Dimensions are in inches (millimeters).

Figure A-3. Rosemount 2051 Wireless Housing with Coplanar Platform



Dimensions are in inches (millimeters).

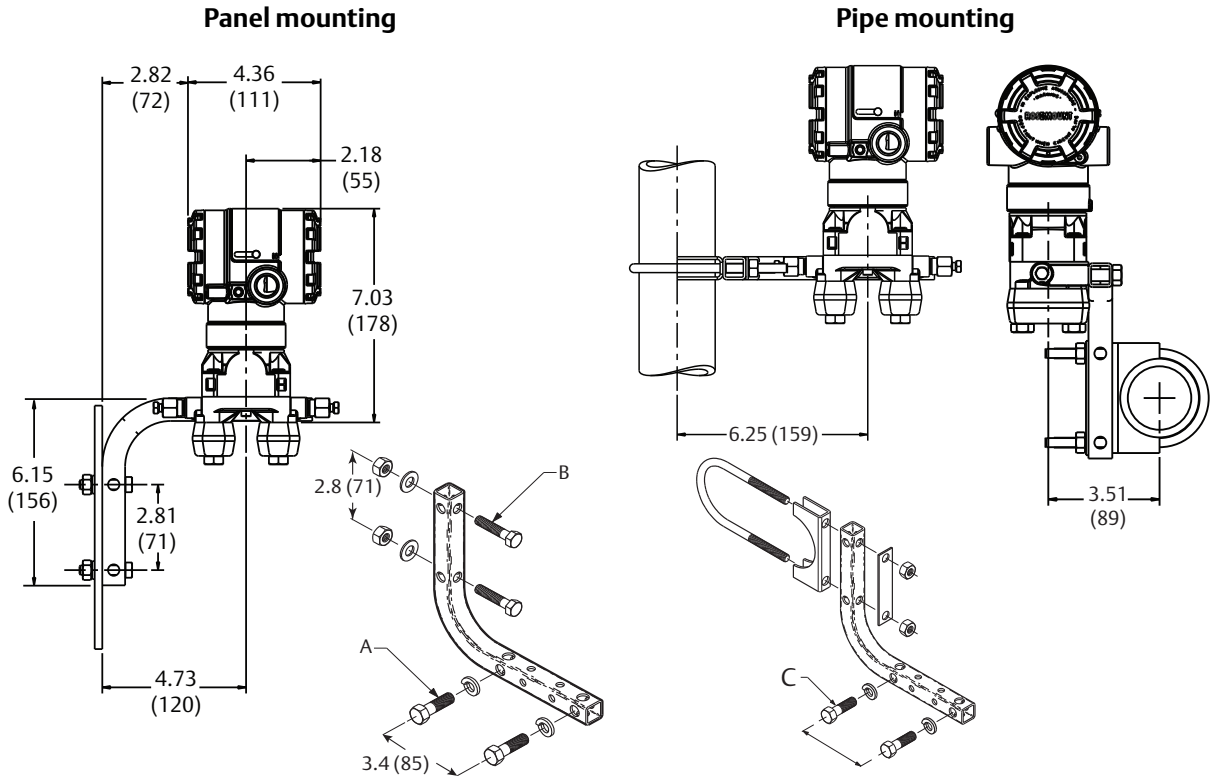
Figure A-4. Rosemount 2051C Coplanar with Rosemount 305 Three-Valve Coplanar Integral Manifold



A. Drain/Vent valve
B. Terminal connections
C. Fieldbus display cover
D. HART display cover
E. Transmitter circuitry

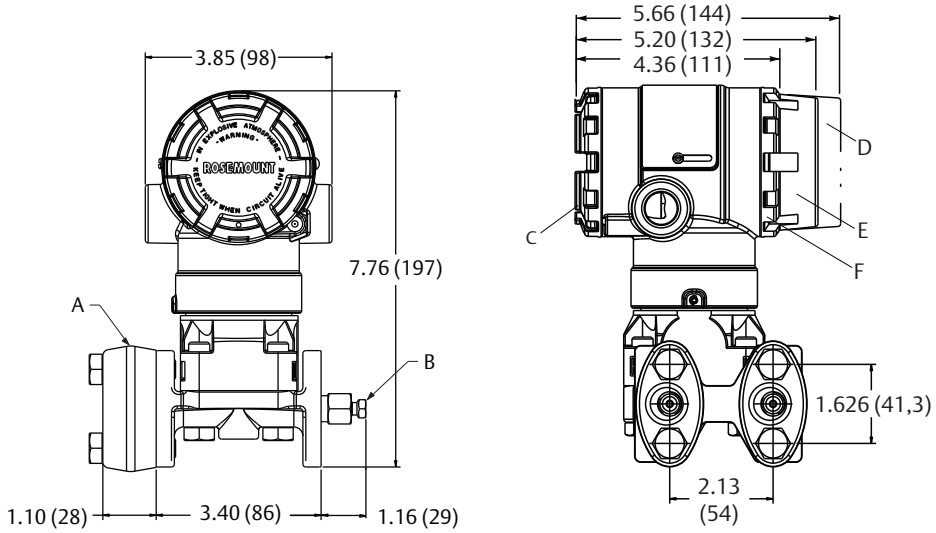
Dimensions are in inches (millimeters).

Figure A-5. Coplanar Flange Mounting Configurations with Optional Bracket (B4) for 2-in. Pipe or Panel Mounting



A. $^{3}/_{8}$–16 × $1^{1}/_{4}$ bolts for mounting to transmitter
B. $^{5}/_{16}$ × $1^{1}/_{2}$ bolts for panel mounting (not supplied)
C. 2-in. U-bolt for pipe mounting
Dimensions are in inches (millimeters).

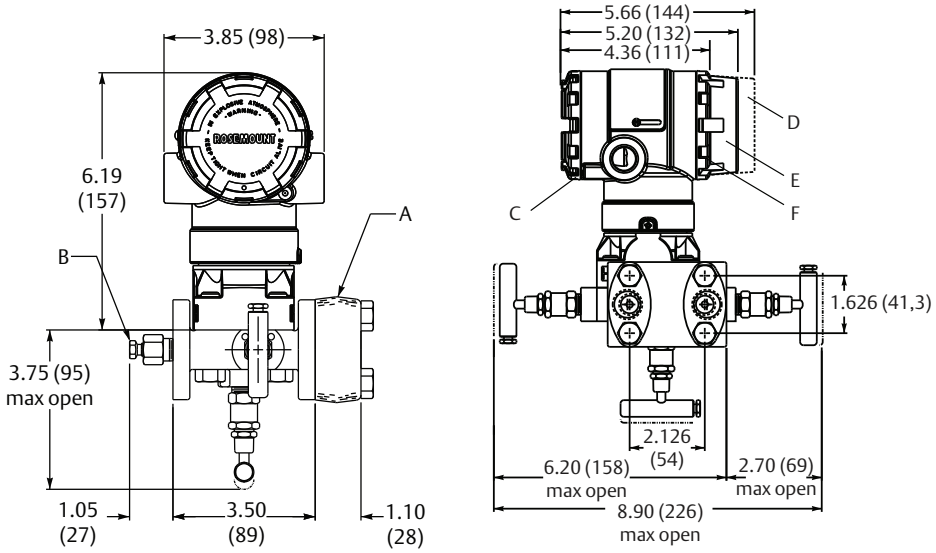
Figure A-6. Rosemount 2051C Coplanar with Traditional Flange



A. $^{1}/_{2}$–14 NPT flange adapter (optional)
B. Drain/vent valve
C. Terminal connections
Dimensions are in inches (millimeters).

D. Fieldbus display cover
E. HART display cover
F. Transmitter circuitry

Figure A-7. Rosemount 2051C Coplanar with Rosemount 305 Three-Valve Traditional Integral Manifold

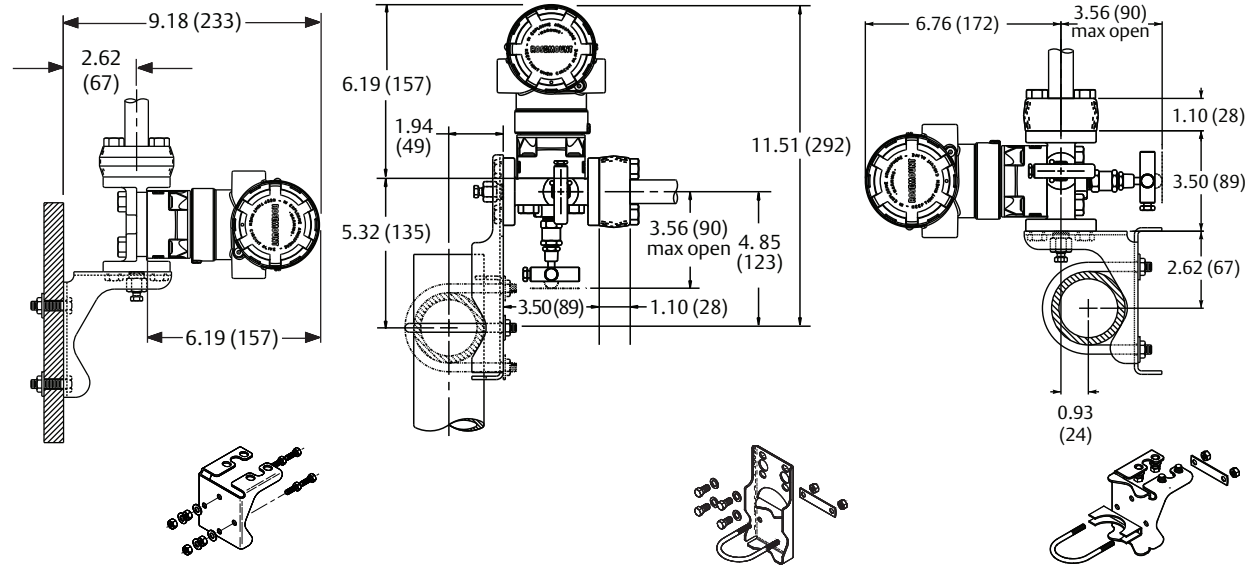


A. 1/2–14 NPT flange adapter (optional)
B. Drain/vent valve
C. Terminal connections
D. Fieldbus display cover
E. HART display cover
F. Transmitter circuitry

Dimensions are in inches (millimeters).

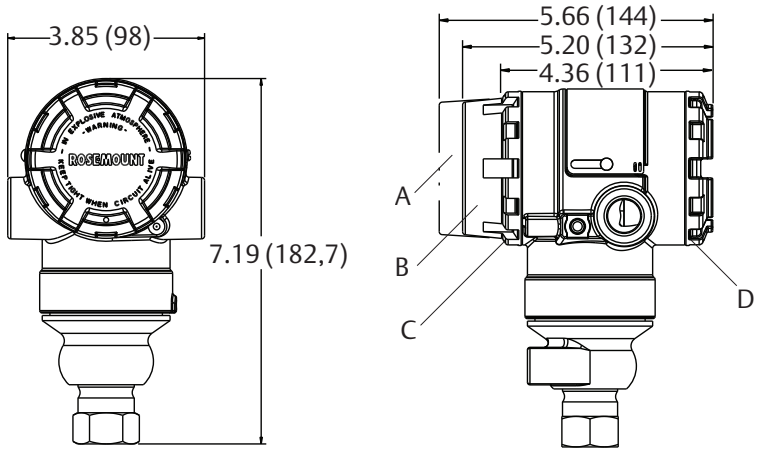
Figure A-8. Traditional Flange Mounting Configurations with Optional Brackets for 2-in. Pipe or Panel Mounting

Panel mount (bracket option B2/B8) | **Pipe mount (bracket option B3/B9/BC)** | **Pipe mount (bracket option B1/B7/BA)**



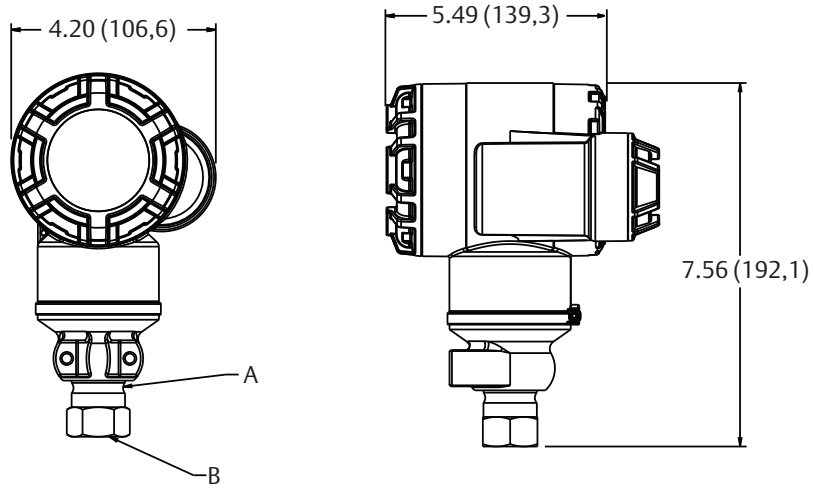
Dimensions are in inches (millimeters).

Figure A-9. Rosemount 2051T



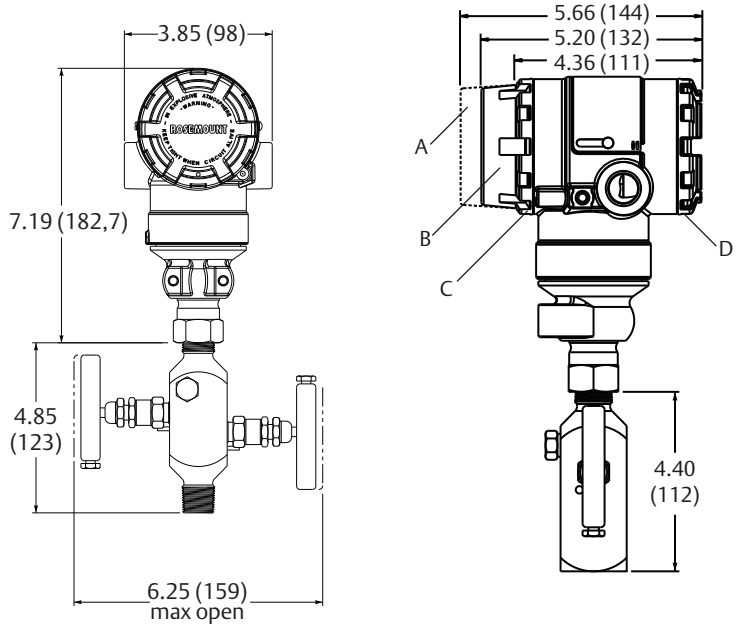
A. Fieldbus display cover
B. HART display cover
C. Transmitter circuitry
D. Terminal connections
Dimensions are in inches (millimeters).

Figure A-10. Rosemount 2051 Wireless Housing with In-line Platform



A. U-Bolt bracket
B. 1/2–14 NPT female or G1/2 A DIN 16288 make process connection
Dimensions are in inches (millimeters).

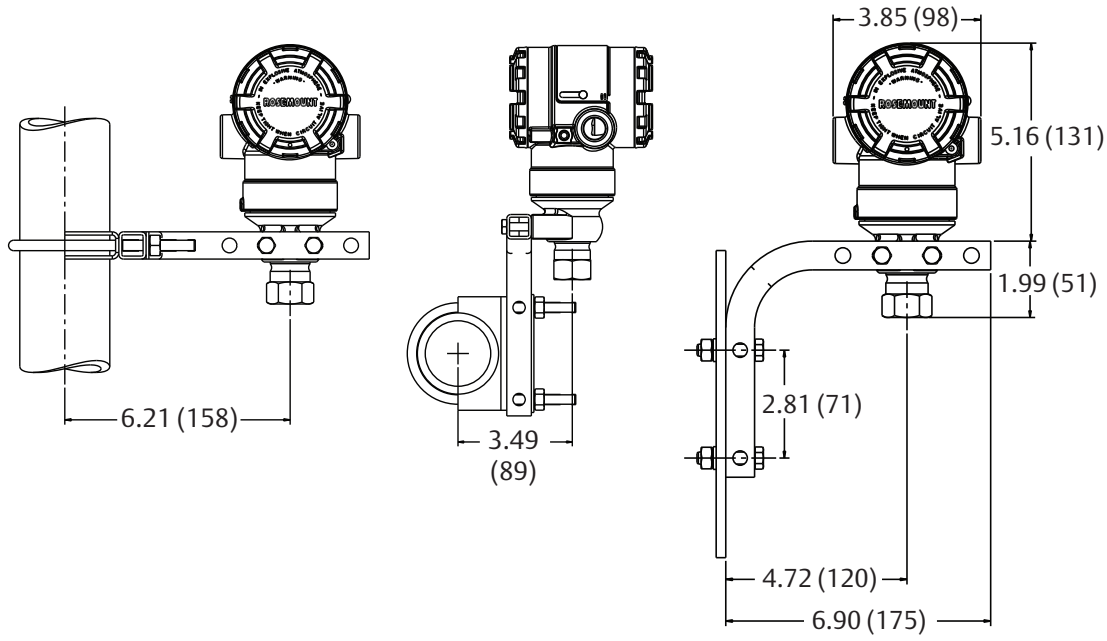
Figure A-11. Rosemount 2051T with Rosemount 306 Two-Valve Integral Manifold



A. Fieldbus display cover
B. HART display cover
C. Transmitter circuitry
D. Terminal connections
Dimensions are in inches (millimeters).

Figure A-12. Rosemount 2051T Typical Mounting Configurations with Optional Mounting Bracket

Pipe mounting **Panel mounting**



Dimensions are in inches (millimeters).

Figure A-13. Rosemount 2051CFA Pak-Lok Annubar Flowmeter(1)

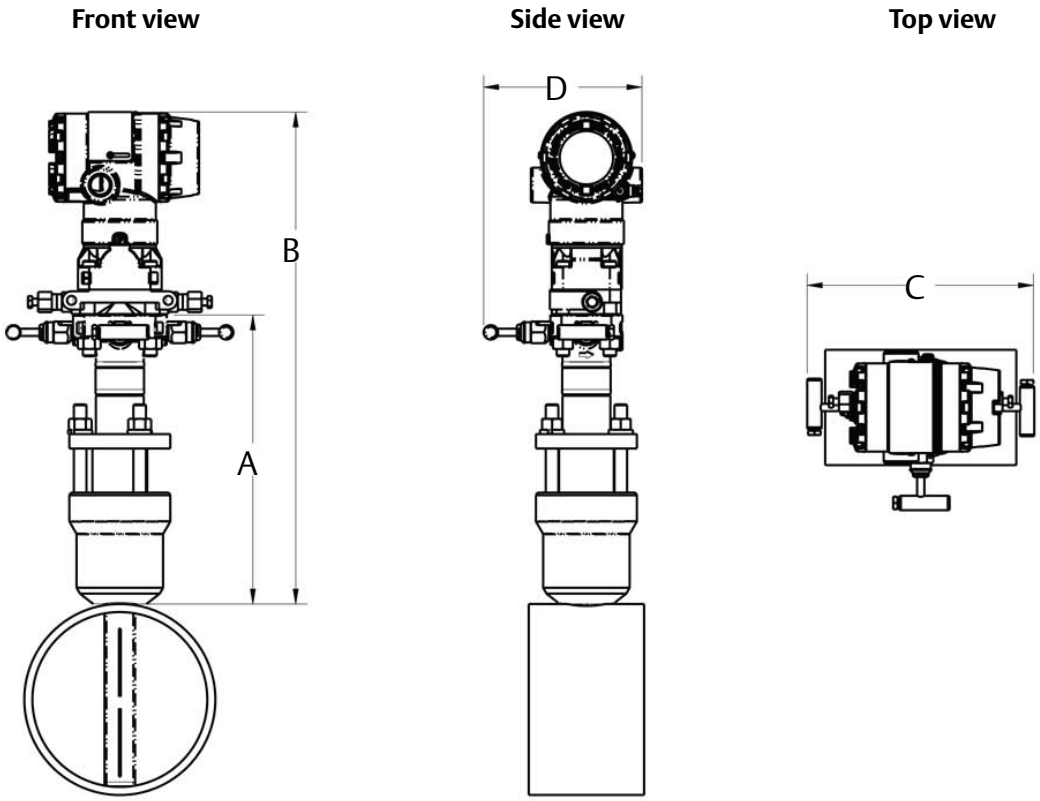


Table A-10. Rosemount 2051CFA Pak-Lok Annubar Flowmeter Dimensional Data

Sensor size	A (max)	B (max)	C (max)	D (max)
1	8.50 (215.9)	14.55 (369.6)	9.00 (228.6)	6.00 (152.4)
2	11.00 (279.4)	16.30 (414.0)	9.00 (228.6)	6.00 (152.4)
3	12.00 (304.8)	19.05 (483.9)	9.00 (228.6)	6.00 (152.4)

Dimensions are in inches (millimeters).

1. *The Pak-Lok Annubar model is available up to Class 600 ANSI (1,440 psig at 100 °F [99 bar at 38 °C]).*

Figure A-14. Rosemount 2051CFC Compact Orifice Flowmeter

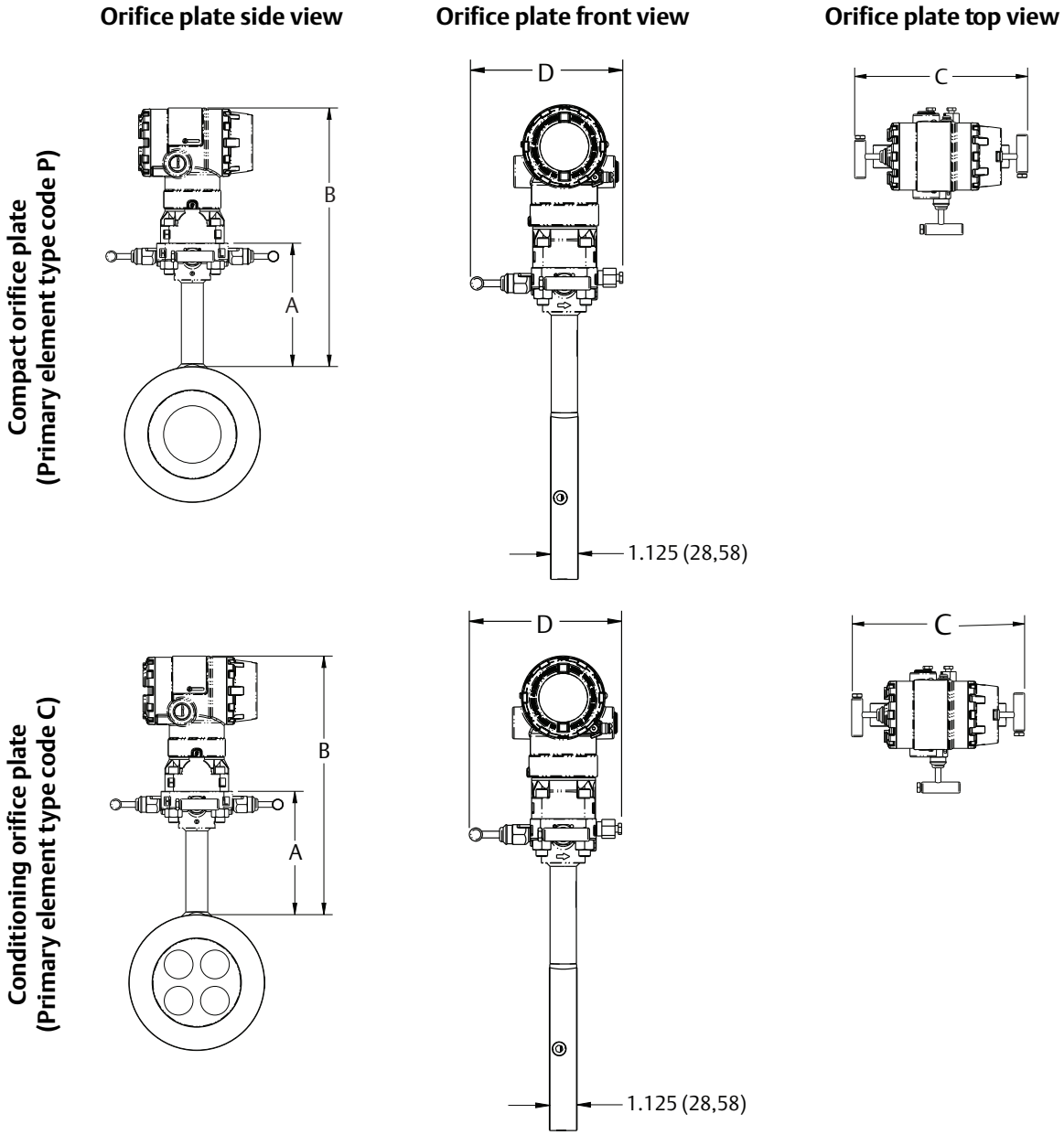
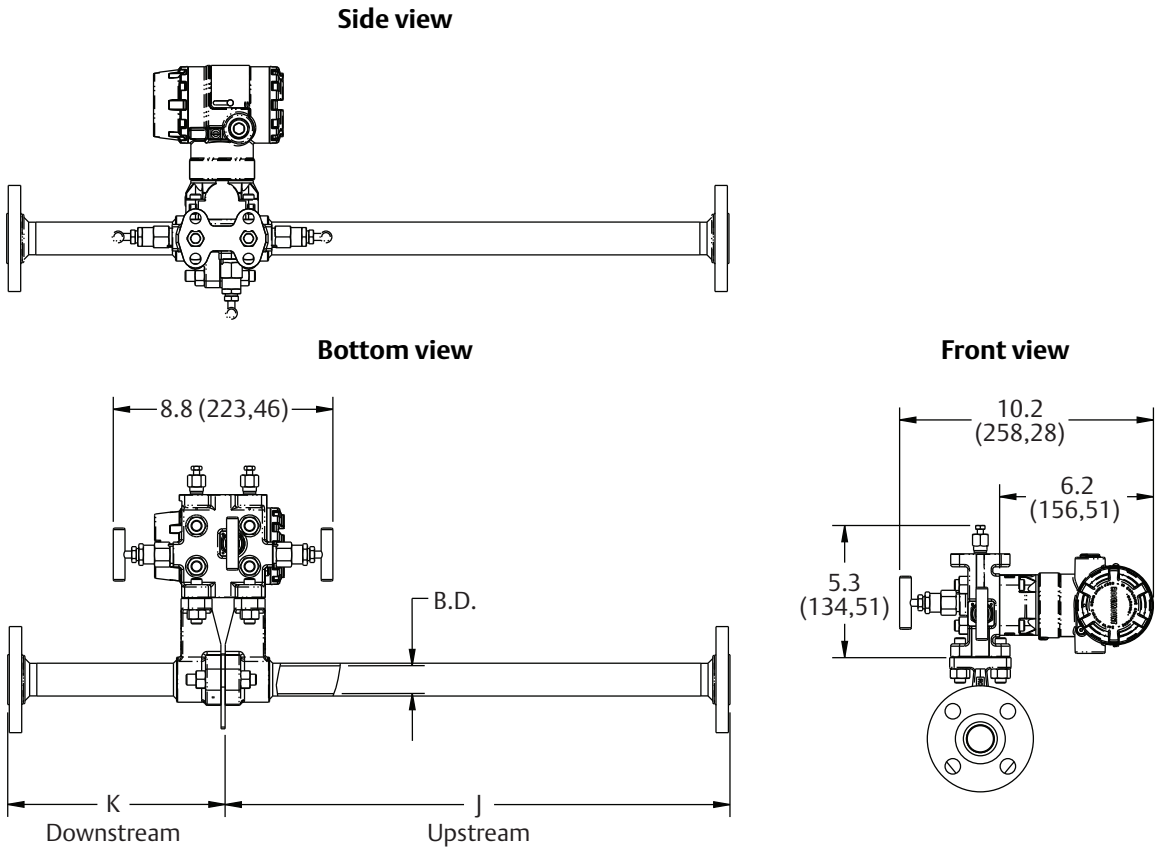


Table A-11. Rosemount 2051CFC Dimensional Data

Primary element type	A	B	Transmitter height	C	D
Type P and C	5.62 (143)	Transmitter Height + A	6.27 (159)	7.75 (197) - closed 8.25 (210) - open	6.00 (152) - closed 6.25 (159) - open

Dimensions are in inches (millimeters).

Figure A-15. Rosemount 2051CFP Integral Orifice Flowmeter



Dimensions are in inches (millimeters).

Table A-12. Rosemount 2051CFP Dimensional Data

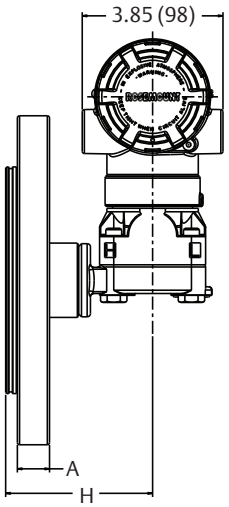
Dimension	Line size		
	1/2-in. (15 mm)	1-in. (25 mm)	1 1/2-in. (40 mm)
J (beveled/threaded pipe ends)	12.54 (318.4)	20.24 (514,0)	28.44 (722,4)
J (RF slip-on, RTJ slip-on, RF-DIN slip on)	12.62 (320,4)	20.32 (516,0)	28.52 (724,4)
J (RF Class 150, weld neck)	14.37 (364,9)	22.37 (568,1)	30.82 (782,9)
J (RF Class 300, weld neck)	14.56 (369,8)	22.63 (574,7)	31.06 (789,0)
J (RF Class 600, weld neck)	14.81 (376,0)	22.88 (581,0)	31.38 (797,1)
K (beveled/threaded pipe ends)	5.74 (145,7)	8.75 (222,2)	11.91 (302,6)
K (RF slip-on, RTJ slip-on, RF-DIN slip on)(1)	5.82 (147,8)	8.83 (224,2)	11.99 (304,6)
K (RF Class 150, weld neck)	7.57 (192,3)	10.88 (276,3)	14.29 (363,1)
K (RF Class 300, weld neck)	7.76 (197,1)	11.14 (282,9)	14.53 (369,2)
K (RF Class 600, weld neck)	8.01 (203,4)	11.39 (289,2)	14.85 (377,2)
B.D. (bore diameter)	0.664 (16,87)	1.097 (27,86)	1.567 (39,80)

Dimensions are in inches (millimeters).

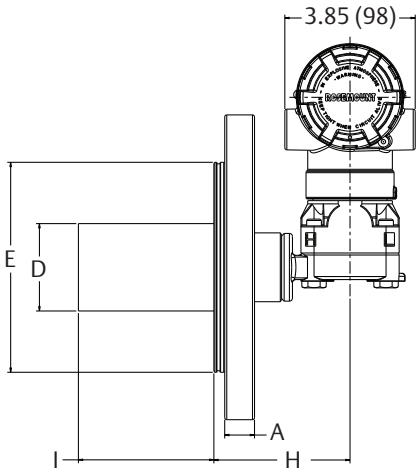
1. Downstream length shown here includes plate thickness of 0.162-in. (4.11 mm).

Figure A-16. Rosemount 2051L Liquid Level

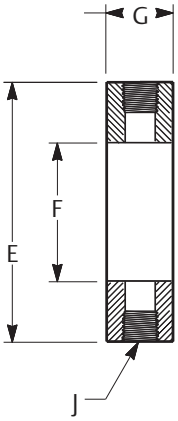
2-in. flange configuration (flush mount only)



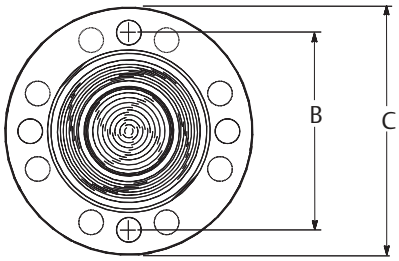
3- and 4-in. flange configuration

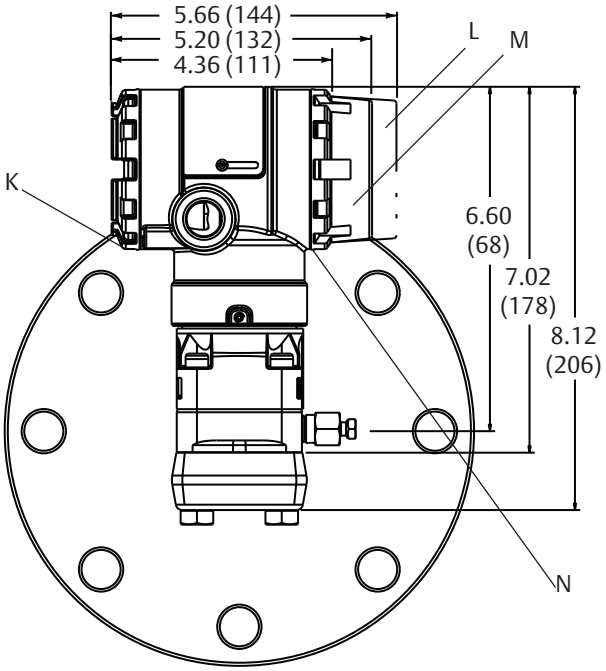


Optional flushing connection ring (lower housing)



Diaphragm assembly and mounting flange





A–H. Refer to Table A-13
I. 2-in., 4-in., or 6-in. extension (50.8, 101.6, 152.4)
J. Flushing connection
Dimensions are in inches (millimeters).

K. Terminal connections
L. Fieldbus display cover
M. HART display cover
N. Transmitter circuitry

Table A-13. 2051L Dimensional Specifications

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

Dimensions are in inches (millimeters).

Class[1]	Pipe size	O.D. gasket surface E	Process side F	Lower housing G		H
				1/4 NPT	1/2 NPT	
ASME B16.5 (ANSI) 150	2 (51)	3.6 (92)	2.12 (54)	0.97 (25)	1.31 (33)	5.65 (143)
	3 (76)	5.0 (127)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	4 (102)	6.2 (158)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
ASME B16.5 (ANSI) 300	2 (51)	3.6 (92)	2.12 (54)	0.97 (25)	1.31 (33)	5.65 (143)
	3 (76)	5.0 (127)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	4 (102)	6.2 (158)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
DIN 2501 PN 10–40	DN 50	4.0 (102)	2.4 (61)	0.97 (25)	1.31 (33)	5.65 (143)
DIN 2501 PN 25/40	DN 80	5.4 (138)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	DN 100	6.2 (158)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)

Dimensions are in inches (millimeters).

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

A.6 Ordering information

Table A-14. Rosemount 2051C Coplanar Pressure Transmitters Ordering Information

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

Model	Transmitter type			
2051C	Coplanar Pressure Transmitter			
Measurement type				
D	Differential			★
G	Gage			★
Pressure range				
	2051CD	**2051CG**		
1	–25 to 25 inH_2O (–62,2 to 62,2 mbar)	–25 to 25 inH_2O (–62,2 to 62,2 mbar)		
2	–250 to 250 inH_2O (–623 to 623 mbar)	–250 to 250 inH_2O (–623 to 623 mbar)		★
3	–1000 to 1000 inH_2O (–2,5 to 2,5 bar)	–393 to 1000 inH_2O (–0,98 to 2,5 bar)		★
4	–300 to 300 psi (–20,7 to 20,7 bar)	–14.2 to 300 psi (–0,98 to 20,7 bar)		★
5	–2000 to 2000 psi (–137,9 to 137,9 bar)	–14.2 to 2000 psi (–0,98 to 137,9 bar)		★
Transmitter output				
A[1]	4–20 mA with digital signal based on HART Protocol			★
F	FOUNDATION Fieldbus Protocol			★
W	PROFIBUS PA Protocol			★
X	Wireless			★
M	Low Power, 1–5 Vdc with digital signal based on HART Protocol			
Materials of construction				
	Process flange type	**Flange material**	**Drain/vent**	
2	Coplanar	SST	SST	★
3[2]	Coplanar	Cast C-276	Alloy C-276	★
5	Coplanar	Plated CS	SST	★
7[2]	Coplanar	SST	Alloy C-276	★
8[2]	Coplanar	Plated CS	Alloy C-276	★
0	Alternate process connection			★
Isolating diaphragm				
2[2]	316L SST			★
3[2]	Alloy C-276			★
5[3][4]	Tantalum			
O-ring				
A	Glass-filled PTFE			★
B	Graphite-filled PTFE			★

Table A-14. Rosemount 2051C Coplanar Pressure Transmitters Ordering Information

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

Sensor fill fluid			
1	Silicone		★
2[4]	Inert		★
Housing material		**Conduit entry size**	
A	Aluminum	1/2–14 NPT	★
B	Aluminum	M20 × 1.5	★
J	SST	1/2–14 NPT	★
K[5]	SST	M20 × 1.5	★
P[6]	Engineered polymer	No conduit entries	★
D[7]	Aluminum	G1/2	
M[5][7]	SST	G1/2	

Wireless options (requires wireless output code X and engineered polymer housing code P)

Wireless transmit rate, operating frequency and protocol		
WA3	User configurable transmit rate, 2.4 GHz *Wireless*HART	★
Antenna and SmartPower™		
WP5	Internal antenna, compatible with green power module (I.S. power module sold separately)	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
HART revision configuration[19]		
HR5[8]	Configured for HART Revision 5	★
HR7[9]	Configured for HART Revision 7	★
PlantWeb control functionality		
A01	FOUNDATION Fieldbus advanced control function block suite	★
Alternate flange[10]		
H2	Traditional flange, 316 SST, SST drain/vent	★
H3[2]	Traditional flange, Cast C-276, Alloy C-276 drain/vent	★
H7[2]	Traditional flange, 316 SST, Alloy C-276 drain/vent	★
HJ	DIN compliant traditional flange, SST, 7/16-in. adapter/manifold bolting	★
FA	Level flange, SST, 2-in., ANSI Class 150, vertical mount	★
FB	Level flange, SST, 2-in., ANSI Class 300, vertical mount	★
FC	Level flange, SST, 3-in., ANSI Class 150, vertical mount	★

Table A-14. Rosemount 2051C Coplanar Pressure Transmitters Ordering Information

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

FD	Level flange, SST, 3-in., ANSI Class 300, vertical mount	★
FP	DIN level flange, SST, DN 50, PN 40, vertical mount	★
FQ	DIN level flange, SST, DN 80, PN 40, vertical mount	★
Alternate flange[10]		
HK[11]	DIN compliant traditional flange, SST, 10 mm adapter/manifold bolting	
HL	DIN compliant traditional flange, SST, 12 mm adapter/manifold bolting	
Manifold assembly[11][12]		
S5	Assemble to Rosemount 305 Integral Manifold	★
S6	Assemble to Rosemount 304 Manifold or connection system	★
Integral mount primary element[11][12]		
S4[13]	Assemble to Rosemount 405A, 485, or 585 Annubar™ Primary Element or 1195 Integral Orifice Primary Element	★
S3	Assemble to Rosemount 405C or 405P Compact Orifice Plate	★
Seal assemblies[12]		
S1[14]	Assemble to one Rosemount 1199 Diaphragm Seal	★
S2[15]	Assemble to two Rosemount 1199 Diaphragm Seals	★
Mounting brackets		
B1	Traditional flange bracket for 2-in. pipe mounting, CS bolts	★
B2	Traditional flange bracket for panel mounting, CS bolts	★
B3	Traditional flange flat bracket for 2-in. pipe mounting, CS bolts	★
B4	Coplanar flange bracket for 2-in. pipe or panel mounting, all SST	★
B7	B1 bracket with Series 300 SST bolts	★
B8	B2 bracket with Series 300 SST bolts	★
B9	B3 bracket with Series 300 SST bolts	★
BA	SST B1 bracket with Series 300 SST bolts	★
BC	SST B3 bracket with Series 300 SST bolts	★
Product certifications		
E1[5]	ATEX Flameproof	★
E2[5]	INMETRO Flameproof	★
E3[5]	China Flameproof	★
E4[5]	TIIS Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7[5]	IECEx Flameproof	★
EW	India (CCOE) Flameproof Approval	★

Table A-14. Rosemount 2051C Coplanar Pressure Transmitters Ordering Information

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

I1[5]	ATEX Intrinsic Safety	★
I2[5]	INMETRO Intrinsically Safe	★
I3[5]	China Intrinsic Safety	★
I4[5][6]	TIIS Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[5]	IECEx Intrinsic Safety	★
IA[16]	ATEX FISCO Intrinsic Safety	★
IE[16]	FM FISCO Intrinsically Safe	★
IF[16]	CSA FISCO Intrinsically Safe	★
IG[16]	IECEx FISCO Intrinsically Safe	★
IW[5]	India (CCOE) Intrinsically Safe	★
K1[5]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K2	INMETRO Flameproof and Intrinsic Safety	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K7[5]	IECEx Flameproof, Intrinsic Safety, Type n and Dust	★
KA[5]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC[5]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[5]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
N1[5]	ATEX Type n	★
N7[5]	IECEx Type n	★
ND[5]	ATEX Dust	★
EM	Technical Regulations Customs Union (EAC) Flameproof	★
IM	Technical Regulations Customs Union (EAC) Intrinsic Safety	★
KM	Technical Regulations Customs Union (EAC) Flameproof and Intrinsic Safety	★
Drinking water approval		
DW[17]	NSF drinking water approval	★
Shipboard approvals[4]		
SBS	American Bureau of Shipping (ABS) type approval	★
SBV	Bureau Veritas (BV) type approval	★
SDN	Det Norske Veritas (DNV) type approval	★
SLL	Lloyds Register (LR) type approval	★

Table A-14. Rosemount 2051C Coplanar Pressure Transmitters Ordering Information

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

Bolting materials		
L4	Austenitic 316 SST bolts	★
L5	ASTM A 193, Grade B7M bolts	★
L6	Alloy K-500 bolts	★
L8	ASTM A 193 Class 2, Grade B8M bolts	★
Display and interface options		
M4[18]	LCD display with local operator interface	★
M5	LCD display	★
Hardware adjustments		
D4[19]	Zero and span configuration buttons	★
DZ[20]	Digital zero trim	★
Flange adapters[21]		
DF	1/2–14 NPT flange adapters	★
Conduit plug[4][22]		
DO	316 SST conduit plug	★
RC 1/4 RC 1/2 process connection[23]		
D9	RC 1/4 flange with RC 1/2 flange adapter - SST	
Ground screw[4][24]		
V5	External ground screw assembly	★
Performance[25]		
P8	High performance option	★
Transient protection[4][26]		
T1	Transient protection terminal block	★
Software configuration[20]		
C1	Custom Software Configuration (Completed Rosemount 2051 Configuration Data Sheet or Rosemount 3051 Configuration Data Sheet for Wireless required with order)	★
Alarm limit[19]		
C4[27]	NAMUR alarm and saturation levels, high alarm	★
CN[27]	NAMUR alarm and saturation levels, low alarm	★
CR	Custom Alarm and saturation signal levels, high alarm (requires C1 and Configuration Data Sheet)	★
CS	Custom Alarm and saturation signal levels, low alarm (requires C1 and Configuration Data Sheet)	★
CT	Low Alarm (standard Rosemount alarm and saturation levels)	★

Table A-14. Rosemount 2051C Coplanar Pressure Transmitters Ordering Information

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

Pressure testing		
P1	Hydrostatic testing with certificate	
Cleaning process area		
P2	Cleaning for special service	
P3	Cleaning for < 1 PPM Chlorine/Flourine	
Maximum static line pressure		
P9	4500 psig (310 bar) static pressure limit (2051CD Ranges 2–5 only)	★
Calibration certification		
Q4	Calibration certificate	★
QG	Calibration certificate and GOST verification certificate	★
QP	Calibration certification and tamper evident seal	★
Material traceability certification		
Q8	Material traceability certification per EN 10204 3.1	★
Quality certification for safety(28)		
QS	Prior-use certificate of FMEDA data	★
QT	Safety certified to IEC 61508 with certificate of FMEDA	★
Surface finish		
Q16	Surface finish certification for sanitary remote seals	★
Toolkit total system performance reports		
QZ	Remote seal system performance calculation report	★
Conduit electrical connection(4)		
GE	M12, 4-pin, male connector (eurofast®)	★
GM	A size mini, 4-pin, male connector (minifast®)	★
NACE certificate(29)		
Q15	Certificate of compliance to NACE® MR0175/ISO 15156 for wetted materials	★
Q25	Certificate of compliance to NACE MR0103 for wetted materials	★
Typical model number: 2051C D 2 A 2 2 A 1 A B4 M5		

1. HART Revision 5 is the default HART output. The Rosemount 2051 with Selectable HART can be factory or field configured to HART Revision 7. To order HART Revision 7 factory configured, add option code HR7.
2. Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments. Order with Q15 or Q25 to receive a NACE certificate.
3. Available in Ranges 2–5 only.
4. Not available with output code X.
5. Not available with low power output code M.
6. Only available with output code X.

7. Transmitter conduit entry will be 1/2 NPT and a 1/2 NPT to G1/2 thread adapter will be provided.
8. Configures the HART output to HART Revision 5. The device can be field configured to HART Revision 7 if needed.
9. Configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 if needed.
10. Requires 0 code in Materials of Construction for alternate process connection.
11. Not valid with optional code P9 for 4500 psi static pressure.
12. "Assemble-to" items are specified separately and require a completed model number.
13. Process flange limited to coplanar (codes 2, 3, 5, 7, 8) or traditional (H2, H3, H7).
14. Not valid with optional code D9 for RC1/2 adapters.
15. Not valid with optional codes DF or D9 for adapters.
16. Only valid with FOUNDATION Fieldbus output code F.
17. Not available with Alloy C-276 isolator (3 code), tantalum isolator (5 code), all cast C-276 flanges, all plated CS flanges, all DIN flanges, all Level flanges, assemble-to manifolds (S5 and S6 codes), assemble-to seals (S1 and S2 codes), assemble-to primary elements (S3 and S4 codes), surface finish certification (Q16 code), and remote seal system report (QZ code).
18. Not available with FOUNDATION Fieldbus output code F or wireless output code X.
19. Only Available with HART 4–20 mA (output codes A and M).
20. Only available with HART 4–20 mA output(output codes A) and wireless output (output code X).
21. Not valid with alternate process connection options S3, S4, S5, S6.
22. Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug.
23. Not available with alternate process connection: DIN flanges and Level flanges.
24. The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.
25. Available with 4–20 mA HART output code A, wireless output code X, FOUNDATION Fieldbus output code F, Rosemount 2051C Ranges 2–5 or Rosemount 2051T Ranges 1–4, SST and Alloy C 276 diaphragms and silicone fill fluid. High performance option includes 0.05% reference accuracy, and five year stability. See "Performance specifications" on page 61 for details.
26. The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA and IE.
27. NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.
28. Only available with HART 4–20 mA output (output code A).
29. NACE-Compliant wetted materials are identified by Footnote 2.

Table A-15. Rosemount 2051T In-line Pressure Transmitter Ordering Information

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

Model	**Transmitter type**		
2051T	In-line Pressure Transmitter		★
Pressure type			
G	Gage		★
A[1]	Absolute		★
Pressure range			
	2051TG	**2051TA**	★
1	-14.7 to 30 psi (–1,0 to 2,1 bar)	0 to 30 psi (0 to 2,1 bar)	★
2	–14.7 to 150 psi (–1,0 to 10,3 bar)	0 to 150 psi (0 to 10,3 bar)	★
3	–14.7 to 800 psi (–1,0 to 55 bar)	0 to 800 psi (0 to 55 bar)	★
4	–14.7 to 4000 psi (–1,0 to 276 bar)	0 to 4000 psi (0 to 276 bar)	★
5	–14.7 to 10000 psi (–1,0 to 689 bar)	0 to 10000 psi (0 to 689 bar)	★
Transmitter output			
A[2]	4–20 mA with Digital Signal Based on HART Protocol		★
F	FOUNDATION Fieldbus Protocol		★
W	PROFIBUS PA Protocol		★
X	Wireless		★
M	Low-Power, 1–5 Vdc with Digital Signal Based on HART Protocol		
Process connection style			
2B	1/2–14 NPT female		★
2C[3]	G1/2 A EN 837-1 male		★
2F[4]	Coned and threaded, compatible with autoclave type F-250-C (Range 5 only)		
Isolating diaphragm[5]		**Process connection wetted parts material**	
2	316L SST	316L SST	★
3	Alloy C-276	Alloy C-276	★
Sensor fill fluid			
1	Silicone		★
2[4]	Inert		★
Housing material		**Conduit entry size**	
A	Aluminum	1/2–14 NPT	★
B	Aluminum	M20 × 1.5	★
J	SST	1/2–14 NPT	★
K[6]	SST	M20 × 1.5	★

Table A-15. Rosemount 2051T In-line Pressure Transmitter Ordering Information

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

P[7]	Engineered polymer	No conduit entries	★
D[8]	Aluminum	G1/2	
M[6][8]	SST	G1/2	

Wireless options (requires wireless output code X and engineered polymer housing code P)

Wireless transmit rate, operating frequency and protocol		
WA3	User configurable transmit rate, 2.4 GHz *Wireless*HART	★
Antenna and SmartPower		
WP5	Internal antenna, compatible with green power module (I.S. power module sold separately)	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
HART revision configuration[19]		
HR5[9]	Configured for HART Revision 5	★
HR7[10]	Configured for HART Revision 7	★
PlantWeb control functionality		
A01	FOUNDATION Fieldbus advanced control function block suite	★
Manifold assemblies[11]		
S5	Assemble to Rosemount 306 Integral Manifold	★
Seal assemblies[11]		
S1	Assemble to one Rosemount 1199 Diaphragm Seal	★
Mounting bracket		
B4	Bracket for 2-in. pipe or panel mounting, All SST	★
Product certifications		
E1[6]	ATEX Flameproof	★
E2[6]	INMETRO Flameproof	★
E3[6]	China Flameproof	★
E4[6]	TIIS Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7[6]	IECEx Flameproof	★
EW[6]	India (CCOE) Flameproof Approval	★

Table A-15. Rosemount 2051T In-line Pressure Transmitter Ordering Information

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

I1[6]	ATEX Intrinsic Safety	★
I2[6]	INMETRO Intrinsically Safe	★
I3[6]	China Intrinsic Safety	★
I4[6][7]	TIIS Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[6]	IECEx Intrinsic Safety	★
IA[14]	ATEX FISCO Intrinsic Safety	★
IE[12]	FM FISCO Intrinsically Safe	★
IF[12]	CSA FISCO Intrinsically Safe	★
IG[12]	IECEx FISCO Intrinsically Safe	★
IW[6]	India (CCOE) Intrinsic Safety Approval	★
K1[6]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K7[6]	IECEx Flameproof, Intrinsic Safety, Type n, Dust	★
KA[6]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC[6]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[6]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
N1[6]	ATEX Type n	★
N7[6]	IECEx Type n	★
ND[6]	ATEX Dust	★
EM	Technical Regulations Customs Union (EAC) Flameproof	★
IM	Technical Regulations Customs Union (EAC) Intrinsic Safety	★
KM	Technical Regulations Customs Union (EAC) Flameproof and Intrinsic Safety	★
Drinking water approval[13]		
DW	NSF drinking water approval	★
Shipboard approvals[4]		
SBS	American Bureau of Shipping (ABS) type approval	★
SBV	Bureau Veritas (BV) type approval	★
SDN	Det Norske Veritas (DNV) type approval	★
SLL	Lloyds Register (LR) type approval	★

Table A-15. Rosemount 2051T In-line Pressure Transmitter Ordering Information

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

Display and interface options		
M4[14]	LCD display with local operator interface	★
M5	LCD display	★
Hardware adjustments		
D4[15]	Zero and span configuration buttons	★
DZ[16]	Digital zero trim	★
Wireless SST sensor module[7]		
WSM	Wireless SST sensor module	★
Conduit plug[4][17]		
DO	316 SST conduit plug	★
Ground screw[4][18]		
V5	External ground screw assembly	★
Performance[19]		
P8	High performance option	★
Terminal blocks[4][20]		
T1	Transient protection terminal block	★
Software configuration[16]		
C1	Custom Software Configuration (Completed Rosemount 2051 Configuration Data Sheet or Rosemount 3051 Configuration Data Sheet for Wireless required with order)	★
Alarm limits[15]		
C4[21]	Analog output levels compliant with NAMUR recommendation NE 43, alarm high	★
CN[22]	Analog output levels compliant with NAMUR recommendation NE 43, alarm low	★
CR	Custom alarm and saturation signal levels, high alarm (requires C1 and Configuration Data Sheet)	★
CS	Custom alarm and saturation signal levels, low alarm (requires C1 and Configuration Data Sheet)	★
CT	Low alarm (standard Rosemount alarm and saturation levels)	★
Pressure testing		
P1	Hydrostatic testing with certificate	
Cleaning process area[23]		
P2	Cleaning for special service	
P3	Cleaning for <1 PPM Chlorine/Fluorine	
Calibration certification		
Q4	Calibration certificate	★

Table A-15. Rosemount 2051T In-line Pressure Transmitter Ordering Information

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

QG	Calibration certificate and GOST verification certificate	★
QP	Calibration certificate and tamper evident seal	★
Material traceability certification		
Q8	Material traceability certification per EN 10204 3.1	★
Quality certification for safety(22)		
QS	Prior-use certificate of FMEDA data	★
QT	Safety certified to IEC 61508 with certificate of FMEDA	★
Surface finish		
Q16	Surface finish certification for sanitary remote seals	★
Toolkit total system performance reports		
QZ	Remote seal system performance calculation report	★
Conduit electrical connector(4)		
GE	M12, 4-pin, male connector (eurofast)	★
GM	A size mini, 4-pin, male connector (minifast)	★
NACE certificate(24)		
Q15	Certificate of compliance to NACE MR0175/ISO 15156 for wetted materials	★
Q25	Certificate of compliance to NACE MR0103 for wetted materials	★
Typical model number: 2051T G 3 A 2B 2 1 A B4 M5		

1. Wireless output (code X) only available in absolute measurement type (code A) in range 1–5 with $^1/_2$–14 NPT process connection (code 2B), and housing code (c ode P).
2. HART Revision 5 is the default HART output. The Rosemount 2051 with Selectable HART can be factory or field configured to HART Revision 7. To order HART Revision 7 factory configured, add option code HR7.
3. Wireless output (code X) only available in G$^1/_2$ A DIN 16288 Male process connection (code 2C) with range 1–4, 316 SST isolating diaphragm (code 2), silicone fill fluid (code 1), and housing code (code P).
4. Not available with output code X.
5. Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments. Order with Q15 or Q25 to receive a NACE certificate.
6. Not available with low power output code M.
7. Only available with output code X.
8. Transmitter conduit entry will be $^1/_2$ NPT and a $^1/_2$ NPT to G$^1/_2$ thread adapter will be provided.
9. Configures the HART output to HART Revision 5. The device can be field configured to HART Revision 7 if needed.
10. Configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 if needed.
11. “Assemble-to” items are specified separately and require a completed model number.
12. Only valid with FOUNDATION Fieldbus output code F.
13. Not available with coned and threaded connection (2F code), assemble-to manifold (S5 code), assemble-to seal (S1 code), surface finish certification (Q16 code), remote seal system report (QZ code).
14. Not available with FOUNDATION Fieldbus output code F or wireless output code X.
15. Only Available with HART (output codes A and M).
16. Only available with HART 4–20 mA output (output code A) and wireless output (output code X).
17. Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug.
18. The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

19. Available with 4–20 mA HART output code A, wireless output code X, FOUNDATION Fieldbus output code F, Rosemount 2051C Ranges 2–5 or Rosemount 2051T Ranges 1–4, SST and Alloy C 276 diaphragms and silicone fill fluid. High performance option includes 0.05% reference accuracy, and five year stability. See "Performance specifications" on page 61 for details.
20. The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA and IE.
21. NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.
22. Only available with HART 4–20 mA output (output code A).
23. Not valid with alternate process connection S5.
24. NACE Compliant wetted materials are identified by Footnote 2.

Table A-16. Rosemount 2051CFA Annubar Flowmeter Ordering Information

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

Model	Product description	
2051CFA	Annubar Flowmeter	
Measurement type		
D	Differential pressure	★
Fluid type		
L	Liquid	★
G	Gas	★
S	Steam	★
Line size		
020	2-in. (50 mm)	★
025	2 1/2-in. (63,5 mm)	★
030	3-in. (80 mm)	★
035	3 1/2-in. (89 mm)	★
040	4-in. (100 mm)	★
050	5-in. (125 mm)	★
060	6-in. (150 mm)	★
070	7-in. (175 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Pipe I.D. range[(1)]		
C	Range C from the pipe I.D. table	★
D	Range D from the pipe I.D. table	★
A	Range A from the pipe I.D. table	
B	Range B from the pipe I.D. table	
E	Range E from the pipe I.D. table	
Z	Non-standard pipe I.D. range or line sizes greater than 12-in.	
Pipe material/mounting assembly material		
C	Carbon steel (A105)	★
S	316 stainless steel	★
0[(2)]	No mounting (customer supplied)	
G	Chrome-Moly Grade F-11	
N	Chrome-Moly Grade F-22	
J	Chrome-Moly Grade F-91	

Table A-16. Rosemount 2051CFA Annubar Flowmeter Ordering Information

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

Piping orientation		
H	Horizontal piping	★
D	Vertical piping with downwards flow	★
U	Vertical piping with upwards flow	★
Annubar type		
P	Pak-Lok	★
F	Flanged with opposite side support	★
Sensor material		
S	316 stainless steel	★
Sensor size		
1	Sensor size 1 — line sizes 2-in. (50 mm) to 8-in. (200 mm)	★
2	Sensor size 2 — line sizes 6-in. (150 mm) to 96-in. (2400 mm)	★
3	Sensor size 3 — line sizes greater than 12-in. (300 mm)	★
Mounting type		
T1	Compression or threaded connection	★
A1	Class 150 RF ANSI	★
A3	Class 300 RF ANSI	★
A6	Class 600 RF ANSI	★
D1	DN PN16 flange	★
D3	DN PN40 flange	★
D6	DN PN100 flange	★
R1	Class 150 RTJ flange	
R3	Class 300 RTJ flange	
R6	Class 600 RTJ flange	
Opposite side support or packing gland		
0	No opposite side support or packing gland (required for Pak-Lok and Flange-Lok models)	★
Opposite side support (required for flanged models)		
C	NPT threaded opposite support assembly — extended tip	★
D	Welded opposite support assembly — extended tip	★
Isolation valve for Flo-Tap models[(2)]		
0	Not applicable or customer supplied	★
Temperature measurement		
T	Integral RTD – not available with flanged model greater than Class 600	★

Table A-16. Rosemount 2051CFA Annubar Flowmeter Ordering Information

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

0	No temperature sensor	★
R	Remote thermowell and RTD	
Transmitter connection platform		
3	Direct mount, Integral 3-valve manifold — not available with flanged model greater than Class 600	★
5	Direct mount, 5-valve manifold — not available with flanged model greater than Class 600	★
7	Remote mount NPT connections (1/2-in. FNPT)	★
8	Remote mount SW connections (1/2-in.)	
Differential pressure range		
1	0 to 25 in H_2O (0 to 62,3 mbar)	★
2	0 to 250 in H_2O (0 to 623 mbar)	★
3	0 to 1000 in H_2O (0 to 2,5 bar)	★
Transmitter output		
A[3]	4–20 mA with digital signal based on HART Protocol	★
F	FOUNDATION Fieldbus Protocol	★
W	PROFIBUS PA Protocol	★
X	Wireless	★
M	Low-Power, 1–5 Vdc with digital signal based on HART Protocol	

Transmitter housing material		**Conduit entry size**	
A	Aluminum	1/2–14 NPT	★
B	Aluminum	M20 × 1.5	★
J	SST	1/2–14 NPT	★
K[4]	SST	M20 × 1.5	★
P[5]	Engineered polymer	No conduit entries	★
D[6]	Aluminum	G1/2	
M[4][6]	SST	G1/2	

Transmitter performance class		
1	2.0% flow rate accuracy, 5:1 flow turndown, 2-year stability	★

Wireless options (requires wireless output code X and engineered polymer housing code P)

Wireless transmit rate, operating frequency and protocol		
WA3	User configurable transmit rate, 2.4 GHz *Wireless*HART	★
Antenna and SmartPower		
WP5	Internal antenna, compatible with green power module (I.S. power module sold separately)	★

Table A-16. Rosemount 2051CFA Annubar Flowmeter Ordering Information

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

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Special cleaning[4]		
P2	Cleaning for special services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material testing[4]		
V1	Dye penetrant exam	
Material examination[4]		
V2	Radiographic examination	
Special inspection[4]		
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★
Surface finish[4]		
RL	Surface finish for low pipe Reynolds number in gas and steam	★
RH	Surface finish for high pipe Reynolds number in liquid	★
Material traceability certification[4][7]		
Q8	Material traceability certification per EN 10474:2004 3.1	★
Code conformance[4]		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
Materials conformance[4][7]		
J5	NACE MR-0175/ISO 15156	
Country certification[4]		
J6	European Pressure Directive (PED)	★
J1	Canadian registration	
Instrument connections for remote mount options[4]		
G2	Needle valves, stainless steel	★
G6	OS&Y gate valve, stainless steel	★
G1	Needle valves, carbon steel	
G3	Needle valves, Alloy C-276	

Table A-16. Rosemount 2051CFA Annubar Flowmeter Ordering Information

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

G5	OS&Y gate valve, carbon steel	
G7	OS&Y gate valve, Alloy C-276	
Special shipment[4]		
Y1	Mounting hardware shipped separately	★
Product certifications		
E1[4]	ATEX Flameproof	★
E2[4]	INMETRO Flameproof	★
E3[4]	China Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7[4]	IECEx Flameproof	★
I1[4]	ATEX Intrinsic Safety	★
I2[4]	INMETRO Intrinsically Safe	★
I3[4]	China Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[4]	IECEx Intrinsic Safety	★
IA[4][7]	ATEX FISCO Intrinsic Safety; for FOUNDATION Fieldbus protocol only	★
IE[4][7]	FM FISCO Intrinsically Safe	★
IF[4][7]	CSA FISCO Intrinsically Safe	★
IG[4][7]	IECEx FISCO Intrinsically Safe	★
K1[4]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K7[4]	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	★
KA[4]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	★
KC[4]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[4]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	★
N1[4]	ATEX Type n	★
N7[4]	IECEx Type n	★
ND[4]	ATEX Dust	★

Table A-16. Rosemount 2051CFA Annubar Flowmeter Ordering Information

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

Sensor fill fluid and O-ring options[4]		
L1[8]	Inert sensor fill fluid	★
L2	Graphite-filled (PTFE) O-ring	★
LA[8]	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	★
Display and interface options[4]		
M4[9]	LCD display with local operator interface	★
M5	LCD display	★
Transmitter calibration certification[4]		
Q4	Calibration certificate for transmitter	★
Quality certification for safety[4][10]		
QS	Prior-use certificate of FMEDA data	★
QT	Safety certified to IEC 61508 with certificate of FMEDA	★
Transient protection[4][8][11]		
T1	Transient terminal block	★
Manifold for remote mount option[4]		
F2	3-valve manifold, stainless steel	★
F6	5-valve manifold, stainless steel	★
F1	3-valve manifold, carbon steel	
F5	5-valve manifold, carbon steel	
PlantWeb control functionality[4][7]		
A01	FOUNDATION Fieldbus advanced control function block suite	★
Hardware adjustments[4]		
D4[12]	Zero and span hardware adjustments	★
DZ[13]	Digital zero trim	★
Alarm limit[4][12]		
C4[14]	NAMUR alarm and saturation levels, high alarm	★
CN[14]	NAMUR alarm and saturation levels, low alarm	★
CR	Custom alarm and saturation signal levels, high alarm (requires C1 and Configuration Data Sheet)	★
CS	Custom alarm and saturation signal levels, low alarm (requires C1 and Configuration Data Sheet)	★
CT	Low alarm (standard Rosemount alarm and saturation levels)	★
Ground screw[4][8][15]		
V5	External ground screw assembly	★

Table A-16. Rosemount 2051CFA Annubar Flowmeter Ordering Information

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

HART revision configuration[4][12]		
HR5[16]	Configured for HART Revision 5	★
HR7[17]	Configured for HART Revision 7	★

Typical model number: 2051CFA D L 060 D C H P S 2 T1 0 0 0 3 2A A 1A 3

1. See the Rosemount DP Flowmeters and Primary Elements Product Data Sheet for Pipe I.D. table.
2. Provide the "A" dimension for flanged (page 75) and Pak-Lok (page 85).
3. HART Revision 5 is the default HART output. The Rosemount 2051 with Selectable HART can be factory or field configured to HART Revision 7. To order HART Revision 7 factory configured, add option code HR7.
4. Not available with low power output code M.
5. Only available with output code X.
6. Transmitter conduit entry will be $^1/_2$ NPT and a $^1/_2$ NPT to G$^1/_2$ thread adapter will be provided.
7. Only valid with FOUNDATION Fieldbus output code F.
8. Not available with output code X.
9. Not available with FOUNDATION Fieldbus (output code F) or wireless (output code X).
10. Only available with 4–20 mA HART (output code A).
11. Not available with housing code 00, 5A or 7J. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.
12. Only available with 4–20 mA HART (output codes A and M).
13. Only available with HART 4–20 mA output (output codes A and M) and wireless output (output code X).
14. NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.
15. The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.
16. Configures the HART output to HART Revision 5. The device can be field configured to HART Revision 7 if needed.
17. Configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 if needed.

Table A-17. Rosemount 2051CFC Compact Flowmeter Ordering Information

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

Model	Product description	
2051CFC	Compact Flowmeter	
Measurement type		
D	Differential pressure	★
Primary element technology		
A	Annubar averaging pitot tube	
C	Conditioning orifice plate	★
P	Orifice plate	★
Material type		
S	316 SST	★
Line size		
005(1)	1/2-in. (15 mm)	★
010(1)	1-in. (25 mm)	★
015(1)	1 1/2-in. (40 mm)	★
020	2-in. (50 mm)	★
030	3-in. (80 mm)	★
040	4-in. (100 mm)	★
060	6-in. (150 mm)	★
080	8-in. (200 mm)	★
100(2)(3)	10-in. (250 mm)	★
120 (2)(3)	12-in. (300 mm)	★
Primary element type		
N000	Annubar sensor size 1	★
N040	0.40 Beta ratio	★
N050	0.50 Beta ratio	★
N065(4)	0.65 Beta ratio	★
Temperature measurement		
0	No temperature sensor	★
T(5)	Integral RTD	
R	Remote thermowell and RTD	
Transmitter connection platform		
3	Direct mount	★
7	Remote mount, NPT connections	★

Table A-17. Rosemount 2051CFC Compact Flowmeter Ordering Information

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

Differential pressure range			
1	0 to 25 in H_2O (0 to 62,3 mbar)		★
2	0 to 250 in H_2O (0 to 623 mbar)		★
3	0 to 1000 in H_2O (0 to 2,5 bar)		★
Transmitter output			
A[6]	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION Fieldbus Protocol		★
W	PROFIBUS PA Protocol		★
X	Wireless		★
M	Low-Power, 1–5 Vdc with Digital Signal Based on HART Protocol		
Transmitter housing material		**Conduit entry size**	
A	Aluminum	1/2–14 NPT	★
B	Aluminum	M20 × 1.5	★
J	SST	1/2–14 NPT	★
K[7]	SST	M20 × 1.5	★
P[8]	Engineered polymer	No conduit entries	★
D[9]	Aluminum	G1/2	
M[7][9]	SST	G1/2	
Transmitter performance class			
1	up to ±2.25% flow rate accuracy, 5:1 flow turndown, 2-year stability		★

Wireless options (requires wireless output code X and engineered polymer housing code P)

Wireless transmit rate, operating frequency and protocol		
WA3	User configurable transmit rate, 2.4 GHz *Wireless*HART	★
Antenna and SmartPower		
WP5	Internal antenna, compatible with green power module (I.S. power module sold separately)	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Installation accessories[7]		
AB	ANSI alignment ring (Class 150) [only required for 10-in. (250 mm) and 12-in. (300 mm) line sizes]	★
AC	ANSI alignment ring (Class 300) [only required for 10-in. (250 mm) and 12-in. (300 mm) line sizes]	★

Table A-17. Rosemount 2051CFC Compact Flowmeter Ordering Information

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

AD	ANSI alignment ring (Class 600) [only required for 10-in. (250 mm) and 12-in. (300 mm) line sizes]	★
DG	DIN alignment ring (PN16)	★
DH	DIN alignment ring (PN40)	★
DJ	DIN alignment ring (PN100)	★
JB	JIS alignment ring (10K)	
JR	JIS alignment ring (20K)	
JS	JIS alignment ring (40K)	
Remote adapters[7]		
FE	Flange adapters 316 SST ($^1/_2$-in. NPT)	★
High temperature application[7]		
HT	Graphite valve packing (T_{max} = 850 °F)	
Flow calibration[7][10]		
WC	Flow calibration, 3 Pt, conditioning orifice option C (all pipe schedules)	
WD	Flow calibration, 10 Pt, conditioning option C (all schedules), Annubar option A (Schedule 40)	
Pressure testing[7]		
P1	Hydrostatic Testing with certificate	
Special cleaning[7]		
P2	Cleaning for special services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Special inspection[7]		
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★
Transmitter calibration certification[7]		
Q4	Calibration certificate for Transmitter	★
Quality certification for safety[7][11]		
QS	Prior-use certificate of FMEDA data	★
QT	Safety certified to IEC 61508 with certificate of FMEDA	★
Material traceability certification[7]		
Q8	Material traceability certification per EN 10204:2004 3.1	★
Code conformance[7]		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
J4	ANSI/ASME B31.8	

Table A-17. Rosemount 2051CFC Compact Flowmeter Ordering Information

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

Materials conformance[7][12]		
J5	NACE MR-0175/ISO 15156	
Country certification[7]		
J1	Canadian registration	
Product certifications		
E1[7]	ATEX Flameproof	★
E2[7]	INMETRO Flameproof	★
E3[7]	China Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7[7]	IECEx Flameproof	★
I1[7]	ATEX Intrinsic Safety	★
I2[7]	INMETRO Intrinsically Safe	★
I3[7]	China Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[7]	IECEx Intrinsic Safety	★
IA[7][13]	ATEX FISCO Intrinsic Safety; for FOUNDATION Fieldbus Protocol only	★
IE[7][13]	FM FISCO Intrinsically Safe	★
IF[7][13]	CSA FISCO Intrinsically Safe	★
IG[7][13]	IECEx FISCO Intrinsically Safe	★
K1[7]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K7[7]	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	★
KA[7]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	★
KC[7]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[7]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	★
N1[7]	ATEX Type n	★
N7[7]	IECEx Type n	★
ND[7]	ATEX Dust	★

Table A-17. Rosemount 2051CFC Compact Flowmeter Ordering Information

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

Sensor fill fluid and O-ring options[7]		
L1[14]	Inert sensor fill fluid	★
L2	Graphite-filled (PTFE) O-ring	★
LA[14]	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	★
Display and interface options[7]		
M[11]	LCD display with local operator interface	★
M5	LCD display	★
Transient protection[7][14][15]		
T1	Transient terminal block	★
Manifold for remote mount option[7]		
F2	3-valve manifold, stainless steel	★
F6	5-valve manifold, stainless steel	★
Alarm limit[7][16]		
C4[17]	NAMUR alarm and saturation levels, high alarm	★
CN[17]	NAMUR alarm and saturation levels, low alarm	★
CR	Custom alarm and saturation signal levels, high alarm (requires C1 and Configuration Data Sheet)	★
CS	Custom alarm and saturation signal levels, low alarm (requires C1 and Configuration Data Sheet)	★
CT	Low alarm (standard Rosemount alarm and saturation levels)	★
PlantWeb control functionality[7][13]		
A01	FOUNDATION Fieldbus advanced control function block suite	★
Hardware adjustments[7]		
D4[16]	Zero and span hardware adjustments	★
DZ[18]	Digital zero trim	★
Ground screw[7][14][19]		
V5	External ground screw assembly	★
HART revision configuration[7][16]		
HR5[20]	Configured for HART Revision 5	★
HR7[21]	Configured for HART Revision 7	★
Typical model number: 2051CFC D C S 060 N 065 0 3 2 A A 1 WC E5 M5		

1. Not available for Primary Element Technology C.
2. For the 10-in. (250 mm) and 12-in. (300 mm) line size, the alignment ring must be ordered (installation accessories).
3. 10-in. (250 mm) and 12-in. (300 mm) line sizes not available with Primary Element Technology A.
4. For 2-in. (50 mm) line sizes the Primary Element type is 0.6 for Primary Element Technology code C.
5. Available with Primary Element Technology A only.

6. HART Revision 5 is the default HART output. The Rosemount 2051 with Selectable HART can be factory or field configured to HART Revision 7. To order HART Revision 7 factory configured, add option code HR7.
7. Not available with low power output code M.
8. Only available with output code X.
9. Transmitter conduit entry will be $^1/_2$ NPT and a $^1/_2$ NPT to G$^1/_2$ thread adapter will be provided.
10. Not available with Primary Element Technology P.
11. Not available with FOUNDATION Fieldbus (output code F) or wireless (output code X).
12. Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.
13. Only valid with FOUNDATION Fieldbus output code F.
14. Not available with output code X.
15. Not available with housing code 00, 5A, or 7J. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.
16. Only available with 4–20 mA HART (output codes A and M).
17. NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.
18. Only available with HART 4–20 mA (output codes A and M) and wireless (output code X).
19. The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.
20. Configures the HART output to HART Revision 5. The device can be field configured to HART Revision 7 if needed.
21. Configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 if 14 needed.

Table A-18. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

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

Model	Product description	
2051CFP	Integral Orifice Flowmeter	
Measurement type		
D	Differential pressure	★
Material type		
S	316 SST	★
Line size		
005	1/2-in. (15 mm)	★
010	1-in. (25 mm)	★
015	1 1/2-in. (40 mm)	★
Process connection		
T1	NPT female body (not available with thermowell and RTD)	★
S1(1)	Socket weld body (not available with thermowell and RTD)	★
P1	Pipe ends: NPT threaded	★
P2	Pipe ends: beveled	★
D1	Pipe ends: flanged, DIN PN16, slip-on	★
D2	Pipe ends: flanged, DIN PN40, slip-on	★
D3	Pipe ends: flanged, DIN PN100, slip-on	★
W1	Pipe ends: flanged, RF, ANSI Class 150, weld-neck	★
W3	Pipe ends: flanged, RF, ANSI Class 300, weld-neck	★
W6	Pipe ends: flanged, RF, ANSI Class 600, weld-neck	★
A1	Pipe ends: flanged, RF, ANSI Class 150, slip-on	
A3	Pipe ends: flanged, RF, ANSI Class 300, slip-on	
A6	Pipe ends: flanged, RF, ANSI Class 600, slip-on	
R1	Pipe ends: flanged, RTJ, ANSI Class 150, slip-on	
R3	Pipe ends: flanged, RTJ, ANSI Class 300, slip-on	
R6	Pipe ends: flanged, RTJ, ANSI Class 600, slip-on	
Orifice plate material		
S	316 SST	★
Bore size option		
0066	0.066-in. (1,68 mm) for 1/2-in. pipe	★
0109	0.109-in. (2,77 mm) for 1/2-in. pipe	★
0160	0.160-in. (4,06 mm) for 1/2-in. pipe	★
0196	0.196-in. (4,98 mm) for 1/2-in. pipe	★

Table A-18. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

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

0260	0.260-in. (6,60 mm) for 1/2-in. pipe	★
0340	0.340-in. (8,64 mm) for 1/2-in. pipe	★
0150	0.150-in. (3,81 mm) for 1-in. pipe	★
0250	0.250-in. (6,35 mm) for 1-in. pipe	★
0345	0.345-in. (8,76 mm) for 1-in. pipe	★
0500	0.500-in. (12,70 mm) for 1-in. pipe	★
0630	0.630-in. (16,00 mm) for 1-in. pipe	★
0800	0.800-in. (20,32 mm) for 1-in. pipe	★
0295	0.295-in. (7,49 mm) for 1 1/2-in. pipe	★
0376	0.376-in. (9,55 mm) for 1 1/2-in. pipe	★
0512	0.512-in. (13,00 mm) for 1 1/2-in. pipe	★
0748	0.748-in. (19,00 mm) for 1 1/2-in. pipe	★
1022	1.022-in. (25,96 mm) for 1 1/2-in. pipe	★
1184	1.184-in. (30,07 mm) for 1 1/2-in. pipe	★
0010	0.010-in. (0,25 mm) for 1/2-in. pipe	
0014	0.014-in. (0,36 mm) for 1/2-in. pipe	
0020	0.020-in. (0,51 mm) for 1/2-in. pipe	
0034	0.034-in. (0,86 mm) for 1/2-in. pipe	
Transmitter connection platform		
D3	Direct mount, 3-valve manifold, SST	★
D5	Direct mount, 5-valve manifold, SST	★
R3	Remote mount, 3-valve manifold, SST	★
R5	Remote mount, 5-valve manifold, SST	★
Differential pressure ranges		
1	0 to 25 in H_2O (0 to 62,3 mbar)	★
2	0 to 250 in H_2O (0 to 623 mbar)	★
3	0 to 1000 in H_2O (0 to 2,5 bar)	★
Transmitter output		
A[(2)]	4–20 mA with digital signal based on HART Protocol	★
F	FOUNDATION Fieldbus Protocol	★
W	PROFIBUS PA Protocol	★
X	Wireless	★
M	Low-Power, 1–5 Vdc with digital signal based on HART Protocol	

Table A-18. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

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

Transmitter housing material		Conduit entry size	
A	Aluminum	1/2–14 NPT	★
B	Aluminum	M20 × 1.5	★
J	SST	1/2–14 NPT	★
K[3]	SST	M20 × 1.5	★
P[4]	Engineered polymer	No conduit entries	★
D[5]	Aluminum	G1/2	
M[3][5]	SST	G1/2	
Transmitter performance class			
1	up to ±2.25% flow rate accuracy, 5:1 flow turndown, 2-year stability		★

Wireless options (requires wireless output code X and engineered polymer housing code P)

Wireless transmit rate, operating frequency and protocol		
WA3	User configurable transmit rate, 2.4 GHz *Wireless*HART	★
Antenna and SmartPower		
WP5	Internal antenna, compatible with green power module (I.S. power module sold separately)	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Temperature sensor[3][6]		
RT	Thermowell and RTD	
Optional connection[3]		
G1	DIN 19213 transmitter connection	★
Pressure testing[3][7]		
P1	Hydrostatic testing with certificate	
Special cleaning[3]		
P2	Cleaning for special services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material testing[3]		
V1	Dye penetrant exam	
Material examination[3]		
V2	Radiographic examination	

Table A-18. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

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

Flow calibration[3][8]		
WD	Discharge coefficient verification	
Special inspection[3]		
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★
Material traceability certification[3]		
Q8	Material traceability certification per EN 10204:2004 3.1	★
Code conformance[3][9]		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
J4	ANSI/ASME B31.8	
Materials conformance[3][10]		
J5	NACE MR-0175/ISO 15156	
Country certification[3]		
J6	European Pressure Directive (PED)	★
J1	Canadian registration	
Transmitter calibration certification[3]		
Q4	Calibration certificate for transmitter	★
Quality certification for safety[3]		
QS[11]	Prior-use certificate of FMEDA data	★
QT[13]	Safety certified to IEC 61508 with certificate of FMEDA	★
Product certifications		
E1[3]	ATEX Flameproof	★
E2[3]	INMETRO Flameproof	★
E3[3]	China Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7[3]	IECEx Flameproof	★
I1[3]	ATEX Intrinsic Safety	★
I2[3]	INMETRO Intrinsically Safe	★
I3[3]	China Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[3]	IECEx Intrinsic Safety	★

Table A-18. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

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

IA[3][12]	ATEX FISCO Intrinsic Safety; for FOUNDATION Fieldbus Protocol only	★
IE[3][12]	FM FISCO Intrinsically Safe	★
IF[3][12]	CSA FISCO Intrinsically Safe	★
IG[3][12]	IECEx FISCO Intrinsically Safe	★
K1[3][12]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K7[3]	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	★
KA[3]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	★
KC[3]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[3]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	★
N1[3]	ATEX Type n	★
N7[3]	IECEx Type n	★
ND[3]	ATEX Dust	★
Sensor fill fluid and O-ring options[3]		
L1[13]	Inert sensor fill fluid	★
L2	Graphite-filled (PTFE) O-ring	★
LA[13]	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	★
Display and interface options[3]		
M4[13]	LCD display with local operator interface	★
M5	LCD display	★
Transient protection[3][13][14]		
T1	Transient terminal block	★
Alarm limit[3][15]		
C4[16]	NAMUR alarm and saturation levels, high alarm	★
CN[16]	NAMUR alarm and saturation levels, low alarm	★
CR	Custom alarm and saturation signal levels, high alarm (requires C1 and Configuration Data Sheet)	★
CS	Custom alarm and saturation signal levels, low alarm (requires C1 and Configuration Data Sheet)	★
CT	Low alarm (standard Rosemount alarm and saturation levels)	★
PlantWeb control functionality[3][12]		
A01	FOUNDATION Fieldbus advanced control function block suite	★

Table A-18. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

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

Hardware adjustments[3]		
D4[15]	Zero and span hardware adjustments	★
DZ[17]	Digital zero trim	★
Ground screw[3][13][18]		
V5	External ground screw assembly	★
HART revision configuration[3][15]		
HR5[19]	Configured for HART Revision 5	★
HR7[20]	Configured for HART Revision 7	★
Typical model number: 2051CFP D S 010 W1 S 0500 D3 2 A A 1 E5 M5		

1. To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.
2. HART Revision 5 is the default HART output. The Rosemount 2051 with Selectable HART can be factory or field configured to HART Revision 7. To order HART Revision 7 factory configured, add option code HR7.
3. Not available with low power output code M.
4. Only available with output code X.
5. Transmitter conduit entry will be $^1/_2$ NPT and a $^1/_2$ NPT to G$^1/_2$ thread adapter will be provided.
6. Thermowell Material is the same as the body material.
7. Does not apply to process connection codes T1 and S1.
8. Not available for bore sizes 0010, 0014, 0020, or 0034.
9. Not available with DIN process connection codes D1, D2, or D3.
10. Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.
11. Not available with FOUNDATION Fieldbus (Output Code F) or Wireless (Output Code X).
12. Only valid with FOUNDATION Fieldbus output code F.
13. Not available with output code X.
14. Not available with housing code 00, 5A, or 7J. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.
15. Only available with 4–20 mA HART (output codes A and M).
16. NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.
17. Only available with HART 4–20 mA (output codes A and M) and wireless (output code X).
18. The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.
19. Configures the HART output to HART Revision 5. The device can be field configured to HART Revision 7 if needed.
20. Configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 if needed.

Table A-19. Rosemount 2051L Liquid Level Transmitter Ordering Information

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

Model	Transmitter type			
2051L	Liquid Level Transmitter			★
Pressure range				
2	–250 to 250 inH_2O (–0,6 to 0,6 bar)			★
3	–1000 to 1000 inH_2O (–2,5 to 2,5 bar)			★
4	–300 to 300 psi (–20,7 to 20,7 bar)			★
Transmitter output				
A[(1)]	4–20 mA with digital signal based on HART Protocol			★
F	FOUNDATION Fieldbus Protocol			★
W	PROFIBUS PA Protocol			★
X	Wireless			★
M	Low-Power, 1–5 V dc with digital signal based on HART Protocol			
Process connection size, diaphragm material (high side)				
	Process connection size	**Diaphragm**		
C[(2)]	2-in./DN 50	316L SST		★
H[(2)]	2-in./DN 50	Alloy C-276		★
J	2-in./DN 50	Tantalum		★
A[(2)]	3-in./DN 80	316L SST		★
B[(2)]	4-in./DN 100	316L SST		★
C[(2)]	3-in./DN 80	Alloy C-276		★
D[(2)]	4-in./DN 100	Alloy C-276		★
E	3-in./DN 80	Tantalum		★
F	4-in./DN 100	Tantalum		★
Extension length (high side)				
0	None, flush mount			★
2	2-in./50 mm			★
4	4-in./100 mm			★
6	6-in./150 mm			★
Mounting flange size, rating, material (high side)				
	Size	**Rating**	**Material**	
M	2-in.	ANSI/ASME B16.5 Class 150	CS	★
A	3-in.	ANSI/ASME B16.5 Class 150	CS	★
B	4-in.	ANSI/ASME B16.5 Class 150	CS	★
N	2-in.	ANSI/ASME B16.5 Class 300	CS	★

Table A-19. Rosemount 2051L Liquid Level Transmitter Ordering Information

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

C	3-in.	ANSI/ASME B16.5 Class 300	CS	★
D	4-in.	ANSI/ASME B16.5 Class 300	CS	★
X[2]	2-in.	ANSI/ASME B16.5 Class 150	SST	★
F[2]	3-in.	ANSI/ASME B16.5 Class 150	SST	★
G[2]	4-in.	ANSI/ASME B16.5 Class 150	SST	★
Y[2]	Displayed	ANSI/ASME B16.5 Class 300	SST	★
H[2]	3-in.	ANSI/ASME B16.5 Class 300	SST	★
J[2]	4-in.	ANSI/ASME B16.5 Class 300	SST	★
Q	DN50	PN 10-40 per EN 1092-1	CS	★
R	DN80	PN 40 per EN 1092-1	CS	★
K[2]	DN50	PN 10-40 per EN 1092-1	SST	★
T[2]	DN80	PN 40 per EN 1092-1	SST	★
Seal fill fluid (high side)		**Specific gravity at 77 °F (25 °C)**	**Temperature limits (ambient temperature of 70 °F [21 °C])**	
A	SYLTHERM™ XLT	0.85	–102 to 293 °F (–75 to 145 °C)	★
C	Silicone 704	1.07	32 to 401 °F (0 to 205 °C)	★
D	Silicone 200	0.93	–49 to 401 °F (–45 to 205 °C)	★
F	Silicone 200 for vacuum applications limits: For use in vacuum applications below 14.7 psia (1 bar-a), refer to vapor pressure curves in Rosemount DP Level Fill Fluid Specification Technical Note.			
H	Inert (halocarbon)	1.85	5 to 401 °F (–15 to 205 °C)	★
G	Glycerin and water	1.13	–49 to 320 °F (–45 to 160 °C)	★
L	Silicone 704 for Vacuum Applications Limits: For use in vacuum applications below 14.7 psia (1 bar-a), refer to vapor pressure curves in Rosemount DP Level Fill Fluid Specification Technical Note.			
N	Neobee® M-20	0.92	5 to 401 °F (–15 to 205 °C)	★
P	Propylene glycol and water	1.02	5 to 203 °F (–15 to 95 °C)	★
Sensor module configuration, flange adapter (low side)				
	Configuration	**Flange adapter**		
1	Gage	SST		★
2	Differential	SST		★
3[3]	Tuned-System with remote seal	None		★
Sensor module diaphragm material, sensor fill fluid (low side)				
	Diaphragm material	**Sensor fill fluid**		
1	316L SST	Silicone		★
2	Alloy C-276 (SST valve seat)	Silicone		★
7	Alloy C-276 (Alloy C-276 valve seat)	Silicone		★
A[4]	316L SST	Inert (halocarbon)		★

Table A-19. Rosemount 2051L Liquid Level Transmitter Ordering Information

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

B[2][4]	Alloy C-276 (SST valve seat)	Inert (halocarbon)	★
G[4]	Alloy C-276 (Alloy C-276 valve seat)	Inert (halocarbon)	★
O-ring			
A	Glass-filled PTFE		★
Housing material		**Conduit entry size**	
A	Aluminum	1/2–14 NPT	★
B	Aluminum	M20 × 1.5	★
J	SST	1/2–14 NPT	★
K[5]	SST	M20 × 1.5	★
P[6]	Engineered polymer	No conduit entries	★
D[7]	Aluminum	G1/2	
M[5][7]	SST	G1/2	

Wireless options (requires wireless output code X and engineered polymer housing code P)

Wireless transmit rate, operating frequency and protocol		
WA3	User configurable transmit rate, 2.4 GHz *Wireless*HART	★
Antenna and SmartPower		
WP5	Internal antenna, compatible with green power module (I.S. power module sold separately)	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
PlantWeb control functionality[8]		
A01	FOUNDATION Fieldbus advanced control function block suite	★
Seal assemblies[9]		
S1	Assemble to one Rosemount 1199 Seal (requires 1199M)	★
Product certifications		
E1[5]	ATEX Flameproof	★
E2[5]	INMETRO Flameproof	★
E3[5]	China Flameproof	★
E4	TIIS Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7[5]	IECEx Flameproof	★

Table A-19. Rosemount 2051L Liquid Level Transmitter Ordering Information

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

EW[5]	India (CCOE) Flameproof Approval	★
I1[5]	ATEX Intrinsic Safety	★
I2[5]	INMETRO Intrinsically Safe	★
I3[5]	China Intrinsic Safety	★
I4[5][6]	TIIS Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[5]	IECEx Intrinsic Safety	★
IA[8]	ATEX FISCO Intrinsic Safety	★
IE[8]	FM FISCO Intrinsically Safe	★
IF[8]	CSA FISCO Intrinsically Safe	★
IG[8]	IECEx FISCO Intrinsically Safe	★
IW[5]	India (CCOE) Intrinsically Safety Approval	★
K1[5]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K2	INMETRO Flameproof and Intrinsic Safety	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K7[5]	IECEx Flameproof, Intrinsic Safety, Type n and Dust	★
KA[5]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC[5]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[5]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
N1[5]	ATEX Type n	★
N7[5]	IECEx Type n	★
ND[5]	ATEX Dust	★
EM	Technical Regulations Customs Union (EAC) Flameproof	★
IM	Technical Regulations Customs Union (EAC) Intrinsic Safety	★
KM	Technical Regulations Customs Union (EAC) Flameproof and Intrinsic Safety	★
Shipboard approvals[4]		
SBS	American Bureau of Shipping (ABS) type approval	★
SBV	Bureau Veritas (BV) type approval	★
SDN	Det Norske Veritas (DNV) type approval	★
SLL	Lloyds Register (LR) type approval	★
Display and interface options		
M4[10]	LCD display with local operator interface	★
M5	LCD display	★

Table A-19. Rosemount 2051L Liquid Level Transmitter Ordering Information

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

Hardware adjustments		
D4[11]	Zero and span configuration buttons	★
DZ[12]	Digital zero trim	★
Flange adapters[13]		
DF	1/2–14 NPT flange adapters	★
Conduit plug[4][14]		
DO	316 SST conduit plug	★
Ground screw[4][15]		
V5	External ground screw assembly	★
Transient protection[4][16]		
T1	Transient terminal block	★
Software configuration[12]		
C1	Custom software configuration (requires completed Configuration Data Sheet)	★
Alarm limit[11]		
C4[17]	NAMUR alarm and saturation levels, high alarm	★
CN[17]	NAMUR alarm and saturation levels, low alarm	★
CR	Custom alarm and saturation signal levels, high alarm (requires C1 and Configuration Data Sheet)	★
CS	Custom alarm and saturation signal levels, low alarm (requires C1 and Configuration Data Sheet)	★
CT	Low alarm (standard Rosemount alarm and saturation levels)	★
Calibration certification		
Q4	Calibration certificate	★
QG	Calibration certificate and GOST verification certificate	★
GP	Calibration certificate and tamper evident seal	★
Material traceability certification		
Q8	Material traceability certification per EN 10204 3.1	★
Quality certification for safety[18]		
QS	Prior-use certificate of FMEDA data	★
QT	Safety certified to IEC 61508 with certificate of FMEDA	★
Toolkit total system performance reports		
QZ	Remote seal system performance calculation report	★
Conduit electrical connector[4]		
GE	M12, 4-pin, male connector (eurofast)	★
GM	A size mini, 4-pin, male connector (minifast)	★

Table A-19. Rosemount 2051L Liquid Level Transmitter Ordering Information

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

NACE certificate[19]				
Q15	Certificate of compliance to NACE MR0175/ISO 15156 for wetted materials			★
Q25	Certificate of compliance to NACE MR0103 for wetted materials			★
Lower housing flushing connection options				
	Ring material	**Number**	**Size (NPT)**	
F1	316 SST	1	1/4–18 NPT	★
F2	316 SST	2	1/4–18 NPT	★
F3[20]	Alloy C-276	1	1/4–18 NPT	★
F4[20]	Alloy C-276	2	1/4–18 NPT	★
F7	316 SST	1	1/2–14 NPT	★
F8	316 SST	2	1/2–14 NPT	★
F9	Alloy C-276	1	1/2–14 NPT	★
F0	Alloy C-276	2	1/2–14 NPT	★
Typical model number: 2051L 2 A A0 X D 21 A A B4 M5 F1				

1. HART Revision 5 is the default HART output. The Rosemount 2051 with Selectable HART can be factory or field configured to HART Revision 7. To order HART Revision 7 factory configured, add option code HR7.
2. Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments. Order with Q15 or Q25 to receive a NACE certificate.
3. Requires option code S1.
4. Not available with output code X.
5. Not available with low power output code M.
6. Only available with output code X.
7. Transmitter conduit entry will be 1/2 NPT and a 1/2 NPT to G1/2 thread adapter will be provided.
8. Only valid with FOUNDATION Fieldbus output code F.
9. "Assemble-to" items are specified separately and require a completed model number.
10. Not valid with FOUNDATION Fieldbus output code F and wireless output code X.
11. Only available with 4–20 mA HART (output codes A and M).
12. Only available with HART 4–20 mA output (output codes A) and wireless output (output code X).
13. Not available with remote mount seal assembly option S1.
14. Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug.
15. The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.
16. The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA, IE, IF, and IG.
17. NAMUR-Compliant operation is pre-set at the factory.
18. Only available with HART 4–20 mA output (output code A).
19. NACE Compliant wetted materials are identified by Footnote 2.
20. Not available with option codes A0, B0, and G0.

A.7 Range limits

Table A-20. Rosemount 2051C Differential/Gage Pressure Transmitter Range Limits

Units	Range 1 span		Range 2 span		Range 3 span		Range 4 span		Range 5 span	
	min	max	min	max	min	max	min	max	min	max
inH_2O	0.5	25	2.5	250	10	1000	83.040	8304	553.60	55360
inHg	0.03678	1.8389	0.18389	18.389	0.73559	73.559	6.1081	610.81	40.720	4072.04
ftH_2O	0.04167	2.08333	0.20833	20.8333	0.83333	83.3333	6.9198	691.997	46.13	4613.31
mmH_2O	12.7	635.5	63.553	6355	254	25421	2110.95	211095	14073	1407301
mmHg	0.93416	46.7082	4.67082	467.082	18.6833	1868.33	155.145	15514.5	1034.3	103430
psi	0.01806	0.903	0.0902	9.03183	0.36127	36.127	3	300	20	2000
bar	0.00125	0.06227	0.00623	0.62272	0.02491	2.491	0.20684	20.6843	1.37895	137.895
mbar	1.2454	62.2723	6.22723	622.723	24.9089	2490.89	206.843	20684.3	1378.95	137895
g/cm^2	1.26775	63.3875	6.33875	633.875	25.355	2535.45	210.547	21054.7	1406.14	140614
kg/cm^2	0.00127	0.0635	0.00635	0.635	0.0254	2.54	0.21092	21.0921	1.40614	140.614
Pa	124.545	6227.23	622.723	62160.6	2490.89	249089	20684.3	2068430	137895	13789500
kPa	0.12545	6.2272	0.62272	62.2723	2.49089	249.089	20.6843	2068.43	137.895	13789.5
torr	0.93416	46.7082	4.67082	467.082	18.6833	1868.33	155.145	15514.5	1034.3	103430
atm	0.00123	0.06146	0.00615	0.61460	0.02458	2.458	0.20414	20.4138	1.36092	136.092
When using a Field Communicator, ±5% adjustment is allowed on the sensor limit to allow for unit conversions.										

Table A-21. Rosemount 2051L/2051H Pressure Transmitter Range Limits

Units	Range 2 span		Range 3 span		Range 4 span		Range 5 span	
	min	max	min	max	min	max	min	max
inH_2O	2.5	250	10	1000	83.040	8304	553.60	55360
inHg	0.18389	18.389	0.73559	73.559	6.1081	610.81	40.720	4072.04
ftH_2O	0.20833	20.8333	0.83333	83.3333	6.9198	691.997	46.13	4613.31
mmH_2O	63.553	6355	254	25421	2110.95	211095	14073	1407301
mmHg	4.67082	467.082	18.6833	1868.33	155.145	15514.5	1034.3	103430
psi	0.0902	9.03183	0.36127	36.127	3	300	20	2000
bar	0.00623	0.62272	0.02491	2.491	0.20684	20.6843	1.37895	137.895
mbar	6.22723	622.723	24.9089	2490.89	206.843	20684.3	1378.95	137895
g/cm^2	6.33875	633.875	25.355	2535.45	210.547	21054.7	1406.14	140614
kg/cm^2	0.00635	0.635	0.0254	2.54	0.21092	21.0921	1.40614	140.614
Pa	622.723	62160.6	2490.89	249089	20684.3	2068430	137895	13789500
kPa	0.62272	62.2723	2.49089	249.089	20.6843	2068.43	137.895	13789.5
torr	4.67082	467.082	18.6833	1868.33	155.145	15514.5	1034.3	103430
atm	0.00615	0.61460	0.02458	2.458	0.20414	20.4138	1.36092	136.092
When using a Field Communicator, ±5% adjustment is allowed on the sensor limit to allow for unit conversions.								

Table A-22. Rosemount 2051T Gage and Absolute Pressure Transmitter Range Limits

Units	Range 1 span		Range 2 span		Range 3 span		Range 4 span		Range 5 span	
	min	max	min	max	min	max	min	max	min	max
inH_2O	8.30397	831.889	41.5198	4159.45	221.439	22143.9	1107.2	110720	55360	276799
inHg	0.61081	61.0807	3.05403	305.403	16.2882	1628.82	81.441	8144.098	4072.04	20360.2
ftH_2O	0.69199	69.3241	3.45998	345.998	18.4533	1845.33	92.2663	9226.63	4613.31	23066.6
mmH_2O	211.10	21130	1054.60	105460.3	5634.66	563466	28146.1	2814613	1407301	7036507
mmHg	15.5145	1551.45	77.5723	7757.23	413.72	41372	2068.6	206860.0	103430	517151
psi	0.3	30	1.5	150	8	800	40	4000	2000	10000
bar	0.02068	2.06843	0.10342	10.3421	0.55158	55.1581	2.75791	275.7905	137.895	689.476
mbar	20.6843	2068.43	103.421	10342.11	551.581	55158.1	2757.91	275790.5	137895	689476
g/cm^2	21.0921	2109.21	105.461	10546.1	561.459	56145.9	2807.31	280730.6	140614	703067
kg/cm^2	0.02109	2.10921	0.10546	10.5461	0.56246	56.2456	2.81228	281.228	140.614	701.82
Pa	2068.43	206843	10342.1	1034212	55158.1	5515811	275791	27579054	13789500	68947600
kPa	2.06843	206.843	10.3421	1034.21	55.1581	5515.81	275.791	27579.05	13789.5	68947.6
torr	15.5145	1551.45	77.5726	7757.26	413.721	413721	2068.6	206859.7	103430	517151
atm	0.02041	2.04138	0.10207	10.2069	0.54437	54.4368	2.72184	272.1841	136.092	680.46
When using a Field Communicator, ±5% adjustment is allowed on the sensor limit to allow for unit conversions.										

Table A-23. Rosemount 2051C Absolute Pressure Transmitter Range Limits

Units	Range 1 span		Range 2 span		Range 3 span		Range 4 span	
	min	max	min	max	min	max	min	max
inH_2O	8.30397	831.889	41.5198	4151.98	221.439	22143.9	1107.2	110720
inHg	0.61081	61.0807	3.05403	305.403	16.2882	1628.82	81.441	8144.098
ftH_2O	0.69199	69.3241	3.45998	345.998	18.4533	1845.33	92.2663	9226.63
mmH_2O	211.10	21130	6.35308	635.308	5634.66	563466	28146.1	2814613
mmHg	15.5145	1551.45	1055.47	105547	413.72	41372	2068.6	206860.0
psi	0.3	30	1.5	150	8	800	40	4000
bar	0.02068	2.06843	0.10342	10.342	0.55158	55.1581	2.75791	275.7905
mbar	20.6843	2068.43	103.421	10342.1	551.581	55158.1	2757.91	275790.5
g/cm^2	21.0921	2109.21	105.27	105.27	561.459	56145.9	2807.31	280730.6
kg/cm^2	0.02109	2.10921	0.10546	10.546	0.56246	56.2456	2.81228	281.228
Pa	2068.43	206843	10342.1	1034210	55158.1	5515811	275791	27579054
kPa	2.06843	206.843	10.3421	1034.21	55.1581	5515.81	275.791	27579.05
torr	15.5145	1551.45	77.5726	7757.26	413.721	413721	2068.6	206859.7
atm	0.02041	2.04138	0.10207	10.207	0.54437	54.4368	2.72184	272.1841
When using a Field Communicator, ±5% adjustment is allowed on the sensor limit to allow for unit conversions.								

A.8 Profibus electronics spare parts ordering information

Model	Spare Part Type
SP2051	Rosemount 2051 Electronics Board Spare Parts
Transmitter Output	
W	Profibus — PA Protocol
Options (include with existing model number)	
Configure Electronics for Configuration Buttons	
CZ1	Configure Electronics for Local Operator Interface
Hardware Upgrade Kits - Buttons (to add Analog Zero and Span, Digital Zero and LOI buttons)	
BZ5	Add External Buttons Hardware for Profibus LOI (for AL housing, LCD Display not included)
BZ6	Add External Buttons Hardware for Profibus LOI (for SST housing, LCD Display not included)
Hardware Upgrade Kits - LCD Upgrade Kit	
M5	Add LCD Display Hardware
Hardware Upgrade Kits - Display Cover	
AB	Add Aluminum Housing Cover with Glass for Display
JK	Add SST Housing Cover with Glass for Display
Typical Model: SP2051 W CZ1	

A.9 Other spare parts

Terminal block	Part number
Standard terminal block assembly	02051-9005-0021
Transient terminal block assembly (option T1)	02051-9005-0022
FISCO terminal block assembly	02051-9005-0023
LCD display	**Part number**
LCD display kit[1]	
PROFIBUS PA - Aluminum	03031-0193-0104
PROFIBUS PA - 316 SST	03031-0193-0112
LCD displays only[2]	**Part number**
For PROFIBUS PA	03031-0193-0105
LCD display hardware	**Part number**
Extended LCD Display cover assembly - Aluminum[3]	03031-0193-0007
Extended LCD Display cover assembly - 318 SST[3]	03031-0193-0013
O-ring package for electronics housing cover, pkg of 12	03031-0232-0001
Local operator interface kits (includes new electronics board)	**Part number**
Including LCD Display and Cover (to upgrade devices without displays)	
PROFIBUS PA - AL	02051-9030-0001
PROFIBUS PA - SST	02051-9030-0011
Without an LCD Display and Cover (to upgrade devices that have displays)	
PROFIBUS PA - AL	02051-9030-1001
PROFIBUS PA - SST	02051-9030-1011
O-ring packages (package of 12)	**Part number**
Electronic housing, cover (standard and meter)	03031-0232-0001
Electronics housing, module	03031-9233-0001
Process flange, glass-filled PTFE	03031-0234-0001
Process flange, graphite-filled PTFE	03031-0234-0002
Flange adapter, glass-filled PTFE	03031-0242-0001
Flange adapter, graphite-filled PTFE	03031-0242-0002
Bolt kits	**Part number**
Coplanar flange	
Flange bolt kit (44 mm [1.75 in.]) (set of 4)	
Carbon steel	03031-0312-0001
316 SST	03031-0312-0002
ASTM A 193, Grade B7M	03031-0312-0003

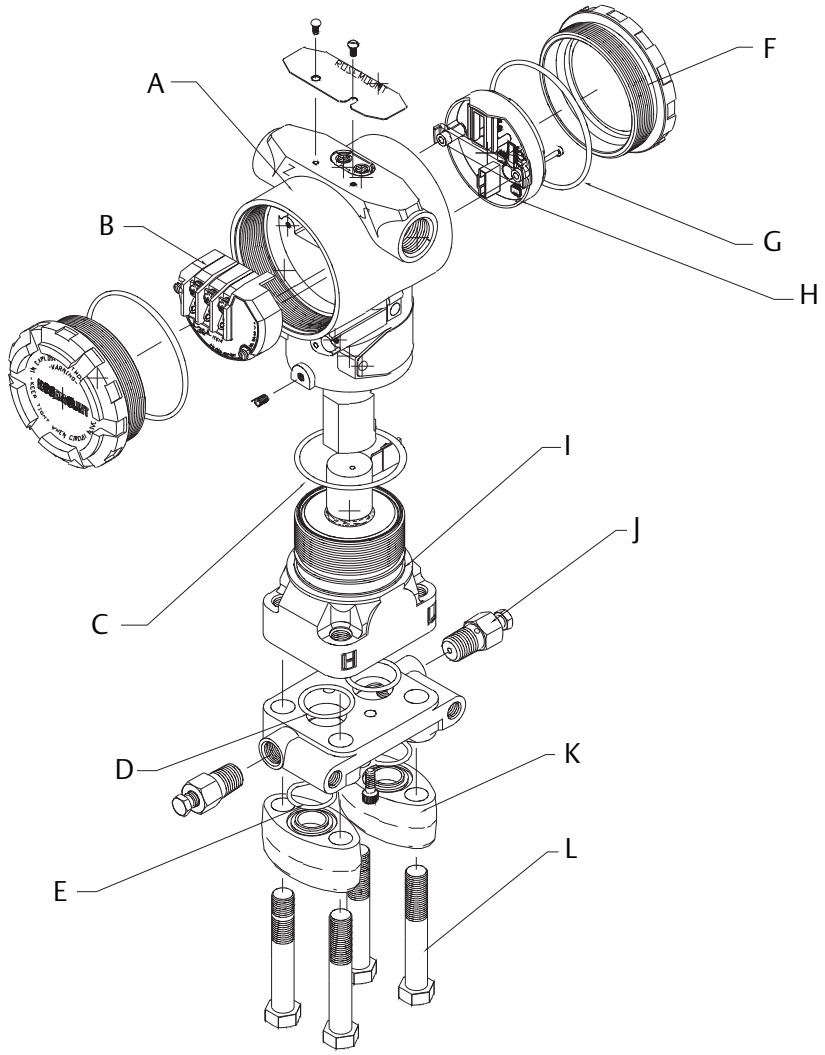
Flange/adapter bolt kit (73 mm [2.88 in.]) (set of 4)	**Part number**
Carbon steel	03031-0306-0001
316 SST	03031-0306-0002
ASTM A 193, Grade B7M	03031-0306-0003
Manifold/flange kit (57 mm [2.25 in]) (set of 4)	**Part number**
Carbon steel	03031-0311-0001
316 SST	03031-0311-0002
ASTM A 193, Grade B7M	03031-0311-0003
ASTM A 193, Class 2, Grade B8M	03031-0311-0020
Traditional flange	**Part number**
Differential flange and adapter bolt kit (44 mm [1.75 in]) (set of 8)	
Carbon steel	03031-0307-0001
316 SST	03031-0307-0002
ASTM A 193, Grade B7M	03031-0307-0003
Gage flange and adapter bolt kit (set of 6)	**Part number**
Carbon steel	03031-0307-1001
316 SST	03031-0307-1002
ASTM A 193, Grade B7M	03031-0307-1003
Level flange, vertical mount	**Part number**
Flange bolt kit (set of 4)	
Carbon steel	03031-0395-0001
316 SST	03031-0395-0002
Housing covers (including O-ring)	**Part number**
Field terminal cover - Aluminum	03031-0292-0001
Field terminal cover - 316 SST	03031-0292-0002
Fieldbus extended electronics cover - Aluminum	03031-0292-0003
Fieldbus extended electronics cover - 316 SST	03031-0292-0004
Fieldbus extended LCD Display cover - Aluminum	03031-0193-0007
Fieldbus extended LCD Display cover - 316 SST	03031-0193-0013
Miscellaneous	**Part number**
External ground screw assembly (option V5)	03031-0398-0001
Flanges	**Part number**
Differential coplanar flange	
Nickel-plated carbon steel	03031-0388-0025

316 SST	03031-0388-0022
Cast C-276	03031-0388-0023
Gage coplanar flange	**Part number**
Nickel-plated carbon steel	03031-0388-1025
316 SST	03031-0388-1022
Cast C-276	03031-0388-1023
Coplanar Flange Alignment Screw (package of 12)	03031-0309-0001
Traditional flange	**Part number**
316 SST	03031-0320-0002
Cast C-276	03031-0320-0003
Level flange, Vertical mount	**Part number**
2 in., class 150, SST	03031-0393-0221
2 in., class 300, SST	03031-0393-0222
3 in., class 150, SST	03031-0393-0231
3 in., class 300, SST	03031-0393-0232
DIN, DN 50, PN 40	03031-0393-1002
DIN, DN 80, PN 40	03031-0393-1012
Flange adapter	**Part number**
Nickel-plated carbon steel	02024-0069-0005
316 SST	02024-0069-0002
Cast C-276	02024-0069-0003
Drain/vent valve kits (each kit contains parts for one transmitter)	**Part number**
Differential drain/vent kits	
316 SST stem and seat kit	01151-0028-0022
Alloy C-276 stem and seat kit	01151-0028-0023
316 SST ceramic ball drain/vent kit	03031-0378-0022
Alloy C-276 ceramic ball drain/vent kit	01151-0028-0123
Gage drain/vent kits	**Part number**
316 SST stem and seat kit	01151-0028-0012
Alloy C-276 stem and seat kit	01151-0028-0013
316 SST ceramic ball drain/vent kit	03031-0378-0012
Alloy C-276 ceramic ball drain/vent kit	01151-0028-0113
Mounting brackets	**Part number**
Rosemount 2051C and 2051L coplanar flange bracket kit	
B4 bracket, SST, 2-in. pipe mount, SST bolts	03031-0189-0003

Rosemount 2051T bracket kit	Part number
B4 bracket, SST, 2-in. pipe mount, CS bolts	03031-0189-0004
Rosemount 2051C Traditional flange bracket kits	**Part number**
B1 bracket, 2-in. pipe mount, CS bolts	03031-0313-0001
B2 bracket, panel mount, CS bolts	03031-0313-0002
B3 flat bracket for 2-in. pipe mount, CS bolts	03031-0313-0003
B7 (B1 style bracket with SST bolts)	03031-0313-0007
B8 (B2 style bracket with SST bolts)	03031-0313-0008
B9 (B3 style bracket with SST bolts)	03031-0313-0009
BA (SST B1 bracket with SST bolts)	03031-0313-0011
BC (SST B3 bracket with SST bolts)	03031-0313-0013

1. Kit includes LCD display, captive mounting hardware, 10-pin interconnection header, cover assembly.
2. Displays include LCD display, captive mounting hardware, 10-pin interconnection header. No cover assembly.
3. Display cover assembly includes the cover and O-ring only.

Figure A-17. Spare Parts Diagram



A. Electronics housing
B. Terminal block
C. Electronics housing module O-ring
D. Process O-ring
E. Flange adapter O-ring
F. Housing cover
G. Electronics housing cover O-ring
H. Electronics board
I. Sensor module
J. Drain/vent valve
K. Flange adapter
L. Flange adapter bolts

Appendix B Product Certifications

Rev 1.5

B.1 European Directive Information

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

B.2 Ordinary Location Certification

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

B.3 North America

E5 USA Explosionproof (XP) and Dust-Ignitionproof (DIP)
Certificate: FM16US0232
Standards: FM Class 3600 – 2011,
FM Class 3615 – 2006,
FM Class 3616 – 2011,
FM Class 3810 – 2005,
ANSI/NEMA 250 – 2008,
ANSI/IEC 60529 2004
Markings: XP CL I, DIV 1, GP B, C, D; DIP CL II, DIV 1, GP E, F, G; CL III; T5(–50 °C ≤ T_a ≤ +85 °C); Factory Sealed; Type 4X

I5 USA Intrinsic Safety (IS) and Nonincendive (NI)
Certificate: FM16US0231X
Standards: FM Class 3600 – 2011,
FM Class 3610 – 2010,
FM Class 3611 – 2004,
FM Class 3810 – 2005,
ANSI/NEMA 250 – 2008
Markings: IS CL I, DIV 1, GP A, B, C, D; CL II, DIV 1, GP E, F, G; Class III; DIV 1 when connected per Rosemount drawing 02051-1009; Class I, Zone 0; AEx ia IIC T4; NI CL 1, DIV 2, GP A, B, C, D; T4(–50 °C ≤ T_a ≤ +70 °C); Type 4X

Specific Condition of Use (X):

1. The Model 2051 transmitter housing contains aluminum and is considered a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact and friction.

IE USA FISCO
Certificate: FM16US0231X
Standards: FM Class 3600 – 2011,
FM Class 3610 – 2010,
FM Class 3611 – 2004,
FM Class 3810 – 2005
Markings: IS CL I, DIV 1, GP A, B, C, D when connected per Rosemount drawing 02051-1009 (–50 °C ≤ T_a ≤ +60 °C); Type 4X

Specific Condition of Use (X):

1. The Model 2051 transmitter housing contains aluminum and is considered a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact and friction.

E6 Canada Explosion-Proof, Dust Ignition Proof
Certificate: 2041384
Standards: CAN/CSA C22.2 No. 0-10, CSA Std C22.2 No. 25-1966, CSA Std C22.2 No. 30-M1986, CAN/CSA-C22.2 No. 94-M91, CSA Std C22.2 No.142-M1987, CAN/CSA-C22.2 No.157-92, CSA Std C22.2 No. 213-M1987, CAN/CSA-E60079-0:07, CAN/CSA-E60079-1:07, CAN/CSA-E60079-11-02, CAN/CSA-C22.2 No.60529:05, ANSI/ISA-12.27.01–2003
Markings: Explosion-Proof for Class I, Divisions 1, Groups B, C, and D. Dust-Ignition Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2; Groups A, B, C, and D for indoor and outdoor hazardous locations. Class I Zone 1 Ex d IIC T5. Enclosure type 4X, factory sealed. Single Seal.

I6 Canada Intrinsic Safety
Certificate: 2041384
Standards: CSA Std. C22.2 No. 142 - M1987, CSA Std.C22.2 No. 213 - M1987, CSA Std. C22.2 No.157 - 92, CSA Std. C22.2 No. 213 - M1987, ANSI/ISA 12.27.01 – 2003, CAN/CSA-E60079-0:07, CAN/CSA-E60079-11:02
Markings: Intrinsically safe for Class I, Division 1, Groups A,B, C, and D when connected in accordance with Rosemount drawing 02051-1008. Ex ia IIC T3C. Single Seal. Enclosure Type 4X.

B.4 Europe

E1 ATEX Flameproof
Certificate: KEMA 08ATEX0090X
Standards: EN 60079-0:2012 + A11:2013, EN 60079-1:2014, EN 60079-26:2015
Markings: ⟨Ex⟩ II 1/2 G Ex db IIC T6 (–60 °C ≤ T_a ≤ +70°C); T4/T5 (-60 °C ≤ T_a ≤ +80 °C)

Table B-1. Process Connection Temperature

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

Special Conditions for Safe Use (X):

1. Appropriate cable, glands and plugs need to be suitable for a temperature of 5 °C greater than maximum specified temperature for location where installed.
2. Non- standard paint options may cause risk from electrostatic discharge. Avoid installations that could cause electrostatic build-up on painted surfaces, and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.
3. 2.3.The device contains a thin wall diaphragm less than 1 mm thickness that forms a boundary between zone 0 (process connection) and zone 1 (all other parts of the equipment). The model code and datasheet are to be consulted for details of the diaphragm material. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm shall be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure

I1 ATEX Intrinsic Safety
Certificate: Baseefa08ATEX0129X
Standards: EN60079-0:2012, EN60079-11:2012
Markings: ⟨Ex⟩ II 1 G Ex ia IIC T4 Ga (–60 °C ≤ T_a ≤ +70 °C)

Table B-2. Input Parameters

Parameter	HART	Fieldbus/PROFIBUS
Voltage U_i	30 V	30 V
Current I_i	200 mA	300 mA
Power P_i	1.0 W	1.3 W
Capacitance C_i	0.012 µF	0 µF
Inductance L_i	0 mH	0 mH

Special Condition for Safe Use (X):

1. If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of withstanding the 500 V isolation from earth test and this must be taken into account during installation.
2. The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact and abrasion when located in Zone 0.

IA ATEX FISCO
Certificate: Baseefa08ATEX0129X
Standards: EN60079-0:2012, EN60079-11:2012
Markings: ⟨Ex⟩ II 1 G Ex ia IIC T4 Ga (–60 °C ≤ T_a ≤ +60 °C)

Table B-3. Input Parameters

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

Special Conditions for Safe Use (X):

1. If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of withstanding the 500 V isolation from earth test and this must be taken into account during installation.
2. The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact and abrasion when located in Zone 0.

N1 ATEX Type n
Certificate: Baseefa08ATEX0130X
Standards: EN60079-0:2012, EN60079-15:2010
Markings: Ⓔx II 3G Ex nA IIC T4 Gc
(–40 °C ≤ T_a ≤ +70 °C)

Special Condition for Safe Use (X):

1. If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of withstanding the 500 V electrical strength test as defined in clause 6.5.1 of by EN 60079-15:2010. This must be taken into account during installation.

ND ATEX Dust
Certificate: Baseefa08ATEX0182X
Standards: EN60079-0:2012, EN60079-31:2009
Markings: Ⓔx II 1 D Ex ta IIIC T95 °C T_{500} 105 °C Da
(–20 °C ≤ T_a ≤ +85 °C)

Special Condition for Safe Use (X):

1. If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of withstanding the 500 V isolation from earth test and this must be taken into account during installation.

B.5 International

E7 IECEx Flameproof
Certificate: IECExKEM08.0024X
Standards: IEC 60079-0:2011, IEC 60079-1:2014-06, IEC 60079-26:2014-10
Markings: Ex db IIC T6... T4 Ga/Gb
T6(–60 °C ≤ T_a ≤ +70 °C),
T4/T5(–60 °C ≤ T_a ≤ +80 °C)

Table B-4. Process Connection Temperature

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

Special Conditions for Safe Use (X):

1. The device contains a thin wall diaphragm less than 1 mm thickness that forms a boundary between zone 0 (process connection) and zone 1 (all other parts of the equipment). The model code and datasheet are to be consulted for details of the diaphragm material. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm shall be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. Appropriate cable, glands and plugs need to be suitable for a temperature of 5 °C greater than maximum specified temperature for location where installed.
3. Flameproof joints are not intended for repair
4. Non-standard paint options may cause risk from electrostatic discharge. Avoid installations that could cause electrostatic build-up on painted surfaces, and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.

I7 IECEx Intrinsic Safety
Certificate: IECExBAS08.0045X
Standards: IEC60079-0:2011, IEC60079-11:2011
Markings: Ex ia IIC T4 Ga (–60 °C ≤ T_a ≤ +70 °C)

Table B-5. Input Parameters

Parameter	HART	Fieldbus/PROFIBUS
Voltage U_i	30 V	30 V
Current I_i	200 mA	300 mA
Power P_i	1.0 W	1.3 W
Capacitance C_i	0.012 µF	0 µF
Inductance L_i	0 mH	0 mH

Special Condition for Safe Use (X):

1. If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of withstanding the 500 V isolation from earth test and this must be taken into account during installation.
2. The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact and abrasion when located in Zone 0.

IG IECEx FISCO
Certificate: IECExBAS08.0045X
Standards: IEC60079-0:2011, IEC60079-11:2011
Markings: Ex ia IIC T4 Ga (–60 °C ≤ T_a ≤ +60 °C)

Table B-6. Input Parameters

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

Special Condition for Safe Use (X):

1. If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of withstanding the 500 V isolation from earth test and this must be taken into account during installation.
2. The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact and abrasion when located in Zone 0.

N7 IECEx Type n
Certificate: IECExBAS08.0046X
Standards: IEC60079-0:2011, IEC60079-15:2010
Markings: Ex nA IIC T4 Gc (–40 °C ≤ T_a ≤ +70 °C)

Special Condition for Safe Use (X):

1. If fitted with a 90 V transient suppressor, the equipment is not capable of withstanding the 500 V electrical strength test as defined in clause 6.5.1 of IEC60079-15:2010. This must be taken into account during installation.

B.6 Brazil

E2 INMETRO Flameproof
Certificate: UL-BR 14.0375X
Standards: ABNT NBR IEC60079-0:2008 + Errata 1:2011, ABNT NBR IEC 60079-1:2009 + Errata 1:2011,ABNT NBR IEC 60079-26:2008 + Errata 1:2009
Markings: Ex d IIC T6/T5 Gb IP66,
T6(–50 °C ≤ T_a ≤ +65 °C),
T5(–50 °C ≤ T_a ≤ +80 °C)

Special Condition for Safe Use (X):

1. The device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. The Ex d blanking elements, cable glands, and wiring shall be suitable for a temperature of 90 °C
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

I2 INMETRO Intrinsic Safety
Certificate: UL-BR 14.0759X
Standards: ABNT NBR IEC 60079-0:2008 + Errata 1:2011; ABNT NBR IEC 60079-11:2009
Markings: Ex ia IIC T4 Ga (–60 °C ≤ T_a ≤ +70 °C)

Table B-7. Input Parameters

Parameter	HART	Fieldbus/PROFIBUS
Voltage U_i	30 V	30 V
Current I_i	200 mA	300 mA
Power P_i	1 W	1.3 W
Capacitance C_i	0.012 µF	0 µF
Inductance L_i	0 mH	0 mH

Special Conditions for Safe Use (X):

1. If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of withstanding the 500 V insulation from earth test and this must be taken into account during installation.
2. The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact and abrasion when located in atmospheres that require ELP Ga.

IB INMETRO FISCO
Certificate: UL-BR 14.0759X
Standards: ABNT NBR IEC 60079-0:2008 + Errata 1:2011; ABNT NBR IEC 60079-11:2009
Markings: Ex ia IIC T4 Ga ($-60\ °C \le T_a \le +60\ °C$)

Table B-8. Input Parameters

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

Special Condition for Safe Use (X):

1. If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of withstanding the 500 V insulation from earth test and this must be taken into account during installation.
2. The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact and abrasion when located in atmospheres that require ELP Ga.

B.7 China

E3 China Flameproof
Certificate: GYJ13.1386X; GYJ5.1366X [Flowmeters]
Standards: GB3836.1-2010, GB3836.2-2010, GB3836.20-2010-2010
Markings: Pressure Transmitter: Ex d IIC Gb, T6($-50\ °C \le T_a \le +65\ °C$), T5($-50\ °C \le T_a \le +80\ °C$)
Flowmeter: Ex d IIC Ga/Gb, T6($-50\ °C \le T_a \le +65\ °C$), T5($-50\ °C \le T_a \le +80\ °C$)

Special Conditions for Safe Use (X):

1. Symbol "X" is used to denote specific conditions of use:
   - The Ex d blanking elements, cable glands, and wiring shall be suitable for a temperature of 90 °C.
   - This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environment conditions to which the diaphragm will be subjected.
2. The relation between T code and ambient temperature range is:

T_a	Temperature class
$-50\ °C \le T_a \le +80\ °C$	T5
$-50\ °C \le T_a \le +65\ °C$	T6

3. The earth connection facility in the enclosure should be connected reliably.
4. During installation, use and maintenance of the product, observe the warning "Don't open the cover when the circuit is alive."
5. During installation, there should be no mixture harmful to flameproof housing
6. Cable entry and conduit, certified by NEPSI with type of protection Ex d IIC and appropriate thread form, should be applied when installed in a hazardous location. Blanking elements should be used on the redundant cable entries.
7. End users are not permitted to change any internal components, but to settle the problem in conjunction with the manufacturer to avoid damage to the product.
8. Maintenance should be done in a non-hazardous location.
9. During installation, use and maintenance of this product, observe the following standards: GB3836.13-2013, GB3836.15-2000, GB3836.16-2006, GB50257-2014.

I3 China Intrinsic Safety
Certificate: GYJ12.1295X; GYJ15.1365X [Flowmeters]
Standards: GB3836.1-2010, GB3836.4-2010, GB3836.20-2010
Markings: Ex ia IIC T4 Ga ($-60\ °C \le T_a \le +70\ °C$)

Special Conditions for Safe Use (X):

1. Symbol "X" is used to denote specific conditions of use:
   - If the apparatus is fitted with an optional 90 V transient suppressor, it is not capable of withstanding the 500 V insulation test for 1 minute. This must be taken into account when installing the apparatus.

- The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in Zone 0.

2. The relation between T code and ambient temperature range is:

Model	T code	Temperature range
HART, Fieldbus, PROFIBUS, and Low Power	T4	$-60\ °C \le T_a \le +70\ °C$

3. Intrinsically safe parameters:

Parameter	HART	Fieldbus/ PROFIBUS	FISCO
Voltage U_i	30 V	30 V	17.5 V
Current I_i	200 mA	300 mA	380 mA
Power P_i	1 W	1.3 W	5.32 W
Capacitance C_i	0.012 µF	0 µF	0 nF
Inductance L_i	0 mH	0 mH	0 µF

Note 1: FISCO parameters comply with the requirements for FISCO field devices in GB3836.19-2010.
Note 2: [For Flowmeters] When Rosemount 644 Temperature Transmitter is used, the transmitter should be used with Ex-certified associated apparatus to establish explosion protection system that can be used in explosive gas atmospheres. Wiring and terminals should comply with the instruction manual of both Rosemount 644 and associated apparatus. The cables between Rosemount 644 and associated apparatus should be shielded cables (the cables must have insulated shield). The shielded cable has to be grounded reliably in a non-hazardous area.

4. The product should be used with Ex-certified associated apparatus to establish explosion protection system that can be used in explosive gas atmospheres. Wiring and terminals should comply with the instruction manual of the product and associated apparatus.
5. The cables between this product and associated apparatus should be shielded cables (the cables must have insulated shield). The shielded cable has to be grounded reliably in a non-hazardous area.
6. End users are not permitted to change any internal components, and needs to settle the problem in conjunction with the manufacturer to avoid damage to the product.
7. During installation, use and maintenance of this product, observe the following standards: GB3836.13-2013, GB3836.15-2000, GB3836.16-2006, GB3836.18-2010, GB50257-2014.

B.8 Japan

E4 Japan Flameproof
Certificate: TC20598, TC20599, TC20602, TC20603 [HART]; TC20600, TC20601, TC20604, TC20605 [Fieldbus]
Markings: Ex d IIC T5

B.9 Technical Regulations Customs Union (EAC)

EM EAC Flameproof
Certificate: RU C-US.GB05.B.01199
Markings: Ga/Gb Ex d IIC T5/T6 X, $T5(-50\ °C \le T_a \le +80\ °C)$, $T6(-50\ °C \le T_a \le +65\ °C)$

Special Condition for Safe Use (X):

1. See certificate for special conditions.

IM EAC Intrinsically Safe
Certificate: RU C-US.GB05.B.01199
Markings: 0Ex ia IIC T4 Ga X $(-60\ °C \le T_a \le +70\ °C)$

Special Condition for Safe Use (X):

1. See certificate for special conditions.

B.10 Combinations

K1 Combination of E1, I1, N1, and ND

K2 Combination of E2 and I2

K5 Combination of E5 and I5

K6 Combination of E6 and I6

K7 Combination of E7, I7, N7 and IECEx Dust

IECEx Dust
Certificate: IECExBAS08.0058X
Standards: IEC60079-0:2011, IEC60079-15:2010
Markings: Ex nA IIIC T95 °C T_{500} 105 °C Da $(-20\ °C \le T_a \le +85\ °C)$

Special Condition for Safe Use (X):

1. If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of withstanding a 500 V isolation from earth test and this must be taken into account during installation.

KA Combination of E1, I1, and K6

KB Combination of K5 and K6

KC Combination of E1, I1, and K5

KD Combination of K1, K5, and K6

KM Combination of EM and IM

B.11 Additional Certifications

SBS American Bureau of Shipping (ABS) Type Approval
Certificate: 09-HS446883B-3-PDA
Intended Use: Marine and Offshore Applications
Measurement of either Gauge or Absolute Pressure for Liquid, Gas, and Vapor
ABS Rules: 2013 Steel Vessels Rules 1-1-4/7.7, 1-1-Appendix 3, 4-8-3/1.7, 4-8-3/13.1

SBV Bureau Veritas (BV) Type Approval
Certificate: 23157/B0 BV
BV Rules: Bureau Veritas Rules for the Classification of Steel Ships
Application: Class notations: AUT-UMS, AUT-CCS, AUT-PORT and AUT-IMS; Pressure transmitter type 2051 cannot be installed on diesel engines.

SDN Det Norske Veritas (DNV) Type Approval
Certificate: TAA00004F
Intended Use: DNV GL Rules for Classification — Ships and offshore units
Application:

Location classes	
Type	2051
Temperature	D
Humidity	B
Vibration	A
EMC	B
Enclosure	D

SLL Lloyds Register (LR) Type Approval
Certificate: 11/60002
Application: Environmental categories ENV1, ENV2, ENV3, and ENV5

B.12 Installation drawings

Figure B-1. Factory Mutual 02051-1009

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

REVISIONS

REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB	ADD AMBIENT TEMP LIMITS	RTC1026995	J.G.K.	9/24/08
AC	REMOVE LOW POWER	RTC1027021	J.G.K.	10/2/08
AD	ADD LOW POWER	RTC1027539	J.G.K.	12/22/08

ENTITY APPROVALS FOR
2051C
2051L
2051T

OUTPUT CODE A (4-20 mA HART) I.S. SEE SHEETS 2-5
OUTPUT CODE M (LOW POWER) I.S. SEE SHEETS 6-7
OUTPUT CODE F/W (FIELDBUS) I.S. SEE SHEETS 8-12
ALL OUTPUT CODES NONINCENDIVE SEE SHEET 13

THE ROSEMOUNT TRANSMITTERS LISTED ABOVE ARE F.M. APPROVED AS INTRINSICALLY SAFE WHEN USED IN CIRCUIT WITH F.M. APPROVED BARRIERS WHICH MEET THE ENTITY PARAMETERS LISTED IN THE CLASS I, II, AND III, DIVISION 1 GROUPS INDICATED, TEMP CODE T4. ADDITIONALLY, THE ROSEMOUNT 751 FIELD SIGNAL INDICATOR IS F.M. APPROVED AS INTRINSICALLY SAFE WHEN CONNECTED IN CIRCUIT WITH ROSEMOUNT TRANSMITTERS (FROM ABOVE) AND F.M. APPROVED BARRIERS WHICH MEET THE ENTITY PARAMETERS LISTED FOR CLASS I, II, AND III, DIVISION 1, GROUPS INDICATED, TEMP CODE T4.

TO ASSURE AN INTRINSICALLY SAFE SYSTEM, THE TRANSMITTER AND BARRIER MUST BE WIRED IN ACCORDANCE WITH THE BARRIER MANUFACTURER'S FIELD WIRING INSTRUCTIONS AND THE APPLICABLE CIRCUIT DIAGRAM.

CAD MAINTAINED (MicroStation)

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125

-TOLERANCE-
.X ± .1 [2,5]
.XX ± .02 [0,5]
.XXX ± .010 [0,25]
FRACTIONS ± 1/32
ANGLES ± 2°

DO NOT SCALE PRINT

CONTRACT NO.

DR. Myles Lee Miller 4/16/08

CHK'D

APP'D.

APP'D. GOVT.

EMERSON. Process Management

ROSEMOUNT®
8200 Market Boulevard • Chanhassen, MN 55317 USA

TITLE INDEX OF I.S. & NONINCENDIVE F.M. FOR 2051C/L/T

SIZE A | FSCM NO | DWG NO. 02051-1009

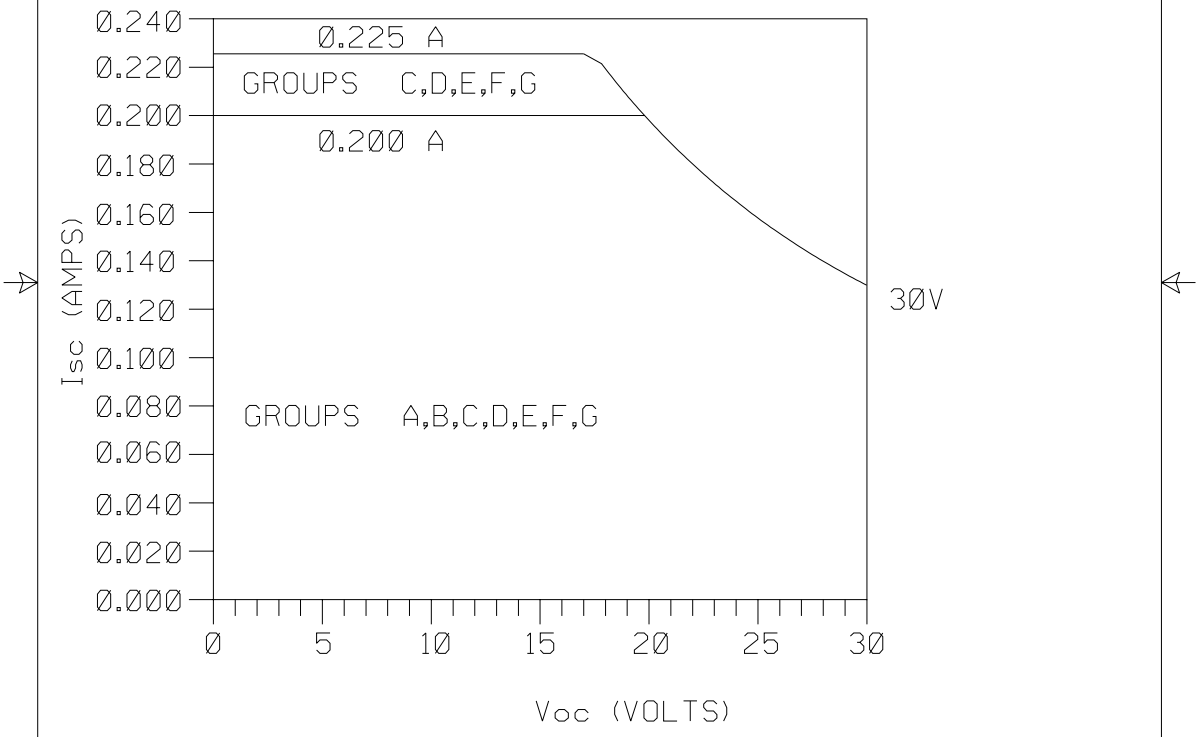
SCALE N/A | WT. ——— | SHEET 1 OF 13

Form Rev A1C

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

BARRIER PARAMETERS (APPLICABLE TO OUTPUT CODES A & M)

Pmax = 1WATT

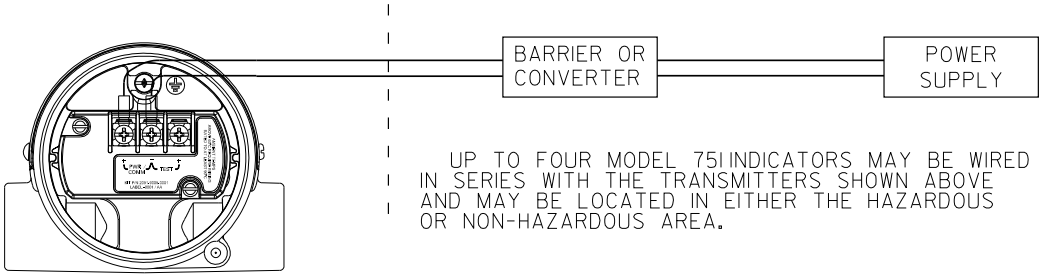


Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 02051-1009
ISSUED	SCALE N/A	WT. ———	SHEET 2 OF 13

Form Rev AC

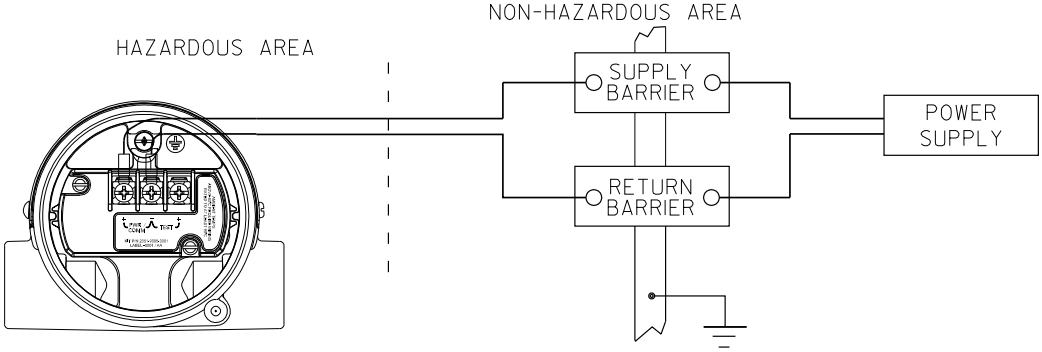
REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AD				

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



OUTPUT CODE A
MODELS INCLUDED
205IC, L, T

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



OUTPUT CODE A
MODELS INCLUDED
205IC, L, T

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 02051-1009
ISSUED	SCALE N/A	WT. ———	SHEET 3 OF 13

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

ENTITY CONCEPT APPROVALS

THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM. THE APPROVED VALUES OF MAX. OPEN CIRCUIT VOLTAGE (Voc OR Vt) AND MAX. SHORT CIRCUIT CURRENT (Isc OR It) AND MAX. POWER (Voc X Isc/4) OR (Vt X It/4), FOR THE ASSOCIATED APPARATUS MUST BE LESS THAN OR EQUAL TO THE MAXIMUM SAFE INPUT VOLTAGE (Vmax), MAXIMUM SAFE INPUT CURRENT (Imax), AND MAXIMUM SAFE INPUT POWER (Pmax) OF THE INTRINSICALLY SAFE APPARATUS. IN ADDITION, THE APPROVED MAX. ALLOWABLE CONNECTED CAPACITANCE (Ca) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE CAPACITANCE AND THE UNPROTECTED INTERNAL CAPACITANCE (C_i) OF THE INTRINSICALLY SAFE APPARATUS, AND THE APPROVED MAX. ALLOWABLE CONNECTED INDUCTANCE (La) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE INDUCTANCE AND THE UNPROTECTED INTERNAL INDUCTANCE (L_i) OF THE INTRINSICALLY SAFE APPARATUS.

FOR OUTPUT CODE A

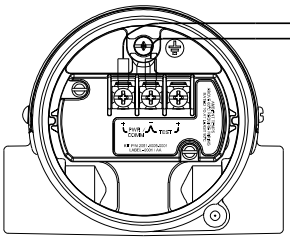
NOTE: ENTITY PARAMETERS LISTED APPLY ONLY TO ASSOCIATED APPARATUS WITH LINEAR OUTPUT.

CLASS I, DIV. 1, GROUPS A AND B

V_T = 30V	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 30V
I_T = 200mA	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 200mA
P_{MAX} = 1 WATT	$(\frac{V_T X I_T}{4})$ OR $(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
C_I = .01µf	C_A IS GREATER THAN .01µf
L_I =10µH	L_A IS GREATER THAN 10µH
T4 (Ta=-50°C to +70°C)	

CLASS I, DIV. 1, GROUPS C AND D

V_T = 30V	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 30V
I_T = 225mA	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 225mA
P_{MAX} = 1 WATT	$(\frac{V_T X I_T}{4})$ OR $(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
C_I = .01µf	C_A IS GREATER THAN .01µf
L_I =10µH	L_A IS GREATER THAN 10µH
T4 (Ta=-50°C to +70°C)	



HAZARDOUS AREA | NON-HAZARDOUS AREA

ASSOCIATED APPARATUS

(SEE SHEET 3)

OUTPUT CODE A
MODELS INCLUDED
205IC, L, T

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

DR. Myles Lee Miller

ISSUED

CAD MAINTAINED (MicroStation)

SIZE	FSCM NO	DWG NO.	
A		02051-1009	
SCALE N/A	WT. ———	SHEET 4 OF 13	

Form Rev A/C

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

FOR OUTPUT CODE M

CLASS I, DIV. 1, GROUPS A AND B

V_{MAX} = 30V	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 30V
I_{MAX} = 200mA	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 200mA
P_{MAX} = 1 WATT	$(\frac{V_T \times I_T}{4})$ OR $(\frac{V_{OC} \times I_{SC}}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
C_I = .02µf	C_A IS GREATER THAN .02µf
L_I =10µH	L_A IS GREATER THAN 10µH
T4 (Ta=-50°C to +70°C)	

* FOR T1 OPTION:

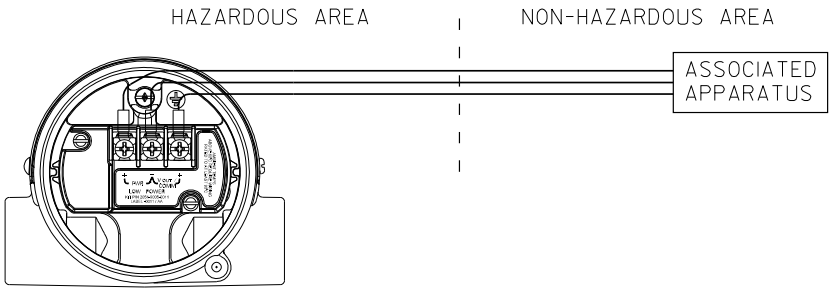
L_I =0.75mH	L_A IS GREATER THAN 0.75mH

CLASS I, DIV. 1, GROUPS C AND D

V_{MAX} = 30V	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 30V
I_{MAX} = 225mA	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 225mA
P_{MAX} = 1 WATT	$(\frac{V_T \times I_T}{4})$ OR $(\frac{V_{OC} \times I_{SC}}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
C_I = .02µf	C_A IS GREATER THAN .02µf
L_I =10µH	L_A IS GREATER THAN 10µH
T4 (Ta=-50°C to +70°C)	

* FOR T1 OPTION:

L_I =0.75mH	L_A IS GREATER THAN 0.75mH



OUTPUT CODE M
AVAILABLE FOR THE MODELS LISTED

205IC 205IT
205IL

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

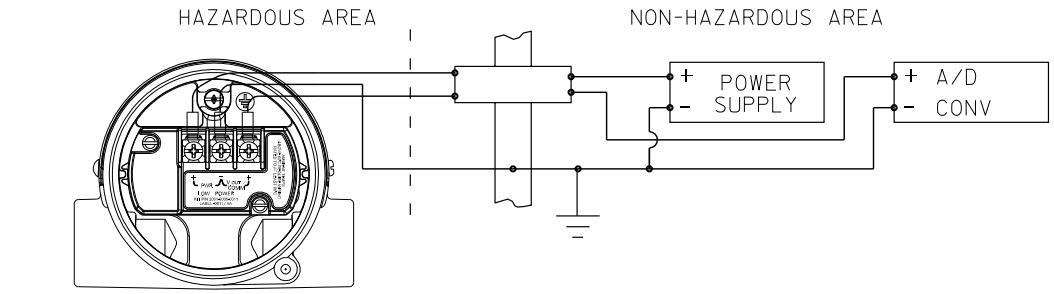
CAD MAINTAINED (MicroStation)

DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 02051-1009
ISSUED	SCALE N/A	WT. ———	SHEET 5 OF 13

Form, Rev. AC

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

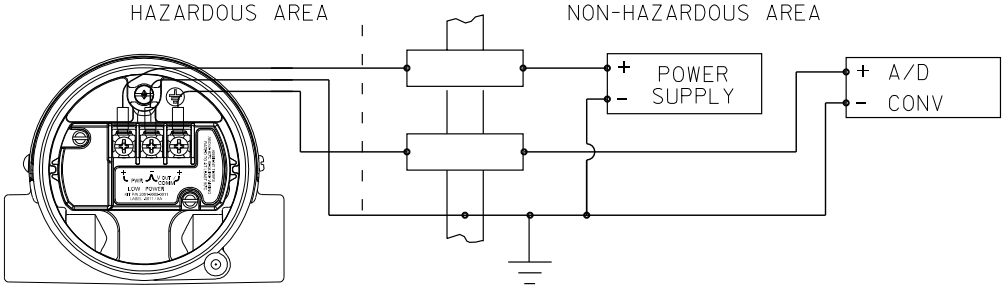
CIRCUIT DIAGRAM 3
ONE DUAL CHANNEL BARRIER



OUTPUT CODE M
AVAILABLE FOR THE MODELS LISTED

205IC 205IT
205IL

CIRCUIT DIAGRAM 4
TWO SINGLE CHANNEL BARRIERS
(ONLY FOR USE WITH BARRIERS APPROVED
IN THIS CONFIGURATION)



OUTPUT CODE M
AVAILABLE FOR THE MODELS LISTED

205IC 205IT
205IL

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 02051-1009
ISSUED	SCALE N/A	WT. ———	SHEET 6 OF 13

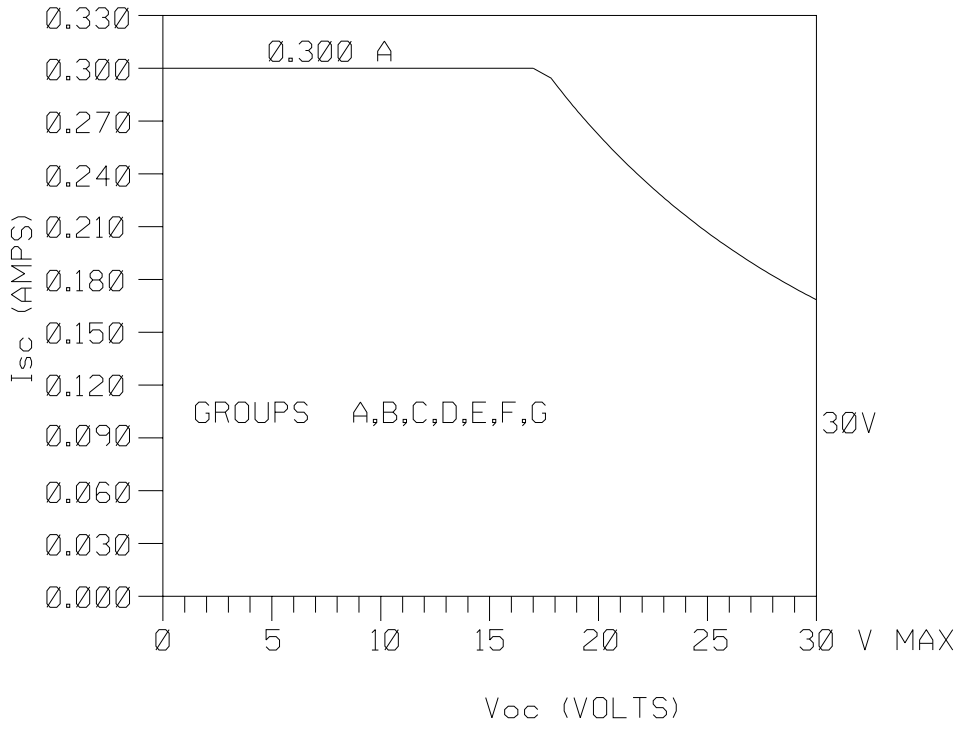
Form Rev AC

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

2051 WITH FOUNDATION FIELDBUS OR PROFIBUS. (OUTPUT CODE F OR W)

BARRIER PARAMETERS (APPLICABLE TO OUTPUT CODE F OR W)

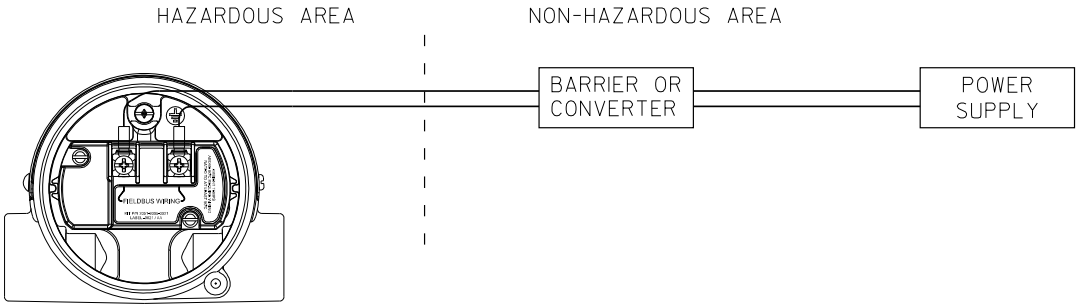
Pmax = 1.3 WATT



Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 02051-1009
ISSUED	SCALE N/A	WT. ———	SHEET 7 OF 13

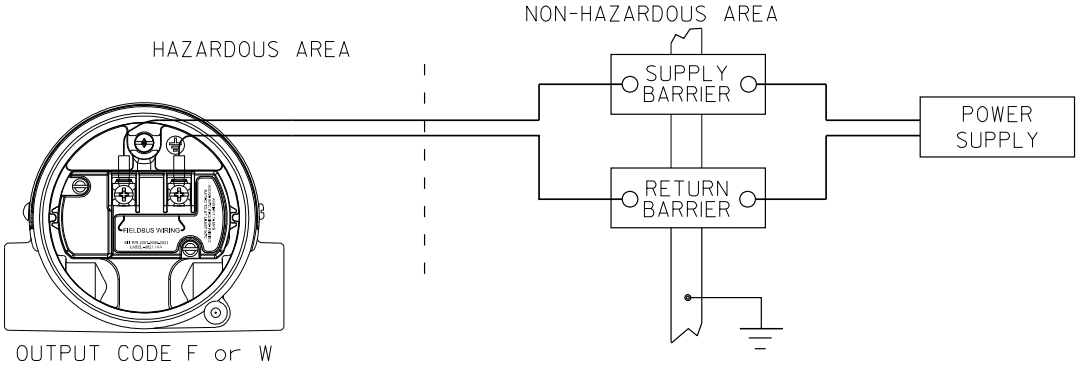
REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AD				

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



OUTPUT CODE F or W
MODELS INCLUDED
205IC, L, T

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



OUTPUT CODE F or W
MODELS INCLUDED
205IC, L, T

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 02051-1009
ISSUED	SCALE N/A	WT. ———	SHEET 8 OF 13

Form Rev. AC

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

ENTITY CONCEPT APPROVALS

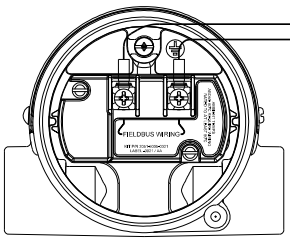
THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM. THE APPROVED VALUES OF MAX. OPEN CIRCUIT VOLTAGE (Voc OR Vt) AND MAX. SHORT CIRCUIT CURRENT (Isc OR It) AND MAX.POWER (Voc X Isc/4) OR (Vt X It/4), FOR THE ASSOCIATED APPARATUS MUST BE LESS THAN OR EQUAL TO THE MAXIMUM SAFE INPUT VOLTAGE (Vmax), MAXIMUM SAFE INPUT CURRENT (Imax), AND MAXIMUM SAFE INPUT POWER (Pmax) OF THE INTRINSICALLY SAFE APPARATUS. IN ADDITION, THE APPROVED MAX. ALLOWABLE CONNECTED CAPACITANCE (Ca) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE CAPACITANCE AND THE UNPROTECTED INTERNAL CAPACITANCE (C_i) OF THE INTRINSICALLY SAFE APPARATUS, AND THE APPROVED MAX. ALLOWABLE CONNECTED INDUCTANCE (La) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE INDUCTANCE AND THE UNPROTECTED INTERNAL INDUCTANCE (L_i) OF THE INTRINSICALLY SAFE APPARATUS.

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

FOR OUTPUT CODE F or W

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

V_{MAX} = 30V	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 30V
I_{MAX} = 300mA	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 300mA
P_{MAX} = 1.3 WATT	$(\frac{V_T \times I_T}{4})$ OR $(\frac{V_{OC} \times I_{SC}}{4})$ IS LESS THAN OR EQUAL TO 1.3 WATT
C_I = 0 µf	C_A IS GREATER THAN 0 µf
L_I = 0 µH	L_A IS GREATER THAN 0 µH
T4 (Ta=-50°C to +70°C)	
T4 (Ta=-50°C to +60°C) FISCO	



HAZARDOUS AREA | NON-HAZARDOUS AREA

ASSOCIATED APPARATUS

(SEE SHEET 3)

OUTPUT CODE F
MODELS INCLUDED
205IC, L, T

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 02051-1009
ISSUED	SCALE N/A	WT. ———	SHEET 9 OF 13

Form Rev AC

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

FISCO CONCEPT APPROVALS

THE FISCO CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIALLY EXAMINED IN SUCH COMBINATION. FOR THIS INTERCONNECTION TO BE VALID THE VOLTAGE (U_i or Vmax), THE CURRENT (I_i or Imax), AND THE POWER (P_i or Pma) THAT INTRINSICALLY SAVE APPARATUS CAN RECEIVE AND REMAIN INTRINSICALY SAFE, INCLUDING FAULTS, MUST BE EQUAL OR GREATER THAN THE VOLTAGE (Uo, Voc, or Vt), THE CURRENT (Io, Isc, or It), AND THE POWER (Po or Pmax) LEVELS WHICH CAN BE DELIVERED BY THE ASSOCIATED APPARATUS, CONSIDERING FAULTS AND APPLICABLE FACTORS. ALSO, THE MAXIMUM UNPROTECTED CAPACITANCE (C_i) AND THE INDUCTANCE (L_i) OF EACH APPARATUS (BESIDES THE TERMINATION) CONNECTED TO THE FIELDBUS MUST BE LESS THAN OR EQUAL TO 5nF AND 10μH RESPECTVELY.
ONLY ONE ACTIVE DEVICE IN EACH SECTION (USUALLY THE ASSOCIATED APPARATUS) IS ALLOWED TO CONTRIBUTE THE DESIRED ENERGY FOR THE FIELDBUS SYSTEM. THE ASSOCIATED APPARATUS' VOLTAGE Uo (or Voc or Vt) IS LIMITED TO A RANGE OF 14V TO 24 V.D.C. ALL OTHER EQUIPENT COMBINED IN THE BUS CABLE MUST BE PASSIVE (THEY CANNOT PROVIDE ENERGY TO THE SYSTEM, EXCEPT A LEAKAGE CURRENT OF 50 μA FOR EACH CONNECTED DEVICE) SEPARATELY POWERED EQUIPMENT REQUIRES A GALVANIC ISOLATION TO AFFIRM THAT THE INTRINSICALLY SAFE FIELDBUS CIRCUIT WILL REMAIN PASSIVE. THE PARAMETER OF THE CABLE USED TO INTERCONNECT THE DEVICES MUST BE IN THE FOLLOWING RANGE:

LOOP RESISTANCE R':	15...150 OHM/km
INDUCTANCE PER UNIT LENGTH L':	0.4...1mH/KM
CAPACITANCE PER UNLIT LENGTH C':	80...200nF

C' = C' LINE/LINE +0.5C' LINE/SCREEN, IF BOTH LINES ARE FLOATING, OR
C' = C' LINE/LINE +C' LINE/SCREEN, IF THE SCREEN IS CONNECTED TO ONE LINE

TRUNK CABLE LENGTH:	≤ 1000 m
SPUR CABLE LENGTH:	≤ 30 m
SPLICE LENGTH:	≤ 1 m

AN APPROVED INFALLIBLE LINE TERMINATION TO EACH END OF THE TRUNK CABLE, WITH THE FOLLOWING PARAMETERS IS APPROPRIATE:

R = 90...100 OHMS C = 2.2μF

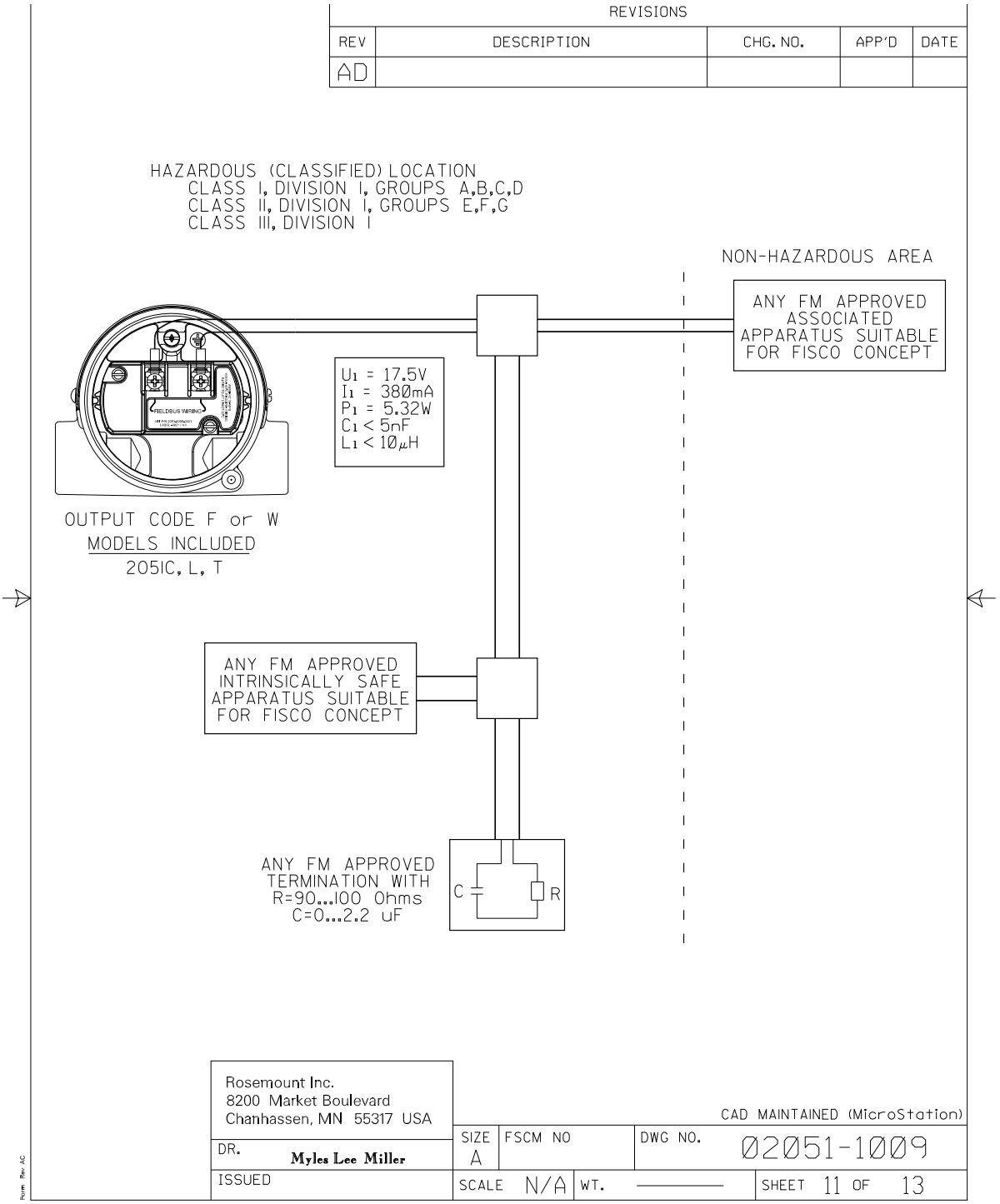
AN ALLOWED TERMINATION MIGHT ALREADY BE LINKED IN THE ASSOCIATED APPARATUS. DUE TO I.S. REASONS, THE NUMBER OF PASSIVE APPARATUS CONNECTED TO THE BUS SEGMENT IS NOT LIMITED. IF THE RULES ABOVE ARE FOLLOWED, UP TO A TOTAL LENGTH OF 1000 m (THE SUMMATION OF TRUNK AND ALL SPUR CABLES), THE INDUCTANCE AND THE CAPACITANCE OF THE CABLE WILL NOT DAMAGE THE INTRINSIC SAFETY OF THE SYSTEM.

NOTES:
INTRINSICALLY SAFE CLASS I, DIV. 1, GROUPS A, B, C, D

1. THE MAXIMUM NON-HAZARDOUS AREA VOLTAGE MUST NOT EXCEED 250 V.
2. CAUTION: ONLY USE SUPPLY WIRES SUITABLE FOR 5°C ABOVE SURROUNDING TEMPERATURE.
3. WARNING: REPLACEMENT OF COMPONENTS MAY DAMAGE INTRINSIC SAFETY.

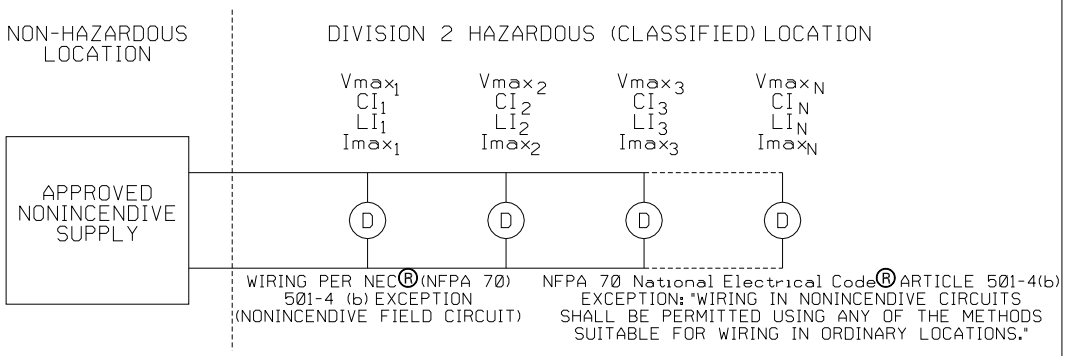
Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 02051-1009
ISSUED	SCALE N/A	WT. ———	SHEET 10 OF 13

Form Rev AC


REVISIONS
REV
DESCRIPTION
CHG. NO.
APP'D
DATE
AD
HAZARDOUS (CLASSIFIED) LOCATION
CLASS I, DIVISION 1, GROUPS A,B,C,D
CLASS II, DIVISION 1, GROUPS E,F,G
CLASS III, DIVISION 1
NON-HAZARDOUS AREA
ANY FM APPROVED ASSOCIATED APPARATUS SUITABLE FOR FISCO CONCEPT
U1 = 17.5V
I1 = 380mA
P1 = 5.32W
C1 < 5nF
L1 < 10μH
OUTPUT CODE F or W
MODELS INCLUDED
205IC, L, T
ANY FM APPROVED INTRINSICALLY SAFE APPARATUS SUITABLE FOR FISCO CONCEPT
ANY FM APPROVED TERMINATION WITH R=90...100 Ohms C=0...2.2 uF
C
R
Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA
DR. Myles Lee Miller
ISSUED
CAD MAINTAINED (MicroStation)
SIZE A
FSCM NO
DWG NO. 02051-1009
SCALE N/A
WT.
SHEET 11 OF 13

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

NONINCENDIVE FIELD CIRCUIT
CLASS I, DIV. 2 LOCATIONS



IN NORMAL OPERATION

DEVICES CONTROL THROUGH-CURRENT

PARAMETERS DEVICE

Voc <= Minimum of ($Vmax_1$, $Vmax_2$, ..., $Vmax_N$)

$Imax_1$ >= Iq_1 + $Isignal_1$

$Imax_2$ >= Iq_1 + $Isignal_2$

.

.

.

$Imax_N$ >= Iq_N + $Isignal_N$

Ca <= $C1_1$ + $C1_2$ +... + $C1_N$ + Ccable

La <= $L1_1$ + $L1_2$ +... + $L1_N$ + Lcable

Imax for an individual device = Iq + Isignal

Iq = Quiescent current through device (Maximum quiescent current for the device)

Isignal = Signaling current through device (Protocol may limit signaling to one device at a time)

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

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

ROSEMOUNT 2051

	4-20mA/ HART	1-5 VDC/ HART	FIELDBUS (F or W)
Vmax	30v	30v	30v
Maximum normal operating current	22mA	3.1mA	27mA
Ca	.010uF	.020uF	0uF
La	10uH	10uH	0uH
La w/T_1		.75mH	

ROSEMOUNT 2051 TRANSMITTERS ARE CURRENT CONTROLLERS ON INDIVIDUAL PARALLEL BRANCHES WITH RESPECT TO THE POWER SUPPLY. IN NONINCENDIVE INSTALLATIONS THE Imax FOR EACH TRANSMITTER IS NOT RELATED TO THE MAXIMUM CURRENT OF THE POWER SUPPLY (Isc) IN THE SAME MANNER AS FOR TRANSMITTER INSTALLED PER I.S. REQUIREMENTS, BECAUSE NONINCENDIVE REQUIREMENTS INCLUDE ONLY NORMAL OPERATING CONDITIONS.

REFERENCE: APPENDIX A7.3 (FM3611)

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 02051-1009	
ISSUED	SCALE N/A	WT. ————	SHEET 12 OF 13	

Form Rev AC

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

NOTES:

1. NO REVISION TO THIS DRAWING WITHOUT PRIOR FM APPROVAL.
2. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.
3. DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS.
4. CONTROL EQUIPMENT CONNECTED TO ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms or Vdc.
5. RESISTANCE BETWEEN INTRINSICALLY SAFE GROUND AND EARTH GROUND MUST BE LESS THAN 1.0 OHM.
6. INSTALLATION SHOULD BE IN ACCORDANCE WITH ANSI/ISA-RP12.06.01 "INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS (CLASSIFIED) LOCATIONS" AND THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70).
7. THE ASSOCIATED APPARATUS MUST BE FM APPROVED.
8. WARNING - SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
9. THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS WITH ASSOCIATED APPARATUS WHEN THE FOLLOWING IS TRUE:
   Vmax or U_i IS GREATER THAN or EQUAL TO Voc, Vt or Uo
   Imax or I_i IS GRETER THAN or EQUAL TO Isc, It or Io
   Pmax or P_i IS GRETER THAN or EQUAL TO Po
   Ca IS GREATER THAN or EQUAL TO THE SUM OF ALL C_i's PLUS Ccable
   La IS GREATER THAN or EQUAL TO THE SUM OF ALL L_i's PLUS Lcable
10. WARNING - TO PREVENT IGNITION OF FLAMMABLE OR COMBUSTIBLE ATMOSPHERES, DISCONNECT POWER BEFORE SERVICING.
11. THE ASSOCIATED APPARATUS MUST BE A RESISTIVELY LIMITED SINGLE OR MULTIPLE CHANNEL FM APPROVED BARRIER HAVEING PARAMETERS LESS THAN THOSE QUOTED, AND FOR WHICH THE OUTPUT AND THE COMBINATIONS OF OUTPUTS IS NON-IGNITION CAPABLE FOR THE CLASS, DIVISION AND GROUP OF USE.
12. FIELD WIRING SHOULD BE RATED TO 70° C.

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ISSUED	SCALE N/A	WT. ———	SHEET 13 OF 13

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Figure B-2. Canadian Standards Association (CSA) 02051-1008

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

REVISIONS

REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AA	NEW RELEASE	RTC1025889	J.G.K.	4/21/08
AB	UPDATE PER CSA REQUIREMENT	RTC1026355	J.G.K.	6/18/08

APPROVALS FOR

2051C
2051L
2051T

OUTPUT CODE A (4-20 mA HART) I.S. SEE SHEETS 2-3
OUTPUT CODE M (LOW POWER) I.S. SEE SHEETS 3-4
OUTPUT CODE F/W (FIELDBUS) I.S. SEE SHEETS 5-7
OUTPUT CODES A,F,W I.S. ENTITY PARAMETERS SHEET 8-9

TO ASSURE AN INTRINSICALLY SAFE SYSTEM, THE TRANSMITTER AND BARRIER MUST BE WIRED IN ACCORDANCE WITH THE BARRIER MANUFACTURER'S FIELD WIRING INSTRUCTIONS AND THE APPLICABLE CIRCUIT DIAGRAM.

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION I.

AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION I.

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UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125

-TOLERANCE-
.X ± .1 [2,5]
.XX ± .02 [0,5]
.XXX ± .010 [0,25]
FRACTIONS ± 1/32
ANGLES ± 2°

DO NOT SCALE PRINT

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CONTRACT NO.

DR. Myles Lee Miller 4/15/08

CHK'D

APP'D.

APP'D. GOVT.

EMERSON. Process Management

ROSEMOUNT®
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TITLE INDEX OF I.S. CSA FOR 2051C/L/T

SIZE A | FSCM NO | DWG NO. 02051-1008

SCALE N/A | WT. ——— | SHEET 1 OF 9

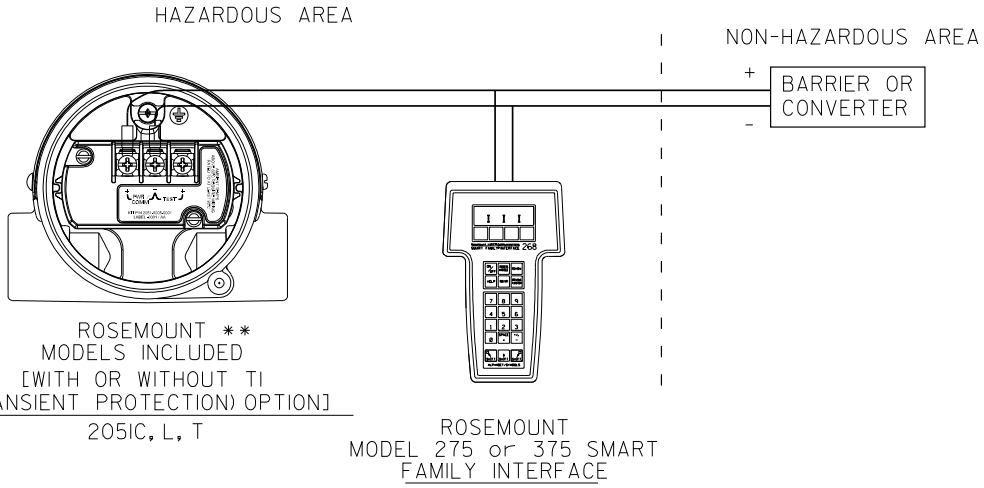
REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB				

CSA INTRINSIC SAFETY APPROVALS

CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE
4-20 mA, ("A" OUTPUT CODE)



** FOR THE LOW POWER OPTION, SEE PAGE 4 FOR THE CIRCUIT CONNECTION WITH BARRIER OR CONVERTER. FOR FIELDBUS OPTIONS("F" or "W" OUTPUT CODE), SEE PAGE 5 FOR PARAMETERS AND CIRCIUT CONNECTION TO BARRIER.

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

4-20 mA, ("A" OUTPUT CODE)

DEVICE	PARAMETERS	APPROVED FOR CLASS I, DIV.I
CSA APPROVED SAFETY BARRIER	30 V OR LESS *330 OHMS OR MORE * 28 V OR LESS 300 OHMS OR MORE 25 V OR LESS 200 OHMS OR MORE * 22 V OR LESS 180 OHMS OR MORE	GROUPS A, B, C, D
FOXBORO CONVERTER 2AI-I2V-CGB, 2AI-I3V-CGB, 2AS-I3I-CGB, 3A2-I2D-CGB, 3A2-I3D-CGB, 3AD-I3I-CGB, 3A4-I2D-CGB, 2AS-I2I-CGB, 3F4-I2DA		GROUPS B, C, D
CSA APPROVED SAFETY BARRIER	30 V OR LESS 150 OHMS OR MORE	GROUPS C, D

LOW POWER, ("M" OUTPUT CODE)

DEVICE	PARAMETERS	APPROVED FOR CLASS I, DIV.I
	Supply ≤ 28V, ≥ 300 Ω Return ≤ 10V, ≥ 47 Ω	GROUPS A, B, C, D
CSA APPROVED SAFETY BARRIER	Supply ≤ 30V, ≥ 150 Ω Return ≤ 10V, ≥ 47 Ω	GROUPS C, D

* MAY BE USED WITH ROSEMOUNT MODEL 275 or 375 SMART FAMILY INTERFACE.

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ISSUED	SCALE N/A	WT. ———	SHEET 3 OF 9	

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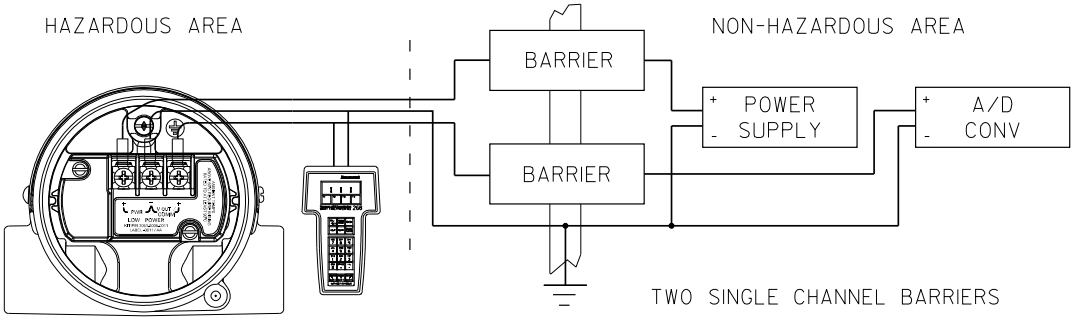
REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB				

CSA INTRINSIC SAFETY APPROVALS

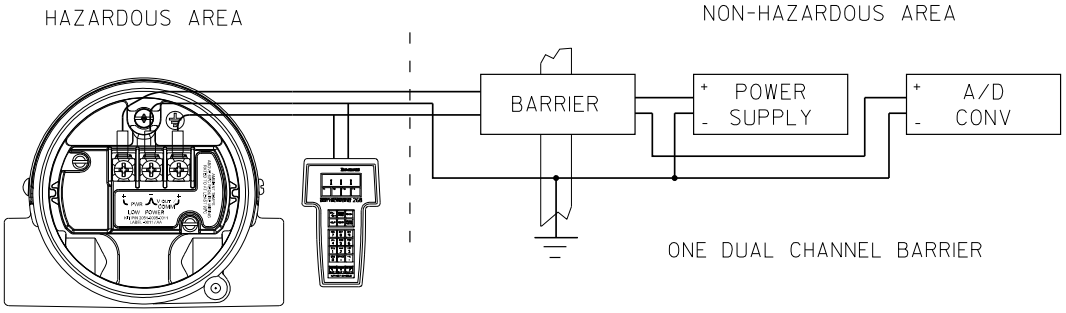
205IC LOW POWER CIRCUIT CONNECTION WITH INTRINSIC SAFETY BARRIERS

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE
LOWPOWER, ("M" OUTPUT CODE)



ROSEMOUNT MODEL 275 or 375



ROSEMOUNT MODEL 275 or 375

APPROVED FOR CLASS I, DIVISION I, GROUPS A,B,C,D WHEN USED IN CIRCUIT WITH TWO CSA APPROVED SINGLE CHANNEL SAFETY BARRIERS, ONE WITH APPROVED SAFETY PARAMETERS OF 28 VOLTS OR LESS AND 300 OHMS OR MORE IN +PWR LINE, AND ONE WITH APPROVED SAFETY PARAMETERS OF 10 VOLTS OR LESS AND 47 OHMS OR MORE IN Vout LINE, OR ONE CSA APPROVED DUAL CHANNEL SAFETY BARRIER WITH IDENTICAL APPROVED SAFETY PARAMETERS CONNECTED IN LIKE MANNER, AS ABOVE.

APPROVED FOR CLASS I, DIVISION I, GROUPS C,D WHEN USED IN CIRCUIT WITH TWO CSA APPROVED SINGLE CHANNEL SAFETY BARRIERS, ONE WITH APPROVED SAFETY PARAMETERS OF 30 VOLTS OR LESS AND 150 OHMS OR MORE IN +PWR LINE AND ONE WITH APPROVED SAFETY PARAMETERS OF 10 VOLTS OR LESS AND 47 OHMS OR MORE IN Vout LINE.

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FIELDBUS, ("F" or "W" OUTPUT CODE)

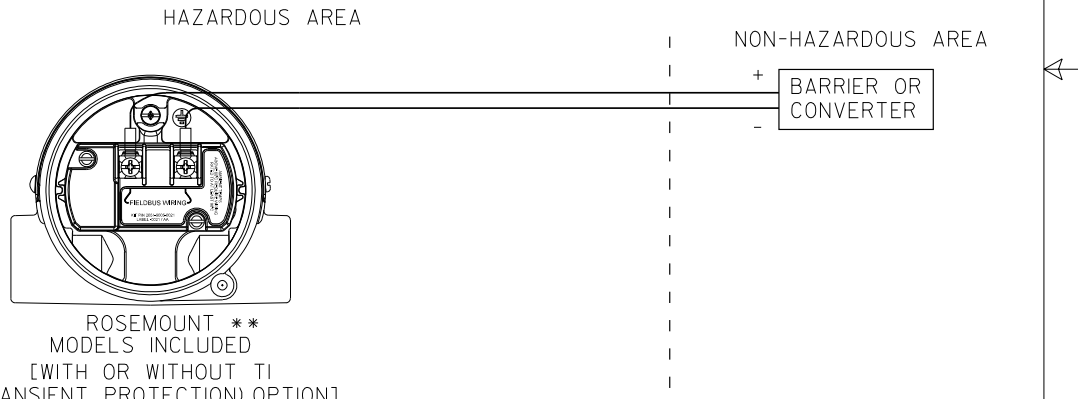
DEVICE	PARAMETERS	APPROVED FOR CLASS I, DIV.I
CSA APPROVED SAFETY BARRIER	30 V OR LESS 300 OHMS OR MORE 28 V OR LESS 235 OHMS OR MORE 25 V OR LESS 160 OHMS OR MORE 22 V OR LESS 100 OHMS OR MORE	GROUPS A, B, C, D

CSA INTRINSIC SAFETY APPROVALS

CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE
FIELDBUS, ("F" or "W" OUTPUT CODE)



ROSEMOUNT **
MODELS INCLUDED
[WITH OR WITHOUT TI
(TRANSIENT PROTECTION) OPTION]
205IC, L, T

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION I.

AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION I.

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FISCO CONCEPT APPROVALS

THE FISCO CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIALLY EXAMINED IN SUCH COMBINATION. FOR THIS INTERCONNECTION TO BE VALID THE VOLTAGE (U_1 or Vmax), THE CURRENT (I_1 or Imax), AND THE POWER (P_1 or Pma) THAT INTRINSICALLY SAVE APPARATUS CAN RECEIVE AND REMAIN INTRINSICALY SAFE, INCLUDING FAULTS, MUST BE EQUAL OR GREATER THAN THE VOLTAGE (Uo, Voc, or Vt), THE CURRENT (Io, Isc, or It), AND THE POWER (Po or Pmax) LEVELS WHICH CAN BE DELIVERED BY THE ASSOCIATED APPARATUS, CONSIDERING FAULTS AND APPLICABLE FACTORS. ALSO, THE MAXIMUM UNPROTECTED CAPACITANCE (C_1) AND THE INDUCTANCE (L_1) OF EACH APPARATUS (BESIDES THE TERMINATION) CONNECTED TO THE FIELDBUS MUST BE LESS THAN OR EQUAL TO 5nF AND 10μH RESPECTVELY.
ONLY ONE ACTIVE DEVICE IN EACH SECTION (USUALLY THE ASSOCIATED APPARATUS) IS ALLOWED TO CONTRIBUTE THE DESIRED ENERGY FOR THE FIELDBUS SYSTEM. THE ASSOCIATED APPARATUS' VOLTAGE Uo (or Voc or Vt) IS LIMITED TO A RANGE OF 14V TO 24 V.D.C. ALL OTHER EQUIPENT COMBINED IN THE BUS CABLE MUST BE PASSIVE (THEY CANNOT PROVIDE ENERGY TO THE SYSTEM, EXCEPT A LEAKAGE CURRENT OF 50 μA FOR EACH CONNECTED DEVICE) SEPARATELY POWERED EQUIPMENT REQUIRES A GALVANIC ISOLATION TO AFFIRM THAT THE INTRINSICALLY SAFE FIELDBUS CIRCUIT WILL REMAIN PASSIVE. THE PARAMETER OF THE CABLE USED TO INTERCONNECT THE DEVICES MUST BE IN THE FOLLOWING RANGE:

LOOP RESISTANCE R':	15...150 OHM/km
INDUCTANCE PER UNIT LENGTH L':	0.4...1mH/KM
CAPACITANCE PER UNLIT LENGTH C':	80...200nF

C' = C' LINE/LINE +0.5C' LINE/SCREEN, IF BOTH LINES ARE FLOATING, OR
C' = C' LINE/LINE +C' LINE/SCREEN, IF THE SCREEN IS CONNECTED TO ONE LINE

TRUNK CABLE LENGTH:	≤ 1000 m
SPUR CABLE LENGTH:	≤ 30 m
SPLICE LENGTH:	≤ 1 m

AN APPROVED INFALLIBLE LINE TERMINATION TO EACH END OF THE TRUNK CABLE, WITH THE FOLLOWING PARAMETERS IS APPROPRIATE:

R = 90...100 OHMS C = 2.2μF

AN ALLOWED TERMINATION MIGHT ALREADY BE LINKED IN THE ASSOCIATED APPARATUS. DUE TO I.S. REASONS, THE NUMBER OF PASSIVE APPARATUS CONNECTED TO THE BUS SEGMENT IS NOT LIMITED. IF THE RULES ABOVE ARE FOLLOWED, UP TO A TOTAL LENGTH OF 1000 m (THE SUMMATION OF TRUNK AND ALL SPUR CABLES), THE INDUCTANCE AND THE CAPACITANCE OF THE CABLE WILL NOT DAMAGE THE INTRINSIC SAFETY OF THE SYSTEM.

NOTES:
INTRINSICALLY SAFE CLASS I, DIV. 1, GROUPS A, B, C, D

1. THE MAXIMUM NON-HAZARDOUS AREA VOLTAGE MUST NOT EXCEED 250 V.
2. CAUTION: ONLY USE SUPPLY WIRES SUITABLE FOR 5°C ABOVE SURROUNDING TEMPERATURE.
3. WARNING: REPLACEMENT OF COMPONENTS MAY DAMAGE INTRINSIC SAFETY.

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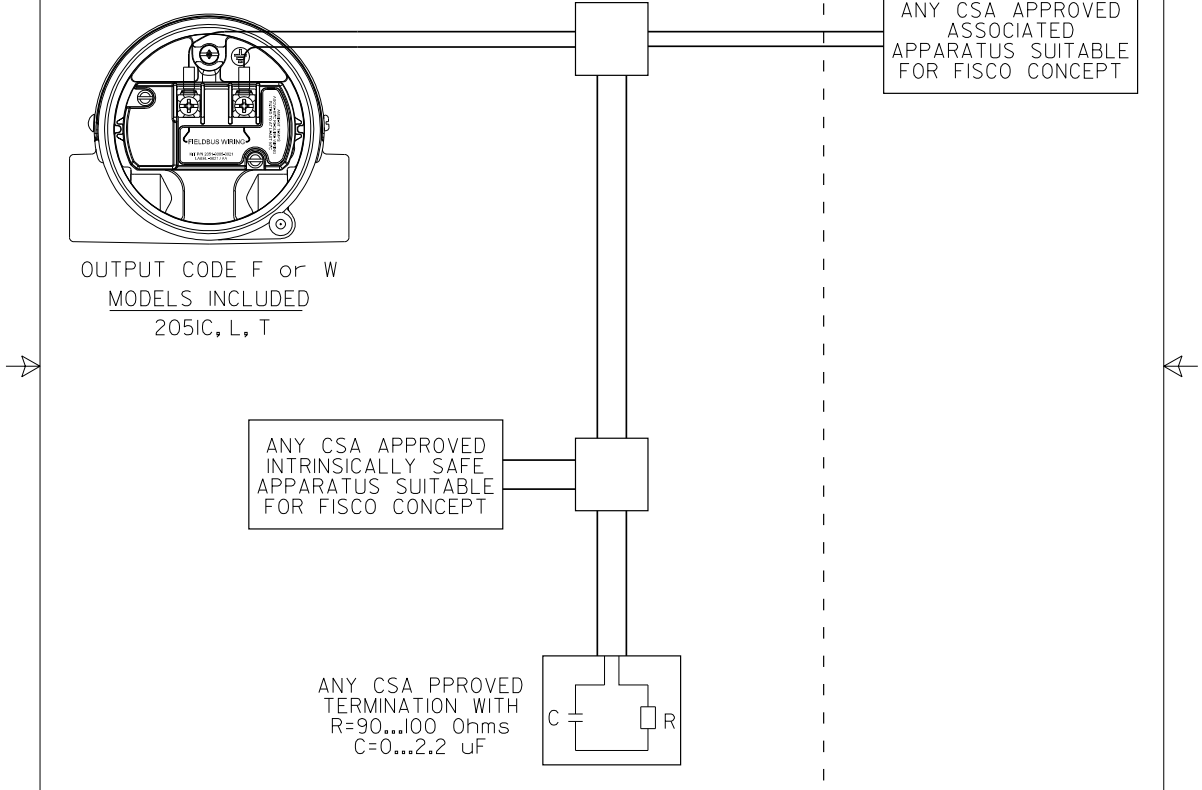

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ISSUED	SCALE N/A	WT. ———	SHEET 7 OF 9

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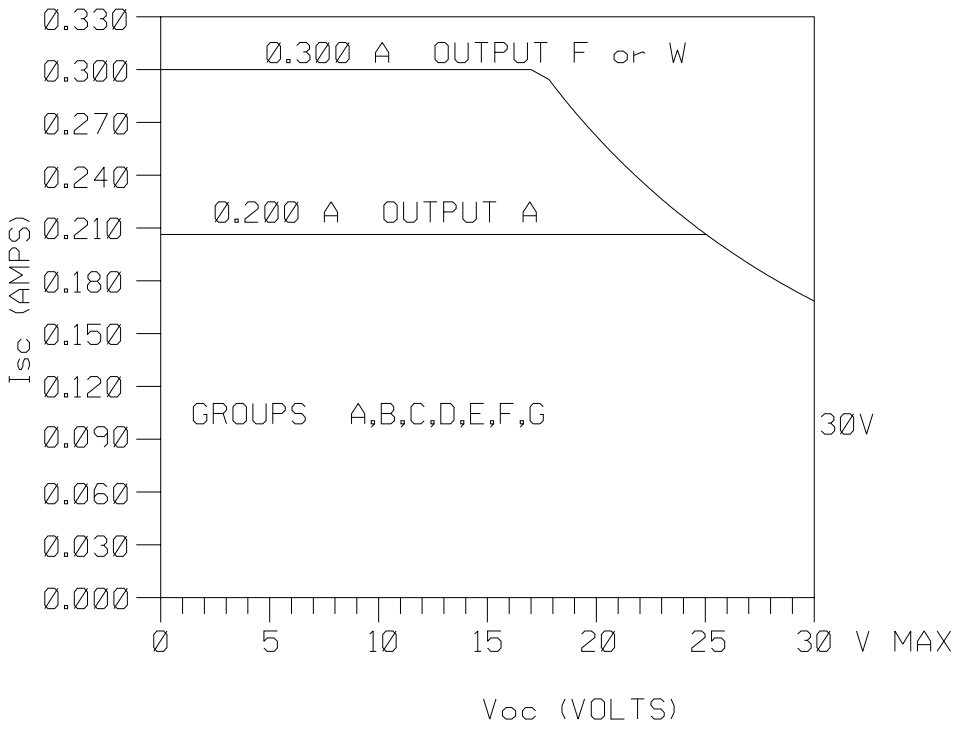
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB				

2051 I.S. ENTITY PARAMETERS. (OUTPUT CODE A,F, or W)

BARRIER PARAMETERS (APPLICABLE TO OUTPUT CODE A,F, or W)

Pmax = 1.3 WATT OUTPUT F or W
Pmax = 1.0 WATT OUTPUT A



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

ENTITY CONCEPT APPROVALS

THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM. THE APPROVED VALUES OF MAX. OPEN CIRCUIT VOLTAGE (Voc) AND MAX. SHORT CIRCUIT CURRENT (Isc) AND MAX. POWER (Voc X Isc/4), FOR THE ASSOCIATED APPARATUS MUST BE LESS THAN OR EQUAL TO THE MAXIMUM SAFE INPUT VOLTAGE (Vmax), MAXIMUM SAFE INPUT CURRENT (Imax), AND MAXIMUM SAFE INPUT POWER (Pmax) OF THE INTRINSICALLY SAFE APPARATUS. IN ADDITION, THE APPROVED MAX. ALLOWABLE CONNECTED CAPACITANCE (Ca) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE CAPACITANCE AND THE UNPROTECTED INTERNAL CAPACITANCE (C_i) OF THE INTRINSICALLY SAFE APPARATUS, AND THE APPROVED MAX. ALLOWABLE CONNECTED INDUCTANCE (La) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE INDUCTANCE AND THE UNPROTECTED INTERNAL INDUCTANCE (L_i) OF THE INTRINSICALLY SAFE APPARATUS.

FOR OUTPUT CODE A
CLASS I, DIV. 1, GROUPS A, B, C AND D: CLASS I, ZONE Ø, GROUP IIC

V_T = 30V	V_{OC} IS LESS THAN OR EQUAL TO 30V
I_T = 200mA	I_{SC} IS LESS THAN OR EQUAL TO 200mA
P_{MAX} = 1 WATT	$(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
C_I = .01µf	C_A IS GREATER THAN .01µf + C CABLE
L_I =10µH	L_A IS GREATER THAN 10µH + L CABLE

FOR OUTPUT CODE F or W
CLASS I, DIV. 1, GROUPS A, B, C AND D: CLASS I, ZONE Ø, GROUP IIC

V_T = 30V	V_{OC} IS LESS THAN OR EQUAL TO 30V
I_T = 300mA	I_{SC} IS LESS THAN OR EQUAL TO 300mA
P_{MAX} = 1.3 WATT	$(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1.3 WATT
C_I = Øµf	C_A IS GREATER THAN Øµf + C CABLE
L_I = Øµ H	L_A IS GREATER THAN Øµ H + L CABLE

FOR OUTPUT CODE M
CLASS I, DIV. 1, GROUPS A, B, C AND D: CLASS I, ZONE Ø, GROUP IIC

V_T = 30V	V_{OC} IS LESS THAN OR EQUAL TO 30V
I_T = 200mA	I_{SC} IS LESS THAN OR EQUAL TO 200mA
P_{MAX} = 1 WATT	$(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
C_I = .02µf	C_A IS GREATER THAN .01µf + C CABLE
L_I =10µH	L_A IS GREATER THAN 10µH + L CABLE

✳ FOR T1 OPTION:

L_I =Ø.75mH	

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

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ISSUED	SCALE N/A	WT. ———	SHEET 9 OF 9

Appendix C Local Operator Interface (LOI) Menu

C.1 Overview

This appendix contains the complete LOI menu.

C.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.

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 Reference Manual for any restrictions associated with a safe installation.

- In an Explosion-Proof/Flameproof installation, do not remove the transmitter covers when power is applied to the unit.

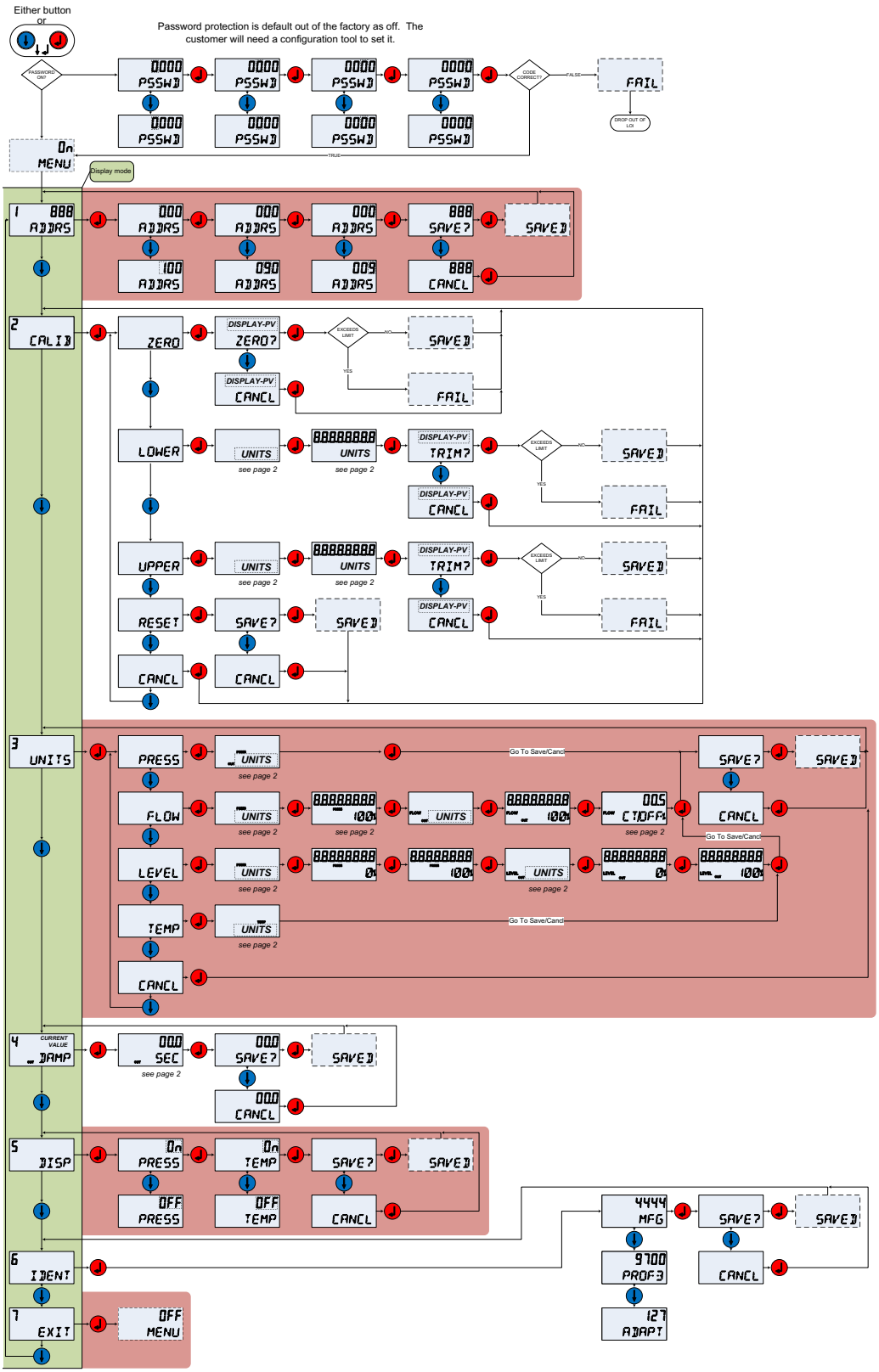
Process leaks may cause harm or result in death.

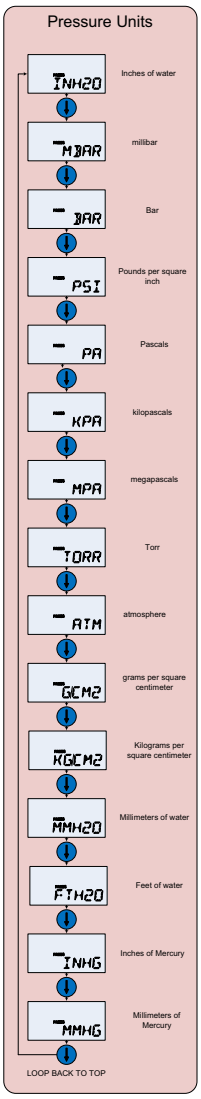
- Install and tighten process connectors before applying pressure.

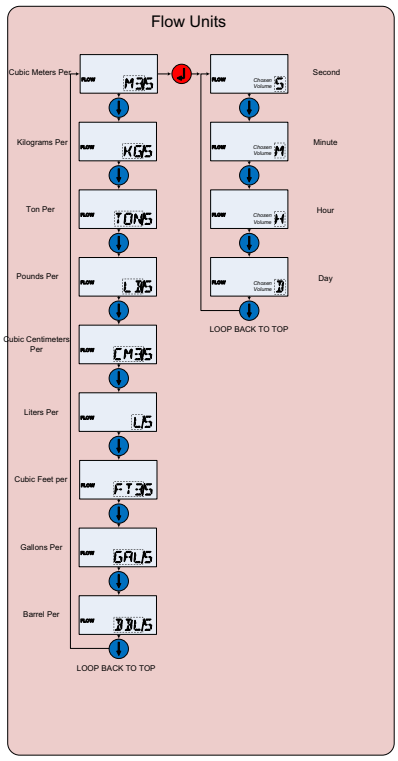
Electrical shock can result in death or serious injury.

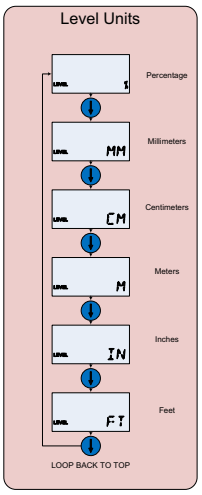
- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

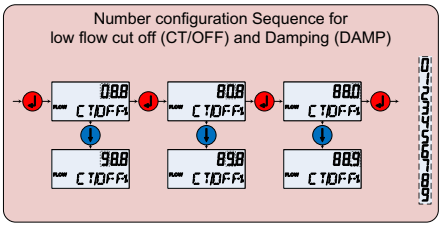
Figure C-1. Detailed LOI Menu

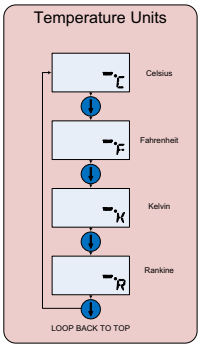


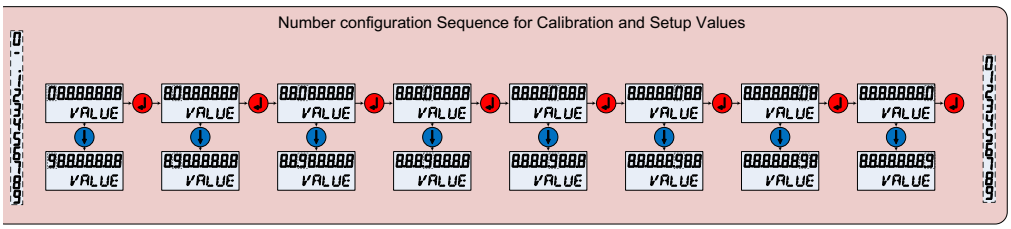

Pressure Units
INH2O
Inches of water
MBAR
millibar
BAR
Bar
PSI
Pounds per square inch
PA
Pascals
KPA
kilopascals
MPA
megapascals
TORR
Torr
ATM
atmosphere
GCM2
grams per square centimeter
KGCM2
Kilograms per square centimeter
MMH2O
Millimeters of water
FTH2O
Feet of water
INHG
Inches of Mercury
MMHG
Millimeters of Mercury
LOOP BACK TO TOP


Flow Units
Cubic Meters Per
M3S
Kilograms Per
KGS
Ton Per
TONS
Pounds Per
LBS
Cubic Centimeters Per
CM3S
Liters Per
LS
Cubic Feet per
FT3S
Gallons Per
GALS
Barrel Per
BLS
Second
Minute
Hour
Day
LOOP BACK TO TOP
LOOP BACK TO TOP


Level Units
Percentage
MM
Millimeters
CM
Centimeters
M
Meters
IN
Inches
FT
Feet
LOOP BACK TO TOP


Number configuration Sequence for
low flow cut off (CT/OFF) and Damping (DAMP)
088
CT/OFF
808
CT/OFF
880
CT/OFF
988
CT/OFF
898
CT/OFF
889
CT/OFF


Temperature Units
°C
Celsius
°F
Fahrenheit
°K
Kelvin
°R
Rankine
LOOP BACK TO TOP


Number configuration Sequence for Calibration and Setup Values
08888888
VALUE
80888888
VALUE
88088888
VALUE
88808888
VALUE
88880888
VALUE
88888088
VALUE
88888808
VALUE
88888880
VALUE
98888888
VALUE
89888888
VALUE
88988888
VALUE
88898888
VALUE
88889888
VALUE
88888988
VALUE
88888898
VALUE
88888889
VALUE

Appendix D PROFIBUS® PA Block Information

D.1 Overview

This appendix contains PROFIBUS block and parameter information.

D.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.

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 Reference Manual for any restrictions associated with a safe installation.

- 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.

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.

D.3 PROFIBUS block parameters

Table D-1 through Table D-5 can be used to cross reference parameters from the PROFIBUS specification, Class 2 Master, and Local Operator Interface (LOI).

Table D-1. Physical Block Parameters

Index	Parameter name	DTM™ name	LOI location(1)	Definition
0	BLOCK OBJECT	Block Object	N/A	N/A
1	ST_REV	Static Revision No.	N/A	The revision level of the static data associated with block; the revision value will be incremented each time a static parameter value in the block is changed.
2	TAG_DESC	Tag	N/A	The user description of the intended block application.
3	STRATEGY	Strategy	N/A	Grouping of function blocks.
4	ALERT_KEY	Alert Key	N/A	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.
5	TARGET_MODE	Target Mode	N/A	Contains desired mode of the block normally set by the operator or a control specification.
6	MODE_BLK	Actual Mode	N/A	Contains the actual, permitted, and normal modes of the block.
7	ALARM_SUM	N/A	N/A	Contains the current states of the block alarms
8	SOFTWARE REVISION	Software Revision	N/A	Software revision, includes a major, minor, and build revision.
9	HARDWARE_REVISION	Hardware Revision	N/A	Hardware revision
10	DEVICE_MAN_ID	Manufacturer	N/A	Identification code of the manufacturer of the field device
11	DEVICE_ID	Device ID	N/A	Identification of the device (Rosemount™ 2051)
12	DEVICE_SER_NUM	Device Serial Num	N/A	Serial number of the device (output board serial number).
13	DIAGNOSIS	Diagnosis	N/A	Detailed information of the device bitwise coded. MSB (bit 31) represents more information available in Diagnosis extension.
14	DIAGNOSIS_EXTENSION	Diagnosis Extension	N/A	Additional manufacturer diagnoses information (See DIAGNOSIS_EXTENSION table below).
15	DIAGNOSIS_MASK	N/A	N/A	Definition of supported DIAGNOSIS information bits
16	DIAGNOSIS_MASK_EXTENSION	N/A	N/A	Definition of supported DIAGNOSIS_EXTENSION information bits
18	WRITE_LOCKING	Write Locking	N/A	Software write protection
19	FACTORY_RESET	Factory Reset	N/A	Command for restarting device

Table D-1. Physical Block Parameters

Index	Parameter name	DTM™ name	LOI location(1)	Definition
20	DESCRIPTOR	Descriptor	N/A	User-definable text to describe the device.
21	DEVICE_MESSAGE	Message	N/A	User-definable message to the device or application in plant.
22	DEVICE_INSTAL_DATE	Installation Date	N/A	Date of installation of the device.
23	LOCAL_OP_ENA	LOI Enable	N/A	Disable/enable the optional LOI
24	IDENT_NUMBER_SELECTOR	Ident Number Selector	IDENT	Specifies the cyclic behavior of a device which is described in the corresponding GSD file
25	HW_WRITE_PROTECTION	HW Write Protection	N/A	Status of the security jumper
26	FEATURE	Optional Device Features	N/A	Indicates optional features implemented in the device
27	COND_STATUS_DIAG	N/A	N/A	Indicates the mode of a device that can be configured for status and diagnostic behavior
33	FINAL_ASSEMBLY_NUM	Final Assembly Number	N/A	The same final assembly number placed on the neck label
34	DOWNLOAD_MODE	Factory Upgrade	N/A	Puts the device into a manufacturer mode for upgrading the device
35	PASSCODE_LOI	Password	PSSWD	Password for the LOI
36	LOI_DISPLAY_SELECTION	Display Selection	DISP	Indicates process variables shown on the local display
37	LOI_BUTTON_STATE	Button State	N/A	Status of the optional LOI buttons
38	VENDOR_IDENT_NUMBER	Vendor Ident Number	IDENT	0x3333
39	LOI_PRESENT	LOI Present	N/A	Parameter written during manufacturing to indicate if an optional LOI is present
40	HW_SIMULATE_PROTECTION	HW Simulation Protection	N/A	Status of hardware simulation jumper

1. If blank, parameter is not applicable to LOI.

Table D-2. Transducer Block Parameters

Index	Parameter name	DTM name	LOI location(1)	Definition
1	ST_REV	Static Revision No.	N/A	The revision level of the static data associated with block; the revision value will be incremented each time a static parameter value in the block is changed.
2	TAG_DESC	Tag	N/A	The user description of the intended block application.
3	STRATEGY	Strategy	N/A	Grouping of function blocks.

Table D-2. Transducer Block Parameters

Index	Parameter name	DTM name	LOI location[1]	Definition
4	ALERT_KEY	Alert Key	N/A	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.
5	TARGET_MODE	Target Mode	N/A	Contains desired mode of the block normally set by the operator or a control specification.
6	MODE_BLK	Actual Mode	N/A	Contains the actual, permitted, and normal modes of the block.
7	ALARM_SUM	N/A	N/A	Contains the current states of the block alarms
8	SENSOR_VALUE	Pressure raw value	N/A	Raw sensor value, untrimmed, in SENSOR_UNIT
9	SENSOR_HI_LIM	Upper Sensor Limit	N/A	Upper sensor range value, in SENSOR_UNIT
10	SENSOR_LO_LIM	Lower Sensor Limit	N/A	Lower sensor range value, in SENSOR_UNIT
11	CAL_POINT_HI	Upper Calibration Point	CALIB-> UPPER	The value of the sensor measurement used for the high calibration point. Unit is derived from SENSOR_UNIT
12	CAL_POINT_LO	Lower Calibration Point	CALIB-> LOWER	The value of the sensor measurement used for the low calibration point. Unit is derived from SENSOR_UNIT
13	CAL_MIN_SPAN	Calibration Min Span	N/A	The minimum span that is allowed between the calibration high and low points.
14	SENSOR_UNIT	Sensor Unit	UNITS	Engineering units for the calibration values
15	TRIMMED_VALUE	Pressure Trimmed Value	UNITS	Contains the sensor value after the trim processing. Unit is derived from SENSOR_UNIT
16	SENSOR_TYPE	Sensor Type	N/A	Sensor type (capacitance, strain gauge)
18	SENSOR_SERIAL_NUMMER	Sensor Serial Number	N/A	Sensor serial number
19	PRIMARY_VALUE	Primary Value	N/A	Measured value and status available to the Function Block. The unit of PRIMARY_VALUE is the PRIMARY_VALUE_UNIT.
20	PRIMARY_VALUE_UNIT	Unit (PV)	N/A	Engineering units for the primary value
21	PRIMARY_VALUE_TYPE	Primary Value Type	N/A	Type of pressure application (pressure, flow, level)
22	SENSOR_DIAPHRAGM_MATERIAL	Isolator Material	N/A	Type of material of the sensor isolator
23	SENSOR_FILL_FLUID	Module Fill Fluid	N/A	Type of fill fluid used in sensor
24	SENSOR_O_RING_MATERIAL	O-ring Material	N/A	Type of material of the flange O-rings
25	PROCESS_CONNECTION_TYPE	Process Connection Type	N/A	Type of flange that is attached to the device

Table D-2. Transducer Block Parameters

Index	Parameter name	DTM name	LOI location[1]	Definition
26	PROCESS_CONNECTION_MATERIAL	Process Connection Material	N/A	Type of material of the flange
27	TEMPERATURE	Temperature	N/A	Sensor temperature, in TEMPERATURE_UNIT
28	TEMPERATURE_UNIT	Temperature Unit	UNITS	Engineering units of the sensor temperature
29	SECONDARY_VALUE_1	Secondary Value 1	UNITS	Trimmed pressure value, unscaled, in SECONDARY_VALUE_1_UNIT
30	SECONDARY_VALUE_1_UNIT	Unit (Secondary Value 1)	UNITS	Engineering unit of SECONDARY_VALUE_1
31	SECONDARY_VALUE_2	Secondary Value 2	UNITS	Measured value after input scaling
33	LIN_TYPE	Characterization type	UNITS	Linearization type
34	SCALE_IN	Scale in	UNITS	Input scaling in SECONDARY_VALUE_1_UNIT
35	SCALE_OUT	Scale out	UNITS	Output scaling in PRIMARY_VALUE_UNIT
36	LOW_FLOW_CUT_OFF	Low Flow Cut Off	UNITS-> FLOW	This is the point in percent of flow until the output of the flow function is set to zero. It is used for suppressing low flow values
59	FACT_CAL_RECALL	Restore Calibration Factory	CALIB-> RESET	Recalls the sensor calibration set at the factory
60	SENSOR_CAL_METHOD	Sensor Calibration Factor	N/A	The method of last sensor calibration.
61	SENSOR_VALUE_TYPE	Transmitter Type	N/A	Type of pressure measurement (differential, absolute, gage)

1. If blank, parameter is not applicable to LOI.

Table D-3. Analog Input Block Parameters

Index	Parameter name	DTM name	LOI location[1]	Definition
1	ST_REV	Static Revision No.	N/A	The revision level of the static data associated with block; the revision value will be incremented each time a static parameter value in the block is changed.
2	TAG_DESC	Tag	N/A	The user description of the intended block application.
3	STRATEGY	Strategy	N/A	Grouping of function blocks.
4	ALERT_KEY	Alert Key	N/A	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.

Table D-3. Analog Input Block Parameters

Index	Parameter name	DTM name	LOI location[1]	Definition
5	TARGET_MODE	Target Mode	N/A	Contains desired mode of the block normally set by the operator or a control specification.
6	MODE_BLK	Actual Mode	N/A	Contains the actual, permitted, and normal modes of the block.
7	ALARM_SUM	Alarm Summary	N/A	Contains the current states of the block alarms
8	BATCH	Batch Information	N/A	Used in Batch applications according to IEC 61512-1
10	OUT	Value (Output)	N/A	Value and status of the block output.
11	PV_SCALE	PV Scale	N/A	Conversion of the Process Variable into percent using the high and low scale value, in TB.PRIMARY_VALUE_UNIT
12	OUT_SCALE	Output Scale	N/A	The high and low scale values, units code, and number of digits to the right of the decimal point associated with OUT.
13	LIN_TYPE	Characterization Type	N/A	Linearization type
14	CHANNEL	Channel	N/A	Used to select the Transducer Block measurement value. Always 0x112.
16	PV_FTIME	Filter Time Const	DAMP	The time constant of the first order PV filter. Time required for a 63% change in the input value (seconds).
17	FSAFE_TYPE	Fail Safe Mode	N/A	Defines the reaction of the device, if a fault is detected
18	FSAFE_VALUE	Fail Safe Default Value	N/A	Default value for the OUT parameter, in OUT_SCALE units, if a sensor or sensor electronic fault is detected
19	ALARM_HYS	Limit Hysteresis	N/A	The amount the alarm value must return within the alarm limit before the associated active alarm condition clears.
21	HI_HI_LIM	Upper Limit Alarm Limits	N/A	The setting of the alarm limit used to detect the HI HI alarm condition.
23	HI_LIM	Upper Limit Warning Limits	N/A	The setting of the alarm limit used to detect the HI alarm condition.
25	LO_LIM	Lower Limit Warning Limits	N/A	The setting of the alarm limit used to detect the LO alarm condition.
27	LO_LO_LIM	Lower Limit Alarm Limits	N/A	The setting of the alarm limit used to detect the LO LO alarm condition.
30	HI_HI_ALM	Upper Limit Alarm	N/A	The HI Hi alarm data.
31	HI_ALM	Upper Limit Warning	N/A	The HI alarm data
32	LO_ALM	Lower Limit Warning	N/A	The LO alarm data.

Table D-3. Analog Input Block Parameters

Index	Parameter name	DTM name	LOI location[1]	Definition
33	LO_LO_ALM	Lower Limit Alarm	N/A	The LO LO alarm data.
34	SIMULATE	Simulation	N/A	A group of data that contains the simulated transducer value and status, and the enable/disable bit.

1. If blank, parameter is not applicable to LOI.

D.4 Condensed status

The Rosemount 2051 device utilizes condensed status as recommended by the Profile 3.02 specification and NE 107. Condensed status has some additional bits and changed bit assignments from classic status. Confirm bit assignment using Table D-4 and Table D-5.

Table D-4. Diagnosis Descriptions

Device related diagnosis		
Byte-bit	**Unit_Diag_Bit**	**Diagnostic description**
2-4	36	Cold Start
2-3	35	Warm Start
3-2	42	Function Check
3-0	40	Maintenance Alarm
4-7	55	More Information Available

Table D-5. Output Status Bit Definition

Description	HEX	DECIMAL
Bad - passivated	0x23	35
Bad, maintenance alarm, more diagnostics available	0x24	36
Bad, process related - no maintenance	0x28	40
Uncertain, substitute set	0x4B	75
Uncertain, process related, no maintenance	0x78	120
Good, ok	0x80	128
Good, update event	0x84	132
Good, advisory alarm, low limit	0x89	137
Good, advisory alarm, high limit	0x8A	138
Good, critical alarm, low limit	0x8D	141
Good, critical alarm, high limit	0x8E	142
Good, function check	0xBC	188

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