Reference Manual
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July 2017

Rosemount™ 3051 Pressure Transmitter

with FOUNDATION™ Fieldbus Protocol

Fieldbus Foundation

EMERSON™

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Rosemount™ 3051 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™ representative.

⚠CAUTION

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

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

⚠ WARNING

Explosions could result in death or serious injury.

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

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

Process leaks may cause harm or result in death.

- Install and tighten process connectors before applying pressure.

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.

Process leaks could result in death or serious injury.

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

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

- Use only bolts supplied or sold by Emerson as spare parts. Improper assembly of manifolds to traditional flange can damage sensor module.
- For safe assembly of manifold to traditional flange, bolts must break back plane of flange web (i.e., bolt hole) but must not contact sensor module housing.

Section 1 Introduction

1.1 Using this manual

The sections in this manual provide information on configuring, installing, operating and maintaining, and troubleshooting Rosemount™ 3051 Pressure Transmitters specifically for FOUNDATION™ Fieldbus protocol.

Section 2: Configuration provides instruction on commissioning and operating Rosemount 3051. Information on software functions, configuration parameters, and online variables is also included.

Section 3: Hardware Installation contains mechanical installation instructions.

Section 4: Electrical Installation contains electrical installation instructions.

Section 5: Operation and Maintenance provides detailed information on calibrating the transmitter.

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.

1.2 Models covered

The following Rosemount 3051Transmitters are covered by this manual:

- Rosemount 3051C Coplanar™ Pressure Transmitter
  - Measures differential and gage pressure up to 2000 psi (137,9 bar)
  - Measures absolute pressure up to 4000 psia (275,8 bar)
- Rosemount 3051T In-Line Pressure Transmitter
  - Measures gage/absolute pressure up to 10000 psi (689,5 bar)
- Rosemount 3051L Level Transmitter
  - Measures level and specific gravity up to 300 psi (20,7 bar)
- Rosemount 3051CF Flowmeter Series
  - Measures flow in line sizes from 1/2-in. (15 mm) to 96-in. (2400 mm)

1.3 Host files

Before configuring the device, ensure the host has the appropriate Device Description (DD) or Device Type Manager (DTM™) file revision for this device. The device descriptor can be found on Fieldbus.org. The DTM can be found at Emerson.com. The current release of the Rosemount 3051 with FOUNDATION Fieldbus protocol is device revision 8. This manual is for revision 8.

1.4 Product recycling/disposal

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

Section 2 Configuration

2.1 Overview

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

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 manual for any restrictions associated with a safe installation.

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

Process leaks may cause harm or result in death.

- Install and tighten process connectors before applying pressure.

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.

2.2.1 Device Description (DD) and Device Type Manager (DTM™) based interfaces

The Rosemount™ 3051Pressure Transmitter Rev 8 has both DD based and DTM based user interfaces available. All device configuration and maintenance tasks can be performed using either technology.

The DD capabilities supported will vary based on host supplier and host revision. Check with your host supplier to determine and obtain the appropriate DD for your situation. The type of DD your host supports may influence navigation between different functions, and the exact steps used to perform different tasks. The device menu tree has multiple ways to navigate between and perform tasks. Not all ways will be usable on all hosts, but at least one way will be usable on every host.

2.2.2 Device menu tree

Device information and device tasks are organized in a menu tree structure. The complete menu tree is shown in Figure 2-10. A partial menu tree covering the most common device tasks is shown in Figure 2-11.

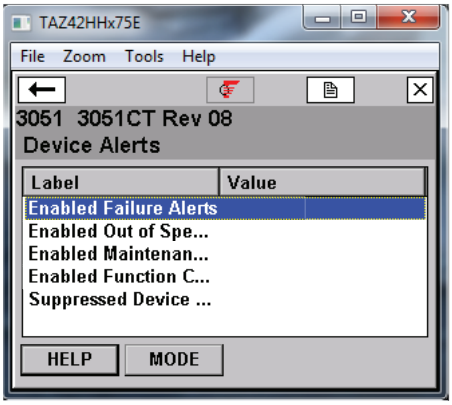
2.2.3 Basic organization

Device information and tasks are organized into three different menu tree branches. They are Overview, Configure, and Service Tools. Information and tasks may be resident in more than a single branch of the menu tree.

The device menu tree is the landing screen for the Handheld user interface. The device menu tree is also permanently displayed on PC based user interfaces. On PC based user interfaces the menu tree can be expanded or collapsed as needed to facilitate navigation.

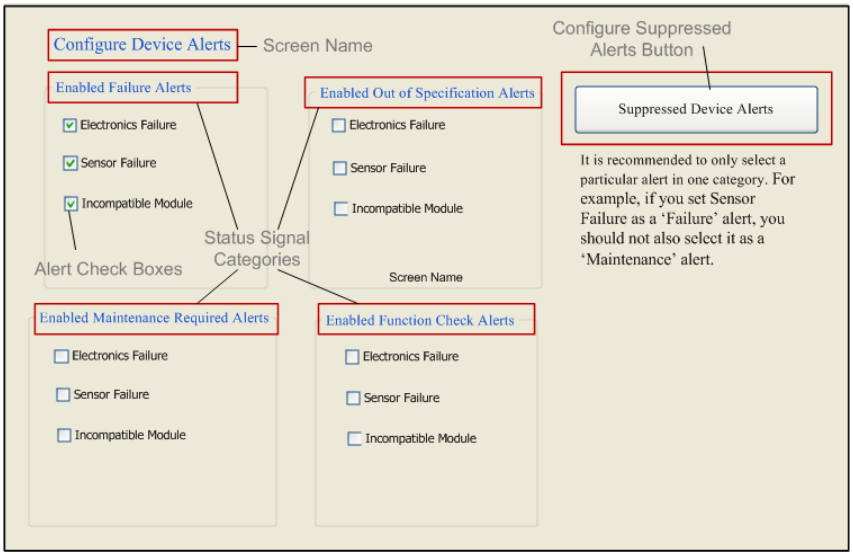
The same device menu tree applies for both handheld and PC based user interfaces. On the handheld, each menu tree entry has a dedicated screen (see Figure 2-3). On PC based user interfaces, several menu tree entries may be displayed on a single screen with each menu tree entry used as the heading for a section of that screen (see Figure 2-2). The net result is the menu tree can be used to navigate all DD's and DTM's, however the user may need to perform actions on one screen, or several screens to perform the same task.

Figure 2-1. Configure Device Alerts-Multiple Screens



On devices with smaller screens the information and parameters necessary to complete a task may be divided into several screens. In this figure each category of alert to be configured has a dedicated screen shown. There are four total screens used for alert configuration.

Figure 2-2. Configure Device Alerts-Single Screen



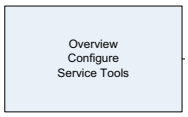
On this PC based configuration screen, alert configuration for all four alert categories is performed on a single screen.

2.2.4 Home screen

The Home screen provides access to the three main branches of the menu tree. These branches are Overview, Configure, and Service Tools. From this screen select any of the three main branches to access detailed device functionality.

Note that some tasks can be performed from multiple locations on the menu tree. This is done to allow users to perform related tasks with a minimum of screen changes and keystrokes. The organization of the device menu tree is further described below.

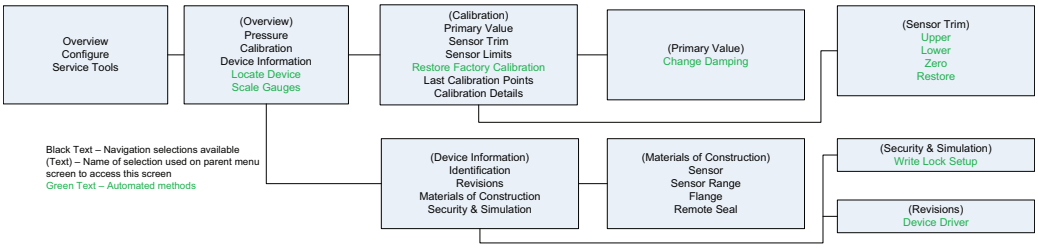
Figure 2-3. Home Screen



2.2.5 Overview

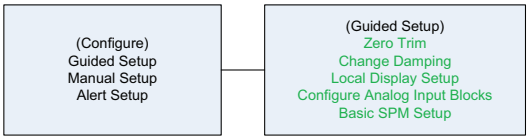
The Overview branch of the menu tree provides device information and single keystroke shortcuts to view variables and device status, access device diagnostics, and perform basic calibration functions. The overview screen is the landing screen for PC based user interfaces.

Figure 2-4. Overview



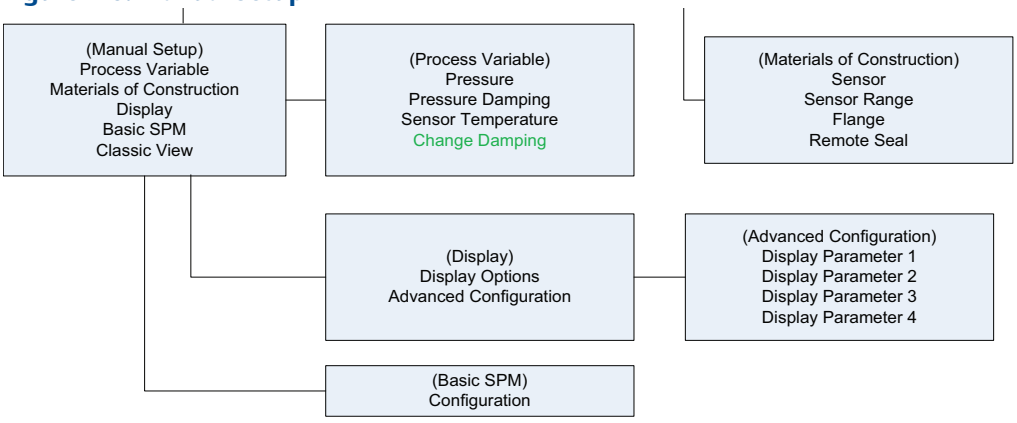
2.2.6 Configure

Figure 2-5. Guided Setup



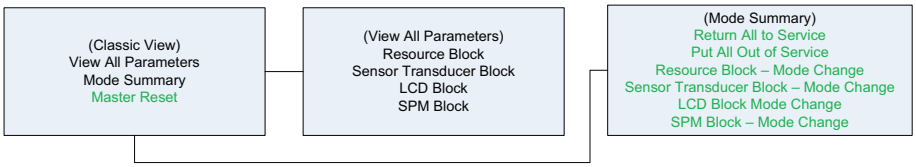
The Configure branch of the menu tree provides both guided setup and manual setup. Guided setup provides automated step by step methods for performing device configuration. Manual setup provides user editable screens where the user can perform a configuration task by selecting or entering the necessary parameters without step by step guidance.

Figure 2-6. Manual Setup



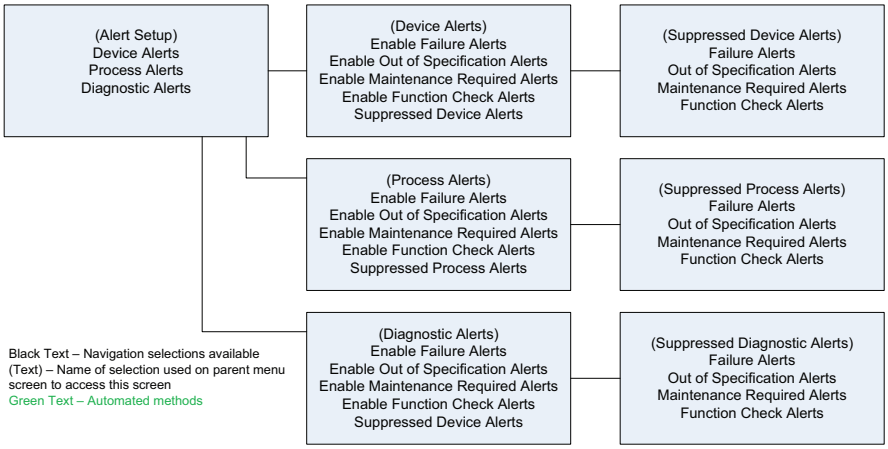
Manual setup can take less time than guided setup if the user is familiar with the task to be performed. Manual setup also allows users to edit specific parameters without needing to step through all the setup steps. If the user is not familiar with a specific task, guided setup is recommended so task steps are done in the correct order and all needed steps are performed.

Figure 2-7. Classic View



The manual setup branch also provides a view called classic view which lists block parameters in a single scroll-down menu. Expert users may prefer this view for configuration as multiple configuration tasks can be performed without leaving the single menu screen.

Figure 2-8. Alert Setup



The final configure branch supports alert setup. The same configuration process supports both NE107 alerts (The factory default Device Alerts), and Plantweb™ Alerts. Note the diagnostics performed and the recommended actions for NE107 Alerts and Plantweb Alerts are identical. The only difference is that NE107 alerts and Plantweb Alerts annunciate the alerts using different categories.

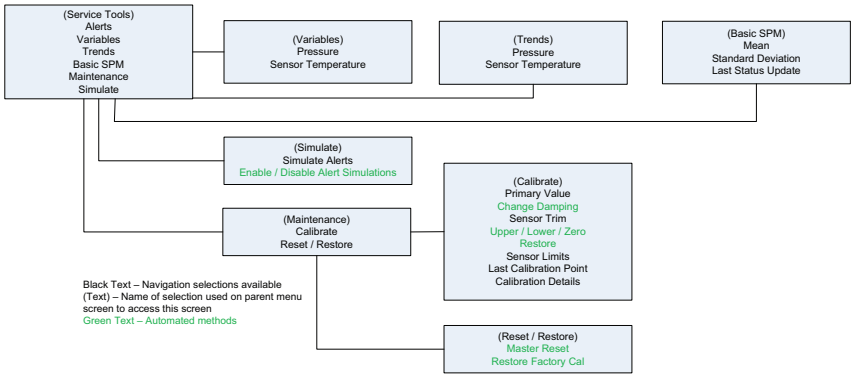
NE107 requires device manufacturers to provide a way for users to enable, suppress, and re-categorize alerts. The Rosemount 3051 organizes alerts as Device Alerts, Process Alerts, or Diagnostic Alerts. NE107 alerts can be defined as any of four categories. They are Failure Alerts" Out of Specification Alerts, Maintenance Required Alerts, and Function Check Alerts. To minimize configuration tasks and time, the Rosemount 3051 ships from the factory with alerts enabled and pre-categorized. The use of factory default categories is recommended if the defaults meet plant standards, and there is no identified benefit to changing categories.

Note
The NE107 specification allows a single alert to be included in multiple categories. As a general practice this is not recommended as alarm management can become needlessly complex.

NE107 alerts can be suppressed. If an alert is configured to reside in multiple categories, it can be suppressed in some categories, but not others. To completely suppress an alert it must be suppressed in every category where it is configured.

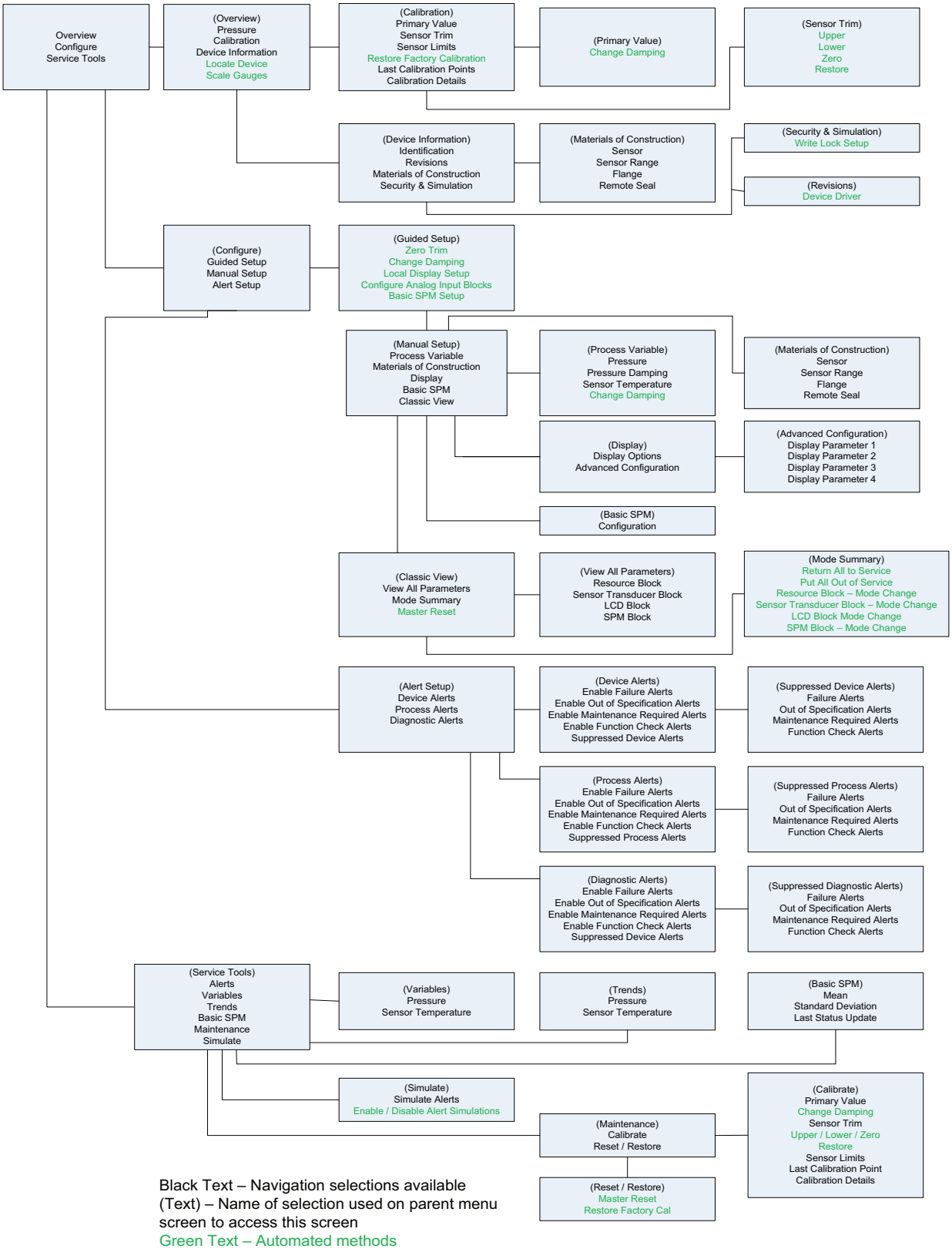
2.2.7 Service tools

Figure 2-9. Service Tools



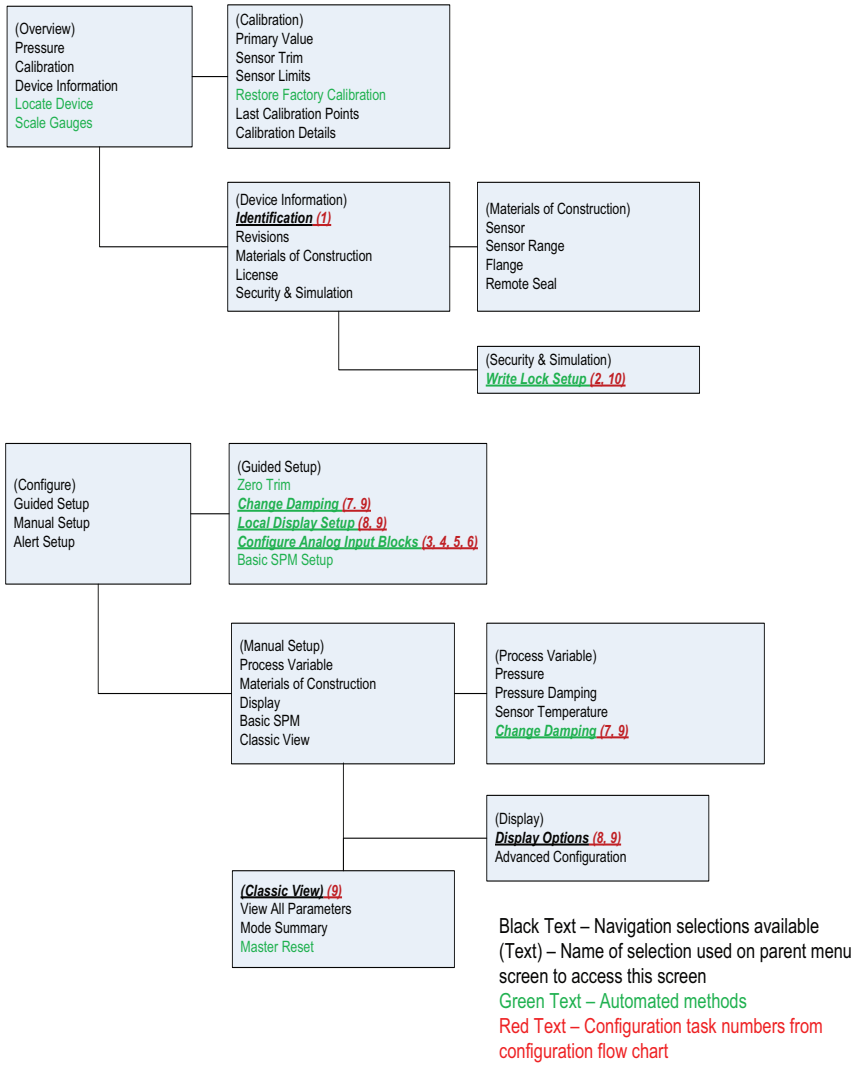
The service tools branch of the menu tree allows users to perform typical device maintenance tasks, simulate alerts and parameters, and perform some configuration resets to return devices to as-manufactured settings.

Figure 2-10. Complete Menu Tree



Black Text – Navigation selections available
(Text) – Name of selection used on parent menu screen to access this screen
Green Text – Automated methods

Figure 2-11. Partial Menu Tree



2.2.8 Navigation

Navigation is performed by clicking on the navigation button labeled with the task the user wishes to perform. This takes the user to the next navigation screen, or the screen where the desired function is performed, or launches a guided configuration automated procedure.

Note that some tasks can be performed from several different locations in the menu tree. For example, a sensor zero trim can be performed from the *Overview*, the *Configure*, *Guided Setup*, or the *Service Tools* branch. This allows users to perform multiple tasks while minimizing the total navigation required to access and use the desired functions.

Guided setup with automated task procedures (methods)

Guided setup provides automated task procedures for tasks which require multiple steps to perform. Guided setup also provides notification of recommended actions such as suggesting the device user contact control room personnel to have the process loop placed in manual mode prior to configuration.

Guided setup will generally proceed in three stages. The first is preparation. In this stage user notifications are given, and steps needed to prepare the device for task setup are performed. The second is task execution where the task is performed in a series of steps. Sometimes the number and sequence of steps is changed based on the values or parameters selected. This eliminates the need for the user to understand and track how each configuration choice may influence what can be done in succeeding steps. The third task is post-setup processing. In this step actions needed to return the device to operation, or gracefully cancel a task are performed.

Guided setup handles mode management as part of preparation and post processing. This means blocks that must be placed in manual or out of service mode for configuration will be placed in those modes, and upon completion of the configuration task, will return those blocks to the normal operating mode.

Guided setup will help the user complete tasks with the highest probability of success, and gracefully terminate partially completed tasks by returning device parameters to the values that existed before the terminated task was started. Users who are not very familiar with a device should consider using Guided Configuration first.

Manual setup with manual and automated task procedures

Manual setup should be used by users who are familiar with the mode changes and configuration steps needed to complete a task and properly return the device to service. Manual Setup is also sometimes used where a single parameter needs to be changed, and the user doesn't want to execute the full sequence of steps that are part of guided configuration.

Manual setup can sometimes be performed in less time than guided setup, however manual setup doesn't provide the comprehensive guidance or graceful task termination of guided setup. Users who are very familiar with tasks and wish to perform them in the least time should consider using manual setup.

2.2.9 Classic view

Classic view provides an alternate way to view parameters and perform manual setup. In the classic view, the individual screens used for manual setup are replaced by a single scrollable list of parameters. The classic view reduces screen to screen navigation to a minimum, but requires that the user know all the parameters which need to be used, and the order of those parameters, to perform each task. The user also needs to know how to manage modes, both to perform tasks, and to return devices to operation.

Expert users will use classic view to review all block parameters, and to perform some configuration or service tasks. Classic view is NOT recommended for anyone who is not a device and FOUNDATION™ Fieldbus expert.

Control function block configuration

The Rosemount 3051 uses standard control function blocks. Configuration of these function blocks, and linking them into control strategies is performed on the control host using the configuration screens and tools specific to that control host. To configure control function blocks and use those in control strategies consult your control host users' documentation.

The Rosemount 3051 device configuration tools support configuration of analog input blocks as needed to select the channel and perform signal conditioning and scaling. The Rosemount 3051 ships from the factory with Analog Input Block 1 linked to the primary variable of the transducer block, and scheduled to run. This is necessary to configure signal conditioning and scaling. The user is encouraged to use Analog Input Block 1 for the primary variable when configuring control strategies.

2.2.10 Confirm correct device driver

- Verify the latest Device Driver (DD/DTM) is loaded on your systems to ensure proper communications.

1. Download the latest DD at Emerson.com or Fieldbus.org.
2. In the Browse by *Member* dropdown menu, select Rosemount business unit of Emerson.
3. Select desired product.
   a. Within Table 2-1, use the Device Revision numbers to find the correct Device Driver.

Table 2-1. Rosemount 3051 FOUNDATION Fieldbus Device Revisions and Files

Device revision[1]	Host	Device driver (DD)[2]	DD download web address	Device driver (DTM)
8	All	DD4: DD Rev 1	Fieldbus.org	Emerson.com
	All	DD5: DD Rev 1	Fieldbus.org	
	Emerson	AMS V 10.5 or higher: DD Rev 2	Emerson.com	
	Emerson	AMS V 8 to 10.5: DD Rev 1	Emerson.com	
	Emerson	375/475: DD Rev 2	Easy Upgrade Utility	
7	All	DD4: DD Rev 3	Fieldbus.org	Emerson.com
	All	DD5: NA	N/A	
	Emerson	AMS V 10.5 or higher: DD Rev 6	Emerson.com	
	Emerson	AMS V 8 to 10.5: DD Rev 4	Emerson.com	
	Emerson	375/475: DD Rev 6	Easy Upgrade Utility	

1. FOUNDATION Fieldbus device revision can be read using a FOUNDATION Fieldbus capable configuration tool.
2. Device driver file names use device and DD revision. To access functionality, the correct device driver must be installed on your control and asset management hosts, and on your configuration tools.

2.3 Device capabilities

2.3.1 Link Active Scheduler (LAS)

The Rosemount 3051 can be designated to act as the backup LAS in the event that the LAS is disconnected from the segment. As the backup LAS, the Rosemount 3051 will take over the management of communications until the host is restored.

The host system may provide a configuration tool specifically designed to designate a particular device as a backup LAS.

2.3.2 Capabilities

Virtual Communication Relationship (VCRs)

There are a total of 20 VCRs. Two are permanent and 18 are fully configurable by the host system. 25 link objects are available.

Network parameter	Value
Slot time	6
Maximum response delay	4
Maximum inactivity to claim LAS delay	47
Minimum inter DLPDU delay	7
Time sync class	4 (1ms)
Maximum scheduling overhead	21
Per CLPDU PhL overhead	4
Maximum inter-channel signal skew	0
Required number of post-transmission-gab-ext units	0
Required number of preamble-extension units	1

Host timer recommendations

T1 = 96000
T2 = 9600000
T3 = 480000

Block	Time (in ms)
Analog input	20
PID	25
Arithmetic	20
Input selection	20
Signal characterizer	20
Integrator	20
Output splitter	20
Control selector	20

2.4 Node address

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

2.5 General block information

2.5.1 FOUNDATION Fieldbus function blocks

Reference information on the process control function blocks can be found in the Function Block Reference Manual.

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.

Statistical Process Monitoring (SPM) block

The SPM block is available on a new transmitter if the D01 option is ordered.

This block allows a user to view, configure and monitor the statistical process monitoring diagnostics used for process monitoring and plugged impulse line detection.

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 INT 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 20 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.

The block supports two forms of the PID equation: standard and series. You can select the appropriate equation using the MATHFORM parameter. The standard ISA PID equation is the default selection.

Control selector block

The Control Selector (CSEL) 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 (OSPL) 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.

Index numbers

Table 2-2. Block Index N umbers

Block name	Revision 7	Revision 8
Resource block	1000	1000
Sensor transducer block	1100	1100
Display transducer block	1200	1200
SPM block	1300	1300
Analog input block	1400, 1500	1400, 1500, 2300, 2400
PID block	1600	1600
Input selector block	1700	1700
Signal characterizer block	1800	1800
Arithmetic block	1900	1900
Integrator block	2000	2000
Control selector block	N/A	2100
Output splitter block	N/A	2200

Function blocks with default block indexes up to 1500 are permanent. Function blocks with default block addresses 1600 and higher are instantiated and can be deleted by the user.

2.5.2 Modes

The resource, transducer, and all function blocks in the device have modes of operation. These modes govern the operation of the block. Every block supports both automatic (AUTO) and out of service (OOS) modes. Other modes may also be supported.

⚠ Changing modes

To change the operating mode, set the MODE_BLK.TARGET to the desired mode. After a short delay, the parameter MODE_BLK.ACTUAL should reflect the mode change if the block is operating properly. Appropriate resource, transducer, and Analog Input block mode changes are made by the automated procedures (methods) for most configuration tasks.

Permitted modes

It is possible to prevent unauthorized changes to the operating mode of a block. To do this, configure MODE_BLK.PERMITTED to allow only the desired operating modes. It is recommended to always select OOS as one of the permitted modes.

Types of modes

For procedures described in this manual, it will be helpful to understand the following modes.

AUTO

The functions performed by the block will execute. If the block has any outputs, these will continue to update. This is typically the normal operating mode.

Out of Service (OOS)

The functions performed by the block will not execute. If the block has any outputs, these will typically not update and the status of any values passed to downstream blocks will be “BAD”. To make some changes to the configuration of the block, change the mode of the block to OOS. When the changes are complete, change the mode back to AUTO.

MAN

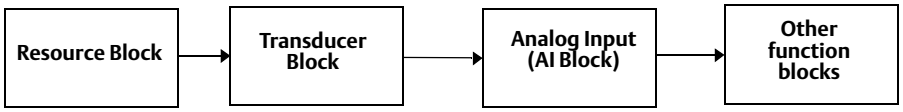
In this mode, variables that are passed out of the block can be manually set for testing or override purposes.

Other types of modes

Other types of modes are Cas, RCas, ROut, IMan and LO. Some of these may be supported by different function blocks in the Rosemount 3051. For more information, see the Function Block Reference Manual.

Mode propagation

Note
When an upstream block is set to OOS, this will impact the output status of all downstream blocks. The figure below depicts the hierarchy of blocks:



2.5.3 Block instantiation

The Rosemount 3051 supports the use of function block instantiation. When a device supports block instantiation, the number of blocks and block types can be defined to match specific application needs.The number of blocks that can be instantiated is only limited by the amount of memory within the device and the block types that are supported by the device. Instantiation does not apply to standard device blocks like the resource, sensor transducer, LCD display transducer, and SPM blocks.

Block instantiation is done by the host control system or configuration tool, but not all hosts are required to implement this functionality. Refer to your specific host or configuration tool manual for more information.

2.5.4 Simulation

Simulation is the functionality of the AI block. There are two ways to simulate values as follows:

1. Change the mode of the block to manual and adjust the output value.
2. Enable simulation through the configuration tool and manually enter a value for the measurement value and its status (this single value will apply to all outputs).

In both cases, first set the **ENABLE** switch on the field device.

⚠ With simulation enabled, the actual measurement value has no impact on the OUT value or the status. The OUT values will all have the same value as determined by the simulate value.

2.6 Resource block

2.6.1 FEATURES and FEATURES_SEL

The FEATURES parameter is read only and defines which host accessible features are supported by the Rosemount 3051. Below is a list of the FEATURES the Rosemount 3051 supports. See Appendix A: Specifications and Reference Data for the complete list.

Reference the feature list in the parameter table in Appendix A: Specifications and Reference Data.

FEATURES_SEL is used to turn on any of the supported features that are found in the FEATURES parameter. The default setting of the Rosemount 3051 has the HARD W LOCK enabled and the hardware write lock switch on the electronics board in the unlocked position.

UNICODE

All configurable string variables in the Rosemount 3051, except tag names, are octet strings. Either ASCII or Unicode may be used. If the configuration device is generating Unicode octet strings, you must set the Unicode option bit.

REPORTS

The Rosemount 3051 supports alert reports. The Reports option bit must be set in the features bit string to use this feature. If it is not set, the host must poll for alerts. If this bit is set, the transmitter will actively report alerts.

SOFT W LOCK and HARD W LOCK

Inputs to the security and write lock functions include the hardware security switch, the hardware and software write lock bits of the FEATURE_SEL parameter, and the WRITE_LOCK parameter.

The WRITE_LOCK parameter prevents modification of parameters within the device except to clear the WRITE_LOCK parameter. During this time, the block will function normally updating inputs and outputs and executing algorithms. When the WRITE_LOCK condition is cleared, a WRITE_ALM alert is generated with a priority that corresponds to the WRITE_PRI parameter.

The FEATURE_SEL parameter enables the user to select any one of the following: a hardware write lock, a software write lock, or no write lock capability. To enable the hardware security function, enable the HARD W LOCK bit in the FEATURE_SEL parameter. When this bit has been enabled the WRITE_LOCK parameter becomes read only and will reflect the state of the hardware switch. In order to enable the software write lock, place the hardware write lock switch in the unlocked position. Then the SOFT W LOCK bit must be set in the FEATURE_SEL parameter. Once this bit is set, the WRITE_LOCK parameter may be set to “Locked” or “Not Locked.” Once the WRITE_LOCK parameter is set to “Locked” by either the software or the hardware lock, all user requested writes shall be rejected.

2.6.2 MAX_NOTIFY

The MAX_NOTIFY parameter value of seven is the maximum number of alert reports the resource can have sent without getting a confirmation from the host, corresponding to the amount of buffer space available for alert messages. The number can be set lower, to control alert flooding, by adjusting the LIM_NOTIFY parameter value. If LIM_NOTIFY is set to zero, then no alerts are reported.

2.6.3 Alerts/alarms

Note
See "Alert configuration NE107 and Plantweb" on page 40 for Alert Configuration.

The Rosemount 3051 Rev 8 Pressure Transmitter annunciates alerts as either Plantweb or NE107 Status Signals. All alerts are configured, masked, and mapped as NE 107 Status Signals. If the control host is DeltaV™ version 11.5 or older alerts are automatically annunciated as Plantweb Alerts. No user configuration is needed for this conversion.

The alerts and recommended actions should be used in conjunction with Section 6: Trouble-shooting. See "Resource block" on page 109 for more information on resource block parameters.

The resource block will act as a coordinator for alerts. Depending on user configuration, each device will have either three or four alert parameters. If Plantweb alerts are annunciated, the three alert parameters will be (FAILED_ALARM, MAINT_ALARM, and ADVISE_ALARM). If NE107 alerts are annunciated, the four alert parameters called status signals will be (FD_FAIL_ACTIVE, FD_OFFSPEC_ACTIVE, FD_MAINT_ACTIVE, and FD_CHECK_ACTIVE).

Note
NE107 alerts and Plantweb Alerts annunciate the same diagnostics and display the same recommended actions. The only difference in the alerts reported is the parameters or status signals used to annunciate the alert conditions. The default factory configuration has NE107 alerts enabled. A device will report either NE 107 status signals or Plantweb alerts, but not both at the same time.

Alerts processing within the device

1. Diagnostics perform comprehensive checks and update status within the device. These status conditions allow the user to troubleshoot probable causes and take corrective actions.
2. The status conditions are then mapped into four status signals that can be used for annunciation on the segment to the host.
3. Before annunciation a check is made to determine if the user has masked any alert parameters. Any masked parameters will not be annunciated to the host, but will be visible using the device DD or DTM.
4. Unmasked alert conditions are annunciated by the appropriate status signal to the host.

Plantweb Alerts and NE107 Alerts are both processed using the steps described above, and annunciate the same consolidated status parameters.

Figure 2-12. NE107 Alert Processing Diagram

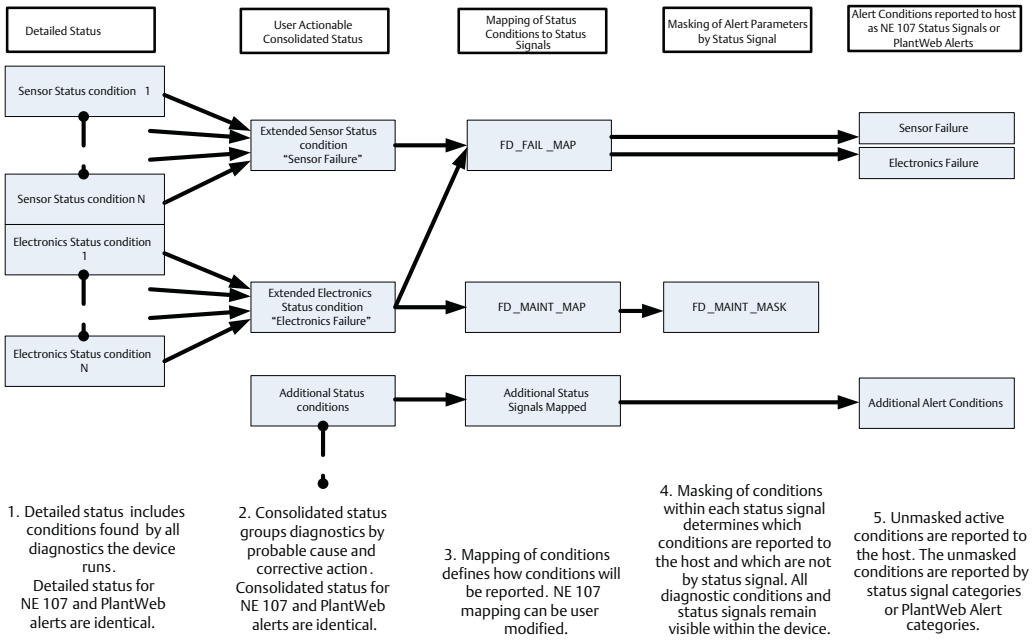
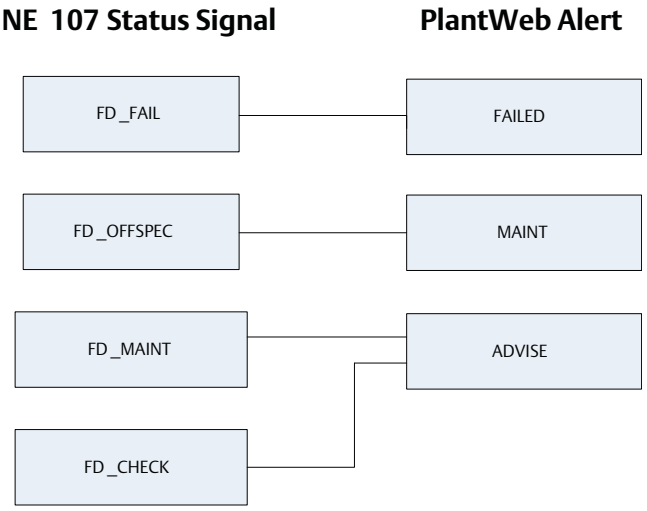


Figure 2-13. NE 107 Status Signal to Plantweb Alert Mapping



The alert priority enumeration value

Alerts have priorities that determine if they occur, and where and how they are annunciated.

NE107 status signals and Plantweb alerts use the same priorities and annunciate the same ways.

0 = Alerts will not occur. If there is an existing alert and the priority is changed from a number greater than zero to zero and it will clear. Active device diagnostics are still shown within the Device Description even if the alert has been cleared.

1 = The associated alert is not sent as a notification. If the priority is above 1, then the alert must be reported.

2 = Reserved for alerts that do not require the attention of a plant operator, e.g. diagnostic and system alerts. Block alert, error alert, and update event have a fixed priority of 2.

3–7 = Increasing higher priorities - advisory alerts.

8–15 = Increasing higher priority - critical alerts.

Plantweb Alert priorities are configured using DeltaV.

NE107 alerts overview

NE107 alert parameters

NE107 has four alert status signals. They are in order from highest to lowest priority:

1. FD_FAIL_ACTIVE
2. FD_OFFSPEC_ACTIVE
3. FD_MAINT_ACTIVE
4. FD_CHECK_ACTIVE

Any of the eight alert conditions can be user configured to annunciate as any of the four status signals. Individual alert conditions can also be mapped into multiple status signals.

Alert parameter definitions and factory defaults

Note
All eight alert conditions are factory assigned to appropriate status signals. Change the parameter assignment of individual alert conditions only if needed.

Devices are shipped from the factory with all applicable alerts enabled. The factory default alert conditions reported in each status signal are:

1. FD_FAIL_ACTIVE
   a. Incompatible module
   b. Sensor failure
   c. Electronics failure

A FD_FAIL_ACTIVE status signal indicates a failure within a device that will make the device or some part of the device non-operational. This implies that the process variable may no longer be available and the device is in need of immediate repair.

2. FD_OFFSPEC_ACTIVE
   a. Pressure out of limits
   b. Sensor temperature out of limits

A FD_OFFSPEC_ACTIVE status signal indicates that the device is experiencing pressure or temperature conditions that are outside the device operating range. This implies that the process variable may no longer be accurate. It also implies that if the condition is ignored the device will eventually fail.

3. FD_MAINT_ACTIVE
    a. Display update failure
    b. Variation change detected

A FD_MAINT_ACTIVE status signal indicates the device is still functioning but an abnormal process or device condition exists. The device should be checked to determine the type of abnormal condition and recommended actions to resolve it.

4. FD_CHECK_ACTIVE
    a. Function check

A FD_CHECK_ACTIVE status signal indicates a transducer block is not in “Auto” mode. This may be due to configuration or maintenance activities.

Mapping alert conditions

Any of the alert conditions can be mapped into any of the NE107 status signals. This is done using the following parameters.

1. FD_FAIL_MAP assigns a condition to FD_FAIL_ACTIVE
2. FD_OFFSPEC_MAP assigns a condition to FD_OFFSPEC_ACTIVE
3. FD_MAINT_MAP assigns a condition to FD_MAINT_ACTIVE
4. FD_CHECK_MAP assigns a condition to FD_CHECK_ACTIVE

Masking alert conditions

Any combination of status signals can be masked. When a status signal is masked, it will not be annunciated to the host system but will still be active in the device and viewable in the device DD or DTM. The recommended action, FD_RECOMMEN_ACT will continue to show the recommended action for the most severe condition or conditions detected as determined by the status signal priority. This allows maintenance personnel to view and correct device conditions without annunciating the conditions to operational staff. They are masked using the following parameters:

1. FD_FAIL_MASK to mask FD_FAIL_ACTIVE status signals
2. FD_OFFSPEC_MASK to mask FD_OFFSPEC_ACTIVE status signals
3. FD_MAINT_MASK to mask FD_MAINT_ACTIVE status signals
4. FD_CHECK_MASK to mask FD_CHECK_ACTIVE status signals

If a consolidated diagnostic condition is configured to annunciate in multiple status signal categories it can be masked in one or several status signal categories, but left active and annunciate in others. This provides significant flexibility but can lead to confusion when responding to alerts. Generally alert conditions are assigned to only a single status signal.

Alert priorities

NE107 alerts can have any of 16 different condition priorities ranging from the lowest priority of 0 to the highest priority of 15. This is done using the following parameters.

1. FD_FAIL_PRI to specify the priority of FD_FAIL_ACTIVE status signals
2. FD_OFFSPEC_PRI to specify the priority FD_OFFSPEC_ACTIVE status signals
3. FD_MAINT_PRI to specify the priority FD_MAINT_ACTIVE status signals
4. FD_CHECK_PRI to specify the priority FD_CHECK_ACTIVE status signals

Note
FOUNDATION Fieldbus standards require that NE 107 alert priority is set to zero for all status signals at manufacturing.
Zero priority behavior shows any active device diagnostics in the DD or DTM but alerts are not generated based on the diagnostic conditions or published on the bus.
An alert priority of two or higher is required for every status signal category where status signals are to be published on the bus.
Check with your host provider to determine the alarm priorities assigned to each status signal category by your host. Manual configuration may be required.
DeltaV assigns a priority of two or higher. The priority is based on status signal category.
The status signal priority determines the behavior of both real and simulated alerts.

2.6.4 Plantweb alerts overview

Alerts are generated, mapped, and masked as NE 107 Status Signals. If Plantweb alerts are required the NE 107 Status Signals are automatically converted to Plantweb alerts for annunciation and display. Plantweb alerts have three alert parameters. They are in order from highest to lowest priority:

1. FAILED_ALM
2. MAINT_ALM
3. ADVISE_ALM

The eight alert conditions are factory configured to annunciate as one of the three specific alert parameters.

Plantweb alert parameter conditions and factory defaults

Devices are shipped from the factory with all applicable alerts enabled. The alert conditions reported in each parameter are:

1. FAILED_ALM
   a. Incompatible module
   b. Sensor failure
   c. Electronics failure

A FAILED_ALM indicates a failure within a device that will make the device or some part of the device non-operational. This implies that the process variable may no longer be available and the device is in need of immediate repair.

2. MAINT_ALM
   a. Pressure out of limits
   b. Sensor temperature out of limits

A MAINT_ALM indicates that the device is experiencing pressure or temperature conditions that are outside the device operating range. This implies that the process variable may no longer be accurate. It also implies that if the condition is ignored the device will eventually fail. The device should be checked to determine the type of abnormal condition and recommended actions to resolve it.

3. ADVISE_ALM
   a. Function check
   b. Display update failure
   c. Variation change detected

An ADVISE_ALM indicates a transducer block is not in “Auto” mode. This may be due to configuration or maintenance activities. It can also indicate an abnormal process or device condition exists. The device should be checked to determine the type of abnormal condition and recommended actions to resolve it.

Plantweb alert priorities

Plantweb alert priorities are configured in DeltaV. Plantweb alerts can have any of 16 different condition priorities ranging from the lowest priority of 0 to the highest priority of 15. This is done using the following parameters.

1. FAILED_PRI to specify the priority of FAILED_ALM
2. MAINT_PRI to specify the priority of MAINT_ALM
3. ADVISE_PRI to specify the priority of ADVISE_ALM

Plantweb alert priority is configured using DeltaV and is not part of the DD functionality.

2.7 Basic device setup

⚠ CAUTION

Set all transmitter hardware adjustments during commissioning to avoid exposing the transmitter electronics to the plant environment after installation.

Note
The information contained within Basic device setup is the same as in the Quick Start Guide. Reference Analog Input (AI) function block through Advanced device setup for more detailed configuration information.

2.7.1 Configure

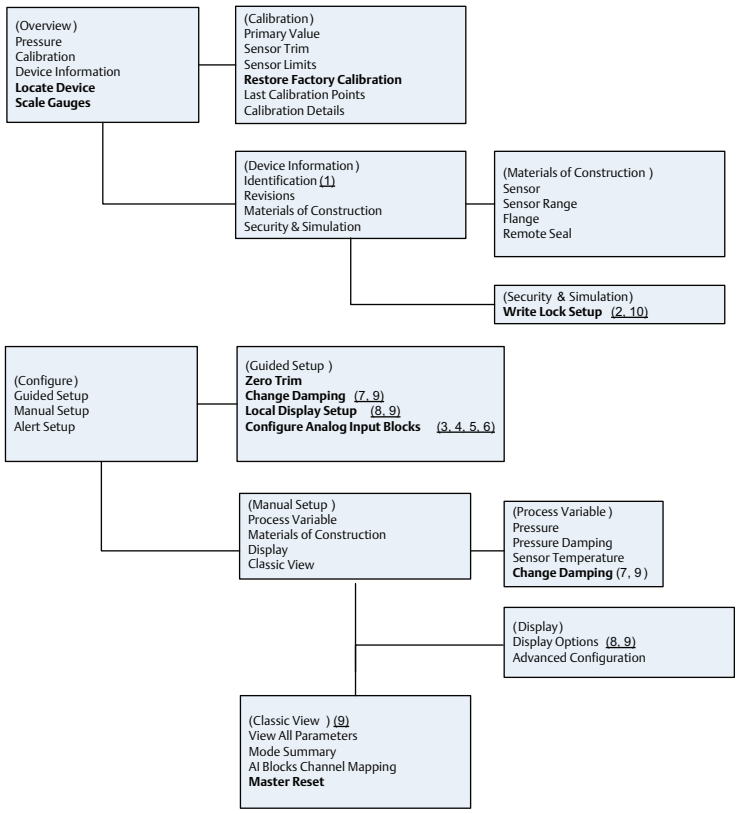
Each FOUNDATION Fieldbus host or configuration tool has a different way of displaying and performing configurations. Some use DD methods for configuration and to display data consistently across platforms. There is no requirement that a host or configuration tool support these features. Use the following block examples to do basic configuration to the transmitter. For more advanced configurations, reference Analog Input (AI) function block through Advanced device setup in this manual.

Note
DeltaV users should use DeltaV Explorer for the resource and transducer blocks and control studio for the function blocks.

AI block quick configuration

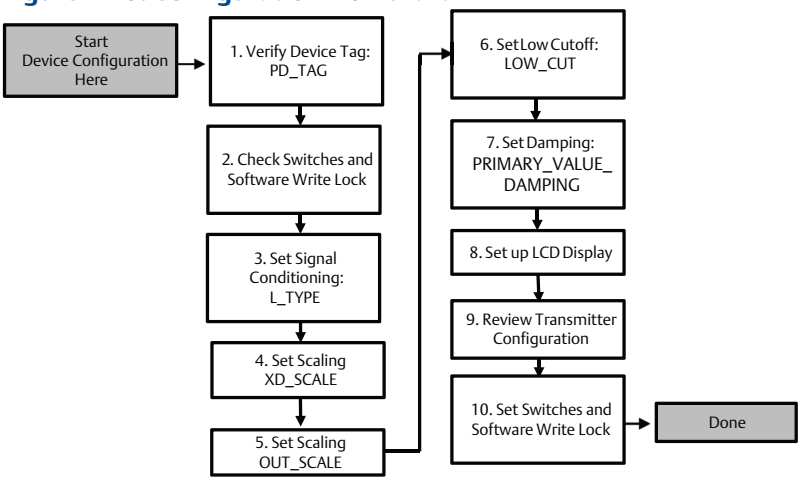
The screens used for each step are shown in Figure 2-14, basic configuration menu tree. In addition, step-by-step instructions for each step of AI block configuration are provided in Figure 2-15.

Figure 2-14. Basic Configuration Menu Tree



Standard Text – Navigation selections available
(Text) – Name of selection used on parent menu screen to access this screen
Bold Text – Automated methods
Underlined Text -- Configuration task numbers from configuration flow chart

Figure 2-15. Configuration Flowchart



Before you begin

See Figure 2-14 to graphically view the step by step process for basic device configuration. Before beginning configuration you may need to verify the Device Tag or deactivate hardware and software write protection on the transmitter. To do this follow steps below. Otherwise continue at AI block configuration .

1. To verify the device tag:
   a. Navigation: from the overview screen, select **Device Information** to verify the device tag.
2. To check the switches (see Figure 2-28):
   a. The write lock switch must be in the unlocked position if the switch has been enabled in software.
   b. To disable the Software Write Lock (devices ship from the factory with the software write lock disabled):
      - Navigation: from the overview screen, select **Device Information** and then select the **Security and Simulation** tab.
      - Perform **Write Lock Setup** to disable Software Write Lock.

Note
Place the control loop in Manual mode before beginning Analog Input Block configuration.

⚠ AI block configuration

AI block configuration edits

Note
Always check and reconcile function block configuration (with the exception of resource and transducer blocks) after commissioning the transmitter to the control host. Function block configuration, including AI blocks, made prior to device commissioning to the control host may not be saved to the control host database during the commissioning process. In addition, the control host may download configuration changes to the transmitter as part of the commissioning process.

Note
Changes to the AI block configuration performed after the transmitter is commissioned are typically performed using the control host configuration software. Consult your host system documentation to see if the AI Block guided configuration method provided in the DD or DTM should be used after the device has been commissioned.

Note
For DeltaV users, final AI block configuration and AI block configuration changes should only be made using the DeltaV Explorer.

To use guided setup:

1. Navigate to *Configure>Guided Setup.*
2. Select **AI Block Unit Setup**.

Note
Guided setup will automatically go through each step in the proper order.

Note
For convenience, AI Block 1 is pre-linked to the transmitter primary variable and should be used for this purpose. AI Block 2 is pre-linked to the transmitter sensor temperature. The channel must be selected for AI Blocks 3 and 4. The control host, and some asset management hosts can deconfigure the factory assigned links and assign the primary variable and sensor temperature to other AI blocks.

- Channel 1 is the primary variable.
- Channel 2 is the sensor temperature.

If the FOUNDATION Fieldbus Diagnostics Option Code D01 is enabled, these additional channels are available.

- Channel 12 is the SPM mean.
- Channel 13 is the SPM standard deviation.

To configure SPM, refer to "Advanced Pressure Diagnostics" on page 93.

Note
Step 4 through Step 7 are all performed in a single step by step method under guided setup.

Note
If the L_TYPE selected in Step 3 is "Direct", Step 4, Step 5 and Step 6 are not needed. If the L_TYPE selected is "Indirect", Step 6 is not needed. Guided setup automatically skips any unneeded steps.

3. Select the Signal Conditioning "L_TYPE" from the drop down menu:
   a. Select L_TYPE: "Direct" for pressure measurements using the device default units.
   b. Select L_TYPE: "Indirect" for other pressure or level units.
   c. Select L_TYPE: "Indirect Square Root" for flow units.

4. Set “XD_SCALE” to the 0% and 100% scale points (the transmitter range):
   a. Select the **XD_SCALE_UNITS** from the drop down menu.
   b. Enter the XD_SCALE 0% point. This may be elevated or suppressed for level applications.
   c. Enter the XD_SCALE 100% point. This may be elevated or suppressed for level applications.
   d. If L_TYPE is “Direct”, the AI Block may be placed in AUTO mode to return the device to service. Guided setup does this automatically.
5. If L_TYPE is “Indirect” or “Indirect Square Root”, set “OUT_SCALE” to change engineering units.
   a. Select the **OUT_SCALE UNITS** from the drop down menu.
   b. Set the OUT_SCALE low value. This may be elevated or suppressed for level applications.
   c. Set the OUT_SCALE high value. This may be elevated or suppressed for level applications.
   d. If L_TYPE is “Indirect”, the AI Block may be placed in AUTO mode to return the device to service. Guided Setup does this automatically.
6. If L_TYPE is “Indirect Square Root”, a “LOW FLOW CUTOFF” function is available.
   a. Enable LOW FLOW CUTOFF.
   b. Set the LOW_CUT VALUE in XD_SCALE UNITS.
   c. The AI Block may be placed in AUTO mode to return the device to service. Guided Setup does this automatically.
7. Change damping.
   a. To use guided setup:
      - Navigate to *Configure>Guided Setup,* and select **Change Damping**.

Note
Guided setup will automatically go through each step in the proper order.

      - Enter the desired damping value in seconds. The permitted range of values is 0.4 to 60 seconds.

   b. To use manual setup:
      - Navigate to *Configure>Manual Setup>Process Variable,* and select **Change Damping**.
      - Enter the desired damping value in seconds. The permitted range of values is 0.4 to 60 seconds.
8. Configure optional LCD display (if installed).
   a. To use guided setup:
      - Navigate to *Configure>Guided Setup*, and select **Local Display Setup**.

Note
Guided setup will automatically go through each step in the proper order.

      - Check the box next to each parameter to be displayed to a maximum of four parameters. The LCD display will continuously scroll through the selected parameters.

   b. To use manual setup:
      - Navigate to *Configure>Manual Setup*, and select **Local Display Setup**.
      - Check each parameter to be displayed. The LCD display will continuously scroll through the selected parameters.
9. Review transmitter configuration and place in service.
   a. To review the transmitter configuration navigate using the guided setup navigation sequences for **AI Block Unit Setup**, **Change Damping**, and **Set up LCD Display**.

b. Change any values as necessary.
c. Return to the *Overview* screen.
d. If Mode is Not in Service, click on the **Change** button, and then click on **Return All to Service**.

Note
If hardware or software write protection is not needed, Step 10 can be skipped.

10. Set switches and software write lock.
    a. Check switches (see Figure 4-2).

Note
The write lock switch can be left in the locked or unlocked position. The simulate enable/disable switch may be in either position for normal device operation.

Enable software write lock

1. Navigate from the *overview* screen.
   a. Select **Device Information**.
   b. Select the **Security and Simulation** tab.
2. Perform **Write Lock Setup** to enable Software Write Lock.

2.8 Analog Input (AI) function block

2.8.1 Configure the AI block

AI block configuration edits

Note
Always check and reconcile function block configuration (with the exception of resource and transducer blocks) after commissioning the transmitter to the control host. unction block configuration, including AI blocks, made prior to device commissioning to the control host may not be saved to the control host database during the commissioning process. In addition, the control host may download configuration changes to the transmitter as part of the commissioning process.

Note
Changes to the AI block configuration performed after the transmitter is commissioned are typically performed using the control host configuration software. Consult your host system documentation to see if the AI Block guided configuration method provided in the DD or DTM should be used after the device has been commissioned.

Note
For DeltaV users, final AI block configuration and AI block configuration changes should only be made using the DeltaV Explorer.

⚠ A minimum of four parameters are required to configure the AI Block. The parameters are described below with example configurations shown at the end of this section.

CHANNEL

Select the channel that corresponds to the desired sensor measurement. The Rosemount 3051 measures both pressure (channel 1) and sensor temperature (channel 2).

Table 2-3. I/O Channel Definitions

Channel number	Channel description
1	Pressure in AI.XD_SCALE units
2	Sensor temperature in AI.XD_SCALE units
12	SPM mean
13	SPM standard deviation

Note
Channels 12-13 are only available when the Diagnostic option code 'D01' is ordered with the device.

L_TYPE

The L_TYPE parameter defines the relationship of the sensor measurement (pressure or sensor temperature) to the desired output of the AI Block (e.g. pressure, level, flow, etc.). The relationship can be direct, indirect, or indirect square root.

Direct

Select direct when the desired output will be the same as the sensor measurement (pressure or sensor temperature).

Indirect

Select indirect when the desired output is a calculated measurement based on the sensor measurement (e.g. a pressure measurement is made to determine level in a tank). The relationship between the sensor measurement and the calculated measurement will be linear.

Indirect square root

Select indirect square root when the desired output is an inferred measurement based on the sensor measurement and the relationship between the sensor measurement and the inferred measurement is square root (e.g. flow).

XD_SCALE and OUT_SCALE

The XD_SCALE and OUT_SCALE each include three parameters: 0%, 100%, and, engineering units. Set these based on the L_TYPE:

L_TYPE is direct

When the desired output is the measured variable, set the XD_SCALE to the “Primary_Value_Range”. This is found in the Sensor Transducer Block. Set OUT_SCALE to match XD_SCALE.

L_TYPE is indirect

When an inferred measurement is made based on the sensor measurement, set the XD_SCALE to represent the operating range that the sensor will see in the process. Determine the inferred measurement values that correspond to the XD_SCALE 0 and 100% points and set these for the OUT_SCALE.

L_TYPE is indirect square root

When an inferred measurement is made based on the sensor measurement AND the relationship between the inferred measurement and sensor measurement is square root, set the XD_SCALE to represent the operating range that the sensor will see in the process. Determine the inferred measurement values that correspond to the XD_SCALE 0 and 100% points and set these for the OUT_SCALE:

Parameters	Enter data				
Channel	1=Pressure, 2=Sensor Temp, 12=SPM mean, 13=SPM standard deviation				
L-Type	Direct, Indirect, or Square Root				
XD_Scale	Scale and Engineering Units				
Note Select only the units that are supported by the device.	Pa	bar	torr at 0 °C	ftH_2O at 4°C	mH_2O at 4 °C
	kPa	mbar	kg/cm^2	ftH_2O at 60 °F	mmHg at 0 °C
	mPa	psf	kg/m^2	ftH_2O at 68 °F	cmHg at 0 °C
	hPa	Atm	inH_2Oat 4 °C	mmH_2O at 4 °C	inHg at 0 °C
	Deg C	psi	inH_2O at 60 °F	mmH_2O at 68 °C	mHg at 0 °C
	Deg F	g/cm^2	inH_2O at 68 °F	cmH_2O at 4 °C	
Out_Scale	Scale and engineering units				

Note
When the engineering units of the XD_SCALE are selected, this causes the engineering units of the PRIMARY_VALUE_RANGE in the Transducer Block to change to the same units. This is the only way to change the engineering units in the sensor transducer block, PRIMARY_VALUE_RANGE parameter.

Configuration examples

Pressure transmitter

Situation #1

A pressure transmitter with a range of 0–100 psi.

Solution

Table 2-4 lists the appropriate configuration settings.

Table 2-4. Analog Input Function Block Configuration

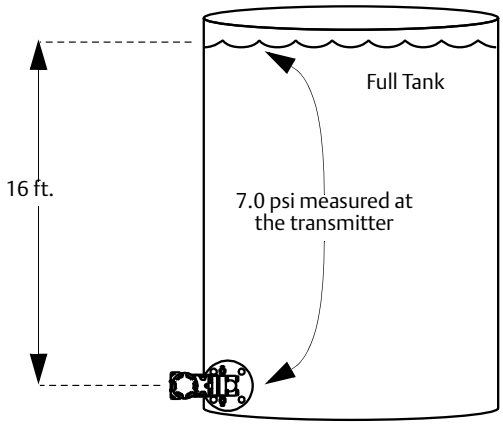
Parameter	Configured values
L_TYPE	Direct
XD_SCALE	Primary_Value_Range
OUT_SCALE	Primary_Value_Range
Channel	1 - pressure

Pressure transmitter used to measure level in an open tank

Situation #2

The level of an open tank is to be measured using a pressure tap at the bottom of the tank. The maximum level of the tank is 16 ft. The liquid in the tank has a density that makes the maximum level correspond to a pressure of 7.0 psi at the pressure tap (see Figure 2-16).

Figure 2-16. Situation #2 Diagram



Solution to Situation #2

The table below lists the appropriate configuration settings.

Analog Input function block configuration for a pressure transmitter used in level measurement (situation #1).

Parameter	Configured values
L_TYPE	Indirect
XD_SCALE	0 to 7 psi
OUT_SCALE	0 to 16 ft
Channel	1 - pressure

Output calculation for situation #2

When the L_Type is configured as Indirect, the OUT parameter is calculated as:

$$OUT = \frac{PV - XD\_SCALE\_0\%}{XD\_SCALE\_100\% - XD\_SCALE\_0\%} \times (OUT\_SCALE\_100\% - OUT\_SCALE\_0\%) + OUT\_SCALE\_0\%$$

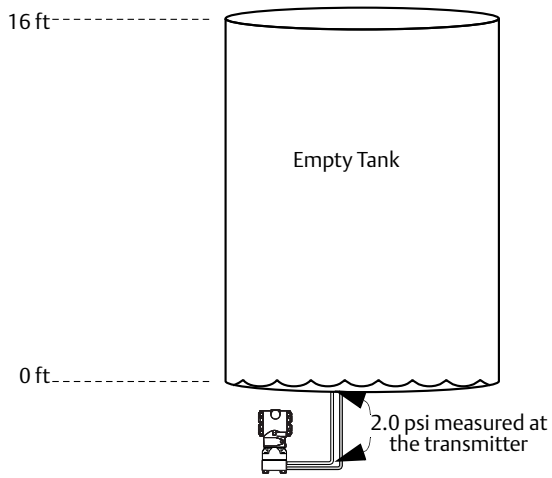
In this example, when PV is 5 psi, then the OUT parameter will be calculated as follows:

$$OUT = \frac{5 \text{ psi} - 0 \text{ psi}}{7 \text{ psi} - 0 \text{ psi}} \times (16 \text{ ft.} - 0 \text{ ft.}) + 0 \text{ ft.} = 11.43 \text{ ft.}$$

Situation #3

The transmitter in situation #3 is installed below the tank in a position where the liquid column in the impulse line, with an empty tank, is equivalent to 2.0 psi (see Figure 2-17).

Figure 2-17. Situation #3 Diagram



Solution to situation #3

The table below lists the appropriate configuration settings.

Analog Input function block configuration for a pressure transmitter used in level measurement (Situation #3).

Parameter	Configured values
L_TYPE	Indirect
XD_SCALE	2 to 9 psi
OUT_SCALE	0 to 16 ft
Channel	1 - pressure

In this example, when the PV is 4 psi, OUT will be calculated as follows:

$$\text{OUT} = \frac{4 \text{ psi} - 2 \text{ psi}}{9 \text{ psi} - 2 \text{ psi}} \times (16 \text{ ft.} - 0 \text{ ft.}) + 0 \text{ ft.} = 4.57 \text{ ft.}$$

Differential pressure transmitter to measure flow

Situation #4

The liquid flow in a line is to be measured using the differential pressure across an orifice plate in the line. Based on the orifice specification sheet, the differential pressure transmitter was calibrated for 0 to 20 inH_2O for a flow of 0 to 800 gal/min.

Solution

The table below lists the appropriate configuration settings.

Parameter	Configured values
L_TYPE	Indirect Square Root
XD_SCALE	0 to 20 inH_2O
OUT_SCALE	0 to 800 gal/min
Channel	1 - pressure

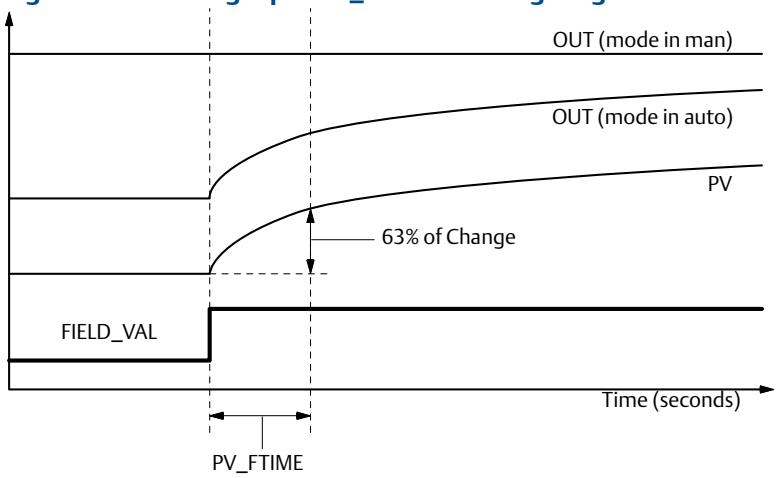
$$Out = \sqrt{\frac{PV - XDSCALE0}{XDSCALE100}}(OUTSCALE100 - OUTSCALE0) + OUTSCALE0$$

$$OUT = \sqrt{\frac{8inH_2O - 0inH_2O}{20inH_2O - 0inH_2O}}\ (800\ gal/min. - 0\ gal/min.) + 0\ gal/min. = 505.96 gal/min.$$

Filtering

⚠ The filtering feature changes the response time of the device to smooth variations in output readings caused by rapid changes in input. Adjust the filter time constant (in seconds) using the PV_FTIME parameter. Set the filter time constant to zero to disable the filter feature.

Figure 2-18. Analog Input PV_FTIME Filtering Diagram



Low cutoff

⚠ When the converted input value is below the limit specified by the LOW_CUT parameter, and the low cutoff I/O option (IO_OPTS) is enabled (True), a value of zero is used for the converted value (PV). This option is useful to eliminate false readings when the differential pressure measurement is close to zero, and it may also be useful with zero-based measurement devices such as flowmeters.

Note
Low cutoff is the only I/O option supported by the AI block. Set the I/O option in manual or out of service mode only.

Process alarms

Process alarms are part of the process loop control strategy. They are configured in the control host. Process alarm configuration is not included in the configuration menu tree. See your control host documentation for information on configuration of process alarms. Process Alarm detection is based on the *OUT* value. Configure the alarm limits of the following standard alarms:

- High (HI_LIM)
- High high (HI_HI_LIM)
- Low (LO_LIM)
- Low low (LO_LO_LIM)

In order to avoid alarm chattering when the variable is oscillating around the alarm limit, an alarm hysteresis in percent of the PV span can be set using the ALARM_HYS parameter. The priority of each alarm is set in the following parameters:

- HI_PRI
- HI_HI_PRI
- LO_PRI
- LO_LO_PRI

Alarm priority

Alarms are grouped into five levels of priority:

Priority number	Priority description
0	The alarm condition is not used.
1	An alarm condition with a priority of 1 is recognized by the system, but is not reported to the operator.
2	An alarm condition with a priority of 2 is reported to the operator.
3–7	Alarm conditions of priority 3 to 7 are advisory alarms of increasing priority.
8–15	Alarm conditions of priority 8 to 15 are critical alarms of increasing priority.

Status options

Status options (STATUS_OPTS) supported by the AI block are shown below:

Propagate fault forward

If the status from the sensor is Bad, Device failure or Bad, Sensor failure, propagate it to OUT without generating an alarm. The use of these sub-status in OUT is determined by this option. Through this option, the user may determine whether alarming (sending of an alert) will be done by the block or propagated downstream for alarming.

Uncertain if limited

Set the output status of the analog input block to **Uncertain** if the measured or calculated value is limited.

BAD if limited

Set the output status to **Bad** if the sensor is violating a high or low limit.

Uncertain if Man mode

Set the output status of the analog input block to **Uncertain** if the actual mode of the block is Man.

Note
The instrument must be in Out of Service mode to set the status option.

Advanced features

The AI function block provides added capability through the addition of the following parameters:

ALARM_TYPE

ALARM_TYPE allows one or more of the process alarm conditions detected by the AI function block to be used in setting its OUT_D parameter.

OUT_D

OUT_D is the discrete output of the AI function block based on the detection of process alarm condition(s). This parameter may be linked to other function blocks that require a discrete input based on the detected alarm condition.

2.9 Advanced device setup

2.9.1 Overall configuration

Configuration tasks will be listed in alphabetical order. Each task will start with navigation per the menu tree navigation diagram, to an appropriate configuration starting screen. Next individual configuration steps will be listed. In many cases the steps can be used for either guided or manual configuration. Specific parameter names and valid input ranges are located in "Specifications and Reference Data" on page 109.

The summary of the sections are as follows:

- Damping
- Gauge scaling
- Local display (LCD display)
- Mode
- Alert configuration NE107 and Plantweb
- Alert simulation
- Write lock

Note
Many configuration tasks can be initiated from more than one appropriate configuration starting screen. This manual will describe configuration from one starting screen only. The starting screen used in the manual should not be interpreted as the preferred starting screen.

Note
Physical layout of the parameters on the screen may be different for different configuration tools. The parameters, parameter names, and operations performed will be consistent regardless of screen layout.

Note
Before performing any configuration or service task contact the control room and have the loop placed in manual mode. When configuration or service tasks are complete, contact the control room so appropriate return to automatic control can take place.

2.9.2 Damping

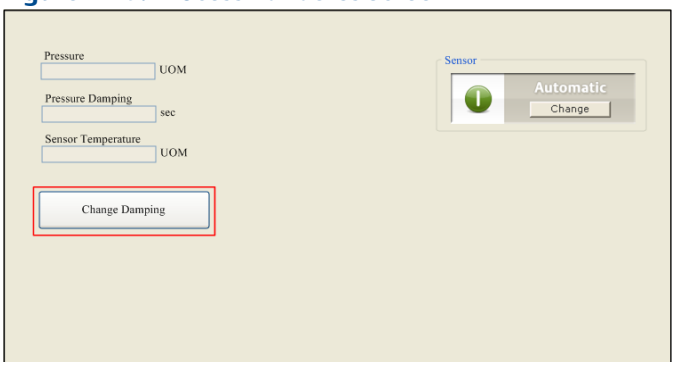
Note
Damping, gauge scaling, calibration, and sensor trims are performed in the Sensor Transducer Block. For block oriented user interfaces, configure Damping in the Sensor Transducer Block.

Menu navigation: *Configure>Manual Setup>Process Variable*

Damping can be changed using the *Overview, Configure*, or *Service Tools* branches of the menu tree. All perform the same function. The *Configure* branch is used here.

Navigate to the *Process Variables* screen and click on the **Change Damping** button. An automated task procedure called "Method" will guide the user through changing the damping. Alternately an operator or configuration engineer can change the damping from the control system Analog Input Block configuration screens. Consult your control system documentation for more information.

Figure 2-19. Process Variables Screen



The change damping button shown in Figure 2-19 above starts an automated procedure called a Method which allows damping to be changed.

The sequence of steps used is:

1. The device will be placed out of service.
2. Enter the new damping value in seconds.
3. The device will be returned to Auto mode.

2.9.3 Gauge scaling

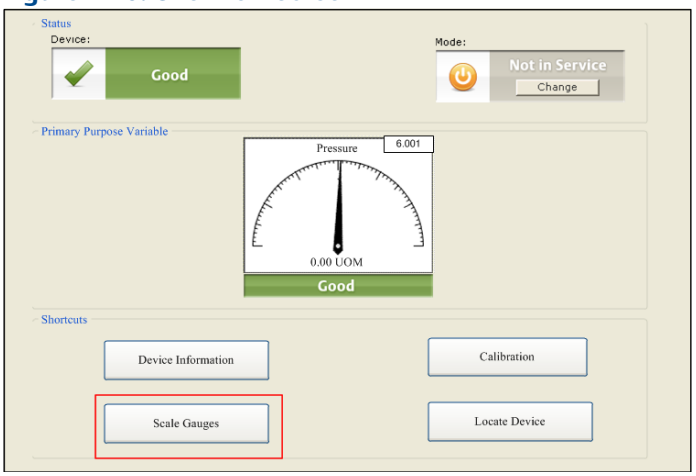
Menu navigation: *Overview*

Scale Gauges is used to change the scaling displayed on the gauges used to view variables. From the *Overview* screen, click on the **Scale Gauges** button. An automated task procedure called a 'Method' will guide the user through scaling the Gauges.

The sequence of steps used is:

1. Enter the desired value for the lower range of the pressure gauge.
2. Enter the desired value for the upper range of the pressure gauge.

Figure 2-20. Overview Screen



The scale gauges button shown in Figure 2-20 above starts an automated procedure called a method which allows the user to change the scaling on the gauge.

2.9.4 Local display (LCD display)

Note
Local display setup is performed in the LCD display transducer block. For block oriented user interfaces, perform local display configuration in the LCD display transducer block.

Menu navigation: *Configure>Manual Setup>Display*

The local display can be configured using Guided Setup or Manual Setup.

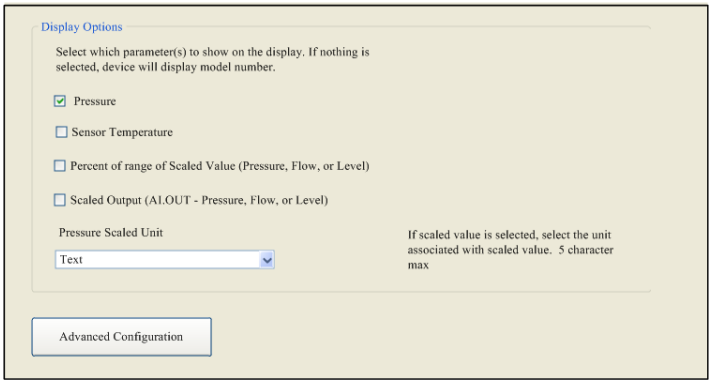
Basic display setup

Basic display setup provides a check - the - box way for the user to configure up to four parameters to display on the LCD display. These parameters are displayed on a rotating basis.

The sequence of steps used is:

1. Check the box next to each parameter the LCD display should display.
2. If **Scaled Output** is selected, use the *Pressure Scaled Unit* dropdown menu to select units.

Figure 2-21. Local Display Basic Configuration Screen



The screen shown in Figure 2-21 above allows the user to select parameters to be displayed on the LCD display by checking the box next to each parameter. Selecting on the **Advanced Configuration** button accesses more display configuration options.

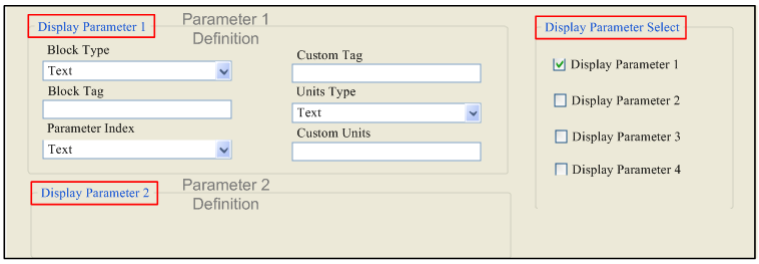
Advanced display setup

Menu navigation: *Configure>Manual Setup>Display>Advanced Configuration*

Advanced display setup provides a fill in the blanks screen where the user can configure parameters from any function block in the device to be displayed on the LCD display. Setup is a two-step process. First, each of up to four parameters is defined. To define a parameter the user selects the **Block Type**, **Parameter Index**, and **Units Type** from dropdown menus. The user can enter Block Tag, Custom Tag, and Custom Units.

Once all desired parameters have been defined, the second step is parameters are selected for display by checking the box in the *Display Parameter Select* area.

Figure 2-22. LCD Display Advanced Configuration Screen



The screen shown in Figure 2-22 above provides the capability to define parameters for display beyond those defined in 'Basic Configuration'. Configuration fields for Parameters 2, 3, and 4 are provided but not shown in the image.

Note
The LCD display can be configured to display a mix of basic and advanced parameters.

2.9.5 Mode

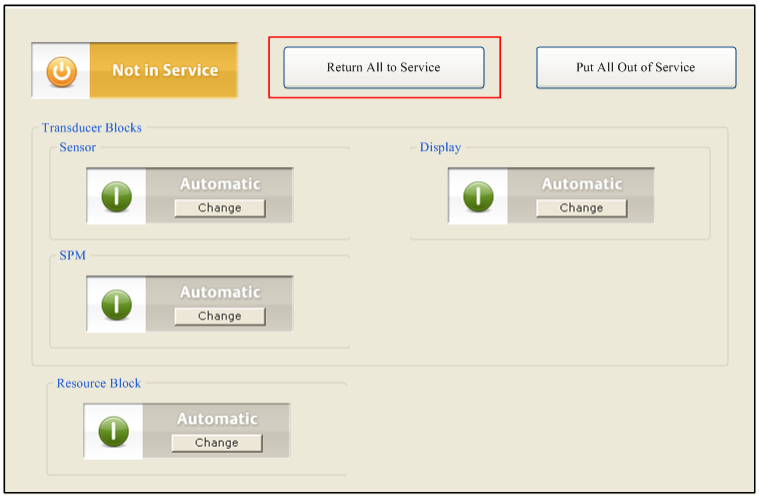
Note
Each block has modes. For block oriented user interfaces modes must be managed individually in each block.

Menu navigation: *Configure>Manual Setup>Classic View>Mode Summary*

FOUNDATION Fieldbus blocks have modes. Modes propagate, so if a block is in out-of-service mode, for example, other blocks linked to it may not function as anticipated. The Rosemount 3051 DD's and DTM's have automated procedures that manage transducer, resource, and analog input block modes, placing them out of service to allow configuration, then returning them to auto mode when the configuration task is completed or canceled. If tasks are done using manual procedures, the user is responsible for managing modes.

The Mode Summary function displays the active mode for all resource and transducer blocks, and allows the user to change modes of those blocks individually, or collectively. This is most frequently used to return all to service. Analog input modes are managed from the analog input block configuration screens, or from the control host.

Figure 2-23. Mode Summary Screen



The screen shown in Figure 2-23 above shows the modes of all resource and transducer blocks, and provides a mechanism to individually or collectively take blocks out of service and return them to automatic mode.

2.9.6 Alert configuration NE107 and Plantweb

The objective of alerts is to inform users of conditions of interest, and guide the user to effective corrective actions. The Rosemount 3051 Revision 8 Pressure Transmitter with FOUNDATION Fieldbus Communications provides alerts in both NE107 and Plantweb Alerts format. The detailed diagnostics performed and the consolidated status which is annunciated are the same for both NE107 and Plantweb Alerts.

Note
Alerts are located in the Resource block. For block oriented user interfaces, configure NE107 and Plantweb alerts, alert suppression, and alert simulation in the Resource Block.

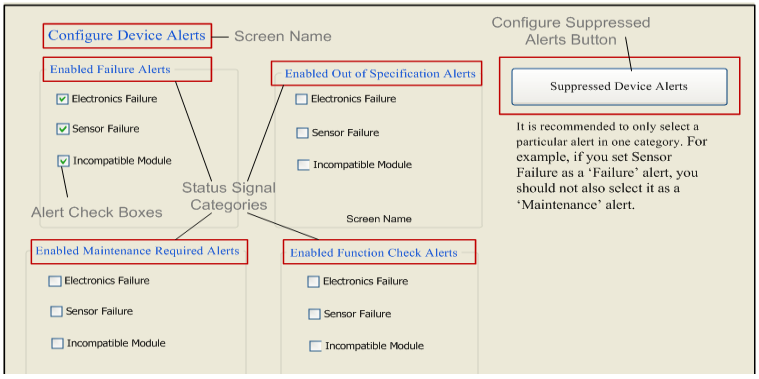
Menu navigation: *Configure>Alert Setup>Device Alerts* OR *Process Alerts* OR *Diagnostic Alerts*

Note
Device Alerts, Process Alerts, and Diagnostic Alerts are configured the same way. One example will be shown.

NE107 Alerts category configuration

NE107 alerts are divided into Device Alerts, Process Alerts, or Diagnostics Alerts. Each alert type has a dedicated configuration screen, and a dedicated Suppress Alerts screen. The configure device alerts screen is used here. See "Alerts/alarms" on page 19 for more information on the conditions of each. The alerts are categorized as Failure alerts, Out of Specification alerts, Maintenance - Required alerts, and Function Check alerts. Each category contains the same list of Device Alerts and check boxes. Alerts are assigned to a category by checking the check box next to the alert. This activates the alert in that category. Alerts can be assigned to more than a single category by checking the same alert check box in multiple categories. This is not recommended as alarms can proliferate increasing the complexity of alarm management and delaying corrective action. Use of the factory default alert categories is recommended.

Figure 2-24. Configure Device Alerts Screen



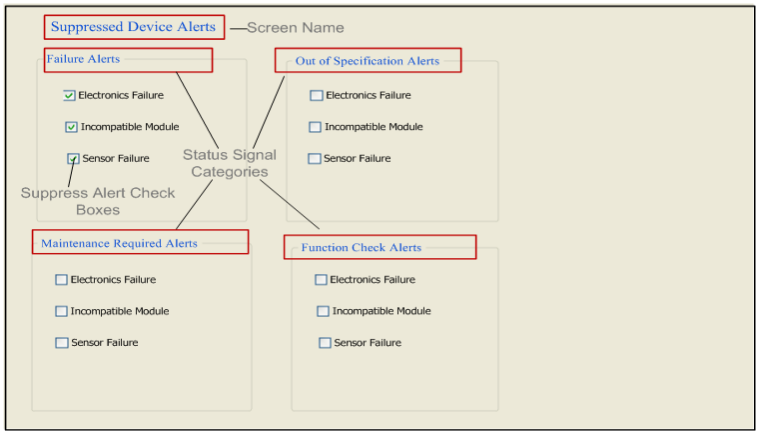
The screen shown in Figure 2-24 is where the alerts are assigned by checking the box next to the desired alert in the desired category.

Alerts suppression

Menu Navigation: *Configure>Alert Setup>Device Alerts* OR *Process Alerts* OR *Diagnostic Alerts>*

Once alerts have been configured they can be suppressed. To suppress alerts click on the **Suppressed Device Alerts** button on the *Configuration* screen. Alerts can be suppressed by checking the check box next to the alert. To stop suppressing an alert, click the checked box suppressing the alert.

Figure 2-25. Suppressed Device Alerts Screen



The screen shown in Figure 2-25 is where alerts are suppressed by checking the box next to the alert to be suppressed.

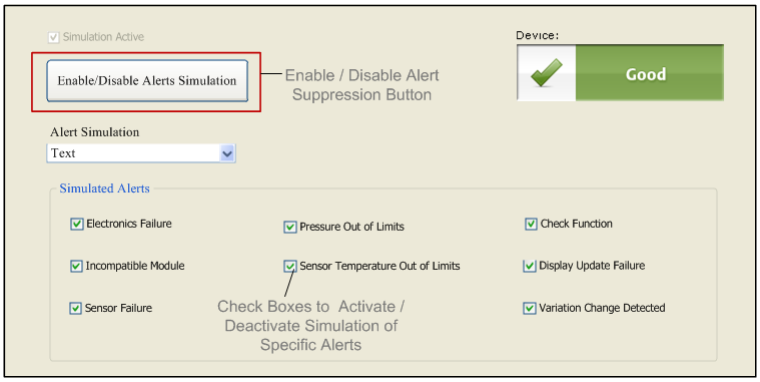
2.9.7 Alert simulation

Alert simulation provides the capability to simulate configured NE107 or Plantweb alerts. NE107 Alerts and Plantweb Alerts show the same consolidated status derived from the same diagnostics so the single Alert Simulation is used for both. Alert Simulation is typically used for training or to verify alert configuration.

Menu navigation: *Service Tools>Simulate*

To enable alert simulation click the **Enable/Disable Alerts Simulation** button. When simulate is active it will display on the screen. Once Alerts Simulation is active individual alerts can be simulated by checking the check box next to the desired alert condition. The device status indication located on the upper right corner of the screen will change to show the device status associated with the simulated alert. The simulated status will be displayed everywhere device status is displayed. Alert Simulation is Enabled and Disabled using an automated procedure called a 'Method'.

Figure 2-26. Enable/Disable Alert Simulation Screen



The screen shown in Figure 2-26 above enables/disables overall alert simulation capability and allows individual alerts to be selected for simulation.

The sequence of steps to enable alert simulation is:

1. A screen displays stating 'Alert Simulation is disabled.'
2. The screen presents the question 'Do you want to enable alerts simulation? Below this sentence are two radio buttons labeled 'Yes' and 'No'. Click the **Yes** radio button.

The sequence of steps to Disable Alert Simulation is:

1. A screen is displayed stating 'Alert Simulation is enabled.'
2. The screen presents the question 'Do you want to disable alerts simulation? Below this sentence are two radio buttons labeled 'Yes' and 'No'. Click on the **Yes** radio button.

2.9.8 Statistical Process Monitoring (SPM)

Note
SPM setup is performed in the SPM transducer block. For block oriented user interfaces, perform SPM configuration in the SPM transducer block.

Menu navigation: *Configure>Guided Setup>Basic SPM Setup*

SPM configuration provides the capability to configure SPM for use in plugged line detection, or other abnormal process conditions. See section 7 for more information on SPM functions and uses.

Note
SPM is a factory only option, option code D01, and can't be licensed/installed in the field.

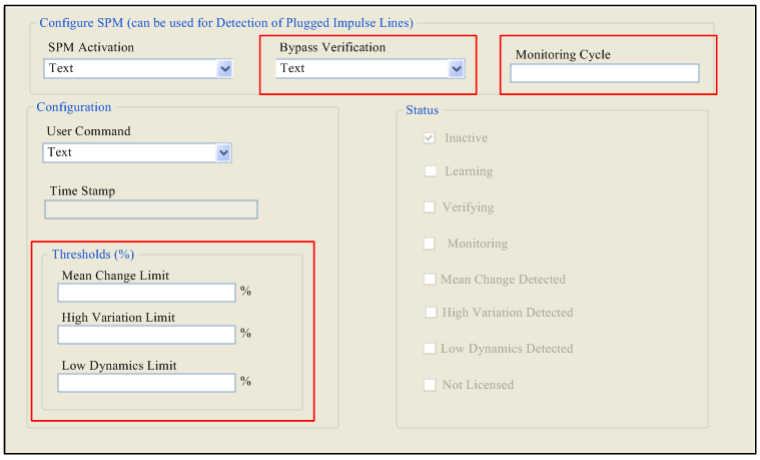
An automated task procedure called a 'Method' will guide the user through SPM setup. The basic sequence of steps is:

1. Enter the monitoring cycle. The minimum monitoring time is one minute; three minutes is a typical monitoring cycle.
2. Bypass Verification, Yes or No. Verification is recommended for applications where SPM monitoring has not been done previously, or where process changes may cause significant changes in mean or standard deviation.
3. Enter the thresholds in percent.
   a. The first threshold is the Mean Change that will trigger an alert.
   b. The second threshold is the High Variation Limit that will trigger an alert. Typical values are from 40–80 percent.
   c. The third threshold is the Low Dynamics Limit that will trigger an alert.
   d. Filtering is selected or disabled.

Note
To enable or disable monitoring or make configuration changes the manual SPM Configuration screen may be preferred.

Menu navigation: *Configure>Manual Setup>Basic SPM*

Figure 2-27. Configure SPM Display Screen



The screen shown in Figure 2-27 above allows full SPM configuration, configuration edits, enabling and disabling monitoring, and provides in indication of the status of the monitored variable.

2.9.9 Write lock

Note
Write lock functions are performed in the Resource Block. For block oriented user interfaces, perform write lock management in the Resource Block.

Menu navigation: *Overview>Device Information>Security and Simulation*

An automated task procedure called a “Method” will guide the user through Write Lock setup. Write lock permits users to configure, enable, and disable the various write lock options. Write lock can be implemented as a hardware lock or a software lock. If it is implemented as a hardware lock the position of the hardware lock switch on the Rosemount 3051 electronics board will determine if device writes are permitted. Hardware write lock is typically used to prevent writes from a remote location. Software write lock is used to prevent local or remote writes unless the write lock is disabled.

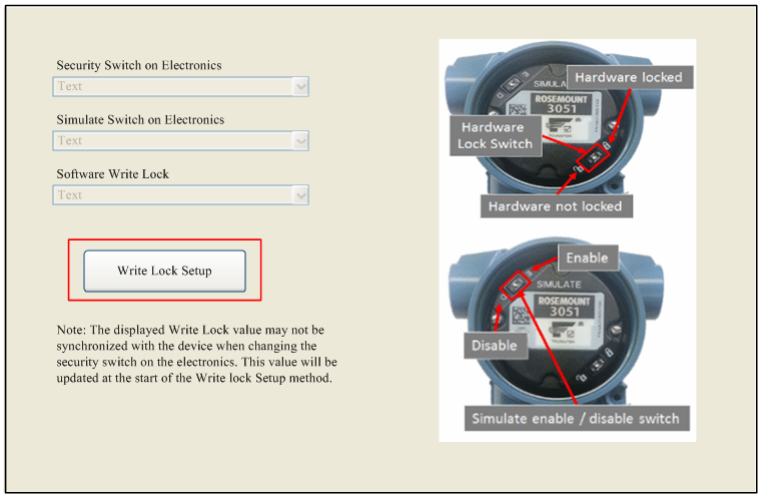
When the write lock procedure is initiated, it first informs the user if write lock is currently enabled, and if it is configured as hardware or software write lock.

If Hardware write lock is enabled the physical switch on the electronics board must be set in the unlocked position to enable changes, including changes to write lock, to be permitted.

If software write lock is enabled follow the on-screen instructions to enable changes.

The selection of the hardware or software write lock is done by clicking on the radio button next to the desired option.

Figure 2-28. Security and Simulation Display Screen



The screen shown in Figure 2-28 above allows users to see if the device has simulation active, to see if any form of write lock is active, and to configure hardware and software write lock.

Section 3 Hardware Installation

3.1 Overview

The information in this section covers installation considerations for the Rosemount™ 3051 with FOUNDATION™ Fieldbus protocols. A Quick Start Guide is shipped with every transmitter to describe recommended pipe-fitting and wiring procedures for initial installation. Dimensional drawings for each Rosemount 3051 variation and mounting configuration are included on page 50.

Note
For transmitter disassembly and reassembly refer to "Disassembly procedures" on page 82, and "Reassembly procedures" on page 84.

3.2 Safety messages

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operation. Information that raises potential safety issues is indicated 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 manual for any restrictions associated with a safe installation.

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

Process leaks may cause harm or result in death.

Install and tighten process connectors before applying pressure.

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.

⚠WARNING

Process leaks could result in death or serious injury.

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

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

- Use only bolts supplied or sold by Emerson as spare parts. Improper assembly of manifolds to traditional flange can damage sensor module.
- For safe assembly of manifold to traditional flange, bolts must break back plane of flange web (i.e., bolt hole) but must not contact sensor module housing.

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 housing conduit opening with a minimum of five threads of engagement to comply with explosion-proof requirements. For tapered threads, install the plug wrench tight.

For material compatibility considerations, refer to 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. Refer to Figure 3-10 on page 54 for correct mounting orientation.

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 3-10 on page 54, 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.

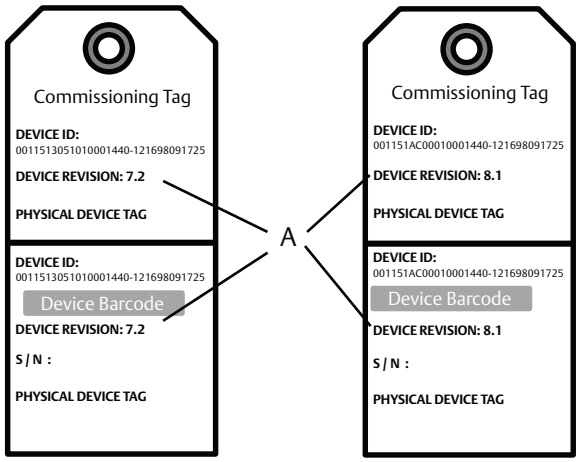
3.4 Tagging

3.4.1 Commissioning tag

The Rosemount 3051 has been supplied with a removable commissioning tag that contains both the Device ID (the unique code that identifies a particular device in the absence of a device tag) and a space to record the device tag (PD_TAG) (the operational identification for the device as defined by the Piping and Instrumentation Diagram [P&ID]).

When commissioning more than one device on a fieldbus segment, it can be difficult to identify which device is at a particular location. The removable tag, provided with the transmitter, can aid in this process by linking the Device ID to its physical location. The installer should note the physical location of the transmitter on both the upper and lower location of the commissioning tag. The bottom portion should be torn off for each device on the segment and used for commissioning the segment in the control system.

Figure 3-1. Commissioning Tag



A. Device revision

3.4.2 Transmitter tag

If permanent tag is ordered:

- Transmitter is tagged in accordance with customer requirements
- Tag is permanently attached to the transmitter

Software (PD_TAG)

- If permanent tag is ordered, the PD Tag contains the permanent tag information up to 32 characters
- If permanent tag is NOT ordered, the PD Tag contains the transmitter serial number

3.5 Installation procedures

3.5.1 Mount the transmitter

For dimensional drawing information refer to Appendix A: Specifications and Reference Data.

Process flange orientation

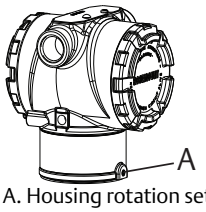
Mount the process flanges with sufficient clearance for process connections. For safety reasons, place the drain/vent valves so the process fluid is directed away from possible human contact when the vents are used. In addition, consider the need for a testing or calibration input.

Note
Most transmitters are calibrated in the horizontal position. Mounting the transmitter in any other position will shift the zero point to the equivalent amount of liquid head pressure caused by the varied mounting position. To reset zero point, refer to "Sensor trim overview" on page 76.

Housing rotation

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

Figure 3-2. Housing Rotation



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

1. Loosen the housing rotation set screw using a $^{5}/_{64}$-in. hex wrench.
2. Rotate the housing clockwise to the desired location.
3. If the desired location cannot be achieved due to thread limit, rotate the housing counterclockwise to the desired location (up to 360° from thread limit).
4. Re-tighten the housing rotation set screw to a maximum of 7 in-lb when desired location is reached.

Electronics housing clearance

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. Three inches of clearance is required for cover removal if a meter is installed.

Environmental seal for housing

Ensure full contact with Terminal Block screw and washer. When using a direct wiring method, wrap wire clockwise to ensure it is in place when tightening the terminal block screw.

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

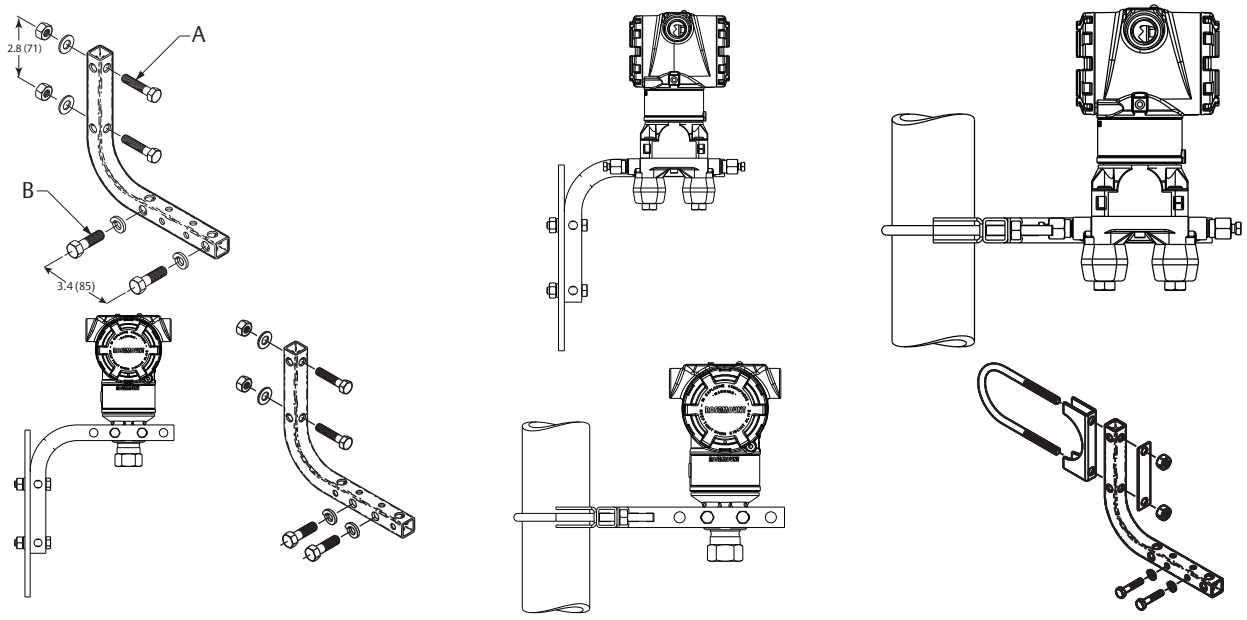
Mounting brackets

Rosemount 3051 Transmitter s may be panel-mounted or pipe-mounted via an optional mounting bracket. Refer to Table 3-1 for the complete offering and see Figure 3-3 through Figure 3-6 on pages 49 and 50 for dimensional and mounting configuration information.

Table 3-1. Mounting Brackets

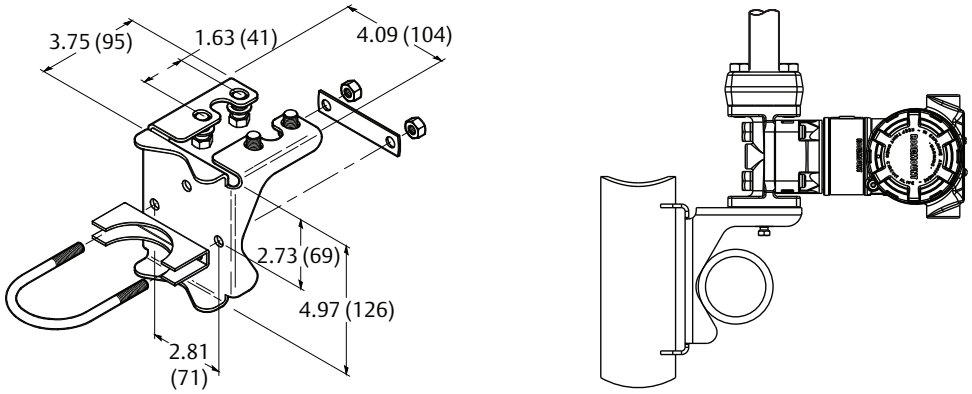
Option code	Process connections			Mounting			Materials			
	Coplanar	In-Line	Traditional	Pipe mount	Panel mount	Flat panel mount	CS bracket	SST bracket	CS bolts	SST bolts
B4	X	X	N/A	X	X	X	N/A	X	N/A	X
B1	N/A	N/A	X	X	N/A	N/A	X	N/A	X	N/A
B2	N/A	N/A	X	N/A	X	N/A	X	N/A	X	N/A
B3	N/A	N/A	X	N/A	N/A	X	X	N/A	X	N/A
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 3-3. Mounting Bracket Option Code B4



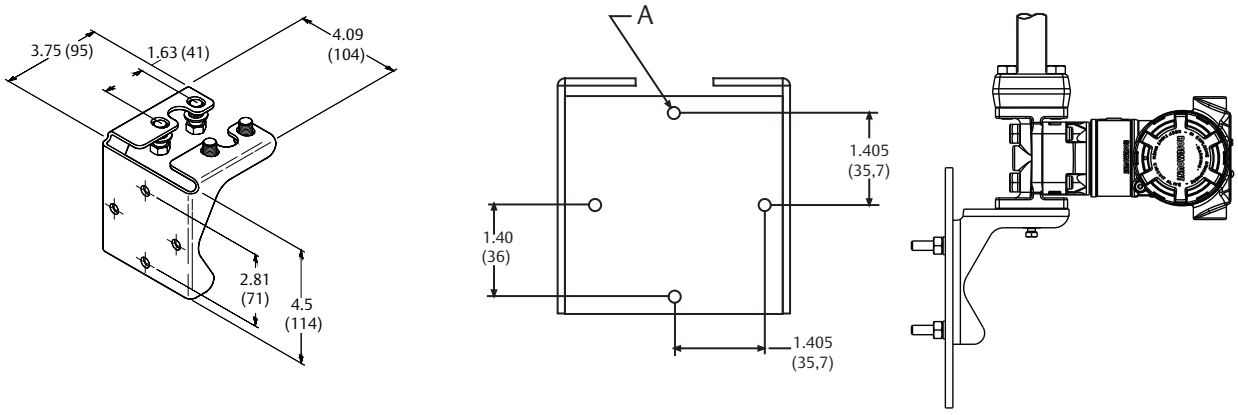
A. $^{5}/_{16} \times 1^{1}/_{2}$-in. bolts for panel mounting (not supplied)
B. $^{3}/_{8}$-16 $\times 1^{1}/_{4}$-in. bolts for mounting to transmitter
Dimensions are in inches (millimeters).

Figure 3-4. Mounting Bracket Option Codes B1, B7, and BA



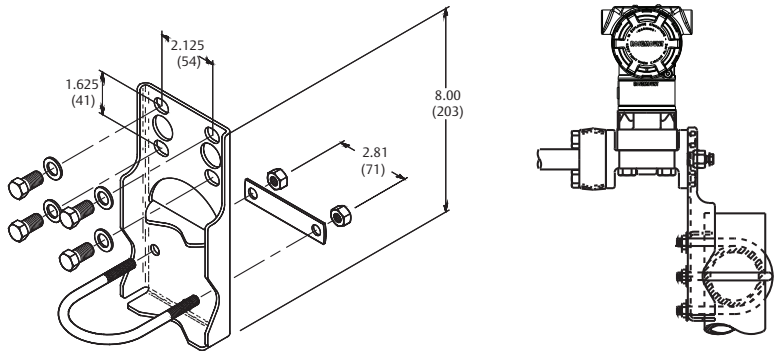
Dimensions are in inches (millimeters).

Figure 3-5. Panel Mounting Bracket Option Codes B2 and B8



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

Figure 3-6. Flat Mounting Bracket Option Codes B3 and BC



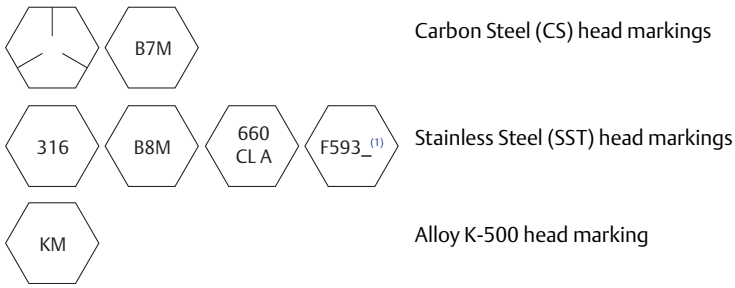
Dimensions are in inches (millimeters).

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.

Flange bolts

The Rosemount 3051 can be shipped with a coplanar flange or a traditional flange installed with four 1.75-in. flange bolts. Mounting bolts and bolting configurations for the coplanar and traditional flanges can be found on page 52. Stainless steel bolts supplied by Emerson are coated with a lubricant to ease installation. Carbon steel bolts do not require lubrication. No additional lubricant should be applied when installing either type of bolt. Bolts supplied by Emerson are identified by their head markings.

Figure 3-7. Head Markings



Carbon Steel (CS) head markings

Stainless Steel (SST) head markings

Alloy K-500 head marking

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

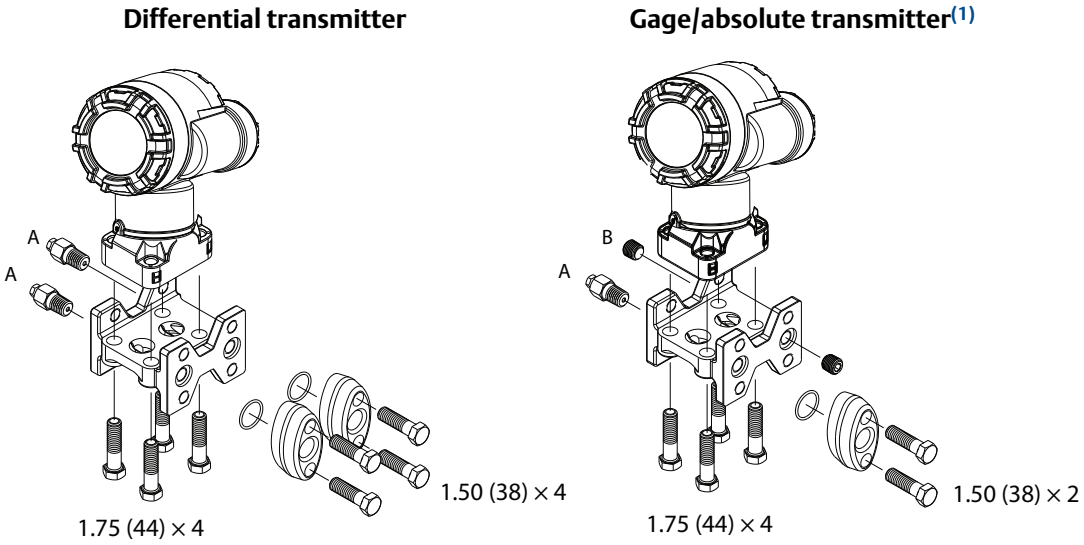
Bolt installation

⚠ Only use bolts supplied with the Rosemount 3051 or sold by Emerson as parts for the Rosemount 3051 Transmitter. The use of non approved bolts could reduce pressure. Use the following bolt installation procedure:

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)
Austemitic 316 SST—Option L4	150 in-lb (17 N-m)	300 in-lb (34 N-m)
ASTM A193 Grade B7M—Option L5	300 in-lb (34 N-m)	650 in-lb (73 N-m)
Alloy K-500—Option L6	300 in-lb (34 N-m)	650 in-lb (73 N-m)

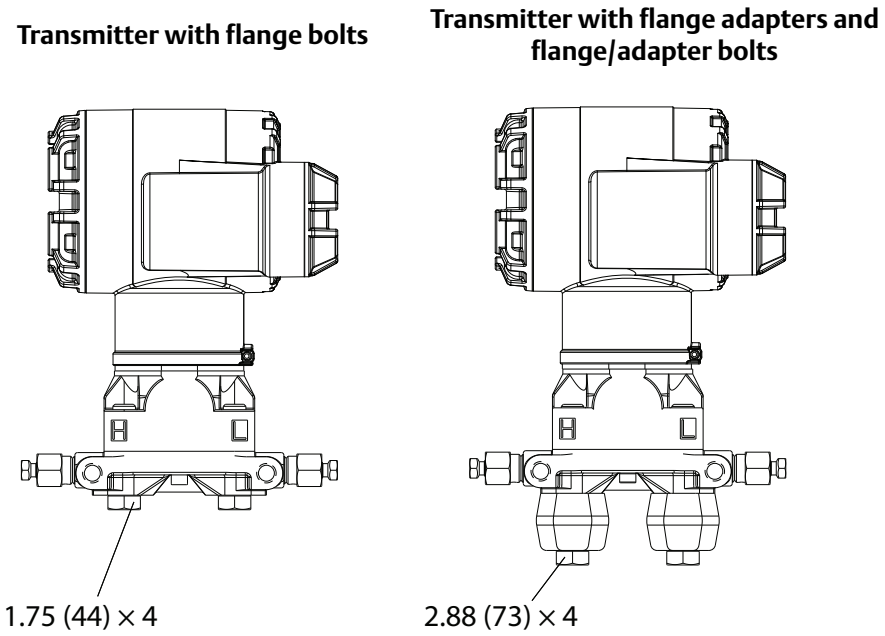
Figure 3-8. Traditional Flange Bolt Configurations



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

1. For Gage and absolute transmitters: 150 (38) × 2

Figure 3-9. Mounting Bolts and Bolt Configurations for Coplanar Flange



Dimensions are in inches (millimeters).

Description	Qty	Size (in. [mm])
Differential pressure		
Flange bolts	4	1.75 (44)
Flange/adapter bolts	4	2.88 (73)
Gage/absolute pressure (1)		
Flange bolts	4	1.75 (44)
Flange/adapter bolts	2	2.88 (73)

1. Rosemount 3051T Transmitters are direct mount and do not require bolts for process connection.

3.5.2 Impulse piping

Mounting requirements

Impulse piping configurations depend on specific measurement conditions. Refer to Figure 3-10 on page 54 for examples of the following mounting configurations:

Liquid measurement

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

Gas measurement

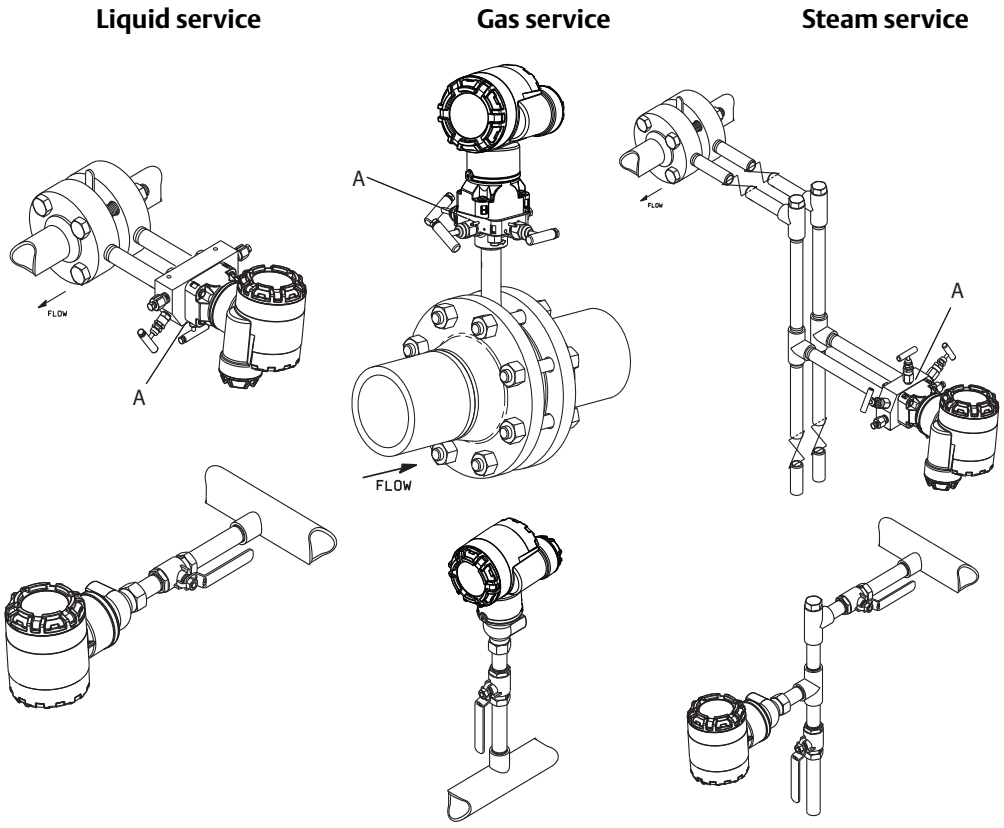
- Place taps in the top or side of the line.
- Mount the transmitter beside or above the taps so liquid will drain into the process line.

Steam measurement

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

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

Figure 3-10. Installation Examples



A. Drain/vent valves

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.

3.5.3 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 3051DP 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 148 for the distance between pressure connections. This distance may be varied ±1/4-in. (6.4 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 51 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 6: Troubleshooting.

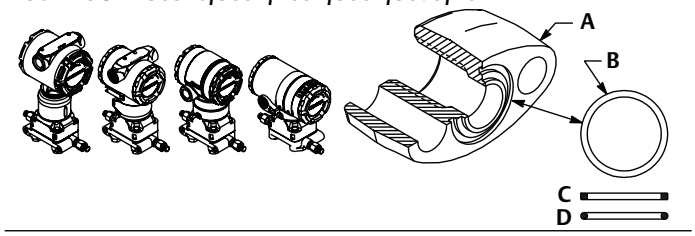
O-rings

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

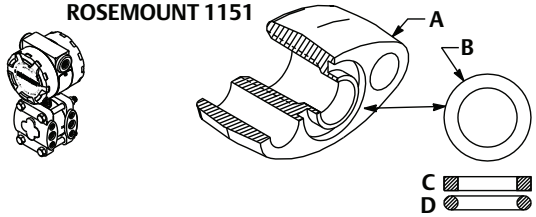
⚠WARNING

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 that is designed for its specific flange adapter, as shown below.

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



ROSEMOUNT 1151



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

⚠ 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.

3.5.4 Inline process connection

Inline gage transmitter orientation

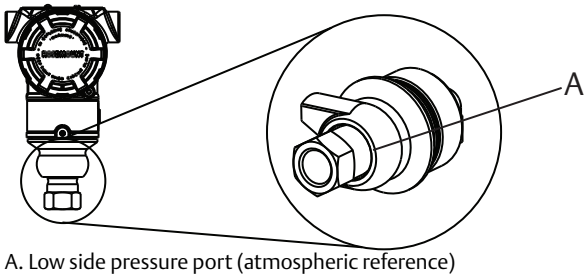
⚠CAUTION

Interfering or blocking the atmospheric reference port will cause the transmitter to output erroneous pressure values.

The low side pressure port on the inline 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 3-11).

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.

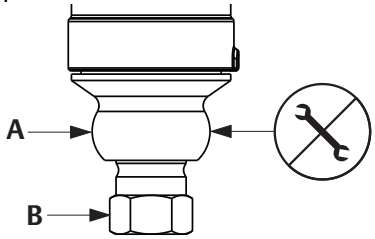
Figure 3-11. Inline Gage Low Side Pressure Port



A. Low side pressure port (atmospheric reference)

⚠WARNING

Do not apply torque directly to the sensor module. Rotation between the sensor module and the process connection can damage the electronics. To avoid damage, apply torque only to the hex-shaped process connection.

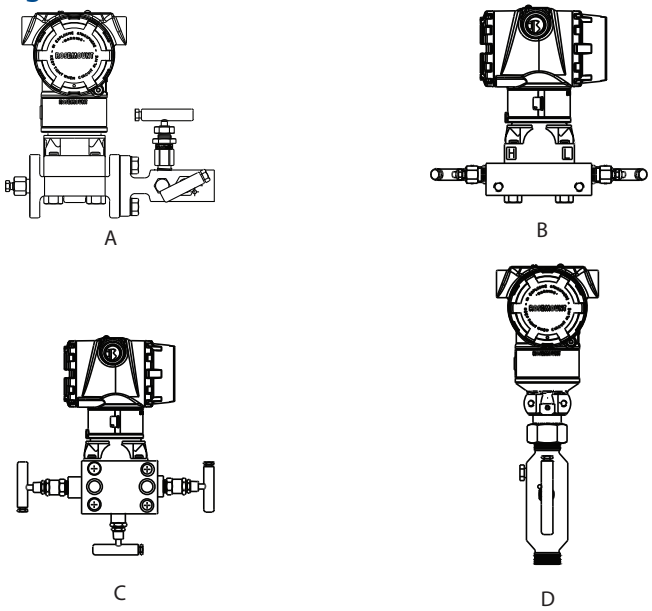


A. Sensor module
B. Process connection

3.6 Rosemount 305, 306, and 304 Manifolds

The Rosemount 305 Integral Manifold mounts directly to the transmitter and is available in two styles: 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 3051T In-Line Transmitters to provide block-and-bleed valve capabilities of up to 10000 psi (690 bar).

Figure 3-12. Manifolds



A. Rosemount 3051C and 304 Conventional
B. Rosemount 3051C and 305 Integral Coplanar
C. Rosemount 3051C and 305 Integral Traditional
D. Rosemount 3051T and 306 In-Line

The Rosemount 304 Conventional Manifold combines a traditional flange and manifold that can be mounted to most primary elements.

3.6.1 Rosemount 305 Integral Manifold installation procedure

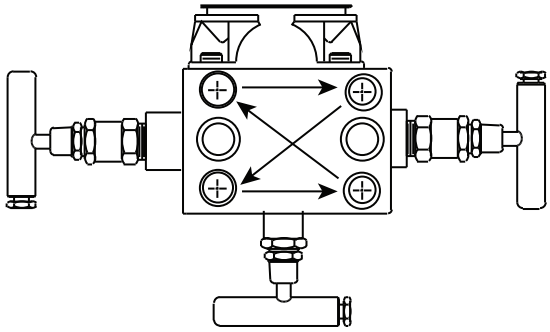
To install a Rosemount 305 Integral Manifold to a Rosemount 3051 Transmitter:

⚠ 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 transmitters.

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

2. Install the integral manifold on the sensor module. Use the four 2.25-in. manifold bolts for alignment. Finger tighten the bolts, then tighten the bolts incrementally in a cross pattern as seen in Figure 3-13 to final torque value. See "Flange bolts" on page 51 for complete bolt installation information and torque values. When fully tightened, the bolts should extend through the top of the sensor module housing.

Figure 3-13. Bolt Tightening Pattern



3. If 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.

3.6.2 Rosemount 306 Integral Manifold installation procedure

The Rosemount 306 Manifold is for use only with a Rosemount 3051T In-Line Transmitter.

⚠ Assemble the Rosemount 306 Manifold to the Rosemount 3051T In-Line Transmitter with a thread sealant.

3.6.3 Rosemount 304 Conventional Manifold installation procedure

To install a Rosemount 304 Conventional Manifold to a Rosemount 3051 Transmitter:

⚠ See "Safety messages" on page 45 for complete warning information.

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 51 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.

3.6.4 Manifold operation

⚠ WARNING

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

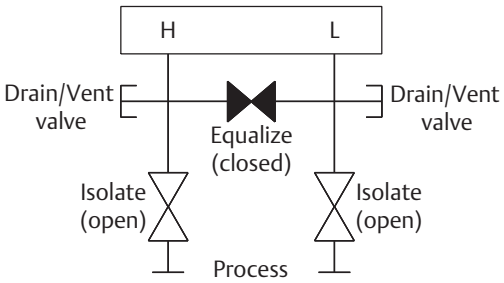
Always perform a zero trim on the transmitter/manifold assembly after installation to eliminate any shift due to mounting effects. See "Sensor trim overview" on page 76.

Coplanar transmitters

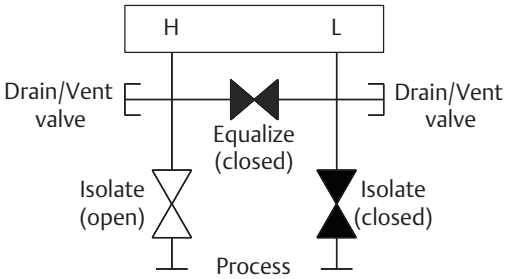
3-valve and 5-valve manifolds

Performing zero trim at static line pressure

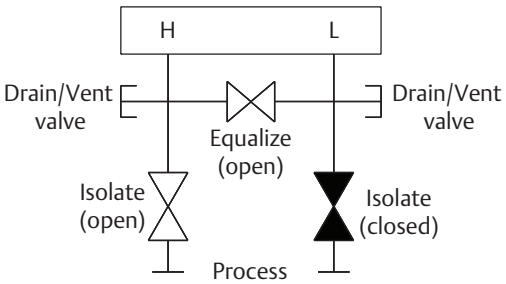
In normal operation the two isolate (block) valves between the process ports and transmitter will be open and the equalize valve will be closed.



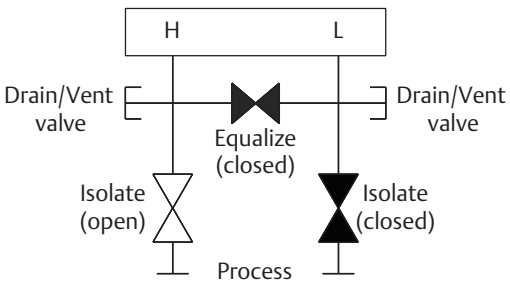
1. To zero trim the transmitter, close the isolate valve on the low side (downstream) side of the transmitter.



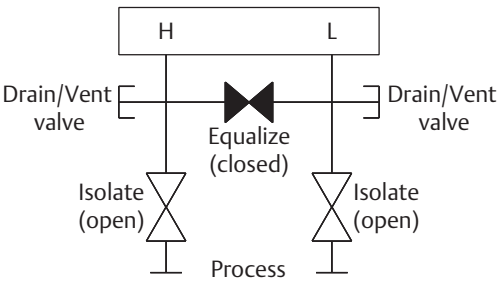
2. Open the equalize valve to equalize the pressure on both sides of the transmitter. The manifold is now in the proper configuration for performing a zero trim on the transmitter.



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.

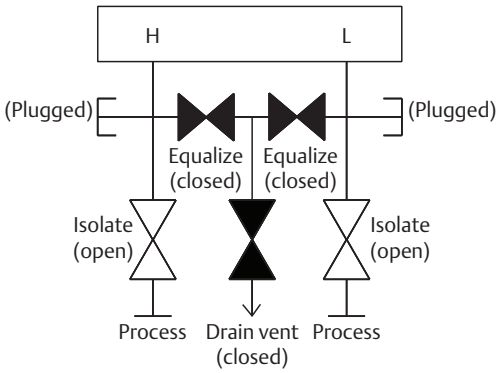


5-valve natural gas manifold

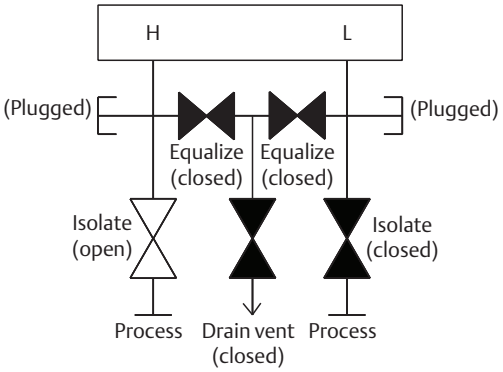
Performing zero trim at static line pressure

5-valve natural gas configurations shown:

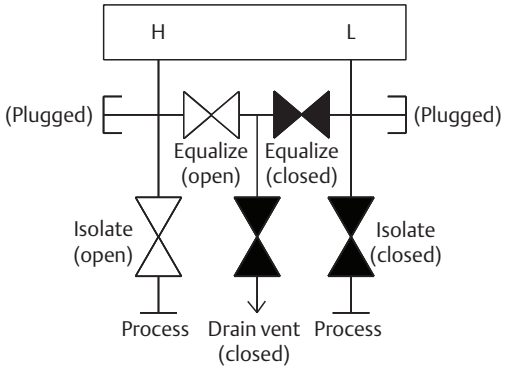
In normal operation, the two isolate (block) valves between the process ports and transmitter will be open, and the equalize valves will be closed. Vent valves may be opened or closed.



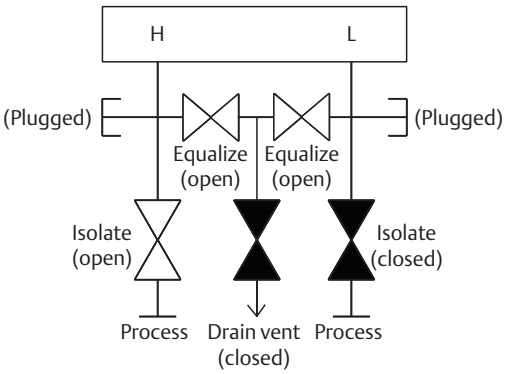
1. To zero trim the transmitter, first close the isolate valve on the low pressure (downstream) side of the transmitter and the vent valve.



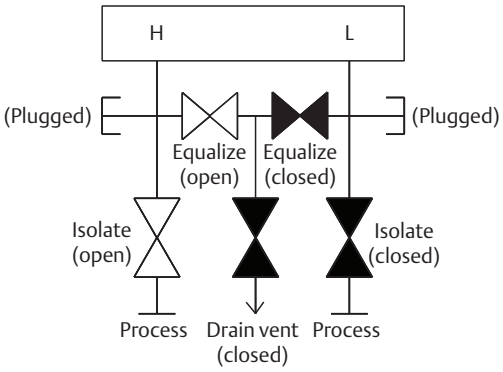
2. Open the equalize valve on the high pressure (upstream) side of the transmitter.



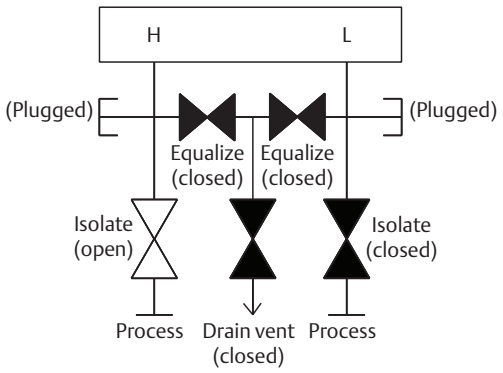
3. Open the equalize valve on the low pressure (downstream) side of the transmitter. The manifold is now in the proper configuration for performing a zero trim on the transmitter.



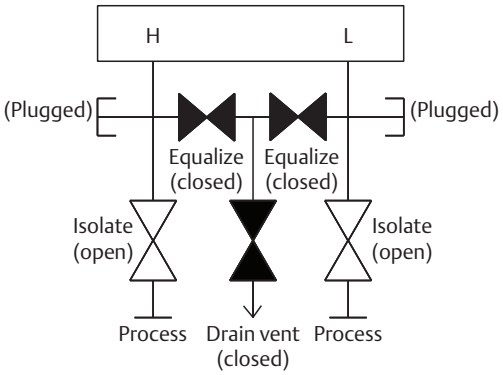
4. After performing a zero trim on the transmitter, close the equalize valve on the low pressure (downstream) side of the transmitter.



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.

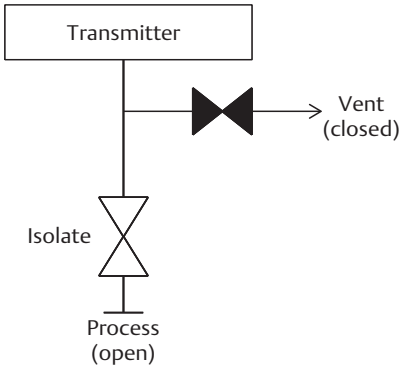


In-line transmitters

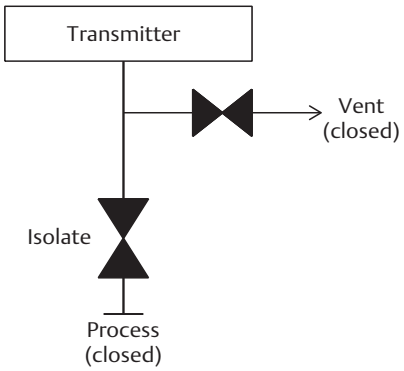
2-valve and block and bleed style manifolds

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.

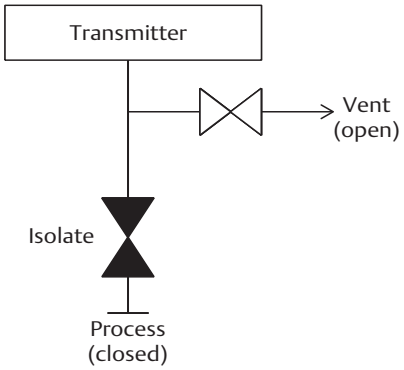


1. To isolate the transmitter, close the isolate valve.

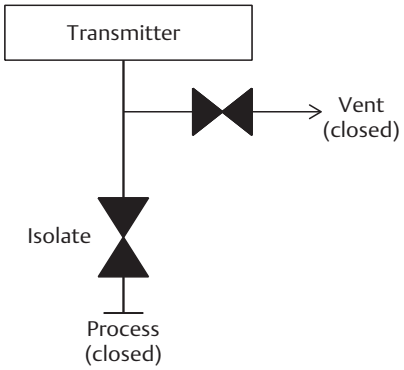


2. To bring the transmitter to atmospheric pressure, open the vent valve or bleed screw.

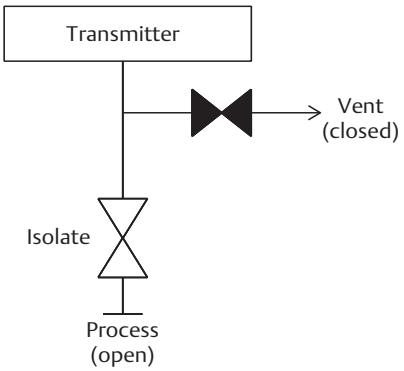
Note
A 1/4-in. male NPT pipe plug may be installed in the test/vent port and will need to be removed with a wrench in order to vent the manifold properly.
⚠ Always use caution when venting directly to atmosphere.



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

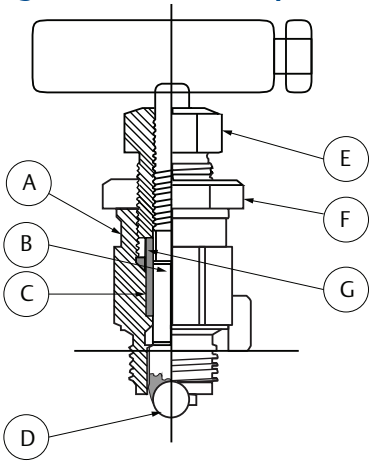
Over time, the packing material inside a Rosemount manifold may require adjustment in order to continue to provide proper pressure retention. Not all Rosemount manifolds have this adjustment capability. The Rosemount manifold model number will indicate what type of stem seal or packing material has been 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 3-14. Valve Components



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

Section 4 Electrical Installation

4.1 Overview

The information in this section covers installation considerations for the Rosemount™ 3051. A Quick Start Guide is shipped with every transmitter to describe pipe-fitting, wiring procedures and basic configuration for initial installation.

Note
For transmitter disassembly and reassembly refer to sections "Disassembly procedures" on page 82, and "Reassembly procedures" on page 84.

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 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.

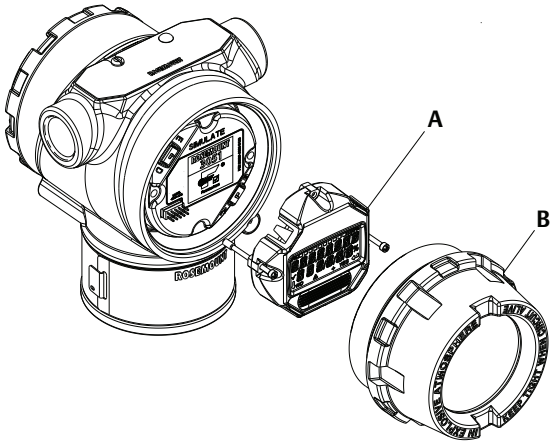
Electrical shock can result in death or serious injury.

- 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 3051 Transmitter requires a small instrument screwdriver. Carefully align the desired display connector with the electronics board connector. If connectors don't align, the display and electronics board are not compatible.

Figure 4-1. LCD Display Assembly



A. LCD display
B. Cover

4.3.1 Rotating LCD display

⚠ 1. Secure the loop to manual control and remove power to transmitter.

2. Remove transmitter housing cover.

3. Remove screws from the LCD display and rotate to desired orientation.
   a. Insert 10 pin connector into the display board for the correct orientation. Carefully align pins for insertion into the output board.

4. Re-insert screws.

⚠ 5. Reattach transmitter housing cover; it is recommended the cover be tightened until there is no gap between the cover and housing to comply with explosion proof requirements.

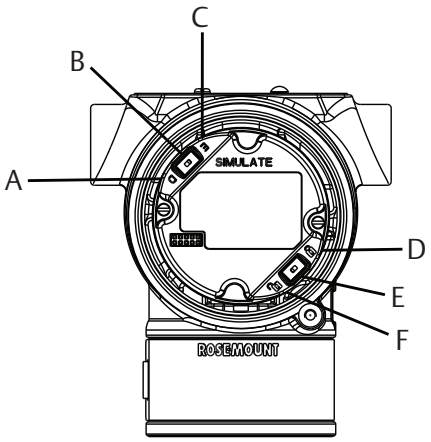
6. Re-attach power and return loop to automatic control.

4.4 Configuring transmitter security and simulation

There are two security methods with the Rosemount 3051 Transmitter use of the security switch and software configured security using (see "Enable software write lock" on page 29). Use of the security switch is described below.

- Security switch

Figure 4-2. Simulate and Security Switches



A. Simulate disabled position
B. Simulate switch
C. Simulate enabled position (default)
D. Security locked position
E. Security switch
F. Security unlocked position (default)

4.4.1 Setting security switch

Set Simulate and Security switch configuration before installation as shown in Figure 4-2.

- The simulate switch enables or disables simulated alerts and simulated AI Block status and values. The default simulate switch position is enabled.
- The Security switch allows (unlocked symbol) or prevents (locked symbol) any configuration of the transmitter.
  - Default security is off (unlocked symbol).
  - The security switch can be enabled or disabled in software.

Use the following procedure to change the switch configuration:

⚠ 1. If the transmitter is installed, secure the loop, and remove power.

2. Remove the housing cover opposite the field terminal side. Do not remove the instrument cover in explosive atmospheres when the circuit is live.

3. Slide the security and simulate switches into the preferred position.

⚠ 4. Reattach transmitter housing cover; it is recommended the cover be tightened until there is no gap between the cover and housing to comply with explosion proof requirements.

4.4.2 Setting simulate switch

The simulate switch is located on the electronics. It is used in conjunction with the transmitter simulate software to simulate process variables and/or alerts and alarms. To simulate variables and/or alerts and alarms, the simulate switch must be moved to the enable position and the software enabled through the host. To disable simulation, the switch must be in the disable position or the software simulate parameter must be disabled through the host.

4.5 Electrical considerations

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

⚠CAUTION

Do not run signal wiring in conduit or open trays with power wiring or near heavy electrical equipment.

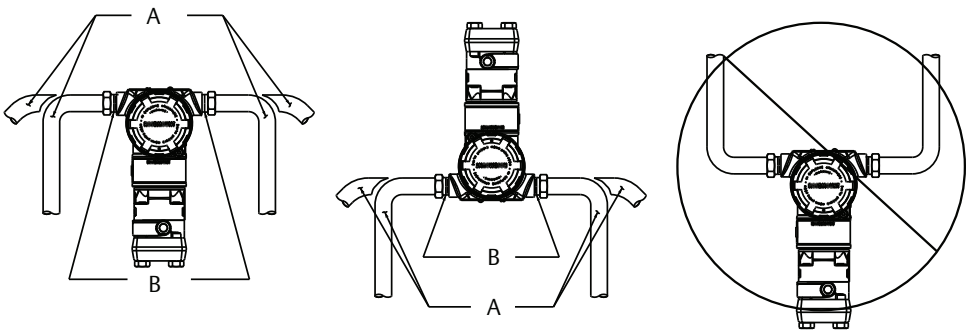
4.5.1 Conduit installation

⚠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 of the transmitter housing.

Recommended conduit connections are shown in Figure 4-3.

Figure 4-3. Conduit Installation Diagrams



A. Possible conduit line positions
B. Sealing compound

4.5.2 Power supply for FOUNDATION™ Fieldbus

Power supply

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

Power conditioner

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

4.6 Wiring

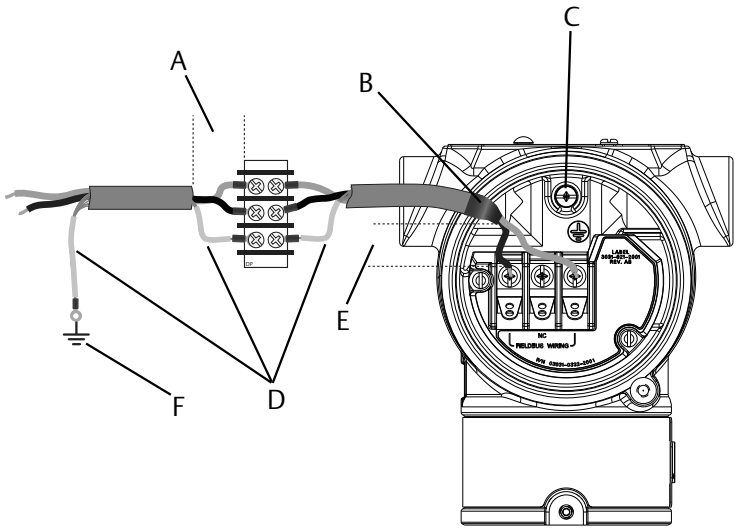
4.6.1 Transmitter wiring

Wiring and power supply requirements can be dependent upon the approval certification. As with all FOUNDATION Fieldbus requirements, a conditioned power supply and terminating resistors are required for proper operation. The standard Rosemount 3051 terminal block is shown in Figure 4-5. The terminals are not polarity sensitive. The transmitter requires 9–32 Vdc to operate. Type A FOUNDATION Fieldbus wiring 18 awg twisted shielded pair is recommended. Do not exceed 5000 ft (1500 m) total segment length.

Note
Avoid running instrument cable next to power cables in cable trays or near heavy electrical equipment.

It is important that the instrument cable shield be:
- trimmed close and insulated from touching the transmitter housing
- continuously connected throughout the segment
- connected to a good earth ground at the power supply end

Figure 4-4. Wiring Terminals



A. Minimize distance
B. Trim shield and insulate
C. Protective grounding terminal (do not ground cable shield at the transmitter)
D. Insulate shield
E. Minimize distance
F. Connect shield back to the power supply ground

Perform the following procedure to make wiring connections:

⚠ 1. Remove the housing cover on terminal compartment side. Do not remove the cover in explosive atmospheres when the circuit is live. Signal wiring supplies all power to the transmitter.

2. Connect the positive lead to the terminal marked (+) and the negative lead to the terminal marked (pwr/comm â€“). Avoid contact with leads and terminals. Do not connect powered signal wiring to the test terminals. Power could damage the test diode.

3. Ensure full contact with Terminal Block screw and washer. When using a direct wiring method, wrap wire clockwise to ensure it is in place when tightening the terminal block screw.

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

4. Plug and seal the unused conduit connection on the transmitter housing to avoid moisture accumulation in the terminal side. Install wiring with a drip loop. Arrange the drip loop so the bottom is lower than the conduit connections and the transmitter housing.

4.6.2 Grounding the transmitter

Signal cable shield grounding

Signal cable shield grounding is summarized in Figure 4-4 on page 69 and Figure 4-6 on page 71. The signal cable shield and unused shield drain wire must be trimmed and insulated, ensuring that the signal cable shield and drain wire do not come in contact with the transmitter case. See Figure 4-5 on page 71 and Figure 4-6 on page 71 for instructions on grounding the transmitter case. Follow the steps below to correctly ground the signal cable shield.

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.

1. Remove the field terminals housing cover.
2. Connect the wiring pair and ground as indicated in "Wiring" on page 69.
   a. Trim the cable shield as short as practical and insulate from touching the transmitter housing.

Note
Do NOT ground the cable shield at the transmitter; if the cable shield touches the transmitter housing, it can create ground loops and interfere with communications.

   b. Continuously connect the cable shields to the power supply ground.
   c. Connect the cable shields for the entire segment to a single good earth ground at the power supply.

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

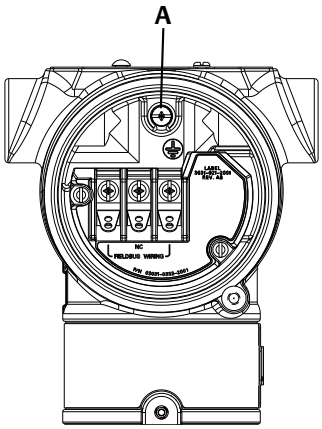
3. Replace the housing cover. It is recommended that the cover be tightened until there is no gap between the cover and the housing.
4. Plug and seal unused conduit connections.

Transmitter case grounding

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

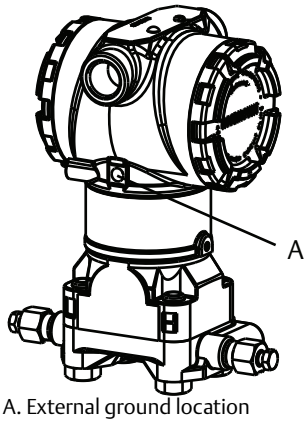
- Internal ground connection: The internal ground connection screw is inside the FIELD TERMINALS side of the electronics housing. This screw is identified by a ground symbol (⏚). The ground connection screw is standard on all Rosemount 3051 Transmitter s. Refer to Figure 4-5 on page 71.
- External ground connection: The external ground connection is located on the exterior of the transmitter housing. Refer to Figure 4-6 on page 71. This connection is only available with option V5 and T1.

Figure 4-5. Internal Ground Connection



A. Internal ground location

Figure 4-6. External Ground Connection (Option V5 or T1)



A. External ground location

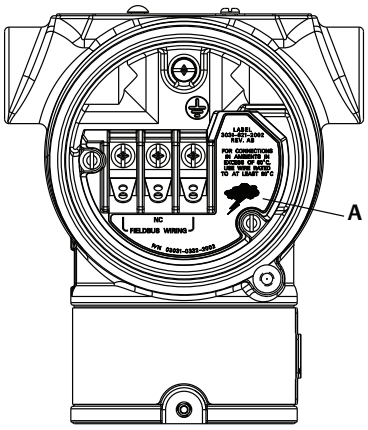
Note
Grounding the transmitter case via threaded conduit connection may not provide sufficient ground continuity.

Transient protection terminal block grounding

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

The transient protection terminal block can be ordered as an installed option (Option Code T1) or as a spare part to retrofit existing Rosemount 3051 Transmitter s in the field. See "Spare parts" on page 207 for part numbers. The lightning bolt symbol shown in Figure 4-7 on page 72 identifies the transient protection terminal block.

Figure 4-7. Transient Protection Terminal Block



A. Lightning bolt location

Note
The transient protection terminal block does not provide transient protection unless the transmitter case is properly grounded. Use the guidelines to ground the transmitter case. Refer to Figure 4-7.

Section 5 Operation and Maintenance

5.1 Overview

⚠ CAUTION

Absolute pressure transmitters (Rosemount™ 3051CA and 3051TA) are 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.

This section contains information on operation and maintenance procedures.

Field Communicator and AMS Device Manager instructions are given to perform configuration functions.

5.1.1 Methods and manual operation

Each FOUNDATION™ Fieldbus host or configuration tool has different ways of displaying and performing operations. Some hosts will use Device Descriptions (DD) and DD Methods to complete device configuration and will display data consistently across platforms. The DD can be found on Fieldbus Foundation's website at Feldbus.org. There is no requirement that a host or configuration tool support these features.

For DeltaV™ users, the DD can be found at Easydeltav.com. The information in this section will describe how to use methods in a general fashion.

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 manual for any restrictions associated with a safe installation.

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

Process leaks may cause harm or result in death.

- Install and tighten process connectors before applying pressure.

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.

Performing a 'Restart with defaults' will set all function block information in the device to factory defaults. This includes the clearing of all function block links and schedule, as well as defaulting all Resource and Transducer Block user data (SPM Block algorithm configurations, LCD display Transducer Block parameter configuration, etc.).

5.3 Calibration overview

⚠ CAUTION

The Rosemount 3051Transmitter is an accurate instrument that is fully calibrated in the factory. Field calibration is provided to the user to meet plant requirements or industry standards.

Sensor calibration allows the user to adjust the pressure (digital value) reported by the transmitter to be equal to a pressure standard. The sensor calibration can adjust the pressure offset to correct for mounting conditions or line pressure effects. This correction is recommended. The calibration of the pressure range (pressure span or gain correction) is not recommended for new instruments.

Calibrate the sensor

- Sensor Trim (page 77)
- Zero Trim (page 77)

5.3.1 Determining necessary sensor trims

Bench calibration is not recommended for new instruments. It is possible to degrade the performance of the transmitter if a trim is done improperly or with inaccurate equipment. The transmitter can be set back to factory settings using the Recall Factory Trim command shown in Figure 5-3 on page 79.

For transmitters that are field installed, the manifolds discussed in "Manifold operation" on page 59 allow the differential transmitter to be zeroed using the zero trim function. Both 3-valve and 5-valve manifolds are discussed. This field calibration will eliminate any pressure offsets caused by mounting effects (head effect of the oil fill) and static pressure effects of the process.

Determine the necessary trims with the following steps.

1. Apply pressure.
2. Check the pressure, if the pressure does not match the applied pressure, perform a sensor trim. See "Perform a calibration or sensor trim" on page 77.

5.3.2 Determining calibration frequency

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

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

Sample calculation for 3051 (0.04% accuracy & 5-year stability)

1. Determine the performance required for your application.

   Required Performance: 0.20% of span

2. Determine the operating conditions.

Transmitter:	3051CD, 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)

3. Calculate total probable error (TPE).

$$TPE = \sqrt{(ReferenceAccuracy)^2 + (TemperatureEffect)^2 + (StaticPressureEffect)^2} = 0.105\% \text{ of span}$$

   Where:

   Reference Accuracy = ± 0.04% of span

   Ambient Temperature Effect = $\left(\frac{(0.0125 \times URL)}{Span} + 0.0625\right)$% per 50 °F = ±0.0833% 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.

4. Calculate the stability per month.

$$Stability = \pm\left[\frac{(0.125 \times URL)}{Span}\right]\% \text{ of span for 5 years} = \pm 0.0021\% \text{ of URL for 1 month}$$

5. Calculate calibration frequency.

$$\text{Cal. Freq.} = \frac{(\text{Req. Performance} - TPE)}{\text{Stability per Month}} = \frac{(0.2\% - 0.105\%)}{0.0021\%} = 45 \text{ months}$$

5.3.3 Compensating for span line pressure effects (range 4 and 5)

Rosemount 3051 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 3051 Differential Pressure Transmitters (ranges 1 through 3) do not require this procedure because optimization occurs at the sensor.

The systematic span shift caused by the application of static line pressure is –0.95 percent of reading per 1000psi (69 bar) for range 4 transmitters, and –1% of reading per 1000 psi (69 bar) for range 5 transmitters. Using the following procedure, the span effect can be corrected to ±0.2 percent of reading per 1000 psi (69 bar) for line pressures from 0 to 3626 psi (0 to 250 bar).

Use the following example to compute correct input values.

Example

A range 4 differential pressure transmitter (Rosemount 3051CD4...) will be used in an application with a static line pressure of 1200 psi (83 bar). The DP measurement span is from 500 inH_20 (1, 2 bar) to 1500 inH_2O (3, 7 bar). To correct for systematic error caused by high static line pressure, first use the following formulas to determine the corrected values for the high trim value.

High trim value

HT = (URV – [S/100 × P/1000 × LRV])

Where:

- HT = Corrected high trim value
- URV = Upper range value
- S = Span shift per specification (as a percent of reading)
- P = Static Line Pressure in psi

In this example:

- URV = 1500 inH_2O (3.74 bar)
- S = –0.95%
- P = 1200 psi
- LT = 1500 – (–0.95%/100 × 1200 psi/1000 psi × 1500 inH_2O)
- LT = 1517.1 inH_2O

Complete the Upper Sensor Trim procedure as described in "Perform a calibration or sensor trim" on page 77. In the example above, at step 4, apply the nominal pressure value of 1500 inH_2O. However, enter the calculated correct upper sensor trim value of 1517.1 inH_2O with a Field Communicator.

5.4 Trim the pressure signal

5.4.1 Sensor trim overview

A sensor trim corrects the pressure offset and pressure range to match a pressure standard. The upper Sensor Trim corrects the pressure range and the lower sensor trim (zero trim) corrects the pressure offset. An accurate pressure standard is required for full calibration. A zero trim can be performed if the process is vented, or the high and low side pressure are equal (for differential pressure transmitters).

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

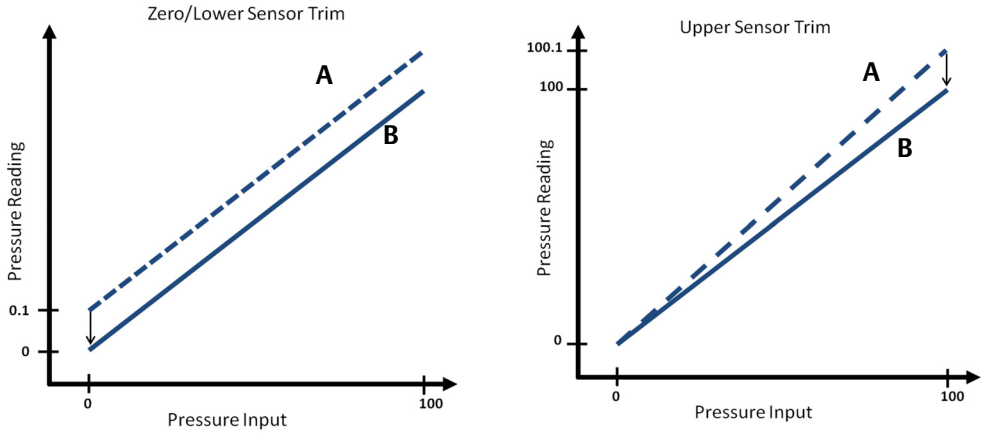
When performing a zero trim, ensure that the equalizing valve is open and all wet legs are filled to the correct levels. Line pressure should be applied to the transmitter during a zero trim to eliminate line pressure errors. Refer to "Manifold operation" on page 59.

Note
FOUNDATION Fieldbus has no analog signal that needs ranging. Therefore, ranging a new device prior to installation is usually not necessary or recommended.

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

Upper and lower sensor trim is a two-point sensor calibration where two end-point pressures are applied, all output is linearized between them, and requires an accurate pressure source. Always adjust the low trim value first to establish the correct offset. Adjustment of the high trim value provides a slope correction to the characterization curve based on the low trim value. The trim values help optimize performance over a specific measurement range.

Figure 5-1. Sensor Trim Example



A. Before trim
B. After trim

5.4.2 Perform a calibration or sensor trim

When performing a sensor trim, if both upper and lower trims are to be performed, the lower trim must be done prior to the upper 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 60 seconds before entering any values.

Performing a sensor trim

Note
Calibration and sensor trims are performed in the sensor transducer block. For block oriented user interfaces, perform calibrations and trims in the sensor transducer block.

Menu navigation: *Overview>Calibration>Sensor Trim*

All sensor trims, and restoring factory calibration can be performed using the overview and service tools branches of the menu tree. In addition, calibrations and trims can be documented with the information stored to an asset management system.

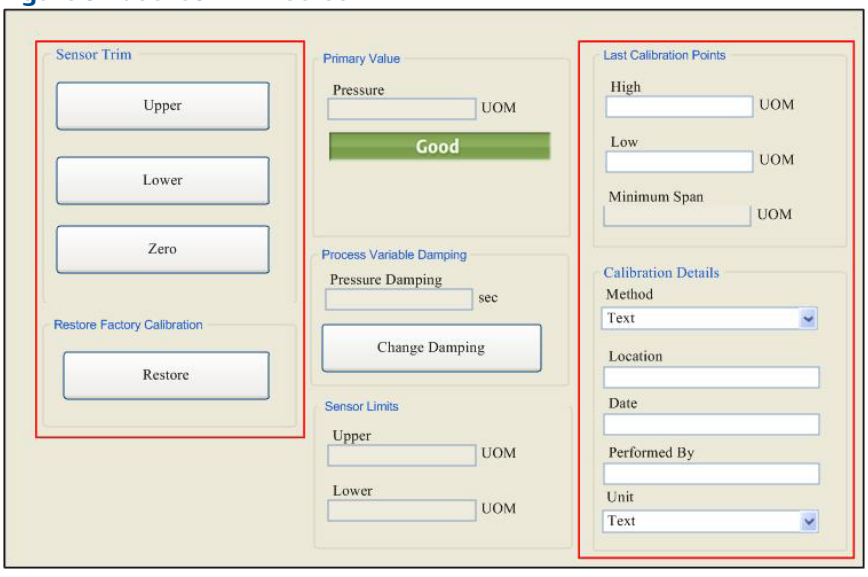
Navigate to the sensor trim screen and click on the button for the type of trim desired. An automated procedure called a 'Method' will guide the user through the desired trim procedure. The automated procedure for upper and lower sensor trims includes steps for documenting pressure, units, date, and name of person performing the trim and physical location where the trim was performed. This information can be entered or edited for full calibrations in "Last Calibration Points", and "Calibration Details".

Note
Generally only a zero trim should be performed. For high static pressure applications, a lower and upper trim can be performed.

Note
Refer to Section 5: Calibration overview through Section 5: Sensor trim overview for information on the various types of trims. Refer to "Rosemount 305, 306, and 304 Manifolds" on page 58 for manifold operation instructions to properly drain/vent valves.

Note
If both an upper and lower sensor trim are needed, perform the lower trim first.

Figure 5-2. Sensor Trim Screen



The “Sensor Trim”, “Upper”, “Lower”, “Zero”, and “Restore” buttons start automated procedures called Methods which guide the user through the sequence of steps needed to perform the desired trim. “Upper and lower” trims require a pressure source. In addition, for “Upper, lower, and zero” trims the user will need to place manifold valves in the proper position to perform the trim, and return the manifold valves to the proper positions for normal operation. “Restore Factory Calibration” doesn’t require a pressure source or manipulation of manifold valves.

To calibrate the sensor using the Sensor Trim function, perform the following procedure:

1. Select **Lower Sensor Trim**.

Note
Select pressure points so that lower and upper values are equal to or outside the expected process operation range.

5.5 Status

Along with the measured or calculated PV value, every FOUNDATION Fieldbus block passes an additional parameter called STATUS. The PV and STATUS are passed from the Transducer Block to the Analog Input Block. The STATUS can be one of the following: GOOD, BAD, or UNCERTAIN. When there are no problems detected by the self-diagnostics of the block, the STATUS will be GOOD. If a problem occurs with the hardware in the device, or, the quality of the process variable is compromised for some reason, the STATUS will become either BAD or UNCERTAIN depending upon the nature of the problem. It is important that the Control Strategy that makes use of the Analog Input Block is configured to monitor the STATUS and take action where appropriate when the STATUS is no longer GOOD.

5.6 Master reset method

5.6.1 Resource block

Menu navigation: *Service Tools>Maintenance>Reset/Restore*

Note
Master Reset (sometimes called restart) is performed in the resource block. For block oriented user interfaces perform the reset in the resource block.

There are two master reset options. One restarts the transmitter processor but doesn't change device configuration. The second is a restart with factory defaults. It returns all device and function block parameters to the factory defaults. An automated procedure called a “Method” will guide the user through both reset options.

Figure 5-3. Master Reset Button

The “Master Reset” button starts the method that initiates the reset and verifies the reset is complete. Note that during the reset communication between the device and the host will be lost. There may be some delay before the device is recognized again by the host.

Set the RESTART to one of the options below:

- Run - Default State
- Resource - Not Used
- ⚠ Defaults - Sets all device parameters to FOUNDATION Fieldbus default values
- Processor - Does a software reset of the CPU

5.7 Simulation

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

5.7.1 Manual mode

To change only the OUT_VALUE and not the OUT_STATUS of the AI Block, place the TARGET MODE of the block to MANUAL. Then, change the OUT_VALUE to the desired value.

5.7.2 Simulate

1. If the SIMULATE switch is in the OFF position, move it to the ON position.
2. To change both the OUT_VALUE and OUT_STATUS of the AI Block, set the TARGET MODE to AUTO.
3. Set SIMULATE_ENABLE_DISABLE to ‘Active’.
4. Enter the desired SIMULATE_VALUE to change the OUT_VALUE and SIMULATE_STATUS_QUALITY to change the OUT_STATUS.
5. Set SIMULATE_ENABLE_DISABLE to 'Inactive' to return the AI block to normal operation.

Section 6 Troubleshooting

6.1 Overview

This section provides summarized troubleshooting suggestions for the most common operating problems. This section contains Rosemount™ 3051 Pressure Transmitter with FOUNDATION™ Fieldbus Protocol troubleshooting information only. Disassembly and reassembly procedures can be found in the "Disassembly procedures" on page 82 and "Reassembly procedures" on page 84.

Follow the procedures described here to verify transmitter hardware and process connections are in good working order. Always deal with the most likely checkpoints first.

Table 6-3 on page 88 provides summarized maintenance and troubleshooting suggestions for the most common operating problems.

If you suspect malfunction despite the absence of any diagnostic messages on the Field Communicator display, consider using "Troubleshooting guides" on page 86 to identify any potential problem.

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 the Rosemount 3051 Reference Manual for any restrictions associated with a safe installation.

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

⚠WARNING

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.

Static electricity can damage sensitive components.

- Observe safe handling precautions for static-sensitive components.

6.3 Disassembly procedures

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

6.3.1 Removing from service

Follow these steps:

1. Follow all plant safety rules and procedures.
2. Power down device.
3. Isolate and vent the process from the transmitter before removing the transmitter from service.
4. Remove all electrical leads and disconnect conduit.
5. Remove the transmitter from the process connection.
   a. The Rosemount 3051C Transmitter is attached to the process connection by four bolts and two cap screws. Remove the bolts and screws and separate the transmitter from the process connection. Leave the process connection in place and ready for re-installation. Reference Figure 3-9 on page 52 for coplanar flange.
   b. The Rosemount 3051T 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. See warning in “Inline process connection” on page 56.
6. Do not scratch, puncture, or depress the isolating diaphragms.
7. Clean isolating diaphragms with a soft rag and a mild cleaning solution, and rinse with clear water.
8. For the Rosemount 3051C, whenever you remove the process flange or flange adapters, visually inspect the PTFE O-rings. Replace the O-rings if they show any signs of damage, such as nicks or cuts. Undamaged O-rings may be reused.

6.3.2 Removing 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.
   See "Safety messages" on page 81 for complete warning information.
2. Loosen the two small screws located on the assembly in the 9 o'clock and 5 o'clock positions relative to the top of the transmitter.
3. Pull the entire terminal block out to remove it.

6.3.3 Removing electronics board

The transmitter electronics board is located in the compartment opposite the terminal side. To remove the electronics board see Figure 4-1 on page 66 and perform 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 front of the LCD display (see Figure 4-1 on page 66 for screw locations). The two screws anchor the LCD display to the electronics board and the electronics board to the housing.

Note
The electronics board is electrostatically sensitive; observe handling precautions for static-sensitive components

3. 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.

Note
If an LCD display is installed, use caution as there is an electronic pin connector that interfaces between the LCD display and electronics board.

6.3.4 Removing sensor module from the electronics housing

1. Remove the electronics board. Refer to "Removing electronics board" on page 83.

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

6.4 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. To do so, 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 on the sensor module 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.
See "Safety messages" on page 81 for complete warning information.

6. Tighten the housing rotation set screw to no more than 7 in-lbs when desired location is reached.

6.4.1 Attaching 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 power 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 housing cover. It is recommended the cover be tightened until there is no gap between the cover and the housing.

6.4.2 Installing terminal block

⚠ 1. Gently slide the terminal block into place, making sure the two power 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.

6.4.3 Reassembling the Rosemount 3051C 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 you are 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:
   a. Coplanar process flange:
      – 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.
      – Install the four 1.75-in. flange bolts by finger tightening them to the flange.
   b. Coplanar process flange with flange adapters:
      – 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.
      – Hold the flange adapters and adapter O-rings in place while installing (in the desired of the four possible process connection spacing configurations) using four 2.88-in. bolts to mount securely to the coplanar flange. For gage pressure configurations, use two 2.88-inch bolts and two 1.75-in. bolts.
   c. Manifold:
      – 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 4 on page 85 for appropriate torque values.
4. Using same cross pattern, tighten bolts to final torque values seen in Table 4 on page 85.

Table 6-1. Bolt Installation Torque Values

Bolt material	Initial torque value	Final torque value
CS-ASTM-A445 Standard	300 in-lb (34 N-m)	650 in-lb (73 N-m)
316 SST—Option L4	150 in-lb (17 N-m)	300 in-lb (34 N-m)
ASTM-A-19 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 you replaced the PTFE sensor module O-rings, re-torque the flange bolts after installation to compensate for cold flow of the O-ring material.

Note
For Range 1 transmitters: after replacing O-rings 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.

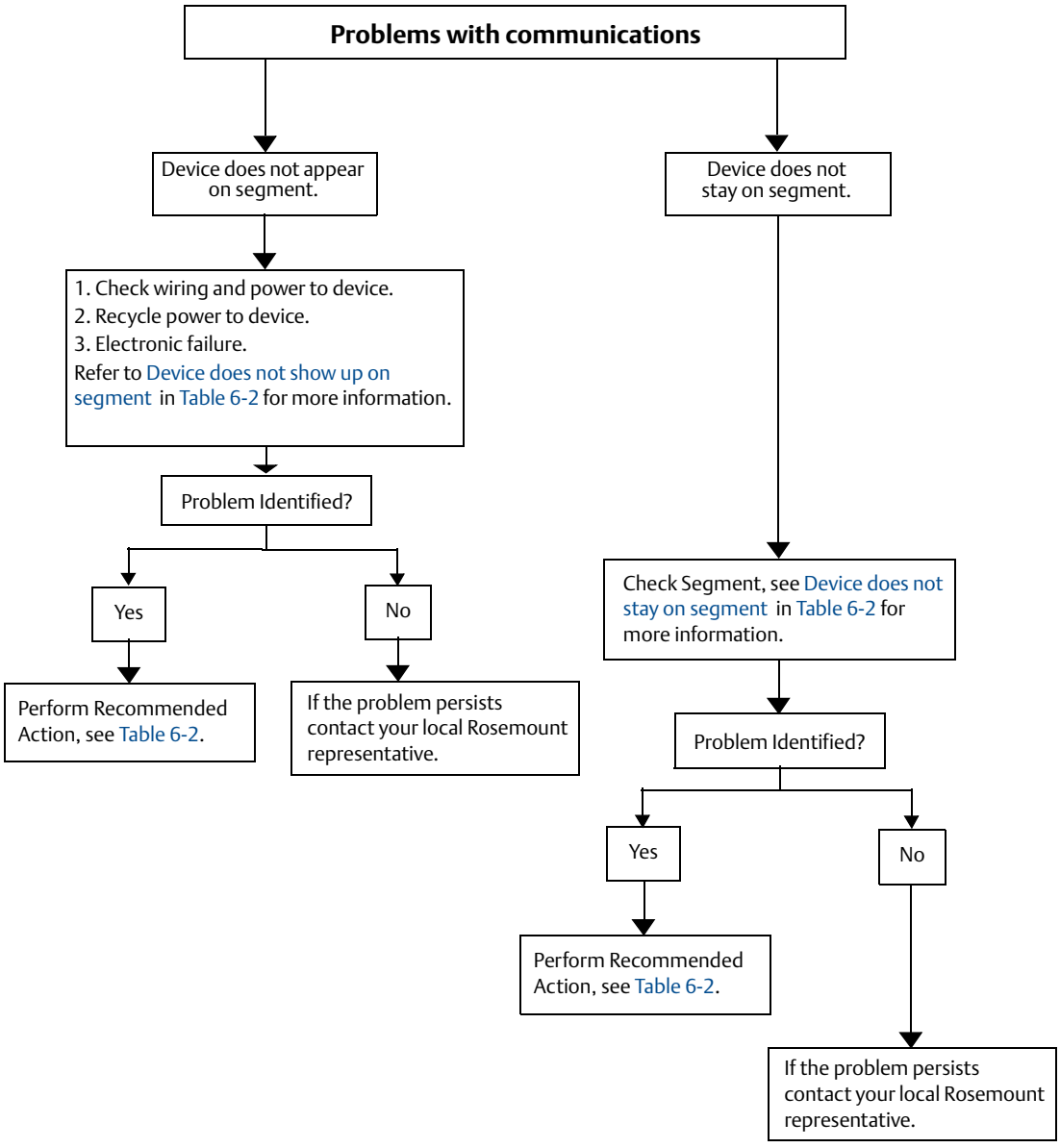
⚠ See "Safety messages" on page 81 for complete warning.

6.4.4 Installing 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 five 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.

6.5 Troubleshooting guides

Figure 6-1. Problems with Communications Flowchart



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

Figure 6-2. Rosemount 3051 Troubleshooting Flowchart

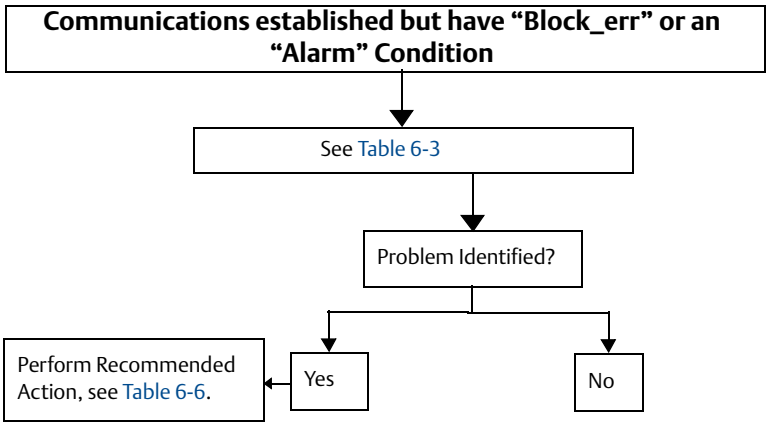


Table 6-2. Troubleshooting Guide

Symptom[1]	Cause	Recommended actions
Device does not show up on segment	Unknown	1. Recycle power to device.
	No power to device	1. Ensure the device is connected to the segment. 2. Check voltage at terminals. There should be 9–32 Vdc. 3. Check to ensure the device is drawing current. There should be approximately 17 mA.
	Segment problems	N/A
	Electronics failing	1. Electronics board loose in housing. 2. Replace electronics.
	Incompatible network settings	Change host network parameters. Refer to host documentation for procedure. See "Device capabilities" on page 12 for device network parameter values.
Device does not stay on segment[2]	Incorrect signal levels. Refer to host documentation for procedure.	1. Check for two terminators. 2. Excess cable length. 3. Bad Power supply or conditioner
	Excess noise on segment. Refer to host documentation for procedure.	1. Check for incorrect grounding. 2. Check for correct shielded wire. 3. Tighten all wiring and shield connections on the effected part of the segment. 4. Check for corrosion or moisture on terminals. 5. Check for bad power supply. 6. Check for electrically noisy equipment attached to the instrument ground.
	Electronics failing	1. Tighten electronics board. 2. Replace electronics.
	Other	1. Check for water in the terminal housing.

1. The corrective actions should be done with consultation of your system integrator.
2. Wiring and installation 31.25 kbit/s, voltage mode, wire medium application guide AG-140 available from the FOUNDATION Fieldbus.

6.6 Troubleshooting and diagnostic messages

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

Table 6-3. Status Messages

NE107 alert	Plant-web™ alert	Diagnostic (alternate name)	Description	Recommended actions	Default configuration	LCD display message	Associated status bits
Failure	Failure	Incompatible Module	The pressure sensor is incompatible with the attached electronics.	1. Replace with electronics board or sensor module with compatible hardware.	Enabled	^^^^XMTR MSMTCH	0x10000000
Failure	Failure	Sensor Failure	An error has been detected in the pressure sensor.	1. Check the interface cable between the sensor module and the electronics board. 2. Replace the sensor module.	Enabled	^^^^FAIL SENSOR	0x20000000
Failure	Failure	Electronics Failure	A failure has occurred in the electronics board.	1. Replace with electronics board.	Enabled	^^^^FAIL ^BOARD	0x40000000
Offspec	Maintenance	Pressure Out of Limits	The process pressure is outside the transmitter's measurement range.	1. Verify the applied pressure is within the range of the pressure sensor. 2. Verify the manifold valves are in the proper position. 3. Check the transmitter pressure connection to verify it is not plugged or the isolating diaphragms are not damaged. 4. Replace the sensor module.	Enabled	PRES^OUT LIMITS	0x00100000
Offspec	Maintenance	Sensor Temperature Out of Limits	The sensor temperature is outside the transmitter's operating range.	1. Check the process and ambient temperature conditions are within -85 to 194 °F (-65 to 90 °C). 2. Replace the sensor module.	Enabled	TEMP^OUT LIMITS	0x00008000
Maintenance	Maintenance	Display Update Failure	The display is not receiving updates from the electronics board.	1. Check the connection between the display and the electronics board. 2. Replace the display. 3. Replace the electronics board.	Enabled	N/A	0x00000010
Maintenance	Maintenance	Variation Change Detected	The statistical process monitor has detected either a mean variation or high or low dynamics in the process.	1. Check the statistical process monitor status in the diagnostics transducer block. 2. Check for plugged impulse lines.	Enabled	^^^^^SPM ^ALERT	0x00000008
Maintenance	Maintenance	Alert Simulation Enabled	Alert simulation is enabled. The active alerts are simulated and any real alerts are suppressed.	1. To view real alerts, disable the alerts simulation.	Enabled	N/A	FD_SIMULATE.ENABLE 0x02
Function Check	Advisory	Function Check	The sensor transducer block mode is not in auto.	1. Check if any transducer block is currently under maintenance. 2. If no transducer block is under maintenance, then follow site procedures to change the affected transducer block's Actual Mode to Auto.	Enabled	N/A	0x00000001

6.7 Analog Input (AI) function block

This section describes error conditions that are supported by the AI Block. Reference Table 6-5 to determine the appropriate corrective action.

Table 6-4. AI BLOCK_ERR Conditions

Condition number	Condition name and description
0	Other
1	**Block Configuration Error:** the selected channel carries a measurement that is incompatible with the engineering units selected in XD_SCALE, the L_TYPE parameter is not configured, or CHANNEL = zero.
3	**Simulate Active:** Simulation is enabled and the block is using a simulated value in its execution.
7	**Input Failure/Process Variable has Bad Status:** The hardware is bad, or a bad status is being simulated.
14	**Power up**
15	**Out of Service:** The actual mode is out of service.

Table 6-5. Troubleshooting the AI Block

Symptom	Possible causes	Recommended actions
Bad or no pressure readings (Read the AI "BLOCK_ERR" parameter)	BLOCK_ERR reads OUT OF SERVICE (OOS)	1. AI Block target mode target mode set to OOS. 2. Resource Block OUT OF SERVICE.
	BLOCK_ERR reads CONFIGURATION ERROR	1. Check CHANNEL parameter (see "Analog input (AI) function block" on page 124) 2. Check L_TYPE parameter (see "Analog input (AI) function block" on page 124) 3. Check XD_SCALE engineering units. (see "Analog input (AI) function block" on page 124)
	BLOCK_ERR reads BAD INPUT	1. Check the interface cable between the Sensor Module and the Fieldbus Electronics Board. 2. Replace the Sensor Module.
	No BLOCK_ERR but readings are not correct. If using Indirect mode, scaling could be wrong.	1. Check XD_SCALE parameter. 2. Check OUT_SCALE parameter. (see "Analog input (AI) function block" on page 124)
	No BLOCK_ERR. Sensor needs to be calibrated or Zero trimmed.	1. See Section 3 to determine the appropriate trimming or calibration procedure.
OUT parameter status reads UNCERTAIN and substatus reads EngUnitRangViolation.	Out_ScaleEU_0 and EU_100 settings are incorrect.	1. See "Analog input (AI) function block" on page 124.

Table 6-6. Recommended Actions

Text string	FD_EXTENDED_ACTIVE_1
Not Initialized	None
No Action Required	No Active Conditions
1. Replace the Fieldbus Electronics Board.	Electronics Failure
1. Check the interface cable between the Sensor Module and the Fieldbus Electronics Board. 2. Replace the Sensor Module.	Sensor Failure
1. Replace the Fieldbus Electronics Board or Sensor Module with compatible hardware.	Incompatible Module
1. Check the transmitter pressure connection to make sure it is not plugged or isolating diaphragms are not damaged. 2. Replace the sensor module.	Pressure Out of Limits

Table 6-6. Recommended Actions

Text string	FD_EXTENDED_ACTIVE_1
1. Check the process and ambient temperature conditions are within -85 to 194 °F (–65 to 90 °C). 2. Replace the sensor module.	Sensor Temperature Out of Limits
1. Check LCD display connection. 2. Replace the LCD display. Replace the Fieldbus Electronics Board.	Display Update Failure
1. Check the statistical process monitor status in the diagnostics transducer block.	Variation Change Detected
1. Check to see if one of the transducer blocks is currently under maintenance. 2. If none of the transducer blocks are under maintenance, then follow site procedures to change the affected transducer block's Actual Mode to Auto.	Check Function
Simulate is Active - No Action Required	Simulation–No Active Conditions
Simulate is Active - 1. Replace the Fieldbus Electronics Board.	Simulating–Electronics Failure
Simulate is Active - 1. Check the interface cable between the Sensor Module and the Fieldbus Electronics Board. 2. Replace the sensor module.	Simulating–Sensor Failure
Simulate is Active - 1. Replace the Fieldbus Electronics Board or Sensor Module with compatible hardware.	Simulating–Incompatible Module
Simulate is Active - 1. Check the transmitter pressure connection to make sure it is not plugged or isolating diaphragms are not damaged. 2. Replace the sensor module.	Simulating–Pressure Out of Limits
Simulate is Active - 1. Check the process and ambient temperature conditions are within -85 to 194 °F (–65 to 90 °C). 2. Replace the sensor module.	Simulating–Sensor Temperature Out of Limits
Simulate is Active - 1. Check LCD display connection. 2. Replace the LCD display. 3. Replace the Fieldbus Electronics Board.	Simulating–Display Update Failure
Simulate is Active - 1. Check the statistical process monitor status in the diagnostics transducer block.	Simulating – Variation Change Detected
Simulate is Active - 1. Check to see if one of the transducer blocks is currently under maintenance. 2. If none of the transducer blocks are under maintenance, then follow site procedures to change the affected transducer block's Actual Mode to Auto.	Simulating–Check Function

6.8 Service support

Within the United States, call the Emerson™ 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.

For inquiries outside of the United States, contact the nearest Emerson representative for RMA instructions.

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

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

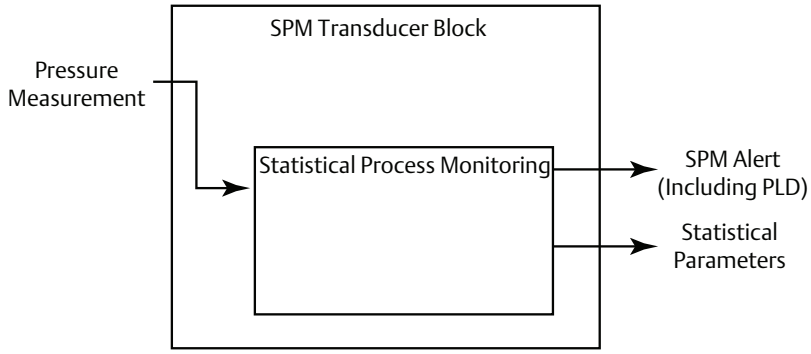
Section 7 Advanced Pressure Diagnostics

7.1 Overview

The Statistical Process Monitoring (SPM) Block is a licensable option on the Rosemount™ 3051 Pressure Transmitter with FOUNDATION™ Fieldbus, and designated by the option code "D01" in the model number.

SPM can be used for Plugged Impulse Line Detection (PLD), as well as detection of a variety of abnormal process conditions.

Figure 7-1. SPM Transducer Block Overview



SPM

The SPM technology can be used to detect changes in the process, process equipment or installation conditions of the transmitter. This is done by modeling the process noise signature (using the statistical values of mean and standard deviation) under normal conditions and then comparing the baseline values to current values over time. If a significant change in the current values is detected, the transmitter can generate an alert. The SPM performs its statistical processing on the primary value of the field device (e.g. pressure measurement). When SPM detects a change in the process statistical characteristics, it generates an alert. The statistical values are also available as secondary variables from the transmitter via AI Function Blocks if a user is interested in their own analysis or generating their own alarms.

When impulse lines are cleaned or changed, the learn and verify cycle should be re-run.

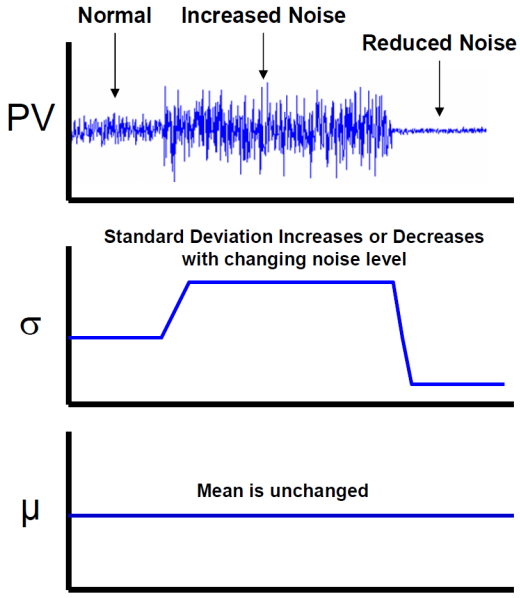
Important
Running the SPM Block could affect other block execution times. We recommend the device be configured as a basic device versus a Link Master device if this is a concern.

7.2 SPM technology

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

The sensing of the unique signature begins with the combination of a high speed sensing device, such as the Rosemount 3051, to compute statistical parameters that characterize and quantify the noise or variation. These statistical parameters are the mean and standard deviation of the input pressure. Filtering capability is provided to separate slow changes in the process due to setpoint changes from the process noise or variation of interest. Figure 7-2 shows an example of how the standard deviation value (σ) is affected by changes in noise level while the mean or average value (μ) remains constant. The calculation of the statistical parameters within the device is accomplished on a parallel software path to the path used to filter and compute the primary output signal (e.g. the pressure measurement used for control and operations). The primary output is not affected in any way by this additional capability.

Figure 7-2. Changes in Process Noise or Variability and Affect on Statistical Parameters



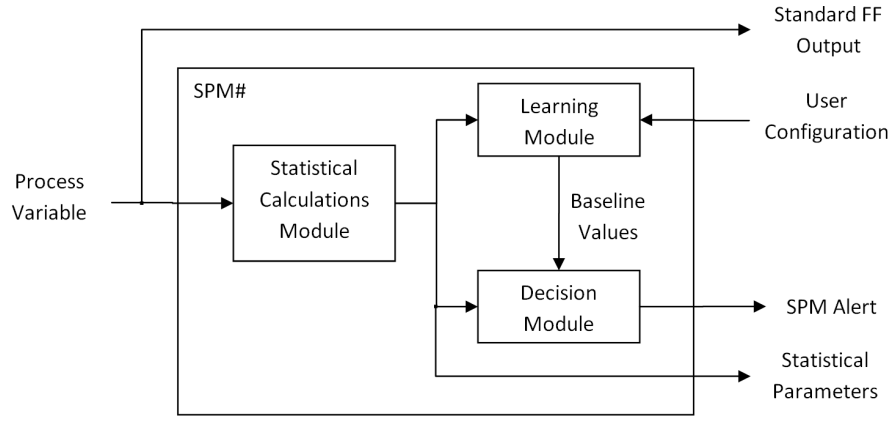
The device can provide the statistical information to the user in two ways. First, the statistical parameters can be made available to the host system directly via FOUNDATION Fieldbus communication protocol or FF to other protocol converters. Once available, the system may make use of these statistical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

Second, the device has internal software that can be used to baseline the process noise or signature via a learning process. Once the learning process is completed, the device itself can detect significant changes in the noise or variation, and communicate an alarm via Plantweb™ alert or NE 107 status signal. Typical applications are change in fluid composition or equipment related problems.

7.2.1 SPM functionality

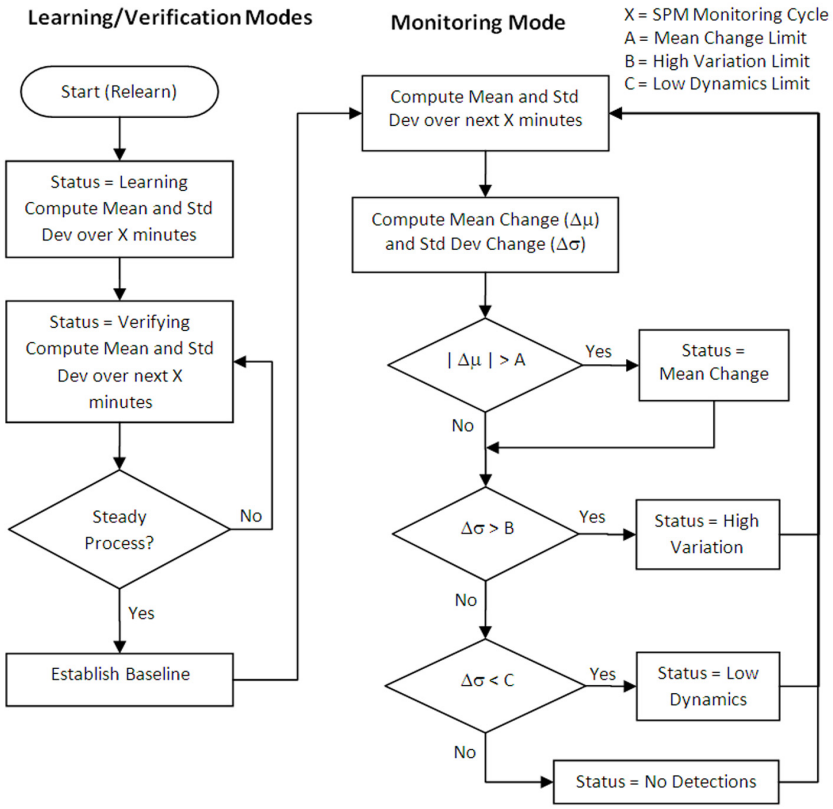
A block diagram of the SPM diagnostic is shown in Figure 7-3. The process variable (the measured pressure) is input to a statistical calculations module where basic high pass filtering is performed on the pressure signal. The mean (or average) is calculated on the unfiltered pressure signal, the standard deviation calculated from the filtered pressure signal. These statistical values are available via handheld communication devices like the field communicator, asset management software, or distributed control systems with FOUNDATION Fieldbus.

Figure 7-3. Rosemount 3051 FF Statistical Process Monitoring



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

Figure 7-4. Rosemount 3051 FF SPM



Further detail of the operation of the SPM diagnostic is shown in the Figure 7-4 flowchart. This is a simplified version showing operation using the default values. After configuration, SPM calculates mean and standard deviation, used in both the learning and the monitoring modes. Once enabled, SPM enters the learning/verification mode. The baseline mean and standard deviation are calculated over a period of time controlled by the user (SPM Monitoring Cycle; default is 15 minutes). The status will be “Learning”. A second set of values is calculated and compared to the original set to verify that the measured process is stable and repeatable. During this period, the status will change to “Verifying”. If the process is stable, the diagnostic will use the last set of values as baseline values and move to “Monitoring” status. If the process is unstable, the diagnostic will continue to verify until stability is achieved.

In the “Monitoring” mode, new mean and standard deviation values are continuously calculated, with new values available every few seconds. The mean value is compared to the baseline mean value, and the standard deviation is compared to the baseline standard deviation value. If either the mean or the standard deviation has changed more than user-defined sensitivity settings, an alert is generated via FOUNDATION Fieldbus. The alert may indicate a change in the process, equipment, or transmitter installation.

Note

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

7.3 SPM configuration and operation

The following section describes the process of configuring and using the Statistical Process Monitoring diagnostic.

7.3.1 SPM configuration for monitoring pressure

The device's pressure measurement is permanently factory pre-configured as the SPM input. To configure the SPM Block, set the following parameters:

Learning the process dynamics

1. Using guided configuration, enter the monitoring cycle for SPM to learn the process.

Note
The minimum monitoring cycle value is one minute; the typical recommended monitoring cycle is three minutes.

Verification

Normally a verification period is used to determine the stability of the process noise before beginning monitoring. This step can be bypassed to reduce SPM setup time.

Note
Bypassing the verification is not recommended.

SPM_Monitoring_Cycle = [1 – 1440] minutes (see "Other SPM settings" on page 97)

(optional) SPM_Bypass_Verification = [Yes/No] (see page 97)

After SPM is enabled, it will spend time equal to one SPM_Monitoring_Cycle (e.g. five minutes) in the learning phase, and then another time period equal to one SPM_Monitoring_Cycle in the verification phase. If a steady process is detected at the end of the verification phase, the SPM will move into the monitoring phase. After five minutes in the monitoring phase, SPM will have the current statistical values (e.g. current mean and standard deviation), and will begin comparing them against the baseline values to determine if an SPM Alert is detected.

7.3.2 Other SPM settings

Additional information on other SPM settings is shown below.

SPM_Bypass_Verification

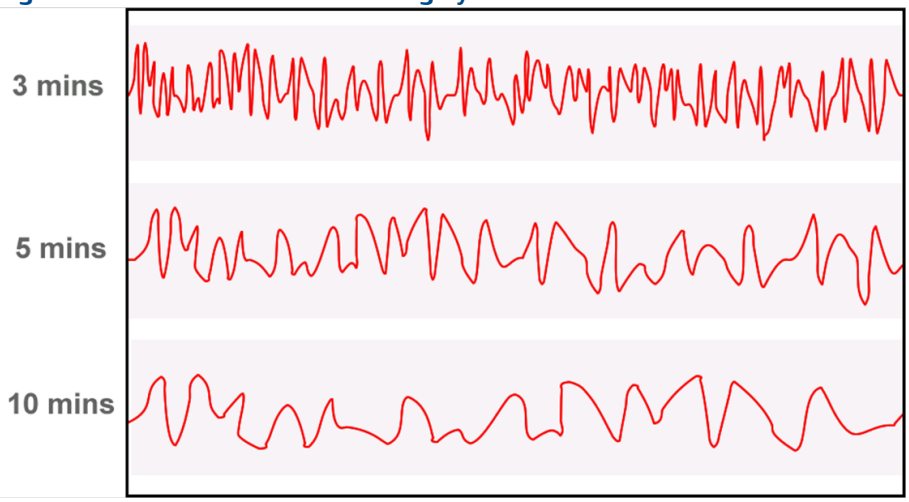
If this is set to "Yes", SPM will skip the verification process, and the first mean and standard deviation from the learning phase will be taken as the baseline mean and standard deviation. By skipping the verification, the SPM can move into the monitoring phase more quickly. This parameter should only be set to "Yes" if you are certain that the process is at a steady-state at the time you start the Learning. The default (and recommended) setting is "No".

SPM_Monitoring_Cycle

This is the length of the sample window over which mean and standard deviation are computed. A shorter sample window means that the statistical values will respond faster when there are process changes, but there is also a greater chance of generating false detections. A longer sample window means that mean and standard deviation will take longer to respond when there is a process change. The default value is 15 minutes. For most applications, a monitoring cycle ranging from 1 to 10 minutes is appropriate. The allowable range is 1 to 1440 minutes.

Figure 7-5 illustrates the effect of the SPM Monitoring Cycle on the Statistical Calculations. Notice how with a shorter sampling window there is more variation (e.g. the plot looks noisier) in the trend. With the longer sampling window the trend looks smoother because the SPM uses process data averaged over a longer period of time.

Figure 7-5. Effect of SPM Monitoring Cycle on Statistical Values



SPM_User_Command

Select **Learn** after all the parameters have been configured to begin the Learning Phase. The monitoring phase will start automatically after the learning process is complete. Select **Quit** to stop the SPM. **Detect** may be selected to return to the monitoring phase.

SPM_Active

The SPM_Active parameter starts the Statistical Process Monitoring when “Enabled”. “Disabled” (default) turns the diagnostic monitoring off. Must be set to “Disabled” for configuration. Only set to “Enabled” after fully configuring the SPM. When Enabling SPM, you may select one of two options:

Enabled with 1st-order HP filter

Applies a high-pass filter to the pressure measurement prior to calculating standard deviation. This removes the effect of slow or gradual process changes from the standard deviation calculation while preserving the higher-frequency process fluctuations. Using the high-pass filter reduces the likelihood of generating a false detection if there is a normal process or setpoint change. For most diagnostics applications, you will want to use the filter.

Enabled without filter

This enables SPM without applying the high-pass filter. Without the filter, changes in the mean of the process variable will cause an increase in the standard deviation. Use this option only if there are very slow process changes (e.g. an oscillation with a long period), which you wish to monitor using the standard deviation.

7.3.3 Configuration of alerts

In order to have SPM generate a NE107 or Plantweb alert, the alert limits must be configured on the mean and/or standard deviation. The three alert limits available are:

SPM_Mean_Lim

Upper and lower limits for detecting a mean change

SPM_High_Variation_Lim

Upper limit on standard deviation for detecting a high variation condition; typical values for high variation limit are 40 percent change for high sensitivity, 60% change for medium sensitivity, and 80 percent change for low sensitivity.

SPM_Low_Dynamics_Lim

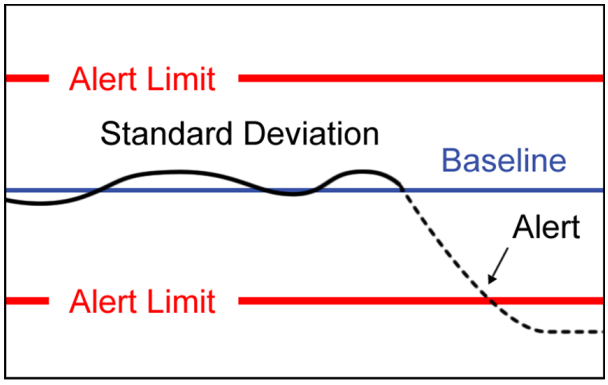
Lower limit on standard deviation for detecting a low dynamics condition (must be specified as a negative number)

All of these limits are specified as a percent change in the statistical value from its baseline. If a limit is set to 0 (the default setting) then the corresponding diagnostic is disabled. For example, if SPM_High_Variation_Limit is 0, then SPM does not detect an increase in standard deviation.

Figure 7-6 illustrates an example of the standard deviation, with its baseline value and alert limits. During the monitoring phase, the SPM will continuously evaluate the standard deviation and compare it against the baseline value. An alert will be detected if the standard deviation either goes above the upper alert limit, or below the lower alert limit.

In general, a higher value in any of these limits leads to the SPM diagnostic being less sensitive, because a greater change in mean or standard deviation is needed to exceed the limit. A lower value makes the diagnostic more sensitive, and could potentially lead to false detections.

Figure 7-6. Example Alerts for Standard Deviation



7.3.4 SPM operations

During operation, the following values are updated for the SPM Block.

SPM_Baseline_Mean

Baseline Mean (calculated average) of the process variable, determined during the Learning/Verification process, and representing the normal operating condition

SPM_Mean

Current Mean of the process variable

SPM_Mean_Change

Percent change between the Baseline Mean and the Current Mean

SPM_Baseline_StDev

Baseline Standard Deviation of the process variable, determined during the Learning/Verification process, and representing the normal operating condition

SPM_StDev

Current Standard Deviation of the process variable

SPM_StDev_Change

Percent change between the Baseline Standard Deviation and the Current Standard Deviation

SPM_Timestamp

Timestamp of the last values and status for the SPM

SPM_Status

Current state of the SPM Block; possible values for SPM status are as follows:

Status value	Description
Inactive	User Command in “Idle”, SPM not Enabled, or the function block is not scheduled.
Learning	Learning has been set in the User Command, and the initial baseline values are being calculated
Verifying	Current baseline values and previous baseline values or being compared to verify the process is stable.
Monitoring	Monitoring the process and no detections are currently active.
Mean Change Detected	Alert resulting from the Mean Change exceeding the Threshold Mean Limit. Can be caused by a set point change, a load change in the flow, or an obstruction or the removal of an obstruction in the process.
High Variation Detected	Alert resulting from the Stdev Change exceeding the Threshold High Variation value. This is an indicator of increased dynamics in the process, and could be caused by increased liquid or gas in the flow, control or rotational problems, or unstable pressure fluctuations.
Low Dynamics Detected	Alert resulting from the Stdev Change exceeding the Threshold Low Dynamics value. This is an indicator for a lower flow, or other change resulting in less turbulence in the flow.
Not Licensed	SPM is not currently purchased in this device.

In most cases, only one of the above SPM status bits will be active at one time. However, it is possible for “Mean Change Detected” to be active at the same time as either “High Variation Detected” or “Low Dynamics Detected” is active.

7.3.5 Alerts

When any of the SPM detections (Mean Change, High Variation, or Low Dynamics) is active, a fieldbus NE107 or Plantweb alert in the device “Variation Change Detected (SPM)” will be generated and sent to the host system. Note that there is just one SPM NE107 or Plantweb alert.

7.3.6 Trending statistical values in control system

SPM Mean and Standard Deviation values may be viewed and/or trended in a fieldbus host system through the AI function blocks.

An Analog Input (AI) block may be used to read either the mean or the standard deviation from the SPM Blocks. To use the AI block to trend SPM data, set the CHANNEL parameter to one of the following values:

Table 7-1. Valid SPM Channels for the AI Block

Channel	SPM variable
12	SPM mean
13	SPM standard deviation

See Table 2-4 for a complete listing of valid Channels for the AI Block.

The OUT_SCALE parameter should be set to the engineering unit and range which are desired for the mean and standard deviation output. For example, it is possible to use the OUT_SCALE parameter to convert mean and standard deviation to some other pressure unit. See “Analog Input (AI) function block” on page 29 for additional details on setting the XD_SCALE, OUT_SCALE, and L_TYPE parameters of the AI function block.

7.3.7 SPM configuration with EDDL

Menu navigation: *Configure>Guided Setup>Basic SPM Setup*

SPM configuration provides the capability to configure SPM for use in plugged line detection, or other abnormal process conditions. See Section 7 for more information on SPM functions and uses.

Note
SPM is a factory only option, option code D01, and can't be licensed/installed in the field.

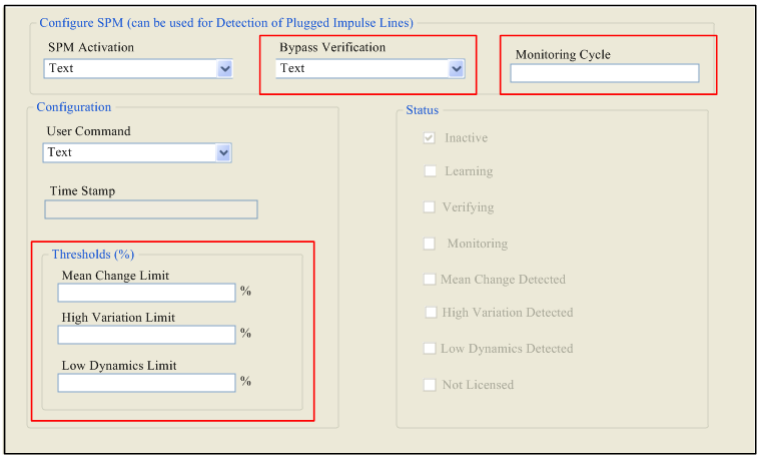
An automated task procedure called a 'Method' will guide the user through SPM setup. The basic sequence of steps is:

1. Enter the 'Monitoring Cycle'. The minimum monitoring time is one minute; three minutes is a typical monitoring cycle.
2. 'Bypass Verification', Yes or No. Verification is recommended for applications where SPM monitoring has not been done previously, or where process changes may cause significant changes in mean or standard deviation.
3. Enter the thresholds in percent.
   a. The first threshold is the 'Mean Change' that will trigger an alert.
   b. The second threshold is the 'High Variation Limit' that will trigger an alert. Typical values are from 40 to 80 percent.
   c. The third threshold is the 'Low Dynamics Limit' that will trigger an alert.
   d. 'Filtering' is selected or disabled.

Note
To enable or disable monitoring or make configuration changes the manual 'SPM Configuration' screen may be preferred.

Menu navigation: *Configure>Manual Setup>Basic SPM*

Figure 7-7. Configure SPM Display Screen



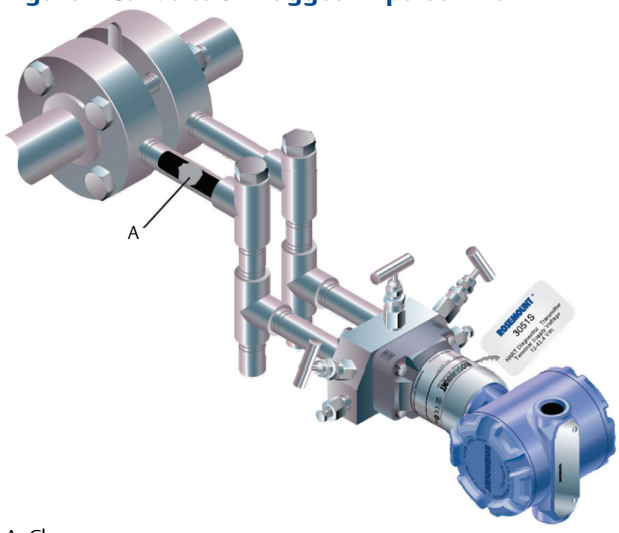
The screen shown in Figure 7-7 above allows full SPM configuration, configuration edits, enabling and disabling monitoring, and provides in indication of the status of the monitored variable.

7.4 Plugged impulse line detection using SPM

7.4.1 Introduction

Pressure transmitters are used in pressure, level, and flow measurement applications. Regardless of application, the transmitter is rarely connected directly to the pipe or vessel. Small diameter tubes or pipes commonly called impulse lines are used to transmit the pressure signal from the process to the transmitter. In some applications, these impulse lines can become plugged with solids or frozen fluid in cold environments, effectively blocking the pressure signals (Figure 7-8). The user typically does not know that the blockage has occurred. Because the pressure at the time of the plug is trapped, the transmitter may continue to provide the same signal as before the plug. Only after the actual process changes and the pressure transmitter's output remains the same may someone recognize that plugging has occurred. This is a typical problem for pressure measurement, and users recognize the need for a plugged impulse line diagnostic for this condition.

Figure 7-8. Basics of Plugged Impulse Line



A. Clog

Testing at Emerson and other sites indicates that SPM technology can detect plugged impulse lines. Plugging effectively disconnects the transmitter from the process, changing the noise pattern received by the transmitter. As the diagnostic detects changes in noise patterns, and there are multiple sources of noise in a given process, many factors can come into play. These factors play a large role in determining the success of diagnosing a plugged impulse line. This section of the product manual will acquaint users with the basics of the plugged impulse lines and the PLD diagnostic, the positive and negative factors for successful plugged line detection, and the do's and don'ts of installing pressure transmitters and configuring and operating the PLD diagnostic.

7.4.2 Plugged impulse line physics

The physics of plugged impulse line detection begins with the fluctuations or noise present in most Pressure and Differential Pressure (DP) signals. In the case of DP flow measurements, these fluctuations are produced by the flowing fluid and are a function of the geometric and physical properties of the system. The noise can also be produced by the pump or control system. This is also true for Pressure measurements in flow applications, though the noise produced by the flow is generally less in relation to the average pressure value. Pressure level measurements may have noise if the tank or vessel has a source of agitation. The noise signatures do not change as long as the system is unchanged. In addition, these noise signatures are not affected significantly by small changes in the average value of the flow rate or pressure. These signatures provide the opportunity to identify a plugged impulse line.

When the lines between the process and the transmitter start to plug through fouling and build-up on the inner surfaces of the impulse tubing or loose particles in the main flow getting trapped in the impulse lines, the time and frequency domain signatures of the noise start to change from their normal states. In the simpler case of a Pressure measurement, the plug effectively disconnects the Pressure transmitter from the process. While the average value may remain the same, the transmitter no longer receives the noise signal from the process and the noise signal decreases significantly. The same is true for a DP transmitter when both impulse lines are plugged.

The case of the Differential Pressure measurement in a flow application with a single line plugged is more complicated, and the behavior of the transmitter may vary depending on a number of factors. First the basics: a differential pressure transmitter in a flow application is equipped with two impulse lines, one on the high pressure side (HP) and one on the low pressure side (LP) of the primary element. Understanding the results of a single plugged line requires understanding of what happens to the individual pressure signals on the HP and LP sides of the primary element. Common mode noise is generated by the primary element and the pumping system as depicted in Figure 7-9. When both lines are open, the differential pressure sensor subtracts the LP from the HP. When one of the lines are plugged (either LP or HP), the common mode cancellation no longer occurs. Therefore there is an increase in the noise of the DP signal. See Figure 7-10.

Figure 7-9. Differential Pressure Signals under Different Plugging Conditions

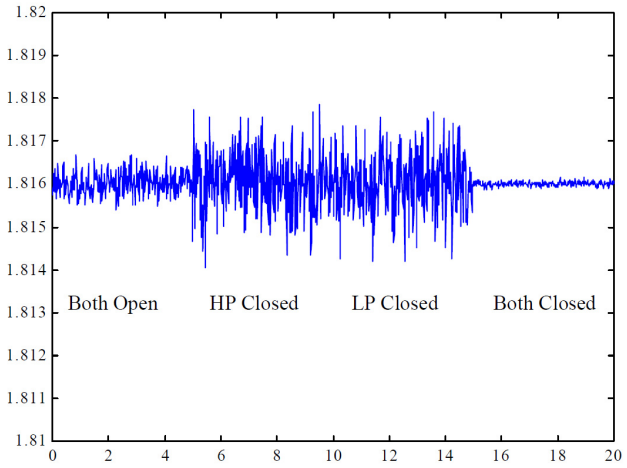
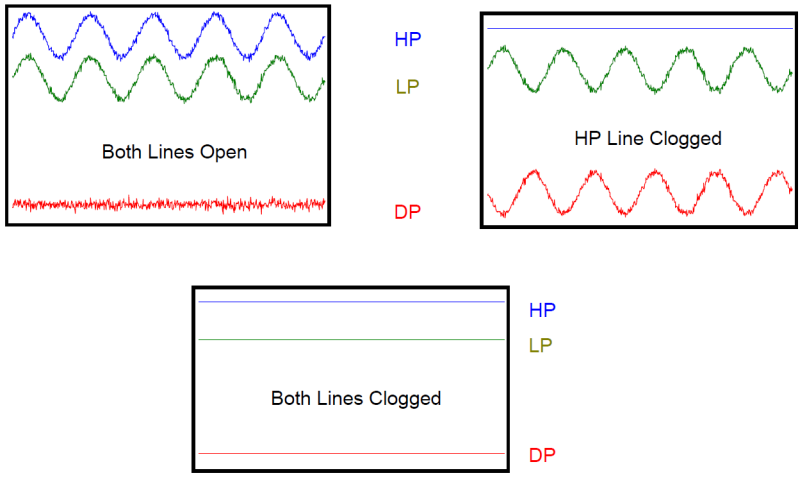


Figure 7-10. Differential Pressure (DP) Signals under Different Plugged Conditions



However, there is a combination of factors that may affect the output of the DP transmitter under single plugged line conditions. If the impulse line is filled with an incompressible fluid, no air is present in the impulse line or the transmitter body, and the plug is formed by rigid material, the noise or fluctuation will decrease. This is because the combination of the above effectively “stiffens” the hydraulic system formed by the DP sensor and the plugged impulse line. The PLD diagnostic can detect these changes in the noise levels through the operation described previously.

7.4.3 Plugged line detection factors

The factors that may play a significant role in a successful or unsuccessful detection of a plugged impulse line can be separated into positive factors and negative factors, with the former increasing the chances of success and the latter decreasing the chances of success. Within each list, some factors are more important than others as indicated by the relative position on the list. If an application has some negative factors that does not mean that it is not a good candidate for the diagnostic. The diagnostic may require more time and effort to set up and test and the chances of success may be reduced. Each factor pair will be discussed.

Ability to test installed transmitter

The single most important positive factor is the ability to test the diagnostic after the transmitter is installed, and while the process is operating. Virtually all DP flow and most pressure measurement installations include a root or manifold valve for maintenance purposes. By closing the valve, preferable the one(s) closest to the process to most accurately replicate a plug, the user can note the response of the diagnostic and the change in the standard deviation value and adjust the sensitivity or operation accordingly.

Stable, in-control process

A process that is not stable or in no or poor control may be a poor candidate for the PLD diagnostic. The diagnostic baselines the process under conditions considered to be normal. If the process is unstable, the diagnostic will be unable to develop a representative baseline value. The diagnostic may remain in the learning/verifying mode. If the process is stable long enough to establish a baseline, an unstable process may result in frequent relearning/verifications and/or false trips of the diagnostic.

Well vented installation

This is an issue for liquid applications. Testing indicates that even small amounts of air trapped in the impulse line of the pressure transmitter can have a significant effect on the operation of the diagnostic. The small amount of air can dampen the pressure noise signal as received by the transmitter. This is particularly true for DP devices in single line plugging situations and GP/AP devices in high pressure/low noise applications. See the next paragraph and "Impulse line length" on page 106 for further explanation. Liquid DP flow applications require elimination of all the air to insure the most accurate measurement.

DP flow and low GP/AP vs. high GP/AP measurements

This is best described as a noise to signal ratio issue and is primarily an issue for detection of plugged lines for high GP/AP measurements. Regardless of the line pressure, flow generated noise tends to be about the same level. This is particularly true for liquid flows. If the line pressure is high and the flow noise is very low by comparison, there may not be enough noise in the measurement to detect the decrease brought on by a plugged impulse line. The low noise condition is further enhanced by the presence of air in the impulse lines and transmitter if a liquid application. The PLD diagnostic will alert the user to this condition during the learning mode by indicating "Insufficient Dynamics" status.

Flow vs. level applications

As previously described, flow applications naturally generate noise. Level applications without a source of agitation have very little or no noise, therefore making it difficult or impossible to detect a reduction in noise from the plugged impulse line. Noise sources include agitators, constant flow in and out of the tank maintaining a fairly consistent level, or bubbler.

Impulse line length

Long impulse lines potentially create problems in two areas. First, they are more likely to generate resonances that can create competing pressure noise signals with the process generated noise. When plugging occurs, the resonant generated noise is still present, and the transmitter does not detect a significant change in noise level, and the plugged condition is undetected. The formula that describes the resonant frequency is:

$$fn = (2n - 1) \times C/4L \quad (2)$$

where:

fn is the resonant frequency,

n is the mode number,

C is the speed of sound in the fluid, and

L is the impulse length in meters.

A 10-meter impulse line filled with water could generate resonant noise at 37 Hz, above the frequency response range of a typical Rosemount Pressure Transmitter. This same impulse line filled with air will have a resonance of 8.7 Hz, within the range. Proper support of the impulse line effectively reduces the length, increasing the resonant frequency.

Second, long impulse lines can create a mechanical low pass filter that dampens the noise signal received by the transmitter. The response time of an impulse line can be modeled as a simple RC circuit with a cutoff frequency defined by:

$\tau = RC$ and $\tau = {}^{1}/_{2}\ \pi\ f_c$

$R = 8\ \upsilon\ L\ /\pi\ r^4$

C = ÄVolume/ÄPressure

where:

f_c is the cut-off frequency

υ is the viscosity in centipoises,

L is the impulse line length in meters

r is the radius of the impulse line.

The “C” formula shows the strong influence of air trapped in a liquid filled impulse line, or an impulse line with air only. Both potential issues indicate the value of short impulse lines. One installation best practice for DP flow measurements is the use of the Rosemount 405 series of integrated compact orifice meters with the Rosemount 3051 Pressure Transmitter. These integrated DP flow measurement systems provide perhaps the shortest practical impulse line length possible while significantly reducing overall installation cost and improved performance. They can be specified as a complete DP flowmeter.

Note
The Plugged Impulse Line diagnostic capability in the Rosemount 3051calculates and detects significant changes in statistical parameters derived from the input process variable. These statistical parameters relate to the variability of the noise signals present in the process variable. It is difficult to predict specifically which noise sources may be present in a given measurement or control application, the specific influence of those noise sources on the statistical parameters, and the expected changes in the noise sources at any time. Therefore, it is not absolutely warranted or guaranteed that Plugged Impulse Line Diagnostic will accurately detect each specific plugged impulse line condition under all circumstances.

Appendix A Specifications and Reference Data

A.1 Resource block

This section contains information on the Rosemount™ 3051 Resource Block. Descriptions of all Resource Block Parameters, errors, and diagnostics are included. The modes, alarm detection, status handling, and troubleshooting are also discussed.

A.1.1 Definition

The resource block defines the physical resources of the device. The resource block also handles functionality that is common across multiple blocks. The block has no linkable inputs or outputs.

Table A-1. Resource Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writable mode
ACK_OPTION (38)	0x0000: No option selected 0x0001: Auto ack write alarm 0x0080: Auto ack block alarm 0x0100: Auto ack fail alarm 0x0200: Auto ack off spec alarm 0x0400: Auto ack maint alarm 0x0800: Auto ack check alarm	0	Enumeration	Selection of which alarms associated with the resource block will be automatically acknowledged	O/S, Auto
ADVISE_ACTIVE (92)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0	Enumeration	Read Only copy of FD_MAINT_ACTIVE & FD_CHECK_ACTIVE combined together This parameter is needed for backward compatibility with Plantweb™ Alerts.	Read-only
ADVISE_ALM (81)	ADVISE_ALM.1 - UNACKNOWLEDGED; ADVISE_ALM.2 - ALARM_STATE; ADVISE_ALM.3 - TIME_STAMP; ADVISE_ALM.4 - SUB_CODE; ADVISE_ALM.5 - VALUE;	N/A	N/A	Alarm indicating advisory alarms. These conditions do not have a direct impact on the process or device integrity.	Mixed
ADVISE_ENABLE (90)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0x00000019	Enumeration	Read Only copy of FD_MAINT_MAP & FD_CHECK_MAP combined together This parameter is needed for backward compatibility with Plantweb Alerts.	Read-only

Table A-1. Resource Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writable mode
ADVISE_MASK (91)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0	Enumeration	Read Only copy of FD_MAINT_MASK & FD_CHECK_MASK combined together This parameter is needed for backward compatibility with Plantweb Alerts.	Read-only
ADVISE_PRI (89)	0 to 15	0	N/A	Designates the alarming priority of the ADVISE_ALM	O/S, Auto
ALARM_SUM (37)	ALARM_SUM.1 - CURRENT; ALARM_SUM.2 - UNACKNOWLEDGED; ALARM_SUM.3 - UNREPORTED; ALARM_SUM.4 - DISABLED;	N/A	N/A	The current alert status, unacknowledged states, unreported states, and disabled states of the alarms associated with the function block	Mixed
ALERT_KEY (4)	Can write any value from 1-255	0	N/A	The identification number of the plant unit	O/S, Auto
BLOCK_ALM (36)	BLOCK_ALM.1 - UNACKNOWLEDGED; BLOCK_ALM.2 - ALARM_STATE; BLOCK_ALM.3 - TIME_STAMP; BLOCK_ALM.4 - SUB_CODE; BLOCK_ALM.5 - VALUE;	N/A	N/A	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.	Mixed
BLOCK_ERR (6)	0x0000: No errors 0x0001: Other (LSB); 0x0008: Simulate Active; 0x0020: Device Fault State Set; 0x0040: Device Needs Maintenance Soon; 0x0200: Memory Failure; 0x0400: Lost Static Data; 0x0800: Lost NV Data; 0x2000: Device Needs Maintenance Now; 0x4000: Power-up; 0x8000: Out-of-Service (MSB);	0x0000	Enumeration	The error status associated with the hardware or software components associated with a block; it is a bit string, so that multiple errors may be shown	Read-only
CLR_FSTATE (30)	0: Uninitialized; 1: Off (Normal operating)	1	Enumeration	Writing a Clear to this parameter will clear the device faultstate state if the field condition, if any, has cleared.	O/S, Auto
COMPATIBILITY_REV (67)	8	8	N/A	This parameter is used when replacing field devices. Specifies the minimum device revision number of the DD file that is compatible with this device	Read-only
CONFIRM_TIME (33)	A 32-bit unsigned integer capable of holding values 0 to 4294967295	640000	1/32 msec	The minimum time between retries of alert reports	O/S, Auto
CYCLE_SEL (20)	0x0000: No selection 0x0001: Scheduled; 0x0002 Block Execution	0x0000	Enumeration	Cycle Selection - used to select the block execution method for this resource. The supported cycle types are: SCHEDULED, COMPLETION_OF_BLOCK_EXECUTION.	O/S, Auto
CYCLE_TYPE (19)	0x0001: Scheduled; 0x0002 Block Execution	0x0003	Enumeration	Identifies the block execution methods available for this resource “Scheduled” means block execution, is scheduled through system management “Block execution” means block execution is scheduled the completion of execution of another block	Read-only
DD_RESOURCE (9)	ALL	32_spaces	N/A	String identifying the tag of the resource which contains the Device Description for the resource	Read-only
DD_REV (13)	1	1	N/A	Revision of the DD associated with the resource - used by the interface device to locate the DD file for the resource	Read-only

Table A-1. Resource Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writable mode
DEV_OPTIONS (72)	0x00000000: No options active 0x00000001: LCD display present 0x00000002: Statistical Process Monitoring	0	Enumeration	Indicates which device options are enabled. Some may be enabled in factory and are not available to the end user.	Read-only
DEV_REV (12)	8	8	N/A	Manufacturer revision number associated with the resource - used by an interface device to locate the DD file for the resource	Read-only
DEV_STRING (7)	N/A	N/A	N/A	Factory use only. Users should not modify.	O/S, Auto
DEV_TYPE (1)	0x3051	0x3051	Enumeration	Manufacturer's model number associated with the resource - used by interface devices to locate the DD file for the resource	Read-only
DEVICE_INFO (11)	Factory defined parameters for display only, not user modifiable	N/A	N/A	Used to group device specific informational parameters	Read-only
DOWNLOAD_MODE (93)	N/A	1	Enumeration	Used by factory only	O/S
FAILED_ACTIVE (75)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0	Enumeration	Read Only copy of FD_FAIL_ACTIVE This parameter is needed for backward compatibility with Plantweb Alerts.	Read-only
FAILED_ALM (84)	FAILED_ALM.1 - UNACKNOWLEDGED FAILED_ALM.2 - ALARM_STATE FAILED_ALM.3 - TIME_STAMP FAILED_ALM.4 - SUB_CODE FAILED_ALM.5 - VALUE	N/A	N/A	Alarm indicating a failure within a device which makes the device non-operational. Includes subfields: UNACKNOWLEDGED, ALARM_STATE,TIME_STAMP,SUB_CODE, VALUE	Mixed
FAILED_ENABLE (82)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0x70000000	Enumeration	Read Only copy of FD_FAIL_MAP This parameter is needed for backward compatibility with Plantweb Alerts.	Read-only
FAILED_MASK (83)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0	Enumeration	Read Only copy of FD_FAIL_MASK This parameter is needed for backward compatibility with Plantweb Alerts.	Read-only
FAILED_PRI (77)	0 (lowest) to 15 (highest) priority 0 = Field Diagnostics Enabled, Plantweb Alerts Disabled 1-15 = Plantweb Alerts Enable, Field Diagnostics Disabled	0	N/A	Designates the alarming priority of the FAILED_ALM. This parameter is also used to switch between Plantweb alerts and Field Diagnostics functionality.	O/S, Auto
FAULT_STATE (28)	0: Uninitialized; 1: Clear (Normal operating)	1	Enumeration	Condition set by loss of communication to an output block, failure promoted to an output block or a physical contact - when faultstate condition is set, output function blocks will perform their FSTATE actions	Read-only

Table A-1. Resource Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writable mode
FD_CHECK_ACTIVE (46)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0	Enumeration	This parameter reflects the error conditions that are being detected as active as selected for this category. It is a bit string, so that multiple conditions may be shown.	Read-only
FD_CHECK_ALM (50)	FD_CHECK_ALM.1 - UNACKNOWLEDGED; FD_CHECK_ALM.2 - ALARM_STATE; FD_CHECK_ALM.3 - TIME_STAMP; FD_CHECK_ALM.4 - SUBCODE; FD_CHECK_ALM.5 - VALUE;	N/A	Enumeration	This parameter is used primarily to broadcast a change in the associated active conditions, which are not masked, for this alarm category to a Host System.	Mixed
FD_CHECK_MAP	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0x00000001	Enumeration	This parameter maps conditions to be detected as active for the CHECK alarm category. Each condition that can be detected has a corresponding bit defined in this map. If the bit is set, it indicates that the condition is in the CHECK category (and will set the same bit in FD_CHECK_ACTIVE if the condition occurs). Multiple bits can be set at the same time.	O/S, Auto
FD_CHECK_MASK (54)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0	Enumeration	This parameter allows the user to suppress any single or multiple conditions that are active, in this category, from being broadcast to the host through the alarm parameter. A bit equal to '1' will mask i.e. inhibit the broadcast of a condition, and a bit equal to '0' will unmask i.e. allow broadcast of a condition.	O/S, Auto
FD_CHECK_PRI (62)	0 to 15	0	N/A	This parameter allows the host system to specify the priority of this alarm category.	O/S, Auto
FD_EXTENDED_ ACTIVE_1 (65)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0	Enumeration	A parameter to allow the user finer detail on conditions causing an active condition in the FD_*_ACTIVE parameters.This parameter will display all possible active conditions so there will always be 1 parameter that will display active conditions even if they are not mapped to the categories.	Read-only
FD_EXTENDED_ MAP_1 (66)	Any bit values are allowed, they will be discarded. The parameter will always return and use 0x70108019 0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0x70108019	Enumeration	A parameter to allow the user finer control on enabling conditions contributing to the conditions in FD_*_ACTIVE parameters.Any bit values are allowed, they will be discarded. The parameter will always return and use 0x70108019 to map each of the bits.	O/S, Auto
FD_FAIL_ACTIVE (43)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0	Enumeration	This parameter reflects the error conditions that are being detected as active as selected for this category. It is a bit string, so that multiple conditions may be shown.	Read-only

Table A-1. Resource Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writable mode
FD_FAIL_ALM (55)	FD_FAIL_ALM.1 - UNACKNOWLEDGED; FD_FAIL_ALM.2 - ALARM_STATE; FD_FAIL_ALM.3 - TIME_STAMP; FD_FAIL_ALM.4 - SUBCODE; FD_FAIL_ALM.5 - VALUE;	N/A	Enumeration	This parameter is used primarily to broadcast a change in the associated active conditions, which are not masked, for this alarm category to a Host System.	Mixed
FD_FAIL_MAP (47)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0x70000000	Enumeration	This parameter maps conditions to be detected as active for the FAIL alarm category. Each condition that can be detected has a corresponding bit defined in this map. If the bit is set, it indicates that the condition is in the FAIL category (and will set the same bit in FD_FAIL_ACTIVE if the condition occurs). Multiple bits can be set at the same.	O/S, Auto
FD_FAIL_MASK (51)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0	Enumeration	This parameter allows the user to suppress any single or multiple conditions that are active, in this category, from being broadcast to the host through the alarm parameter. A bit equal to '1' will mask i.e. inhibit the broadcast of a condition, and a bit equal to '0' will unmask i.e. allow broadcast of a condition.	O/S, Auto
FD_FAIL_PRI (59)	0 to 15	0	N/A	This parameter allows the host system to specify the priority of this alarm category. Set using the control host FOUNDATION Fieldbus interface.	O/S, Auto
FD_MAINT_ACTIVE (45)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0	Enumeration	This parameter reflects the error conditions that are being detected as active as selected for this category. It is a bit string, so that multiple conditions may be shown.	Read-only
FD_MAINT_ALM (57)	FD_MAINT_ALM.1 - UNACKNOWLEDGED; FD_MAINT_ALM.2 - ALARM_STATE; FD_MAINT_ALM.3 - TIME_STAMP; FD_MAINT_ALM.4 - SUBCODE; FD_MAINT_ALM.5 - VALUE;	N/A	Enumeration	This parameter is used primarily to broadcast a change in the associated active conditions, which are not masked, for this alarm category to a Host System.	Mixed
FD_MAINT_MAP (49)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0x00000018	Enumeration	This parameter maps conditions to be detected as active for the MAINT alarm category. Each condition that can be detected has a corresponding bit defined in this map. If the bit is set, it indicates that the condition is in the MAINT category (and will set the same bit in FD_MAINT_ACTIVE if the condition occurs). Multiple bits can be set at the same time.	O/S, Auto
FD_MAINT_MASK (53)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0	Enumeration	This parameter allows the user to suppress any single or multiple conditions that are active, in this category, from being broadcast to the host through the alarm parameter. A bit equal to '1' will mask i.e. inhibit the broadcast of a condition, and a bit equal to '0' will unmask i.e. allow broadcast of a condition.	O/S, Auto
FD_MAINT_PRI (61)	0 to 15	0	N/A	This parameter allows the host system to specify the priority of this alarm category. Set using the control host FOUNDATION Fieldbus interface.	O/S, Auto

Table A-1. Resource Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writable mode
FD_OFFSPEC_ACTIVE (44)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0	Enumeration	This parameter reflects the error conditions that are being detected as active as selected for this category. It is a bit string, so that multiple conditions may be shown.	Read-only
FD_OFFSPEC_ALM (56)	FD_OFFSPEC_ALM.1 - UNACKNOWLEDGED; FD_OFFSPEC_ALM.2 - ALARM_STATE; FD_OFFSPEC_ALM.3 - TIME_STAMP; FD_OFFSPEC_ALM.4 - SUBCODE; FD_OFFSPEC_ALM.5 - VALUE;	N/A	Enumeration	This parameter is used primarily to broadcast a change in the associated active conditions, which are not masked, for this alarm category to a Host System.	Mixed
FD_OFFSPEC_MAP (48)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0x00108000	Enumeration	This parameter maps conditions to be detected as active for the OFFSPEC alarm category. Each condition that can be detected has a corresponding bit defined in this map. If the bit is set, it indicates that the condition is in the OFFSPEC category (and will set the same bit in FD_OFFSPEC_ACTIVE if the condition occurs). Multiple bits can be set at the same time.	O/S, Auto
FD_OFFSPEC_MASK (52)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0	Enumeration	This parameter allows the user to suppress any single or multiple conditions that are active, in this category, from being broadcast to the host through the alarm parameter. A bit equal to '1' will mask i.e. inhibit the broadcast of a condition, and a bit equal to '0' will unmask i.e. allow broadcast of a condition.	O/S, Auto
FD_OFFSPEC_PRI (60)	0 to 15	0	N/A	This parameter allows the host system to specify the priority of this alarm category. Set using the control host FOUNDATION Fieldbus interface.	O/S, Auto
FD_RECOMMEN_ACT (64)	See FD_RECOMMENDED_ACTION table.	1	Enumeration	This parameter is a device enumerated summarization of the most severe condition or conditions detected. The DD help should describe by enumerated action, what should be done to alleviate the condition or conditions. 0 is defined as Not Initialized, 1 is defined as No Action Required, all others defined by manufacturer. Disabling or masking a device condition will not have an effect on the recommended actions.	Read-only
FD_SIMULATE (63)	FD_SIMULATE.1 - DIAGNOSTIC_SIMULATE_VALUE; FD_SIMULATE.2 - DIAGNOSTIC_VALUE; FD_SIMULATE.3 - ENABLE;	N/A	N/A	This parameter allows the conditions to be manually supplied when simulation is enabled. When simulation is disabled both the diagnostic simulate value and the diagnostic value track the actual conditions. The physical simulate switch needs to be enabled to allow simulation to be activated in software. When simulation is enabled, the DIAGNOSTIC_SIMULATE_VALUE can be used to simulate the *_ACTIVE parameters. While simulation is enabled the recommended action will show that simulation is active.	O/S, Auto
FD_VER (42)	1	1	N/A	Reflects the value of the major version of Field Diagnostics specification to which the device was designed - this allows hosts to distinguish between changes that may be necessary to be made in such a recent specification.	Read-only

Table A-1. Resource Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writable mode
FEATURE_SEL (18)	0x0000: No features selected 0x0001: Unicode strings; 0x0002: Reports supported; 0x0008: Soft supported; 0x0010: Hard supported; 0x0400: Multi-bit Alarm (bit-alarm) support; 0x0800: Restart/Relink required after using FB Action	0x0000	Enumeration	Used to select resource block options	O/S, Auto
FEATURES (17)	0x0001: Unicode strings; 0x0002: Reports supported; 0x0008: Soft supported; 0x0010: Hard supported; 0x0400: Multi-bit Alarm (bit-alarm) support; 0x0800: Restart/Relink required after using FB Action	0x0C1B	Enumeration	Used to show supported resource block options	Read-only
FINAL_ASSY_NUM (74)	32 bit number	Set at factory; not modifiable	N/A	The same final assembly number placed on the neck label	O/S, Auto
FREE_SPACE (24)	0.0 to100.0 calculated by the device	33.3333	%	Percent of memory available for further configuration - Additional function blocks may be instantiated if value > 0.0%	Read-only
FREE_TIME (25)	0.0 to100.0	Set to 0 to indicate parameter is not used.	%	Percent of the block processing time that is free to process additional blocks	Read-only
GRANT_DENY (14)	Indexes for subparameters of GRANT_DENY: 1 - GRANT; 2 - DENY;	0	N/A	Options for controlling access of host computer and local control panels to operating, tuning and alarm parameters of the block. See fieldbus specifications for sub-parameters.	O/S, Auto
HARD_TYPES (15)	0x0001 indicated the device contains at least one AI block.	0x0001	Enumeration	The types of hardware available as channel numbers	Read-only
HARDWARE_ REVISION (68)	Set at factory	Set at factory; not modifiable	N/A	Hardware revision of that hardware	Read-only
HEALTH_INDEX (76)	10, 30, 70, 90, 100	100	N/A	Represents the overall health of the device, 100 being perfect.The value will be set based on active field diagnostic conditions. Disabling or masking a device condition will not have an effect on the health index.	Read-only
ITK_VER (41)	6	6	N/A	Major revision number of the interoperability test case used in certifying this device as interoperable - the format and range are controlled by the Fieldbus Foundation.	Read-only
LIM_NOTIFY (32)	0 to 7	7	N/A	Maximum number of unconfirmed alert notify messages allowed	O/S, Auto
MAINT_ACTIVE (88)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0	Enumeration	Read Only copy of FD_OFFSPEC_ACTIVE This parameter is needed for backward compatibility with Plantweb Alerts.	Read-only
MAINT_ALM (80)	MAINT_ALM.1 - UNACKNOWLEDGED; MAINT_ALM.2 - ALARM_STATE; MAINT_ALM.3 - TIME_STAMP; MAINT_ALM.4 - SUB_CODE; MAINT_ALM.5 - VALUE;	N/A	N/A	Alarm indicating the device needs maintenance soon. If the condition is ignored, the device will eventually fail.	Mixed

Table A-1. Resource Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writable mode
MAINT_ENABLE (86)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0x00108000	Enumeration	Read Only copy of FD_OFFSPEC_MAP This parameter is needed for backward compatibility with Plantweb Alerts.	Read-only
MAINT_MASK (87)	0x00000000: All bits cleared 0x00000001: Check Function 0x00000008: Variation Change Detected 0x00000010: Display Update Failure 0x00008000: Sensor Temperature Out of Limits 0x00100000: Pressure Out of Limits 0x10000000: Incompatible Module 0x20000000: Sensor Failure 0x40000000: Electronics Failure	0	Enumeration	Read Only copy of FD_OFFSPEC_MASK	Read-only
MAINT_PRI (85)	0 to 15	0	N/A	Designates the alarming priority of the MAINT_ALM	O/S, Auto
MANUFAC_ID (10)	0x00001151:Rosemount	0x00001151	Enumeration	Manufacturer identification number - used by an interface device to locate the DD file for the resource	Read-only
MAX_NOTIFY (31)	An 8-bit unsigned integer capable of holding values 0 to 255	7	N/A	Maximum number of unconfirmed alert notify messages possible	Read-only
MEMORY_SIZE (22)	16 kilobytes	16	Kbytes	Available configuration memory in the empty resource - to be checked before attempting a download	Read-only
MIN_CYCLE_T (21)	1760 = 55 msec	1760	1/36 msec	Minimum Cycle Time - the smallest macrocycle of time of which the device is capable.	Read-only
MODE_BLK (5)	MODE_BLK.1 - TARGET; MODE_BLK.2 - ACTUAL; MODE_BLK.3 - PERMITTED; MODE_BLK.4 - NORMAL;	N/A	N/A	The actual, target, permitted, and normal modes of the block	Mixed
NV_CYCLE_T (23)	960000= 30 seconds	960000	1/32 msec	Minimum time interval specified by the manufacturer for writing copies of NV parameters to non-volatile memory Zero means it will never be automatically copied. At the end of NV_CYCLE_TIME, only those parameters that have changed (as defined by the manufacturer) need to be updated in NVRAM.	Read-only
OUTPUT_BOARD_SN (73)	Set at the factory	mfg_block	N/A	Output board serial number	Read-only
PD_TAG (70)	Supported characters defined by FOUNDATION Fieldbus specifications.	32_spaces	N/A	PD tag description of device	Read-only
RECOMMENDED_ ACTION (78)	See FD_RECOMMENDED_ACTION.	1	Enumeration	Read-only copy of FD_RECOMMEN_ACT	Read-only

Table A-1. Resource Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writable mode
RESTART (16)	0: Uninitialized; 1: Run: is the passive state of the parameter; 2: Restart resource: to clear up problems like garbage collection; 3: Restart with defaults: to reset all configurable function block application objects to their initial value i.e. their value before any configuration was done by the user; 4: Restart processor: provides a way to hit the reset button on the processor associated with the resource; 5-10: Device specific: unused; 11: Restore Factory default blocks: restores default blocks i.e. manufacturer pre-instantiated blocks; 12: Reset transducer block Factory calibration: resets transducer block calibration to manufacturer settings (same as STB.FACTORY_CAL_RECALL)	1	Enumeration	Allows a manual restart to be initiated or allows values to be defaulted. The values 5-10 will not appear in the DD enumeration, because they are unused.When these values are written the only action that will happen is this parameter will set back to a value of 1.	O/S, Auto
RS_STATE (7)	0: Uninitialized; 1: StartRestart; 2: Initialization; 3: Online Linking; 4: Online; 5: Standby; 6: Failure	0	Enumeration	State of the function block application state machine	Read-only
SET_FSTATE (29)	0: Uninitialized; 1: Off (Normal operating)	1	Enumeration	Allows the faultstate condition to be manually initiated by selecting Set	O/S, Auto
SHED_RCAS (26)	A 32-bit unsigned integer capable of holding values 0 to 4294967295	640000	1/32 msec	Time duration at which to give up on - computer writes to function block RCas locations	O/S, Auto
SHED_ROUT (27)	A 32-bit unsigned integer capable of holding values 0 to 4294967295	640000	1/32 msec	Time duration at which to give up on - computer writes to function block ROut locations	O/S, Auto
SOFTWARE_REV (69)	Denotes software build number and software build date	Read from the device	N/A	Software revision of source code that has resource block in it	Read-only
ST_REV (1)	A 16-bit unsigned integer capable of holding values 0 to 65535	0	N/A	The revision level of the static data associated with the function block	Read-only
STRATEGY (3)	A 16-bit unsigned integer capable of holding values 0 to 65535	0	N/A	The strategy field can be used to identify grouping of blocks	O/S, Auto
SWITCHES_STATE (94)	1: Disable 2: Enable	Read from the device	N/A	Shows the group of device specific informational parameters related to the state of security and simulate switchers	Read-only
TAG_DESC (2)	A string of bytes that can contain any value, usually shown as pairs of hex characters	32_spaces	N/A	The user description of the intended application of the block	O/S, Auto
TEST_RW (8)	TEST_RW.1 - VALUE_1; TEST_RW.2 - VALUE_2; TEST_RW.3 - VALUE_3; TEST_RW.4 - VALUE_4; TEST_RW.5 - VALUE_5; TEST_RW.6 - VALUE_6; TEST_RW.7 - VALUE_7; TEST_RW.8 - VALUE_8; TEST_RW.9 - VALUE_9; TEST_RW.10 - VALUE_10; TEST_RW.11 - VALUE_11; TEST_RW.12 - VALUE_12; TEST_RW.13 - VALUE_13; TEST_RW.14 - VALUE_14; TEST_RW.15 - VALUE_15;	N/A	N/A	Read/write test parameter - used only for ITK conformance testing	O/S, Auto
UPDATE_EVT (35)	UPDATE_EVT.1 - UNACKNOWLEDGED; UPDATE_EVT.2 - UPDATE_STATE; UPDATE_EVT.3 - TIME_STAMP; UPDATE_EVT.4 - STATIC_REVISION; UPDATE_EVT.5 - RELATIVE_INDEX;	N/A	N/A	This alert is generated by any change to the static data - contains subfields: UNACKNOWLEDGED, UPDATE_STATE, TIME_STAMP, STATIC_REVISION, RELATIVE_INDEX	Mixed

Table A-1. Resource Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writable mode
WRITE_ALM (40)	N/A	N/A	N/A	This alert is generated if the parameter is cleared - contains subfields: UNACKNOWLEDGED, ALARM_STATE, TIME_STAMP, SUB_CODE	Mixed
WRITE_LOCK (34)	0: Uninitialized; 1: Not Locked (Writes to Parameters are allowed); 2: Locked (Writes to Parameters are not allowed except to WRITE_LOCK)	1	Enumeration	If set to Locked, no writes from anywhere are allowed, except to clear WRITE_LOCK. Block inputs will continue to be updated.	O/S, Auto
WRITE_PRI (39)	0 to 15	0	N/A	Priority of the alarm generated by clearing the	O/S, Auto

A.2 Sensor transducer block

The transducer block contains the actual measurement data, including a pressure and temperature reading. The transducer block includes information about sensor type, engineering units, linearization, reranging, temperature compensation, and diagnostics.

Table A-2. Sensor Transducer Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writeable mode
ALERT_KEY (4)	Any value from 1-255	0	N/A	The identification number of the PlantUnit	O/S, Auto
BLOCK_ALM (8)	N/A	N/A	N/A	Used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.	Mixed
BLOCK_ERR (6)	0x0000:No errors 0x0001: Other (LSB) 0x8000: Out-of-Service	0x0000	Enumeration	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.	Read-only
CAL_MIN_SPAN (19)	ALL	2.5	CU (Calibration units)	The minimum calibration span value allowed - This minimum span information is necessary to ensure that when calibration is done, the two calibrated points are not too close together.	Read-only
CAL_POINT_HI (17)	ALL	250	CU (Calibration units)	The highest calibrated value	O/S, Man
CAL_POINT_LO (18)	ALL	0.0	CU (Calibration units)	The lowest calibrated value	O/S, Man

Table A-2. Sensor Transducer Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writeable mode
CAL_UNIT (21)	1130: Pascals 1132: Megapascals 1133: Kilopascals 1136: Hectopascals 1137: Bar 1138: Millibar 1139: torr at 0 °C 1140: Atm 1141: Psi 1144: g/cm^2 1145: kg/cm^2 1146: inH_2O at 60 °F 1147: inH_2O at 4 °C 1148: inH_2O at 68 °F 1150: mm H_2O at 4 °C 1151: mm H_2O at 68 °F 1152: ft H_2O at 68 °F 1153: ft H_2O at 4 °C 1154: ft H_2O at 68 °F 1156: in Hg at 0 °C 1158: mm Hg at 0 °C 1724: inH_2O (60 °F) 1735: cmH_2O (4 °C) 1736: mH_2O (4 °C) 1737: cmHg (0 °C) 1738: psf 1739: mHg (0 °C) 1750: ftH_2O (60 °F) 1751: kg/m^2	N/A	Enumeration	The Device Description engineering units code index for the calibration values.	O/S, Man
CAL_VALUE (20)	CAL_VALUE.1 - STATUS; CAL_VALUE.2 - VALUE	N/A	N/A	The pressure value used for calibration in CAL_UNITS	Read-only
COLLECTION_ DIRECTORY (13)	0	0	N/A	A directory that specifies the number, starting indices, and DD Item ID's of the data collections in each transducer block - Directory has a value of zero if only a single data collection exists	Read-only
DRAIN_VENT_MTL (44)	0 to 255 2: 316 Stainless Steel; 3: Alloy C-276; 4: Alloy 400/K-500; 251: None; 252: Unknown; 253: Special	252	N/A	Indicates the type of material of which the drain vents on the flange are made	O/S
FACTORY_CAL_ RECALL (34)	1: No Recall (always read, but can't be written); 2: Recall	1	Enumeration	Recalls the sensor calibration set at the factory	O/S
FLANGE_MTL (38)	0 to 255 0: Carbon Steel; 2: 316 Stainless Steel; 3: Cast C-276; 4: Alloy 400/K-500; 24: K-500; 252: Unknown; 253: Special	252	Enumeration	Indicates the type of material of which the flange is made	O/S

Table A-2. Sensor Transducer Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writeable mode
FLANGE_TYPE (37)	0 to 255 12: Conventional (Traditional); 13: Coplanar; 14: Remote Seal; 15: Level; 3-in., 150 lb.; 16: Level; 4-in., 150 lb.; 17: Level; 3-in., 300 lb.; 18: Level; 4-in., 300 lb.; 19: Level; DN 80, PN 40; 20: Level; DN 100, PN 40; 21: Level; DN 100, PN 10/16; 22: Level; 2-in., 150 lb.; 23: Level; 2-in., 300 lb.; 24: Level; DN 50, PN 6; 25: Level; DN 50, PN 40; 44: 0.5 in NPTF; 45: DIN 16288G $^{1}/_{2}$ A Male; 46: 0.25 in NPT; 243: 1.5-in. Tri Clamp; 244: 2-in. Tri Clamp; 246: Varivent® Type F; 247: Varivent Type N; 248: DIN 11851 DN 40; 249: DIN 11851 DN50; 252: Unknown; 253: Special	252	Enumeration	Indicates the type of flange that is attached to the device	O/S
MODE_BLK (5)	MODE_BLK.1 - TARGET; MODE_BLK.2 - ACTUAL; MODE_BLK.3 - PERMITTED; MODE_BLK.4 - NORMAL	5	N/A	The actual, target, permitted, and normal modes of the block	Mixed
MODULE_TYPE (35)	Values: 0: Standard Coplanar (C) 1: Standard Threaded (T) 252: Unknown	252	Enumeration	Indicates the type of sensor module	Read-only
O_RING_MTL (43)	0 to 255 0: Undefined; 10: PTFE; 11: Viton; 12: Buna-N; 13: Ethyl-Prop; 36: PTFE Glass; 37: PTFE Graphite; 251: None; 252: Unknown; 253: Special	252	N/A	Indicates the type of material of which the flange O-rings are made	O/S
PRIMARY_VALUE (15)	PRIMARY_VALUE.1 - STATUS PRIMARY_VALUE.2- VALUE	N/A	PV range units	Measured value and status available to the function block	Read-only
PRIMARY_VALUE_ DAMPING (45)	0.4 to 60.0	0.4	Sec.	Time constant of a single exponential filter for the PV, in seconds	O/S

Table A-2. Sensor Transducer Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writeable mode
PRIMARY_VALUE_ RANGE (16)	PRIMARY_VALUE_RANGE.1 - EU_100; PRIMARY_VALUE_RANGE.2 - EU_0; PRIMARY_VALUE_RANGE.3 - UNITS_INDEX; 1130: Pascals 1132: Megapascals 1133: Kilopascals 1136: Hectopascals 1137: Bar 1138: Millibar 1139: torr at 0 °C 1140: Atm 1141: Psi 1144: g/cm^2 1145: kg/cm^2 1146: inH_2O at 60 °F 1147: inH_2O at 4 °C 1148: inH_20 at 68 °F 1150: mmH_2O at 4 °C 1151: mmH_2O at 68 °F 1152: ftH_2O at 68 °F 1153: ftH_2O at 4 °C 1154: ftH_2O at 68 °F 1156: inHg at 0 °C 1158: mmHg at 0 °C 1724: inH_2O (60 °F) 1735: cmH_2O (4 °C) 1736: mH_2O (4 °C) 1737: cmHg (0 °C) 1738: psf 1739: mHg (0 °C) 1750: ftH_2O (60 °F) 1751: kg/m^2 PRIMARY_VALUE_RANGE.4 - DECIMAL	N/A	PVR	The high and low range limit values, engineering units code, and number of digits to the right of the decimal point to be used to display the final value	Read-only
PRIMARY_VALUE_ TYPE (14)	107: differential pressure; 108: gauge pressure; 109: absolute pressure; 65535: other; Note: Can only write the same value as the current value	107, 108, or 109 depending on assembled sensor type	Enumeration	The type of measurement represented by the primary value - Can only write the same value as the current value	O/S
PV_GAUGE_SCALE (46)	N/A	N/A	N/A	Used to store the upper and lower scale gauge limits	O/S, Auto, Manual
REM_SEAL_FILL (42)	0 to 255 2: Silicone oil; 3: SYLTHERM™ 800; 4: Inert (Halocarbon™); 5: Glycerin and water; 6: Propylene Glycol and water; 7: Neobee M-20; 8: Sylltherm XLT; 10: Silicone 704; 14: Silicone 200; 251: None; 252: Unknown; 253: Special;	252	N/A	Indicates the type of fill fluid used in the remote seals	O/S
REM_SEAL_ISO_ MTL (41)	0 to 255 2: 316L Stainless Steel 3: Alloy C-276 4: Alloy 400 5: Tantalum 9: Co-Cr-Ni 34: PTFE Coated 316L SST 240: Nickel 201 251: None 252: Unknown 253: Special	252	N/A	Indicates the type of material of which the remote seal isolators are made	O/S

Table A-2. Sensor Transducer Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writeable mode
REM_SEAL_NUM (39)	0 to 255 0: Undefined; 1: One Seal; 2: Two Seals; 251: None; 252: Unknown; 253: Special;	252	Enumeration	Indicates the number of remote seals attached to the device	O/S
REM_SEAL_TYPE (40)	0 to 255 0: Undefined; 1: Reserved; 2: CTW; 3: EFW (Expanded Flange Seal); 4: PFW (Pancake); 5: RFW (Flanged Remote); 6: RTW (Threaded Remote); 7: SCW; 8: SSW; 9: High Temperature; 10: FFW Flanged Flush Surface; 11: UCW; 12: TSW; 251: None; 252: Unknown; 253: Special	252	N/A	Indicates the type of remote seals attached to the device	O/S
SECONDARY_ VALUE (32)	SECONDARY_VALUE.1 - STATUS; SECONDARY_VALUE.2 - VALUE	N/A	N/A	Secondary value, related to the sensor	Read-only
SECONDARY_ VALUE_UNIT (33)	1001: Deg C 1002: Deg F	1001	Enumeration	Engineering units to be used with the SECONDARY_VALUE	Read-only
SENSOR_CAL_ DATE (28)	ALL	0	N/A	The date of the last sensor calibration - This is intended to reflect the calibration of that part of the sensor that is usually wetted by the process.	O/S, Man
SENSOR_CAL_LOC (27)	ALL	32_spaces	N/A	The location of the last sensor calibration - This describes the physical location at which the calibration was performed.	O/S, Man
SENSOR_CAL_ METHOD (26)	0: Uninitialized 100: Volumetric; 101: Static weigh; 102: Dynamic weigh; 103: Factory trim standard calibration; 104: User trim standard calibration; 105: Factory trim special calibration; 106: User trim special calibration; 255: Other	0	Enumeration	The method of last sensor calibration - It could be one of the several standard calibration methods defined by ISO or some other method.	O/S, Man
SENSOR_CAL_TYPE (36)	Values: 0: Differential Pressure 1: Gauge Pressure 2: Absolute Pressure	0	Enumeration	The type of last sensor calibration	O/S, Man
SENSOR_CAL_ WHO (29)	ALL	32_spaces	N/A	The name of the person responsible for the last sensor calibration	O/S, Man
SENSOR_FILL_ FLUID (31)	0 to 255; 0: Undefined; 1: Silicone; 2: Inert; 3: Undefined; 7: Neobee; 251: None; 252: Unknown; 253: Special	252	Enumeration	Defines the type of fill fluid used in the sensor - For UI purposes only (no effect on device behavior)	Read-only

Table A-2. Sensor Transducer Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writeable mode
SENSOR_ISOLATOR_MTL (30)	0 to 255; 0: Undefined; 2: 316 Stainless steel; 3: Alloy C-276; 4: Alloy 400; 5: Tantalum; 15: Gold-Plated Alloy 400; 34: Gold-Plated 316L SST; 251: None; 252: Unknown; 253: Special	252	Enumeration	Defines the construction material for the isolating diaphragms - For UI purposes only (no effect on device behavior)	Read-only
SENSOR_RANGE (24)	SENSOR_RANGE.1 - EU_100; SENSOR_RANGE.2 - EU_0; SENSOR_RANGE.3 - UNITS_INDEX; 1130: Pascals 1132: Megapascals 1133: Kilopascals 1136: Hectopascals 1137: Bar 1138: Millibar 1139: torr at 0 °C 1140: Atm 1141: Psi 1144: g/cm^2 1145: kg/cm^2 1146: inH_2O at 60 °F 1147: inH_2O at 4 °C 1148: inH_2O at 68 °F 1150: mmH_2O at 4 °C 1151: mmH_2O at 68 °F 1152: ftH_2O at 68 °F 1153: ftH_2O at 4 °C 1154: ftH_2O at 68 °F 1156: inHg at 0 °C 1158: mmHg at 0 °C 1724: inH_2O (60 °F) 1735: cmH_2O (4 °C) 1736: mH_2O (4 °C) 1737: cmHg (0 °C) 1738: psf 1739: mHg (0 °C) 1750: ftH_2O (60 °F) 1751: kg/m^2 SENSOR_RANGE.4 - DECIMAL;	N/A	SR	The high and low range limit values, engineering units code. and number of digits to the right of the decimal point for the sensor	Read-only
SENSOR_SN (25)	ALL	“16777215”	N/A	The sensor serial number	Read-only
SENSOR_TYPE (23)	117: Capacitive (DP sensor); 121: Pressure sensor unknown (for no sensor attached); 124 - Strain gauge (AP or GP sensor); Note: Can only write the same value as the current value	117, 124	Enumeration	The type of sensor connected with the transducer block - Can only write the same value as the current value	O/S
ST_REV (1)	A 16-bit unsigned integer capable of holding values 0 to 65535	0	N/A	The revision level of the static data associated with the function block	Read-only
STRATEGY (3)	A 16-bit unsigned integer capable of holding values 0 to 65535	0	N/A	The strategy field can be used to identify grouping of blocks	O/S, Auto
TAG_DESC (2)	A string of bytes that can contain any value, usually shown as pairs of hex characters	32_spaces	N/A	The user description of the intended application of the block	O/S, Auto
TRANSDUCER_DIRECTORY (9)	0	0	N/A	A directory that specifies the number and starting indicies of the transducers in the transducer block	Read-only
TRANSDUCER_TYPE (10)	100= standard pressure with calibration	100	Enumeration	Identifies the transducer that follows	Read-only

Table A-2. Sensor Transducer Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writeable mode
TRANSDUCER_ TYPE_VER (11)	0x0201 02 = Revision of FF-903 01=Rosemount revision	0x0201	N/A	The version of the transducer identified by TRANSDUCER_TYPE in the form 0xAABB where AA is the major revision of the transducer specification on which the transducer is based, and BB is a revision number assigned and controlled by the manufacturer of the device.	Read-only
UPDATE_EVT (7)	N/A	N/A	N/A	This alert is generated by any change to the static data. Contains subfield: UNACKNOWLEDGED, UPDATE_STATE, TIME_STAMP, STATIC_REVISION, RELATIVE_INDEX	Mixed
XD_ERROR (12)	0= No error 22= I/O failure	0	Enumeration	Provides additional error codes related to transducer blocks	Read-only
XD_OPTS (22)	0x00000000: No bits set 0x00000001: Input Status Bad in Manual 0x00000002: Input Status Uncertain in Manual	0x00000000	Enumeration	Options the user may select to alter transducer behavior when the block is in manual mode.	O/S

A.3 Analog input (AI) function block

The Analog Input (AI) function block processes field device measurements 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 measuring device may have several measurements or derived values available in different channels. Use the channel number to define the variable that the AI block processes. The AI block supports alarming, signal scaling, signal filtering, signal status calculation, mode control, and simulation. In Automatic mode, the block's output parameter (OUT) reflects the process variable (PV) value and status. In Manual mode, OUT may be set manually. The Manual mode is reflected on the output status. A discrete output (OUT_D) is provided to indicate whether a selected alarm condition is active. Alarm detection is based on the OUT value and user specified alarm limits. Figure A-1 illustrates the internal components of the AI function block, and Table A-3 lists the AI block parameters and their units of measure, descriptions, and index numbers.

Figure A-1. AI Block Internal Components

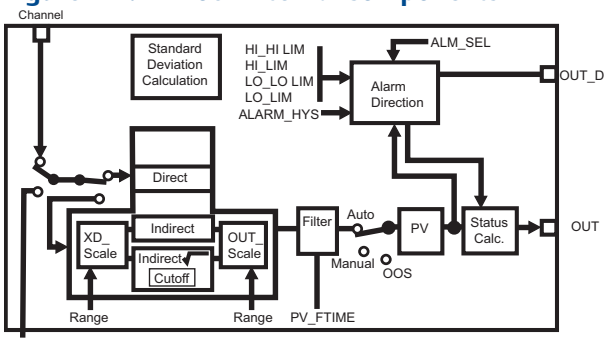


Table A-3. Definitions of Analog Input Function Block System Parameters

Parameter	Available values	Units	Default	Read/write	Description
ACK_OPTION	0 = Auto Ack Disabled 1 = Auto Ack Enabled	None	0 all Disabled	Read and write	Used to set auto acknowledgment of alarms
ALARM_HYS	0–50	Percent	0.5	Read and write	The amount the alarm value must return within the alarm limit before the associated active alarm condition clears.
ALARM_SEL	HI_HI, HI, LO, LO_LO	None	Non selected	Read and write	Used to select the process alarm conditions that will cause the OUT_D parameter to be set.
ALARM_SUM	Enable/Disable	None	Enable	Read and write	The summary alarm is used for all process alarms in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status parameter. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.
ALERT_KEY	1–255	None	0	Read and write	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.
BLOCK_ALM	N/A	None	N/A	Read-only	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status parameter. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.
BLOCK_ERR	N/A	None	N/A	Read-only	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.
CAP_STDDEV	> = 0	Seconds	0	Read and write	The time over which the VAR_INDEX is evaluated.
CHANNEL	1 = Pressure 2 = Housing temperature 12 = SPM mean 13 = SPM standard deviation	None	AI[1]: Channel = 1 AI2: Channel = 2	Read and write	The CHANNEL value is used to select the measurement value. Refer to the appropriate device manual for information about the specific channels available in each device. You must configure the CHANNEL parameter before you can configure the XD_SCALE parameter.
FIELD_VAL	0–100	Percent	N/A	Read-only	The value and status from the transducer block or from the simulated input when simulation is enabled.
GRANT_DENY	Program Tune Alarm Local	None	N/A	Read and write	Normally the operator has permission to write to parameter values, but Program or Local remove that permission and give it to the host controller or a local control panel.
HI_ALM	N/A	None	N/A	Read-only	The HI alarm data, which includes a value of the alarm, a timestamp of occurrence and the state of the alarm.
HI_HI_ALM	N/A	None	N/A	Read-only	The HI HI alarm data, which includes a value of the alarm, a timestamp of occurrence and the state of the alarm.
HI_HI_LIM	Out_Scale[2]	Out_Scale[2]	N/A	Read and write	The setting for the alarm limit used to detect the HI HI alarm condition.
HI_HI_PRI	0–15	None	1	Read and write	The priority of the HI HI alarm.
HI_LIM	Out_Scale[2]	Out_Scale[2]	N/A	Read and write	The setting for the alarm limit used to detect the HI alarm condition.
HI_PRI	0–15	None	1	Read and write	The priority of the HI alarm.
IO_OPTS	Low Cutoff Enable/Disable	None	Disable	Read and write	Allows the selection of input/output options used to alter the PV. Low cutoff enabled is the only selectable option.
L_TYPE	Direct Indirect Indirect Square Root	None	Direct	Read and write	Linearization type. Determines whether the field value is used directly (Direct), is converted linearly (Indirect), or is converted with the square root (Indirect Square Root).

Table A-3. Definitions of Analog Input Function Block System Parameters

Parameter	Available values	Units	Default	Read/write	Description
LO_ALM	N/A	None	N/A	Read-only	The LO alarm data, which includes a value of the alarm, a timestamp of occurrence and the state of the alarm.
LO_LIM	Out_Scale(2)	Out_Scale(2)	N/A	Read and write	The setting for the alarm limit used to detect the LO alarm condition.
LO_LO_ALM	N/A	None	N/A	Read-only	The LO LO alarm data, which includes a value of the alarm, a timestamp of occurrence and the state of the alarm.
LO_LO_LIM	Out_Scale(2)	Out_Scale(2)	N/A	Read and write	The setting for the alarm limit used to detect the LO LO alarm condition.
LO_LO_PRI	0–15	None	1	Read and write	The priority of the LO LO alarm.
LO_PRI	0–15	None	1	Read and write	The priority of the LO alarm.
LOW_CUT	> = 0	Out_Scale(2)	0	Read and write	If percentage value of transducer input fails below this, PV = 0.
MODE_BLK	Auto Manual Out of Service	None	N/A	Read and write	The actual, target, permitted, and normal modes of the block. Target: The mode to “go to” Actual: The mode the “block is currently in” Permitted: Allowed modes that target may take on Normal: Most common mode for target
OUT	Out_Scale(2) ± 10%	Out_Scale(2)	N/A	Read and write	The block output value and status.
OUT_D	Discrete_State 1–16	None	Disabled	Read and write	Discrete output to indicate a selected alarm condition.
OUT_SCALE	Any output range	All available	none	Read and write	The high and low scale values, engineering units code, and number of digits to the right of the decimal point associated with OUT.
PV	N/A	Out_Scale(2)	N/A	Read-only	The process variable used in block execution.
PV_FTIME	> = 0	Seconds	0	Read and write	The time constant of the first-order PV filter. It is the time required for a 63% change in the IN value.
SIMULATE	N/A	None	Disable	Read and write	A group of data that contains the current transducer value and status, the simulated transducer value and status, and the enable/disable bit.
ST_REV	N/A	None	0	Read-only	The revision level of the static data associated with the function block. The revision value will be incremented each time a static parameter value in the block is changed.
STATUS_OPTS	Propagate fault forward Uncertain if Limited Bad if Limited Uncertain if Man Mode		0	Read and write	
STDDEV	0 – 100	Percent	0	Read and write	The average absolute error between the PV and its previous mean value over that evaluation time defined by VAR_SCAN.
STRATEGY	0 – 65535	None	0	Read and write	The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block.

Table A-3. Definitions of Analog Input Function Block System Parameters

Parameter	Available values	Units	Default	Read/write	Description
TAG_DESC	32 text characters	None	none	Read and write	The user description of the intended application of the block.
UPDATE_EVT	N/A	None	N/A	Read-only	This alert is generated by any change to the static data.
XD_SCALE	Any sensor range	1130: Pascals 1132: Megapascals 1133: Kilopascals 1136: Hectopascals 1137: Bar 1138: Millibar 1139: torr at 0 °C 1140: Atm 1141: Psi 1144: g/cm^2 1145: kg/cm^2 1146: inH_2O at 60 °F 1147: inH_2O at 4 °C 1148: inH_2O at 68 °F 1150: mmH_2O at 4 °C 1151: mmH_2O at 68 °F 1152: ftH_2O at 60 °F 1153: ftH_2O at 4 °C 1154: ftH_2O at 68 °F 1156: inHg at 0 °C 1158: mmHg at 0 °C 1724: inH_2O (60 °F) 1735: cmH_2O (4 °C) 1736: mH_2O (4 °C) 1737: cmHg (0 °C) 1738: psf	AI1[1]: Customer specification or inH_2O (68 °F) for DP/GP rng 1, 2, 3) or psi for DP/GP rng 4, 5 AP/3051T all rng AI2 deg C	N/A	In all Rosemount devices the units of the transducer block is forced to match the unit code.

1. The host system may write over default values pre-configured by Rosemount Inc.
2. Assume that when L_Type = Direct, the user configures Out_Scale which is equal to XD_Scale

A.4 LCD display transducer block

Table A-4. LCD Display Transducer Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writeable mode
BLK_TAG_1 (16)	ALL	32_spaces	N/A	The tag of the block containing Advanced Config Display Parameter (DP) slot #1. Block Tag -- a string of 1-32 characters that uniquely identifies each block. BLK_TAG_1 value should match existing block tag in the device and any other values will cause error. The combination of the BLK_TAG_1 and PARAM_INDEX_1 are used to uniquely identify the specific parameter in the device that will be displayed.	O/S, Auto
BLK_TAG_2 (22)	ALL	32_spaces	N/A	The tag of the block containing Advanced Config Display Parameter (DP) slot #2. Block Tag -- a string of 1-32 characters that uniquely identifies each block. BLK_TAG_2 value should match existing block tag in the device and any other values will cause error. The combination of the BLK_TAG_2 and PARAM_INDEX_2 are used to uniquely identify the specific parameter in the device that will be displayed.	O/S, Auto
BLK_TAG_3 (28)	ALL	32_spaces	N/A	The tag of the block containing Advanced Config Display Parameter (DP) slot #3. Block Tag -- a string of 1-32 characters that uniquely identifies each block. BLK_TAG_3 value should match existing block tag in the device and any other values will cause error. The combination of the BLK_TAG_3 and PARAM_INDEX_3 are used to uniquely identify the specific parameter in the device that will be displayed.	O/S, Auto
BLK_TAG_4 (34)	ALL	32_spaces	N/A	The tag of the block containing Advanced Config Display Parameter (DP) slot #4. Block Tag -- a string of 1-32 characters that uniquely identifies each block. BLK_TAG_4 value should match existing block tag in the device and any other values will cause error.The combination of the BLK_TAG_4 and PARAM_INDEX_4 are used to uniquely identify the specific parameter in the device that will be displayed.	O/S, Auto
BLK_TYPE_1 (15)	0x0000: Uninitialized 0x0101: AI Block 0x0108: PID Block 0x011D: Signal Characterizer Block 0x0120: Integrator Block 0x0126: Input Selector Block 0x0127: Arithmetic Block 0x010A: Control Selector 0x011C: Output Splitter	0x0000	Enumeration	Specifies the enumerated block type from which the Advanced Config - Display Parameter 1 (DP1) will read its displayed value from. The value of BLK_TYPE_1 is used by the conditional DD to reduce the list of parameter indices in PARAM_INDEX_1 to only those that are valid for the type of block selected.	O/S, Auto
BLK_TYPE_2 (21)	ALL	2.5	Enumeration	Specifies the enumerated block type from which the Advanced Config - Display Parameter 2 (DP2) will read its displayed value from. The value of BLK_TYPE_2 is used by the conditional DD to reduce the list of parameter indices in PARAM_INDEX_2 to only those that are valid for the type of block selected.	O/S, Auto
BLK_TYPE_3 (27)	ALL	2.5	Enumeration	Specifies the enumerated block type from which the Advanced Config - Display Parameter 3 (DP3) will read its displayed value from. The value of BLK_TYPE_3 is used by the conditional DD to reduce the list of parameter indices in PARAM_INDEX_3 to only those that are valid for the type of block selected.	O/S, Auto
BLK_TYPE_4 (33)	ALL	2.5	Enumeration	Specifies the enumerated block type from which the Advanced Config - Display Parameter 4 (DP4) will read its displayed value from. The value of BLK_TYPE_4 is used by the conditional DD to reduce the list of parameter indices in PARAM_INDEX_4 to only those that are valid for the type of block selected.	O/S, Auto

Table A-4. LCD Display Transducer Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writeable mode
BLOCK_ALM (8)	ALL	2.5	N/A	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.	Mixed
COLLECTION_DIRECTORY (13)	0	0	N/A	A directory that specifies the number, starting indices, and DD Item ID's of the data collections in each transducer block. Directory has a value of zero if only a single data collection exists.	Read-only
CUSTOM_TAG_1 (18)	ALL	PARAM1	N/A	The block description displayed for DP1 (See DISPLAY_PARAM_SEL)	O/S, Auto
CUSTOM_TAG_2 (24)	ALL	PARAM2	N/A	The block description displayed for Advanced Config Display Parameter (DP) slot #2 (See DISPLAY_PARAM_SEL)	O/S, Auto
CUSTOM_TAG_3 (30)	ALL	PARAM3	N/A	The block description displayed for Advanced Config Display Parameter (DP) slot #3 (See DISPLAY_PARAM_SEL)	O/S, Auto
CUSTOM_TAG_4 (36)	ALL	PARAM4	N/A	The block description displayed for Advanced Config Display Parameter (DP) slot #4 (See DISPLAY_PARAM_SEL)	O/S, Auto
CUSTOM_UNITS_1 (20)	ALL	5_spaces	N/A	User entered units displayed when UNITS_TYPE_1 are set to Custom	O/S, Auto
CUSTOM_UNITS_2 (26)	ALL	5_spaces	N/A	User entered units that are displayed when UNITS_TYPE_2 are set to Custom	O/S, Auto
CUSTOM_UNITS_3 (32)	ALL	5_spaces	N/A	User entered units that are displayed when UNITS_TYPE_3 are set to Custom	O/S, Auto
CUSTOM_UNITS_4 (38)	ALL	5_spaces	N/A	User entered units that are displayed when UNITS_TYPE_4 are set to Custom	O/S, Auto
DISPLAY_PARAM_SEL (14)	0x0001: Basic config - Pressure (sensor tblk PRIMARY_VALUE) 0x0002: Basic config - Sensor Temperature (sensor tblk SECONDARY_VALUE) 0x0004: Basic config - Pressure percent of range (% AI.OUT) 0x0008: Basic config - Pressure scaled (AI.OUT) 0x0100: Advanced config - DP1 0x0200: Advanced config - DP2 0x0400: Advanced config - DP3 0x0800: Advanced config - DP4	0x0001	Enumeration	“Basic” configuration involves specifying an internal value that the user wants displayed (pressure, sensor temp, % of AI.OUT, AI.OUT). “Advanced” configuration involves specifying parameters from function blocks for display. DP1 is Display Parameter 1.	O/S, Auto

Table A-4. LCD Display Transducer Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writeable mode
PARAM_INDEX_1 (17)	0: Not Initialized 7: AI.PV, PID.PV, CHAR.OUT_1, ARITH.PV, OSPL.SP, ISEL.OUT, CSEL.OUT 8: AI.OUT, PID.SP, CHAR.OUT_2, ARITH.OUT, OSPL.OUT_1, INTG.OUT 9: PID.OUT, ARITH.PRE_OUT, OSPL.OUT_2 11: ISEL.IN_1, CSEL.SEL_1 12: ISEL.IN_2, CHAR.IN_1, INTG.IN_1, CSEL.SEL_2 13: ISEL.IN_3, CHAR.IN_2, INTG.IN_2, CSEL.SEL_3 14: ISEL.IN_4, ARITH.IN, OSPL.CAS_IN 15: PID.IN, ARITH.IN_LO, OSPL.BKCAL_OUT, CSEL.BKCAL_IN 16: ARITH.IN_1 17: ARITH.IN_2 18: PID.CAS_IN, ARITH.IN_3, CSEL.BKCAL_SEL_1 19: AI.FIELD_VAL, OSPL.BKCAL_IN_1, CSEL.BKCAL_SEL_2 20: OSPL.BKCAL_IN_2, CSEL.BKCAL_SEL_3 25: ISEL.IN_5 26: ISEL.IN_6 27: PID.BKCAL_IN, ISEL.IN_7 28: ISEL.IN_8 31: PID.BKCAL_OUT 32: PID.RCAS_IN 33: PID.ROUT_IN 35: PID.RCAS_OUT 36: PID.ROUT_OUT 39: PID.TRK_VAL 40: PID.FF_VAL	0	Enumeration	The parameter for Advanced Config Display Parameter (DP) slot #1. Each value corresponds to parameter selected by BLK_TAG_1 block to be displayed.The value of BLK_TYPE_1 is used by the conditional DD to reduce the list of parameter indices in PARAM_INDEX_1 to only those that are valid for the type of block selected. The combination of block type, block tag, and parameter index are used to determine the parameter to display on the LCD display.	O/S, Auto
PARAM_INDEX_2 (23)	0: Not Initialized 7: AI.PV, PID.PV, CHAR.OUT_1, ARITH.PV, OSPL.SP, ISEL.OUT, CSEL.OUT 8: AI.OUT, PID.SP, CHAR.OUT_2, ARITH.OUT, OSPL.OUT_1, INTG.OUT 9: PID.OUT, ARITH.PRE_OUT, OSPL.OUT_2 11: ISEL.IN_1, CSEL.SEL_1 12: ISEL.IN_2, CHAR.IN_1, INTG.IN_1, CSEL.SEL_2 13: ISEL.IN_3, CHAR.IN_2, INTG.IN_2, CSEL.SEL_3 14: ISEL.IN_4, ARITH.IN, OSPL.CAS_IN 15: PID.IN, ARITH.IN_LO, OSPL.BKCAL_OUT, CSEL.BKCAL_IN 16: ARITH.IN_1 17: ARITH.IN_2 18: PID.CAS_IN, ARITH.IN_3, CSEL.BKCAL_SEL_1 19: AI.FIELD_VAL, OSPL.BKCAL_IN_1, CSEL.BKCAL_SEL_2 20: OSPL.BKCAL_IN_2, CSEL.BKCAL_SEL_3 25: ISEL.IN_5 26: ISEL.IN_6 27: PID.BKCAL_IN, ISEL.IN_7 28: ISEL.IN_8 31: PID.BKCAL_OUT 32: PID.RCAS_IN 33: PID.ROUT_IN 35: PID.RCAS_OUT 36: PID.ROUT_OUT 39: PID.TRK_VAL 40: PID.FF_VAL	PARAM1	Enumeration	The parameter for Advanced Config Display Parameter (DP) slot #2. Each value corresponds to parameter selected by BLK_TAG_2 block to be displayed.The value of BLK_TYPE_2 is used by the conditional DD to reduce the list of parameter indices in PARAM_INDEX_2 to only those that are valid for the type of block selected. The combination of block type, block tag, and parameter index are used to determine the parameter to display on the LCD display.	O/S, Auto

Table A-4. LCD Display Transducer Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writeable mode
PARAM_INDEX_3 (29)	0: Not Initialized 7: AI.PV, PID.PV, CHAR.OUT_1, ARITH.PV, OSPL.SP, ISEL.OUT, CSEL.OUT 8: AI.OUT, PID.SP, CHAR.OUT_2, ARITH.OUT, OSPL.OUT_1, INTG.OUT 9: PID.OUT, ARITH.PRE_OUT, OSPL.OUT_2 11: ISEL.IN_1, CSEL.SEL_1 12: ISEL.IN_2, CHAR.IN_1, INTG.IN_1, CSEL.SEL_2 13: ISEL.IN_3, CHAR.IN_2, INTG.IN_2, CSEL.SEL_3 14: ISEL.IN_4, ARITH.IN, OSPL.CAS_IN 15: PID.IN, ARITH.IN_LO, OSPL.BKCAL_OUT, CSEL.BKCAL_IN 16: ARITH.IN_1 17: ARITH.IN_2 18: PID.CAS_IN, ARITH.IN_3, CSEL.BKCAL_SEL_1 19: AI.FIELD_VAL, OSPL.BKCAL_IN_1, CSEL.BKCAL_SEL_2 20: OSPL.BKCAL_IN_2, CSEL.BKCAL_SEL_3 25: ISEL.IN_5 26: ISEL.IN_6 27: PID.BKCAL_IN, ISEL.IN_7 28: ISEL.IN_8 31: PID.BKCAL_OUT 32: PID.RCAS_IN 33: PID.ROUT_IN 35: PID.RCAS_OUT 36: PID.ROUT_OUT 39: PID.TRK_VAL 40: PID.FF_VAL	PARAM1	Enumeration	The parameter for Advanced Config Display Parameter (DP) slot #3. Each value corresponds to parameter selected by BLK_TAG_3 block to be displayed.The value of BLK_TYPE_3 is used by the conditional DD to reduce the list of parameter indices in PARAM_INDEX_3 to only those that are valid for the type of block selected. The combination of block type, block tag, and parameter index are used to determine the parameter to display on the LCD display.	O/S, Auto
PARAM_INDEX_4 (35)	0: Not Initialized 7: AI.PV, PID.PV, CHAR.OUT_1, ARITH.PV, OSPL.SP, ISEL.OUT, CSEL.OUT 8: AI.OUT, PID.SP, CHAR.OUT_2, ARITH.OUT, OSPL.OUT_1, INTG.OUT 9: PID.OUT, ARITH.PRE_OUT, OSPL.OUT_2 11: ISEL.IN_1, CSEL.SEL_1 12: ISEL.IN_2, CHAR.IN_1, INTG.IN_1, CSEL.SEL_2 13: ISEL.IN_3, CHAR.IN_2, INTG.IN_2, CSEL.SEL_3 14: ISEL.IN_4, ARITH.IN, OSPL.CAS_IN 15: PID.IN, ARITH.IN_LO, OSPL.BKCAL_OUT, CSEL.BKCAL_IN 16: ARITH.IN_1 17: ARITH.IN_2 18: PID.CAS_IN, ARITH.IN_3, CSEL.BKCAL_SEL_1 19: AI.FIELD_VAL, OSPL.BKCAL_IN_1, CSEL.BKCAL_SEL_2 20: OSPL.BKCAL_IN_2, CSEL.BKCAL_SEL_3 25: ISEL.IN_5 26: ISEL.IN_6 27: PID.BKCAL_IN, ISEL.IN_7 28: ISEL.IN_8 31: PID.BKCAL_OUT 32: PID.RCAS_IN 33: PID.ROUT_IN 35: PID.RCAS_OUT 36: PID.ROUT_OUT 39: PID.TRK_VAL 40: PID.FF_VAL	PARAM1	Enumeration	The parameter for Advanced Config Display Parameter (DP) slot #4. Each value corresponds to parameter selected by BLK_TAG_4 block to be displayed.The value of BLK_TYPE_4 is used by the conditional DD to reduce the list of parameter indices in PARAM_INDEX_4 to only those that are valid for the type of block selected. The combination of block type, block tag, and parameter index are used to determine the parameter to display on the LCD display.	O/S, Auto
PRESSURE_SCALED_UNITS (39)	5 character alphanumeric string	"CUSTM"	N/A	User entered units displayed for the Basic config - Pressure Scaled Value Units Screen	O/S, Auto

Table A-4. LCD Display Transducer Block Parameters

Parameter (index number)	Valid range	Initial value	Units	Description	Writeable mode
TRANSDUCER_DIRECTORY (9)	0	0	N/A	Directory that specifies the number and starting indices of the transducers in the transducer block	Read-only
TRANSDUCER_TYPE (10)	65535	65535	Enumeration	Identifies the transducer that follows	Read-only
TRANSDUCER_TYPE_VER (11)	0x0001	0x0001	N/A	The version of the transducer identified by TRANSDUCER_TYPE in the form 0xAABB where AA is the major revision of the transducer specification on which the transducer is based, and BB is a revision number assigned and controlled by the manufacturer of the device	Read-only
UNITS_TYPE_1 (19)	1: Auto (units come from associated block parameter); 2: Custom (See CUSTOM_UNITS_1); 3: None (units are not displayed)	1	Enumeration	Determines where the units for the display parameter come from	O/S, Auto
UNITS_TYPE_2 (25)	1: Auto (units come from associated block parameter); 2: Custom (See CUSTOM_UNITS_2); 3: None (units are not displayed)	1	Enumeration	Determines where the units for the display parameter come from	O/S, Auto
UNITS_TYPE_3 (31)	1: Auto (units come from associated block parameter); 2: Custom (See CUSTOM_UNITS_3); 3: None (units are not displayed)	1	Enumeration	Determines where the units for the display parameter come from	O/S, Auto
UNITS_TYPE_4 (37)	1: Auto (units come from associated block parameter); 2: Custom (See CUSTOM_UNITS_4); 3: None (units are not displayed)	1	Enumeration	Determines where the units for the display parameter come from	O/S, Auto
UPDATE_EVT (7)	N/A	N/A	N/A	Alert generated by any change to the static data	Mixed
XD_ERROR (12)	0: No Error 19: Configuration Error 22: I/O Failure (An I/O failure has occurred)	0	Enumeration	Indicates the most important error in the LCD display transducer block	Read-only

A.5 Statistical Process Monitoring (SPM) Block

Table A-5. SPM Block

Parameter (index number)	Valid range	Initial value	Units	Description	Writeable mode
BLOCK_ALM (8)	BLOCK_ALM.1 - UNACKNOWLEDGED BLOCK_ALM.2 - ALARM_STATE BLOCK_ALM.3 - TIME_STAMP BLOCK_ALM.4 - SUB_CODE BLOCK_ALM.5 - VALUE	N/A	N/A	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.	Mixed
COLLECTION_ DIRECTORY (12)	0	0	N/A	Directory that specifies the number, starting indices, and DD Item ID's of the data collections in each transducer block.	Read-only
DIAG_EVT (13)	N/A	N/A	N/A	The parameter shall be updated (i.e., transition to an active state) when any of the following events occur: SPM Mean Change,SPM High Variation Detected, SPM Low Dynamic. Note: This parameter behaves the same way as other block alarm parameters.	Read-only
SPM_ACTIVE (14)	0: Disabled 0xFE: Enabled with 1st-order HP Filter 0xFF: Enabled without Filter	0	N/A	Enables/disables the Statistical Process Monitoring algorithm with or without a 1st order high pass filter	O/S, Auto
SPM_BASELINE_ MEAN (24)	ALL	0	SPM_VALUE_ UNIT	Baseline Mean for SPM	Read-only
SPM_BASELINE_ST DEV (25)	ALL	0	SPM_VALUE_ UNIT	Baseline Stdev for SPM	Read-only
SPM_BYPASS_ VERIFICATION (16)	0x00: No 0xFF: Yes	0	N/A	Enables/disables Bypass of Process Stability Checks during Learning	O/S, Auto
SPM_HIGH_ VARIATION_LIM (27)	% value greater than 0	0.0	%	Percent increase in standard deviation allowed before triggering a variation change alert (a value of zero disables the check)	O/S, Auto
SPM_LOW_ DYNAMICS_LIM (28)	–99 to 0	0.0	%	Percent decrease in standard deviation allowed before triggering a variation change alert (a value of zero disables the check)	O/S, Auto
SPM_MEAN (20)	ALL	0.0	SPM_VALUE_ UNIT	Mean calculation of the SPM input	Read-only
SPM_MEAN_ CHANGE (21)	ALL	0.0	%	Percent change in SPM Mean with respect to Baseline Mean	Read-only
SPM_MEAN_LIM (26)	% value greater than 0	0.0	%	Percent change in mean allowed before triggering a variation change alert (a value of zero disables the check)	O/S, Auto
SPM_MONITORING _CYCLE (15)	1 to 1440	5	min	Length of the stdev and mean monitoring cycle	O/S, Auto
SPM_STATUS (17)	0x01: Inactive 0x02: Learning 0x04: Verifying 0x08: Monitoring 0x10: Mean Change Detected 0x20: High Variation Detected 0x40: Low Dynamics Detected 0x80: Not Licensed	0x01	N/A	Status of the SPM Statistical Process Monitoring	Read-only
SPM_STDEV (22)	ALL	0.0	SPM_VALUE_ UNIT	Standard deviation calculation of SPM input	Read-only
SPM_STDEV_ CHANGE (23)	ALL	0.0	%	Change in SPM Stdev with respect to Baseline Stdev	Read-only
SPM_TIMESTAMP (18)	ALL	0	TimeValue	Timestamp of last SPM Statistical Process Monitoring status change	Read-only

Table A-5. SPM Block

Parameter (index number)	Valid range	Initial value	Units	Description	Writeable mode
SPM_USER_ COMMAND (19)	1 to 4 1: Detect 2: Learn 3: Quit 4: Idle	4	Enumeration	User control for the Statistical Process Monitoring session	O/S, Auto
SPM_VALUE_UNIT (29)	1130: Pascals 1132: Megapascals 1133: Kilopascals 1136: Hectopascals 1137: Bar 1138: Millibar 1139: torr at 0 °C 1140: Atm 1141: Psi 1144: g/cm^2 1145: kg/cm^2 1146: inH_2O at 60 °F 1147: inH_2O at 4 °C 1148: inH_2O at 68 °F 1150: mmH_2O at 4 °C 1151: mmH_2O at 68 °F 1152: ftH_2O at 60 °F 1153: ftH_2O at 4 °C 1154: ftH_2O at 68 °F 1156: inHg at 0 °C 1158: mmHg at 0 °C 1724: inH_2O (60 °F) 1735: cmH_2O (4 °C) 1736: mH_2O (4 °C) 1737: cmHg (0 °C) 1738: psf 1739: mHg (0 °C) 1750: ftH_2O (60 °F) 1751: kg/m^2	1148	Enumeration	Engineering units used for SPM calculation output value - The unit values are set in the Mean or Stdev channel AI block XD_SCALE.UNITS_INDEX.	Read-only
TRANSDUCER_ DIRECTORY (9)	0	0	N/A	Directory that specifies the number and starting indicies of the transducers in the transducer block	Read-only
TRANSDUCER_ TYPE (10)	65535	65535	Enumeration	Identifies the transducer that follows	Read-only
UPDATE_EVT (7)	UPDATE_EVT.1 - UNACKNOWLEDGED UPDATE_EVT.2 - UPDATE_STATE UPDATE_EVT.3 - TIME_STAMP UPDATE_EVT.4 - STATIC_REVISION UPDATE_EVT.5 - RELATIVE_INDEX	N/A	N/A	Alert generated by any change to the static data. Contains subfield: UNACKNOWLEDGED, UPDATE_STATE, TIME_STAMP, STATIC_REVISION, RELATIVE_INDEX	Mixed
XD_ERROR (11)	0: No Error	0	Enumeration	Provides additional error codes related to transducer blocks	Read-only

A.6 Performance specifications

This product data sheet covers HART®, Wireless, FOUNDATION™ Fieldbus, and PROFIBUS® PA protocols unless specified.

A.6.1 Conformance to specification (±3σ [Sigma])

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

A.6.2 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	Rosemount 3051and *Wireless*HART®
Rosemount 3051C	
Range 5	±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
Ranges 2-4	± 0.04% of span(1) For spans less than 10:1(2), accuracy = $\pm\left[0.015 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span
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
Range 0 (CD)	± 0.10% of span For spans less than 2:1, accuracy = ± 0.05% of URL
Rosemount 3051CA Ranges 1-4	± 0.04% of span(1) For spans less than 10:1, accuracy = $\pm\left[0.0075\left(\frac{URL}{Span}\right)\right]$% of Span
Rosemount 3051T Ranges 1-4	± 0.04% of span(1) For spans less than 10:1, 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
Rosemount 3051L 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

1. For output code W and M, ±0.065% span.
2. For output code F, for span less than 5:1.

A.6.3 Flow performance - flow reference accuracy[1]

Rosemount 3051CFA Annubar™ Flowmeter		
Ranges 2-3		±1.80% of flow rate at 8:1 flow turndown
Rosemount 3051CFC_A Compact Annubar Flowmeter – Annubar Option A		
Ranges 2-3	Uncalibrated	±2.10% of flow rate at 8:1 flow turndown
	Calibrated	±1.80% of flow rate at 8:1 flow turndown
Rosemount R3051CFC_C Compact Orifice Flowmeter – Conditioning Option C		
Ranges 2-3	β =0.4	±1.75% of flow rate at 8:1 flow turndown
	β =0.65	±1.95% of flow rate at 8:1 flow turndown
Rosemount 3051CFC_P Compact Orifice Flowmeter – Orifice Type Option P[2]		
Ranges 2-3	β =0.4	±2.00% of flow rate at 8:1 flow turndown
	β =0.65	±2.00% of flow rate at 8:1 flow turndown
Rosemount 3051CFP Integral Orifice Flowmeter		
Ranges 2-3	β <0.1	±3.00% of flow rate at 8:1 flow turndown
	0.1<β <0.2	±1.95% of flow rate at 8:1 flow turndown
	0.2<β <0.6	±1.75% of flow rate at 8:1 flow turndown
	0.6<β <0.8	±2.15% of flow rate at 8:1 flow turndown

1. Accuracy over range of use is always application dependent. Range 1 flowmeters may experience an additional uncertainty up to 0.9%. Consult your Emerson™ representative for exact specifications.
2. Applicable to 2- to 12-in. line sizes. For smaller line sizes, see the Rosemount DP Flowmeters and Primary Elements Product Data Sheet.

A.6.4 Total performance

Total performance is based on combined errors of reference accuracy, ambient temperature effect, and static pressure effect at normal operating conditions (70% of span typical reading, 740 psi [51,02 bar] line pressure).

For ±50 °F (28 °C) temperature changes; 0–100% relative humidity, from 1:1 to 5:1 rangedown

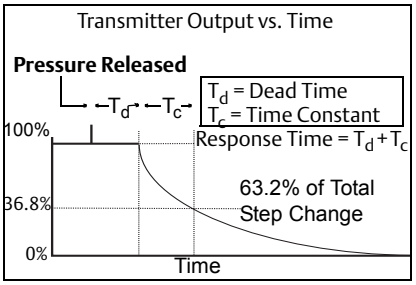
Models	Total performance[1]
Rosemount 3051C Ranges 2-5	± 0.14% of span
Rosemount 3051T Ranges 1-4	± 0.14% of span
Rosemount 3051L Ranges 2-4	Use Instrument Toolkit™ or the QZ option to quantify the total performance of a remote seal assembly under operating conditions.

1. For output code W, F and M, total performance is ±0.15% of span.

A.6.5 Long term stability

Models	Long term stability
Rosemount 3051C Ranges 2-5	±0.2% of URL for 10 years ±50 °F (28 °C) temperature changes, and up to 1000 psi (68,95 bar) line pressure.
Rosemount 3051CD, 3051CG Low/Draft Range Ranges 0-1	±0.2% of URL for one year
Rosemount 3051CA Low Range Range 1	±0.2% of URL for 10 years ±50 °F (28 °C) temperature changes, and up to 1000 psi (68,95 bar) line pressure.
Rosemount 3051T Ranges 1-4	±0.2% of URL for 10 years ±50 °F (28 °C) temperature changes, and up to 1000 psi (68,95 bar) line pressure.

A.6.6 Dynamic performance

	4 –20 mA HART[1]	FOUNDATION Fieldbus and PROFIBUS PA protocols[2]	Typical HART transmitter response time
Total Response Time ($T_d + T_c$)[3]:			
Rosemount 3051C			
Ranges 2-5	100 ms	152 ms	
Range 1	255 ms	307 ms	
Range 0	700 ms	N/A	
Rosemount 3051T	100 ms	152 ms	
Rosemount 3051L	See Instrument Toolkit	See Instrument Toolkit	
Dead Time (T_d)	45 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 "Overpressure limits" on page 142 for wireless update rate.

A.6.7 Line pressure effect per 1000 psi (68,95 bar)

For line pressures above 2000 psi (137,90 bar) and Ranges 4–5, see "Overpressure limits" on page 142 or the Rosemount 3051 Reference Manual for HART, Reference Manual for *Wireless*HART, and Reference Manual for PROFIBUS PA.

Models	Line pressure effect
Rosemount 3051CD, 3051CF	**Zero Error**
Ranges 2-3	±0.05% of URL/1000 psi (68,95 bar) for line pressures from 0 to 2000 psi (0 to 137,90 bar)
Range 1	±0.25% of URL/1000 psi (68,95 bar) for line pressures from 0 to 2000 psi (0 to 137,90 bar)
Range 0	±0.125% of URL/100 psi (6,89 bar) for line pressures from 0 to 750 psi (0 to 51,71 bar)
	Span Error
Ranges 2-3	±0.1% of reading/1000 psi (68,95 bar)
Range 1	±0.4% of reading/1000 psi (68,95 bar)
Range 0	±0.15% of reading/100 psi (68,95 bar)

A.6.8 Ambient temperature effect per 50 °F (28 °C)

Models	Ambient temperature effect
Rosemount 3051C Ranges 2-5	±(0.0125% URL + 0.0625% span) from 1:1 to 5:1 ±(0.025% URL + 0.125% span) from 5:1 to 150:1
Range 1	±(0.1% URL + 0.25% span) from 1:1 to 30:1 ±(0.14% URL + 0.15% span) from 30:1 to 50:1
Range 0	±(0.25% URL + 0.05% span) from 1:1 to 30:1
Rosemount 3051CA Ranges 1-4	±(0.025% URL + 0.125% span) from 1:1 to 30:1 ±(0.035% URL + 0.125% span) from 30:1 to 150:1
Rosemount 3051T Range 2-4	±(0.025% URL + 0.125% span) from 1:1 to 30:1 ±(0.035% URL + 0.125% span) from 30:1 to 150:1

Models	Ambient temperature effect
Range 1	±(0.025% URL + 0.125% span) from 1:1 to 10:1 ±(0.05% URL + 0.125% span) from 10:1 to 100:1
Range 5	±(0.1% URL + 0.15% span) from 1:1 to 5:1
Rosemount 3051L	See Instrument Toolkit software.

A.6.9 Mounting position effects

Models	Mounting position effects
Rosemount 3051C	Zero shifts up to ±1.25 inH_2O (3,11 mbar), which can be calibrated out. No span effect.
Rosemount 3051CA, 3051T	Zero shifts up to ±2.5 inH_2O (6,22 mbar), which can be calibrated out. No span effect.
Rosemount 3051L	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. All zero shifts can be calibrated out. No span effect.

A.6.10 Vibration effect

Less than ±0.1% of URL when tested per the requirements of IEC60770-1: 1999 field or pipeline with high vibration level (10–60 Hz 0.21 mm displacement peak amplitude/60–2000 Hz 3g).

A.6.11 Power supply effect

Less than ±0.005% of calibrated span per volt change

A.6.12 Electromagnetic compatibility (EMC)

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

A.6.13 Transient protection (option code T1)

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

6 kV crest (0.5 ms – 100 kHz)

3 kA crest (8 × 20 ms)

6 kV crest (1.2 × 50 ms)

1. *NAMUR NE-21 does not apply to Low-Power (Transmitter output option code M) and Wireless (Transmitter output code X).*
2. *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.*

A.7 Functional specifications

A.7.1 Range and sensor limits

Table A-6. Rosemount 3051CD, 3051CG, 3051CF, and 3051L Range and Sensor Limits

Range[1]	Minimum span	Range and sensor limits				
	Rosemount 3051CD, 3051CG, 3051CF, 3051L[2]	Upper (URL)	Lower (LRL)			
			Rosemount 3051CD Differential 3051CF Flowmeters	Rosemount 3051CG gage[3]	Rosemount 3051L Differential	Rosemount 3051L Gage[3]
0	0.10 inH_2O (0,24 mbar)	3.00 inH_2O (7,45 mbar)	–3.00 inH_2O (–7,45 mbar)	N/A	N/A	N/A
1	0.50 inH_2O (1,24 mbar)	25.00 inH_2O (62,16 mbar)	–25.00 inH_2O (–62,16 mbar)	–25.00 inH_2O (–62,16 mbar)	N/A	N/A
2	1.67 inH_2O (4,15 mbar)	250.00 inH_2O (621,60 mbar)	–250.00 inH_2O (–621,60 mbar)	–250.00 inH_2O (–621,60 mbar)	–250.00 inH_2O (–621,60 mbar)	–250.00 inH_2O (–621,60 mbar)
3	6.67 inH_2O (16,58 mbar)	1000.00 inH_2O (2,48 bar)	–1000.00 inH_2O (–2,48 bar)	0.50 psia (34,47 mbar)	–1000.00 inH_2O (–2,48 bar)	0.50 psia (34,47 mbar)
4	2.00 psi (137,89 mbar)	300.00 psi (20,68 bar)	–300.00 psi (–20,68 bar)	0.50 psia (34,47 mbar)	–300.00 psi (–20,68 bar)	0.50 psia (34,47 mbar)
5	13.33 psi (919,01 mbar)	2000.00 psi (137,89 bar)	–2000.00 psi (–137,89 bar)	0.50 psia (34,47 mbar)	N/A	N/A

1. Range 0 only available with Rosemount 3051CD. Range 1 only available with Rosemount 3051CD, 3051CG, or 3051CF. inH_2O referenced at 68 °F.
2. For outputs options W and M, minimum span are: range 1 - 0.50 inH_2O (1,24 mbar), range 2 - 2.50 inH_2O (6,21 mbar), range 3 - 10.00 inH_2O (24,86 mbar), range 4 - 3.00 psi (0,21 bar), range 5 - 20.00 psi (1,38 bar).
3. Assumes atmospheric pressure of 14.7 psig.

Table A-7. Rosemount 3051CA and 3051T Range and Sensor Limits

Range	Rosemount 3051CA			Range	Rosemount 3051T			
	Minimum span[1]	Range and sensor limits			Minimum span[1]	Range and sensor limits		Lower[2] (LRL) (gage)
		Upper (URL)	Lower (LRL)			Upper (URL)	Lower (LRL) (absolute)	
1	0.30 psi (20,68 mbar)	30 psia (2,06 bar)	0 psia (0 bar)	1	0.30 psi (20,68 mbar)	30.00 psi (2,06 bar)	0 psia (0 bar)	–14.70 psig (–1,01 bar)
2	1.00 psi (68,94 mbar)	150 psia (10,34 bar)	0 psia (0 bar)	2	1.00 psi (68,94 mbar)	150.00 psi (10,34 bar)	0 psia (0 bar)	–14.70 psig (–1,01 bar)
3	5.33 psi (367,49 mbar)	800 psia (55,15 bar)	0 psia (0 bar)	3	5.33 psi (367,49 mbar)	800.00 psi (55,15 bar)	0 psia (0 bar)	–14.70 psig (–1,01 bar)
4	26.67 psi (1,83 bar)	4000 psia (275,79 bar)	0 psia (0 bar)	4	26.67 psi (1,83 bar)	4000.00 psi (275,79 bar)	0 psia (0 bar)	–14.70 psig (–1,01 bar)
5	N/A	N/A	N/A	5	2000.00 psi (137,89 bar)	10000.00 psi (689,47 bar)	0 psia (0 bar)	–14.70 psig (–1,01 bar)

1. For output options W and M, minimum span are: range 2 - 1.50 psi(0,10 bar), range 3 - 8.00 psi (0,55 bar), range 4 - 40.00 psi (2,75 bar), range 5 for Rosemount 3051T - 2000.00 psi (137,89 bar)
2. Assumes atmospheric pressure of 14.7 psig.

A.7.2 Service

Liquid, gas, and vapor applications

A.7.3 4–20 mA HART (output code A)

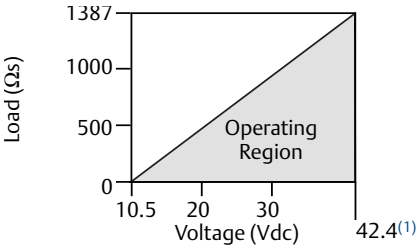
Power supply

External power supply required. Standard transmitter (4–20mA) operates on 10.5–42.4 Vdc with no load.

Load limitations

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

Max. Loop Resistance = 43.5 (power supply voltage – 10.5)



Communication requires a minimum loop resistance of 250 ohms.

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

Indication

Optional two line LOI/LCD display

Optional configuration buttons

Configuration buttons need to be specified:

Digital zero trim (option code DZ) changes digital value of the transmitter and is used for performing a sensor zero trim.

Analog zero span (option code D4) changes analog value and can be used to rerange the transmitter with an applied pressure.

A.7.4 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. The Rosemount 3051 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 local operator interface (M4).

Power advisory diagnostics

Power advisory diagnostics pro-actively detect and notify you of degraded electrical loop integrity before it can affect your process operation. Example loop problems that can be detected include water in the terminal compartment, corrosion of terminals, improper grounding, and unstable power supplies.

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

Local operator interface

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 3051 Reference Manual for LOI configuration menu.

A.7.5 FOUNDATION Fieldbus (output code F)

Power supply

External power supply required; transmitters operate on 9.0 to 32.0 V dc transmitter terminal voltage. FISCO transmitters operate on 9.0 to 17.5 V dc.

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
Sensor and SPM transducer	N/A
LCD display	N/A
Analog Input 1, 2	20 milliseconds
PID	25 milliseconds
Input selector	20 milliseconds
Arithmetic	20 milliseconds
Signal characterizer	20 milliseconds
Integrator	20 milliseconds
Output splitter	20 milliseconds
Control selector	20 milliseconds

FOUNDATION Fieldbus parameters

Links	25 (maximum)
Virtual Communications Relationships (VCR)	20 (maximum)

FOUNDATION Fieldbus function blocks (option A01)

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 and the ability to calibrate 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.

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 gaging, 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.

Backup Link Active Scheduler (LAS)

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

Statistical Process Monitoring (SPM) block

The SPM block is available on a new transmitter if the D01 option is ordered. This block allows a user to view, configure and monitor the statistical process monitoring diagnostics used for process monitoring and plugged impulse line detection.

A.7.6 PROFIBUS PA (output code W)

Profile version

3.02

Power supply

External power supply required; transmitters operate on 9.0 to 32.0 V dc transmitter terminal voltage. FISCO transmitters operate on 9.0 to 17.5 V dc.

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

Local operator interface

The LOI utilizes a two-button menu with external configuration buttons.

A.7.7 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 one second to 60 min.

Wireless sensor module for in-line transmitters

The Rosemount 3051 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)]

A.7.8 Low power output

1-5 Vdc HART Low Power (output code M)

Output

Three-wire 1–5 Vdc (option code C2) user-selectable output. Also user selectable for linear or square root output configuration. Digital process variable superimposed on voltage signal, available to any host conforming to the HART protocol. Low-power transmitter operates on 6–12 Vdc with no load.

Power consumption

3.0 mA, 18–36 mW

Minimum load impedance

100 kΩ (V_{out} wiring)

Indication

Optional five-digit LCD display

A.7.9 Overpressure limits

Rosemount 3051CD/CG/CF

- Range 0: 750 psi (51,71 bar)
- Range 1: 2000 psig (137,90 bar)
- Ranges 2-5: 3626 psig (250,00 bar)
  4500 psig (310,26 bar) for option code P9

Rosemount 3051CA

- Range 1: 750 psia (51,71 bar)
- Range 2: 1500 psia (103,42 bar)
- Range 3: 1600 psia (110,32 bar)
- Range 4: 6000 psia (413,69 bar)

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 or 185 °F (-40 °C or 85 °C) may reduce specified life by less than 20 percent.

Rosemount 3051TG/TA

- Range 1: 750 psi (51,71 bar)
- Range 2: 1500 psi (103,42 bar)
- Range 3: 1600 psi (110,32 bar)
- Range 4: 6000 psi (413,69 bar)
- Range 5: 15000 psi (1034,21 bar)

For Rosemount 3051L or Level Flange Option Codes FA, FB, FC, FD, FP, and FQ, limit is 0 psia to the flange rating or sensor rating, whichever is lower.

Table A-8. Rosemount 3051L and Level Flange Rating Limits

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

A.7.10 Static pressure limit

Rosemount 3051CD only

Operates within specifications between static line pressures of 0.5 psia and 3626 psig (4500 psig (310, 26 bar) for Option Code P9).

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

Range 1: 0.5 psia and 2000 psig (0,03 bar and 137, 90 bar))

A.7.11 Burst pressure limits

Rosemount 3051C, 3051CF Coplanar, or traditional process flange

10081 psig (695,06 bar)

Rosemount 3051T In-Line

Ranges 1-4: 11016 psi (759,53 bar)

Range 5: 26016 psig (1793,74 bar)

A.7.12 Failure mode alarm

HART 4–20 mA (Output option 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/switch on the transmitter. The values to which the transmitter drives its output in failure mode depend on whether it is configured to standard, NAMUR-compliant, or custom levels (see Alarm Configuration below). The values for each are as follows:

	High alarm	Low alarm
Default	≥ 21.75 mA	≤ 3.75 mA
NAMUR compliant[1]	≥ 22.5 mA	≤ 3.6 mA
Custom levels[2]	20.2–23.0 mA	3.4–3.8 mA

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

Output code M

If self-diagnostics detect a gross transmitter failure, the analog signal will be driven either below 0.94 V or above 5.4 V to alert the user (below 0.75 V or above 4.4 V for Option C2). High or low alarm signal is user-selectable by internal jumper.

Output code F, W, and X

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

A.7.13 Temperature limits

Ambient

–40 to 185 °F (–40 to 85 °C)

With LCD display[1][2]: –40 to 176 °F (–40 to 80 °C)

Storage[3]

–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. For the output code M and W, LCD display may not be readable and LCD display updates will 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 temperature below -4 °F (-20 °C).
3. If storage temperature is above 85 °C, perform a sensor trim prior to installation.

Process

At atmospheric pressures and above. See Table A-9.

Table A-9. Rosemount 3051 Process Temperature Limits

Rosemount 3051CD, 3051CG, 3051CF, 3051CA	
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][4]	–40 to 185 °F (–40 to 85 °C)[5][6]
Rosemount 3051T (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]
Rosemount 3051L 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)[5]
Rosemount 3051L 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. 3051CD0 process temperature limits are –40 to 212 °F (–40 to 100 °C).
4. Inert fill with traditional flange on Range 0: limits are 32 to 185°F (0 to 85 °C).
5. 160 °F (71 °C) limit in vacuum service.
6. Not available for Rosemount 3051CA.

A.7.14 Humidity limits

0–100% relative humidity

A.7.15 Turn-on time

Performance within specifications less than 2.0 seconds (20.0 seconds for PROFIBUS PA and Foundation Fieldbus protocols) after power is applied to the transmitter.

A.7.16 Volumetric displacement

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

A.7.17 Damping

4–20 mA HART

Analog output response to a step input change is user-enterable from 0.0 to 60 seconds for one time constant. This software damping is in addition to sensor module response time.

FOUNDATION Fieldbus

Transducer block: 0.4 to 60 seconds.
1-second factory default damping.

AI Block: User configurable

PROFIBUS PA

AI Block only: User configurable

A.8 Physical specifications

Emerson provides a variety of Rosemount products 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 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.8.1 Electrical connections

1/2–14 NPT, G1/2, and M20 × 1.5 conduit. The polymer housing (housing code P) has no conduit entries. HART interface connections fixed to terminal block for output code A and to 701P Power Module for Output Code X.

A.8.2 Process connections

Rosemount 3051C

1/4–18 NPT on 2 1/8-in. centers

1/2–14 NPT on 2-, 2 1/8-, or 2 1/4-in. centers

Rosemount 3051L

High pressure side: 2-, 3-, or 4-in., ASME B 16.5 (ANSI) Class 150, 300 or 600 flange; 50, 80 or 100 mm, PN 40 or 10/16 flange

Low pressure side: 1/4–18 NPT on flange 1/2–14 NPT on adapter

Rosemount 3051T

1/2–14 NPT female

G1/2 A DIN 16288 Male (Range 1–4 only)

Autoclave type F-250-C (Pressure relieved 9/16–18 gland thread; 1/4 OD high pressure tube 60 degrees cone; available in SST for Range 5 transmitters only)

Rosemount 3051CF

For Rosemount 3051CFA, 3051CFC, and 3051CFP, see Rosemount DP Flowmeters and Primary Elements Product Data Sheet.

A.8.3 Process-wetted parts

Drain/vent valves

316 SST, Alloy C-276, or Alloy 400 material (Alloy 400 not available with 3051L)

Process flanges and adapters

Plated carbon steel

SST: CF-8M (Cast 316 SST) per ASTM A743

Cast C-276: CW-12MW per ASTM A494

Cast Alloy 400: M-30C per ASTM A494

Wetted O-rings

Glass-filled PTFE or Graphite-filled PTFE

Process isolating diaphragms

Isolating diaphragm material	3051CD 3051CG	3051T	3051CA
316L SST (UNS S31603)	•	•	•
Alloy C-276 (UNS N10276)	•	•	•
Alloy 400 (UNS N04400)	•	N/A	•
Tantalum (UNS R05440)	•	N/A	N/A
Gold-plated Alloy 400	•	N/A	•
Gold-plated 316L SST	•	N/A	•

A.8.4 Rosemount 3051L 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 Alloy 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.8.5 Non-wetted parts

Electronics housing

Low-copper aluminum or CF-8M (Cast version of 316 SST). Enclosure Type 4X, IP 65, IP 66, IP 68

Housing Material Code P: PBT/PC with NEMA® 4X and IP66/67/68

Coplanar sensor module housing

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

Bolts

Plated carbon steel per ASTM A449, Type 1

Austenitic 316 SST per ASTM F593

ASTM A193, Grade B7M alloy steel

Alloy K-500

Sensor module fill fluid

Coplanar: silicone or Inert Halocarbon

In-Line: silicone or Fluorinert™ FC-43

Process fill fluid (3051L only)

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

Paint

Polyurethane

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.8.6 Shipping weights

Table A-10. Transmitter Weights without Options[1]

Rosemount transmitter	Standard 3051 In lb. (kg)	Wireless in lb. (kg)
3051C	6.0 (2,7)	3.9 (1,8)
3051T	3.0 (1,4)	1.9 (0,86)
3051L	Table A-11	Table A-11

1. Transmitter weights include the sensor module and housing only (aluminum for Rosemount 3051 and polymer for wireless).

Table A-11. Rosemount 3051L 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)
2-in., 600	15.3 (6,9)	N/A	N/A	N/A
3-in., 600	25.2 (11,4)	27.2 (12,3)	28.2 (12,8)	29.2 (13,2)
DN 50/ PN 40	13.8 (6,2)	N/A	N/A	N/A
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 (105),	25.2 (11,5)	26.2 (11,9)	27.2 (12,3)

Table A-12. Rosemount 3051L Weights without Options

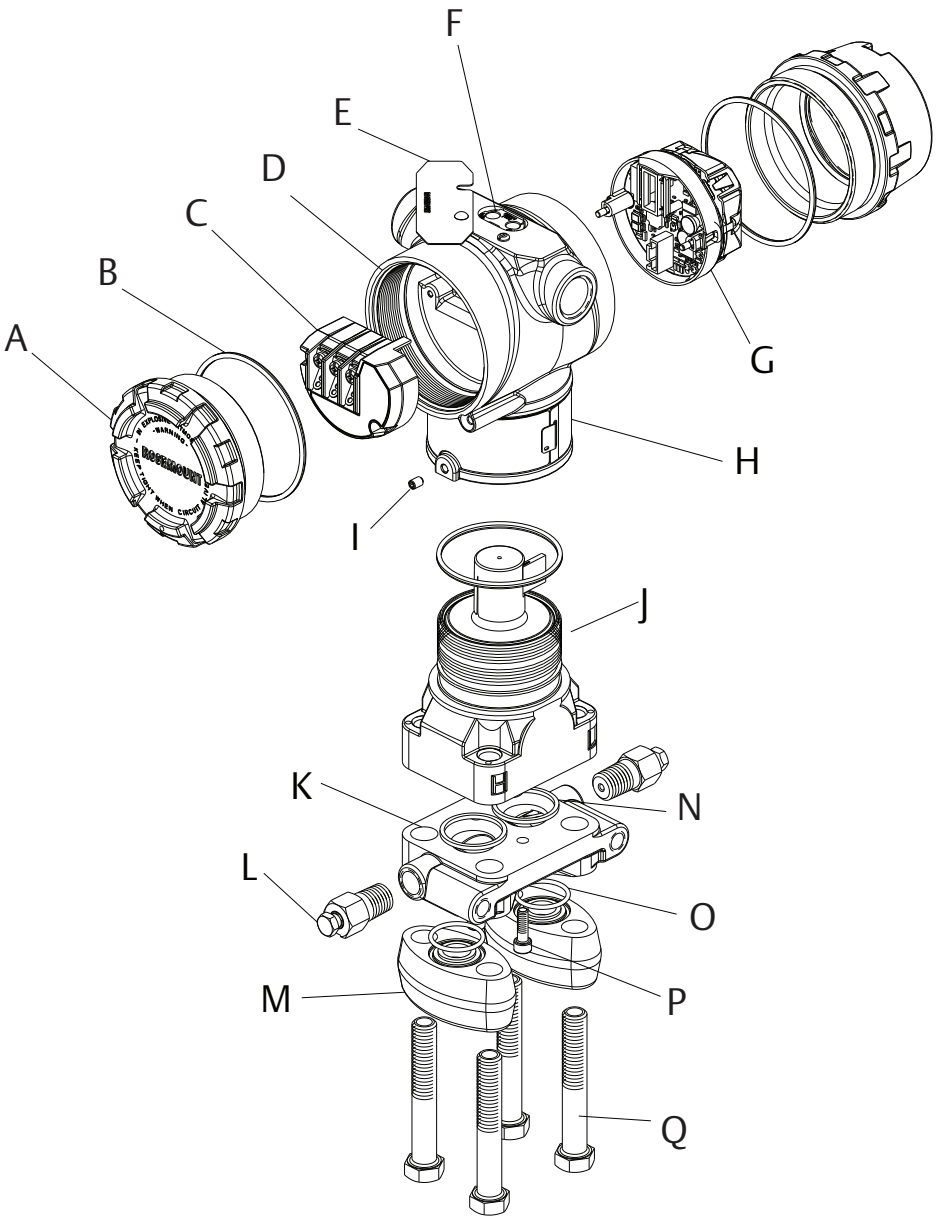
Flange	Flush lb. (kg)	2-in. Ext. lb. (kg)	4-in. Ext. lb. (kg)	6-in. Ext. lb. (kg)
2-in., 150	12.5 (5,7)	N/A	N/A	N/A
3-in., 150	17.5 (7,9)	19.5 (8,8)	20.5 (9,3)	21.5 (9,7)
4-in., 150	23.5 (10,7)	26.5 (12,0)	28.5 (12,9)	30.5 (13,8)
2-in., 300	17.5 (7,9)	N/A	N/A	N/A
3-in., 300	22.5 (10,2)	24.5 (11,1)	25.5 (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)
2-in., 600	15.3 (6,9)	N/A	N/A	N/A
3-in., 600	25.2 (11,4)	27.2 (12,3)	28.2 (12,8)	29.2 (13,2)
DN 50/PN 40	13.8 (6,2)	N/A	N/A	N/A
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-13. Transmitter Option Weights

Code	Option	Add lb. (kg)
J, K, L, M	Stainless Steel Housing (T)	3.9 (1,8)
J, K, L, M	Stainless Steel Housing (C, L, H, P)	3.1 (1,4)
M4/M5	LCD display for wired transmitter	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	2.4 (1,1)
H3	Traditional Flange	2.7 (1,2)
H4	Traditional Flange	2.6 (1,2)
H7	Traditional Flange	2.5 (1,1)
FC	Level Flange—3-in., 150	10.8 (4,9)
FD	Level Flange—3-in., 300	14.3 (6,5)
FA	Level Flange—2-in., 150	10.7 (4,8)
FB	Level Flange—2-in., 300	14.0 (6,3)
FP	DIN Level Flange, SST, DN 50, PN 40	8.3 (3,8)
FQ	DIN Level Flange, SST, DN 80, PN 40	13.7 (6,2)
WSM	SST Sensor Module	1.0 (0,45)
	Power Module (701PGNKF)	0.4 (0,18)

A.9 Dimensional drawings(1)

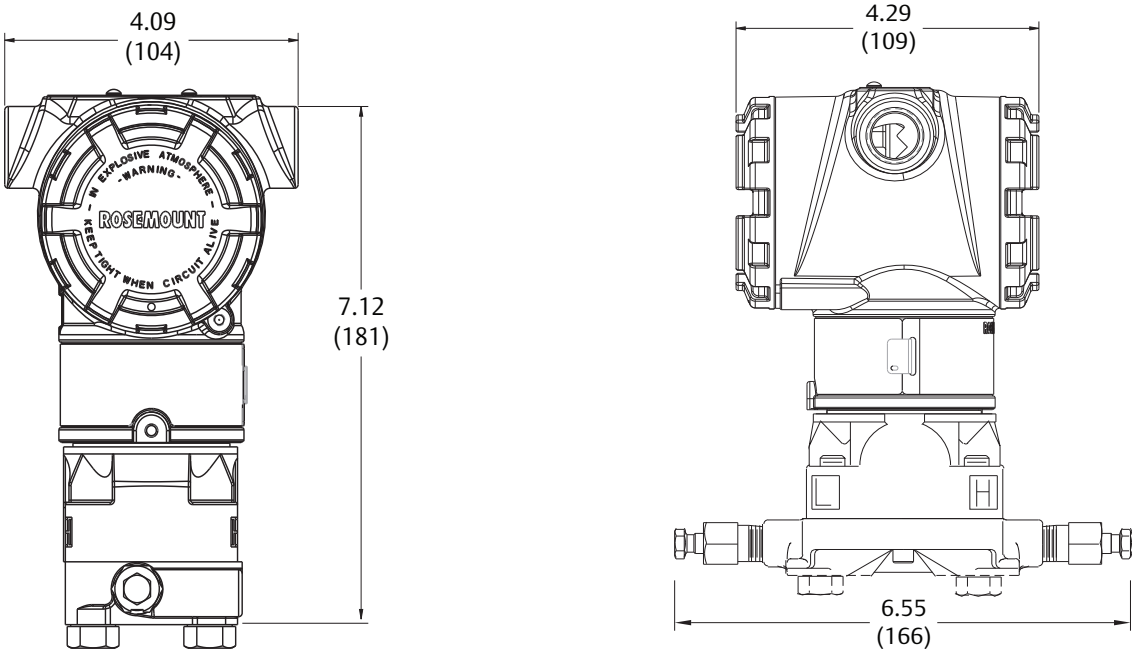
Figure A-2. Rosemount 3051C Exploded View



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

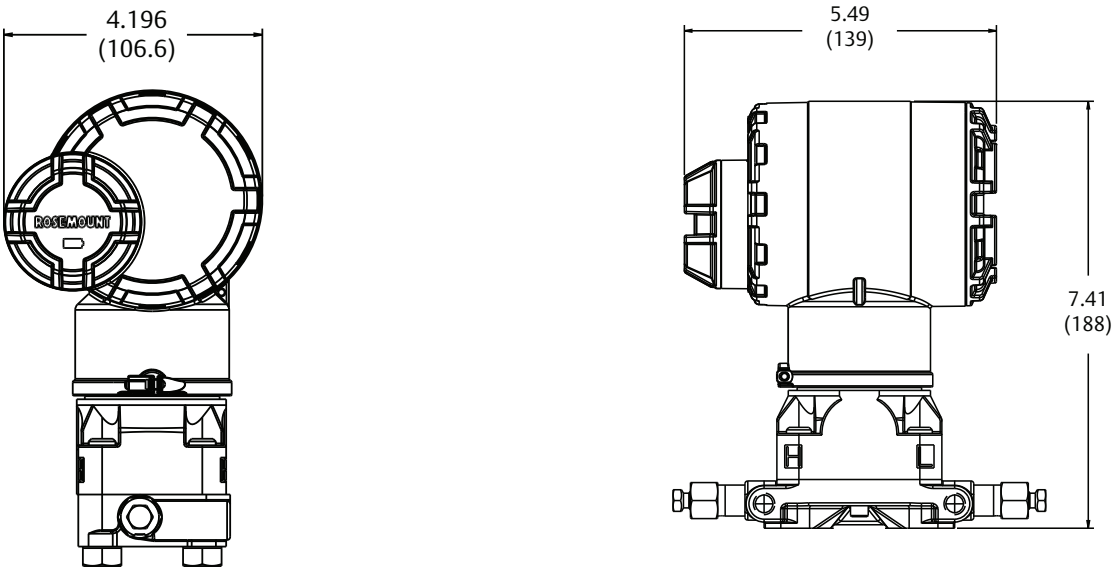
1. This section contains dimensional drawings for output codes A, F and X. For output codes W and M, visit Emerson.com/Rosemount/Drawings

Figure A-3. Rosemount 3051C Coplanar Flange



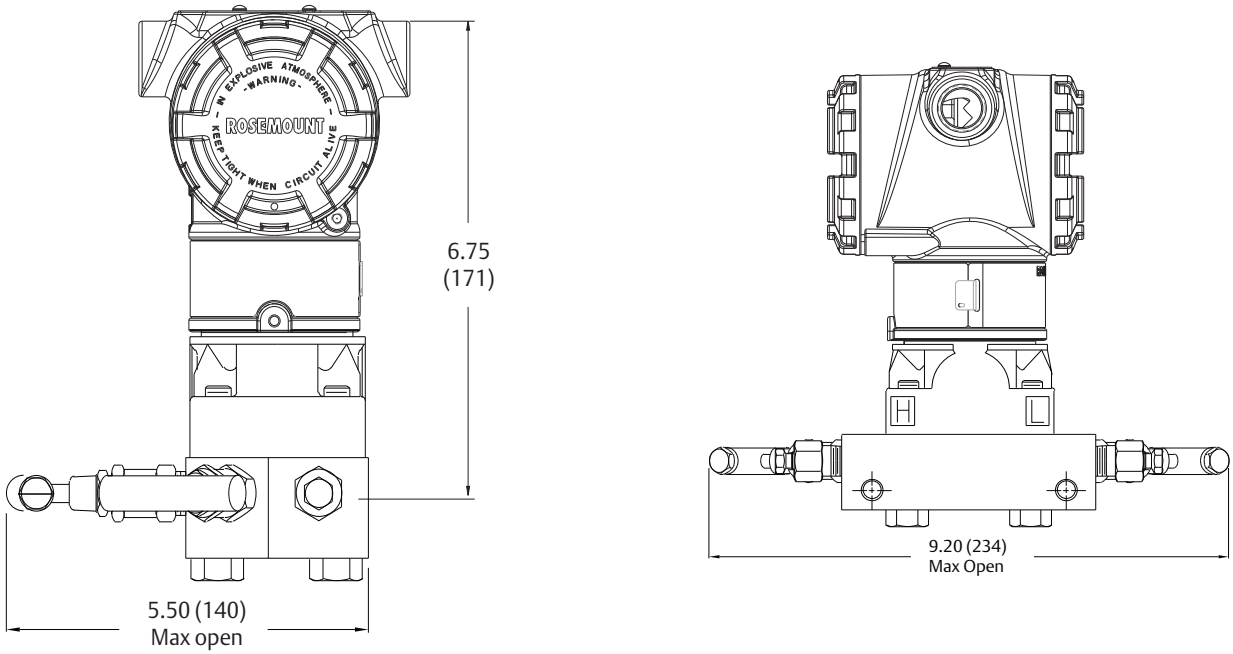
Dimensions are in inches (millimeters).

Figure A-4. Rosemount 3051 Wireless Housing with Coplanar Flange



Dimensions are in inches (millimeters).

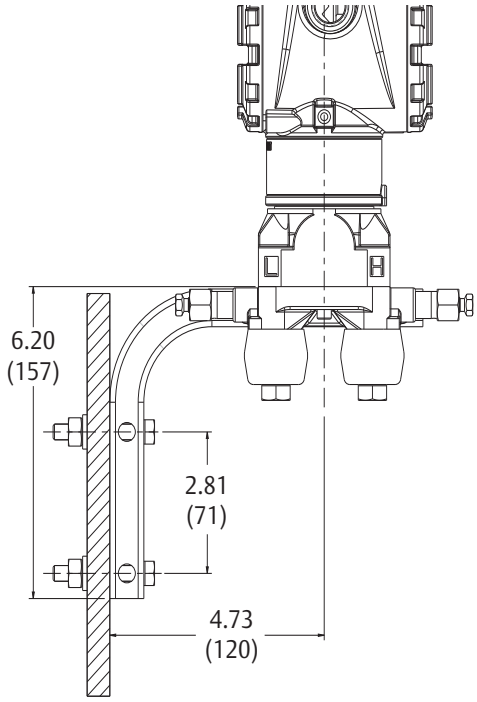
Figure A-5. Rosemount 3051C Coplanar Flange with Rosemount 305RC3 3-Valve Coplanar Integral Manifold

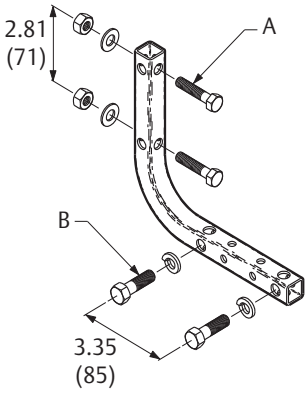


Dimensions are in inches (millimeters).

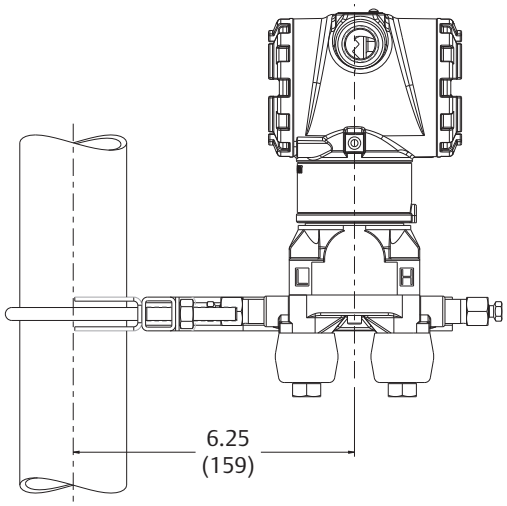
Figure A-6. Coplanar Flange Mounting Configurations with Optional Bracket (B4) for 2-in. Pipe or Panel Mounting

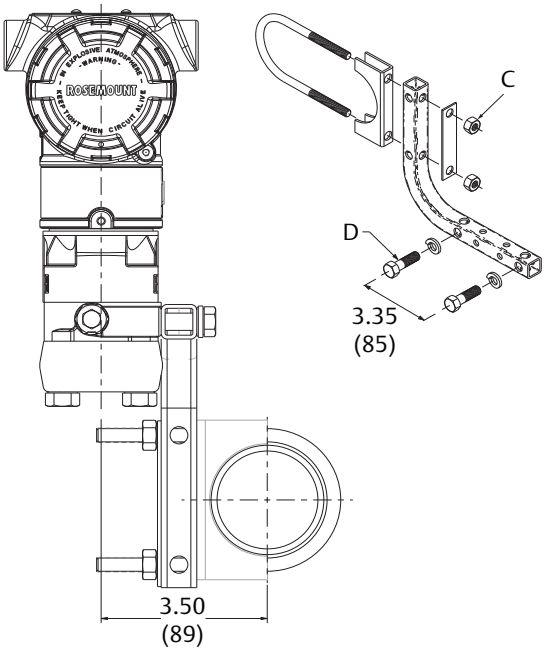
PANEL MOUNTING





PIPE MOUNTING

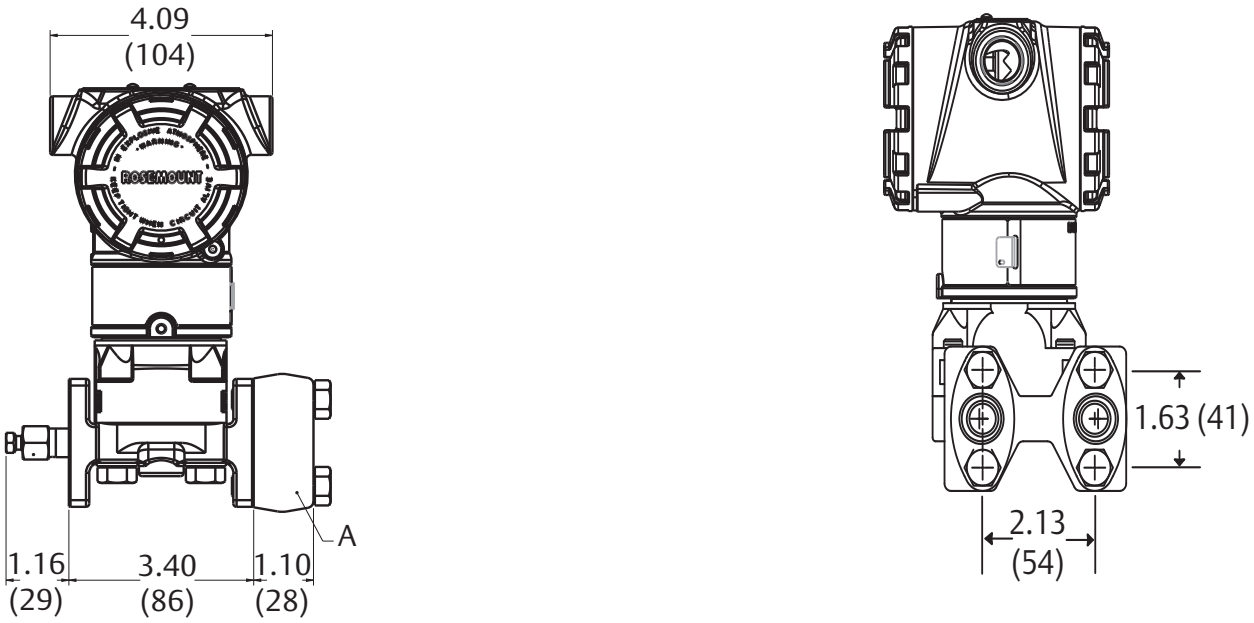




A. 5/16 - 18 bolts (not supplied)
B. 3/8–16 bolts
Dimensions are in inches (millimeters).

C. 2-in. U-bolt
D. 3/8–16 bolts

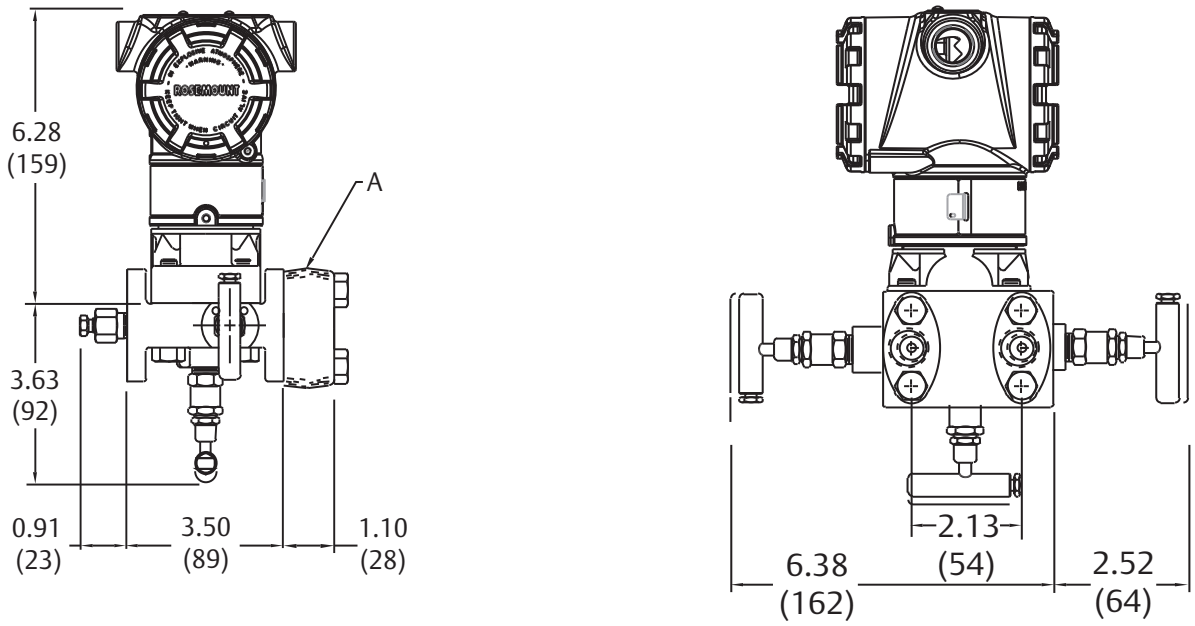
Figure A-7. Rosemount 3051C Coplanar with Traditional Flange



A. Flange adapters (optional)

Dimensions are in inches (millimeters).

Figure A-8. Rosemount 3051C Coplanar with Rosemount 305RT3 3-Valve Traditional Integral Manifold

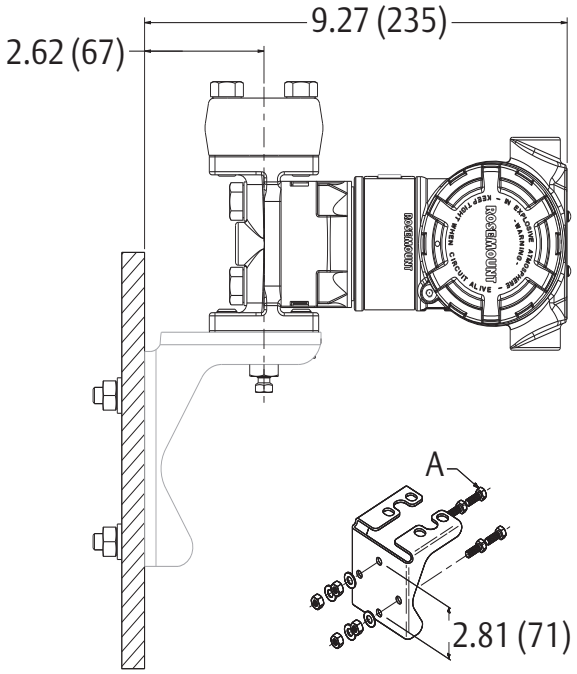


A. 1/2–14 NPT flange adapter (optional)

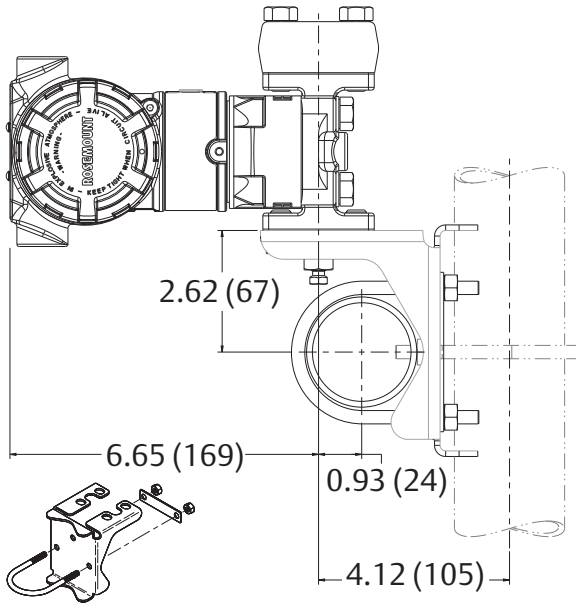
Dimensions are in inches (millimeters).

Figure A-9. Traditional Flange Mounting Configurations with Optional Brackets for 2-in. Pipe or Panel Mounting

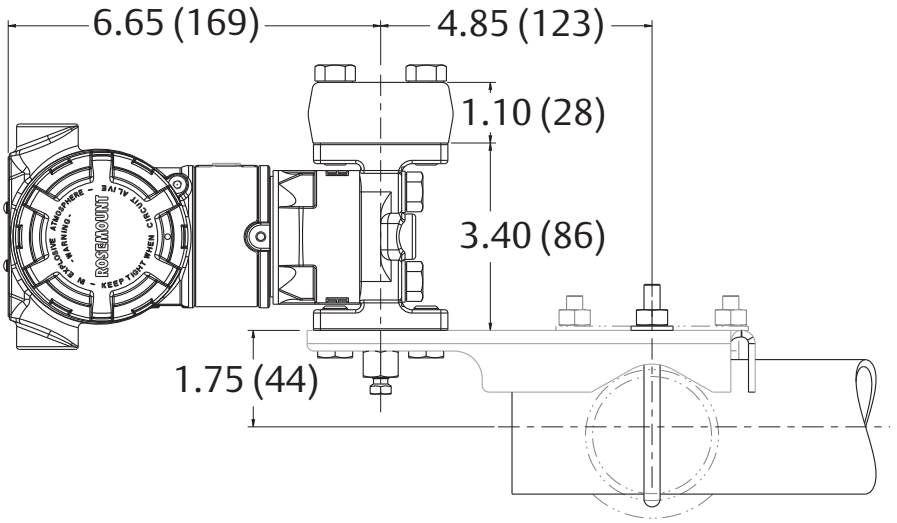
Panel mounting bracket (option B2/B8)



2-in. pipe mounting bracket (option B1/B7/BA)



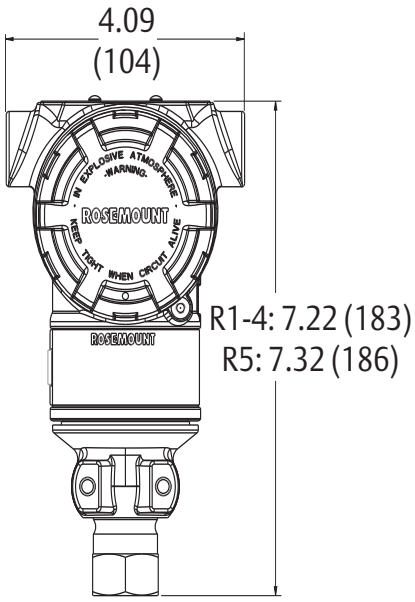
2-in. pipe mounting bracket (option B3/B9/BC)

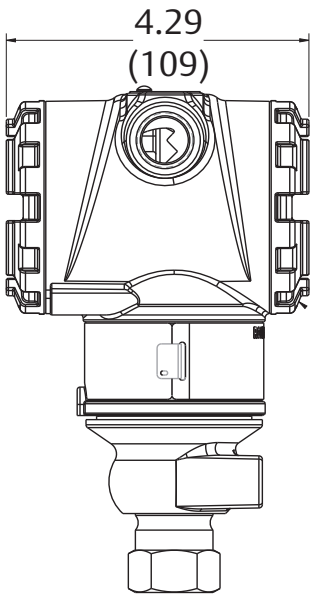


A. 5/16–18 bolts (not supplied)

Dimensions are in inches (millimeters).

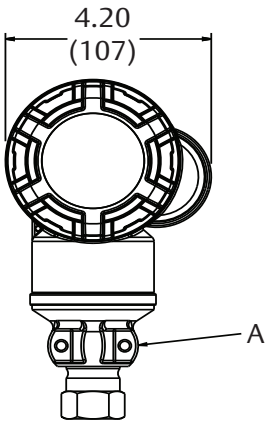
Figure A-10. Rosemount 3051T

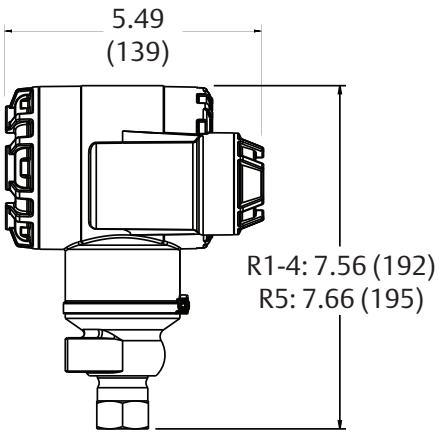




Dimensions are in inches (millimeters).

Figure A-11. Rosemount 3051T Wireless Housing

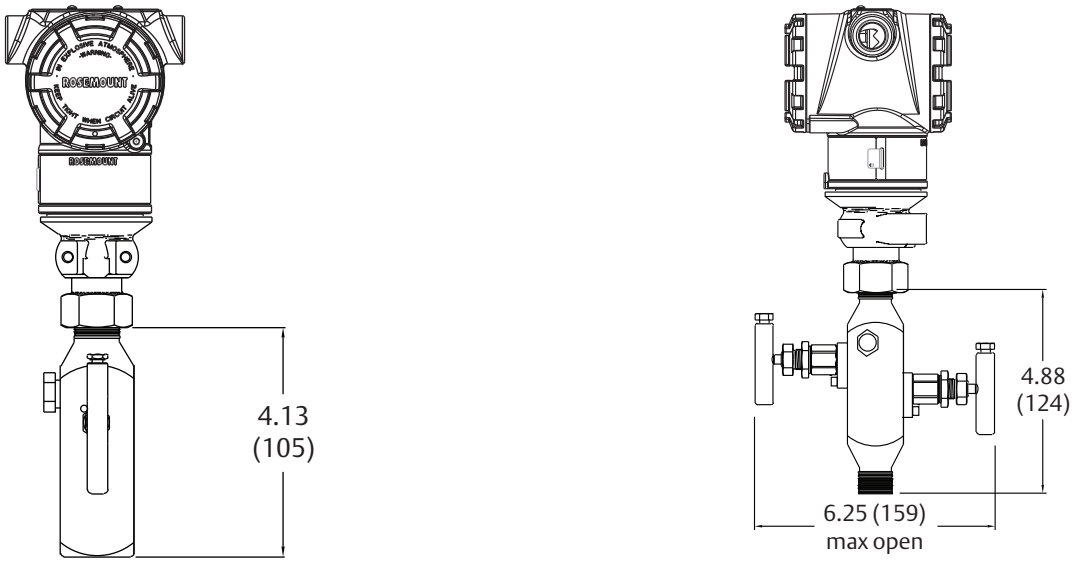




A. U-bolt bracket

Dimensions are in inches (millimeters).

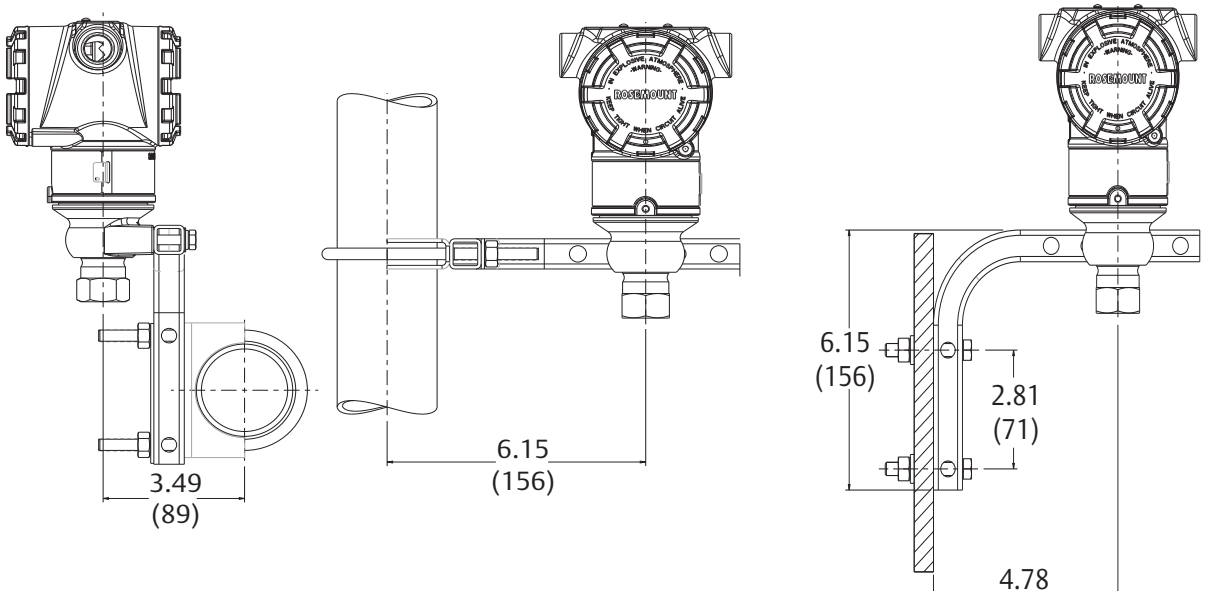
Figure A-12. Rosemount 3051T with Rosemount 306 2-Valve I Integral Manifold



Dimensions are in inches (millimeters).

Figure A-13. Rosemount 3051T Typical Mounting Configurations with Optional Mounting Bracket

Pipe mounting **Panel mounting**



Dimensions are in inches (millimeters).

Figure A-14. Rosemount 3051CFA Pak-Lok Annubar Flowmeter[1]

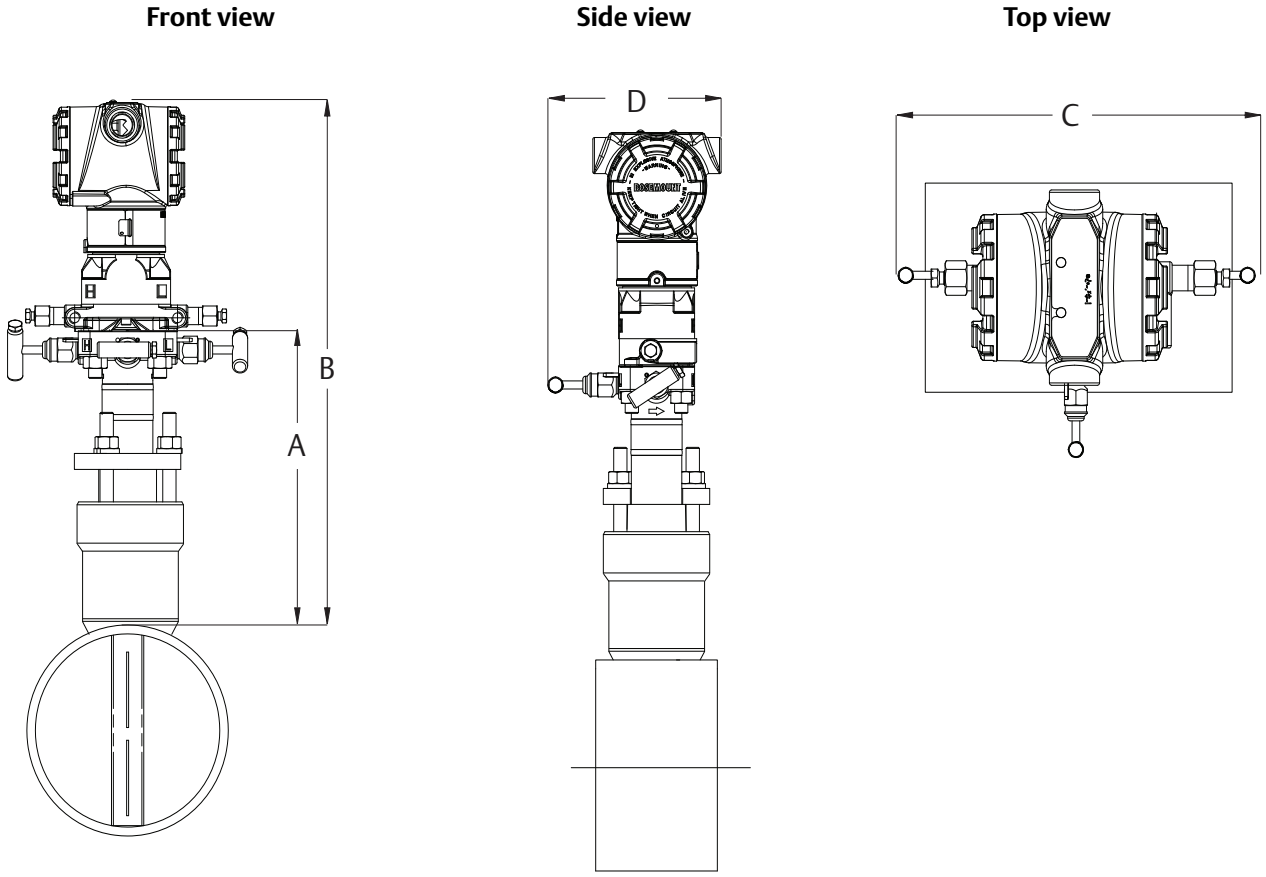


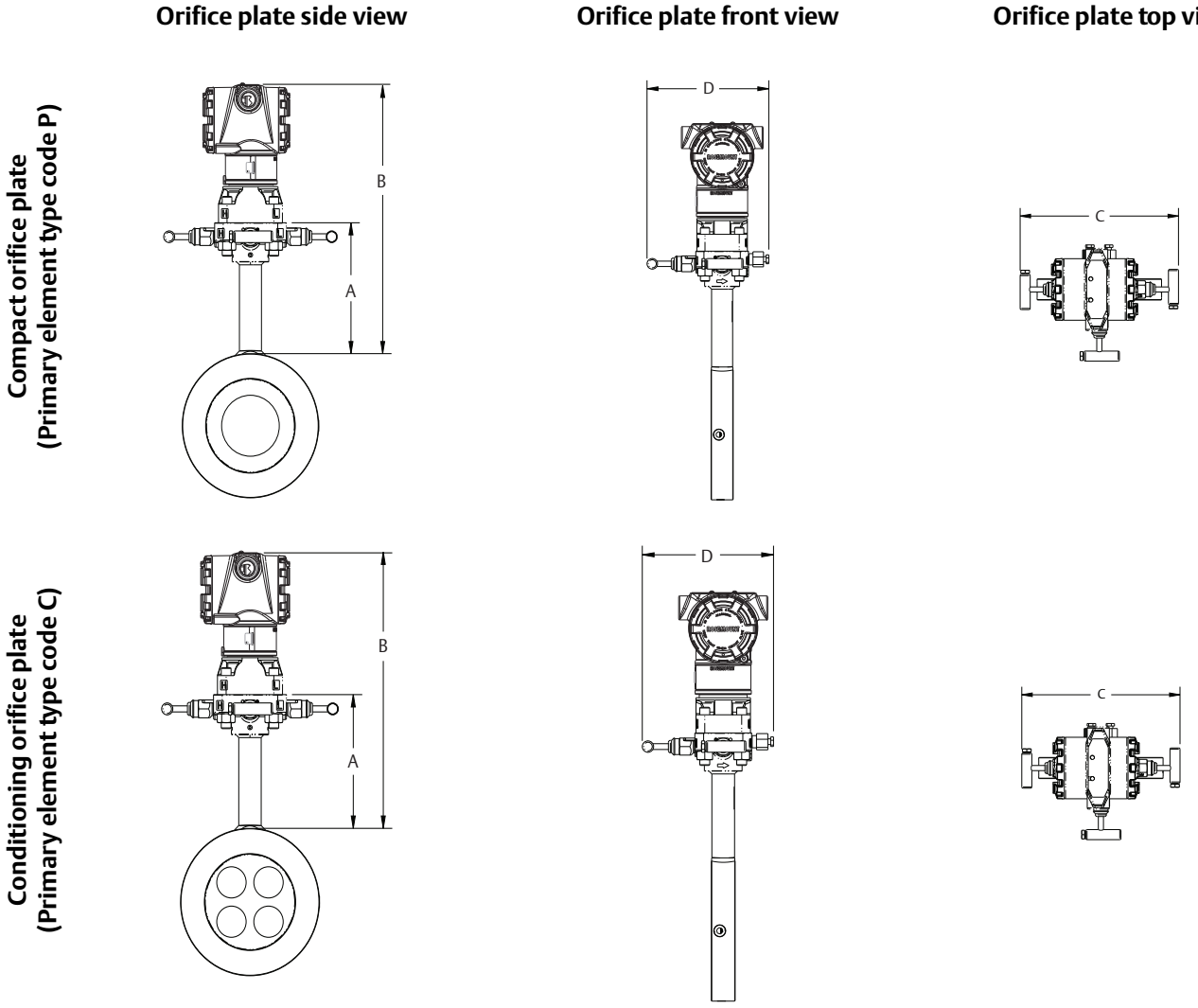
Table A-14. Rosemount 3051CFA Pak-Lok Annubar Flowmeter Dimensional Data (Maximum Dimensions)

Sensor size	A	B	C	D
1	8.50 (215.9)	15.60 (396.9)	9.00 (228.6)	6.00 (152.4)
2	11.0 (279.4)	18.10 (460.4)	9.00 (228.6)	6.00 (152.4)
3	12.0 (304.8)	19.10 (485.8)	9.00 (228.6)	6.00 (152.4)

Dimensions are in inches (millimeters).

1. The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F [99 bar at 38 °C]).

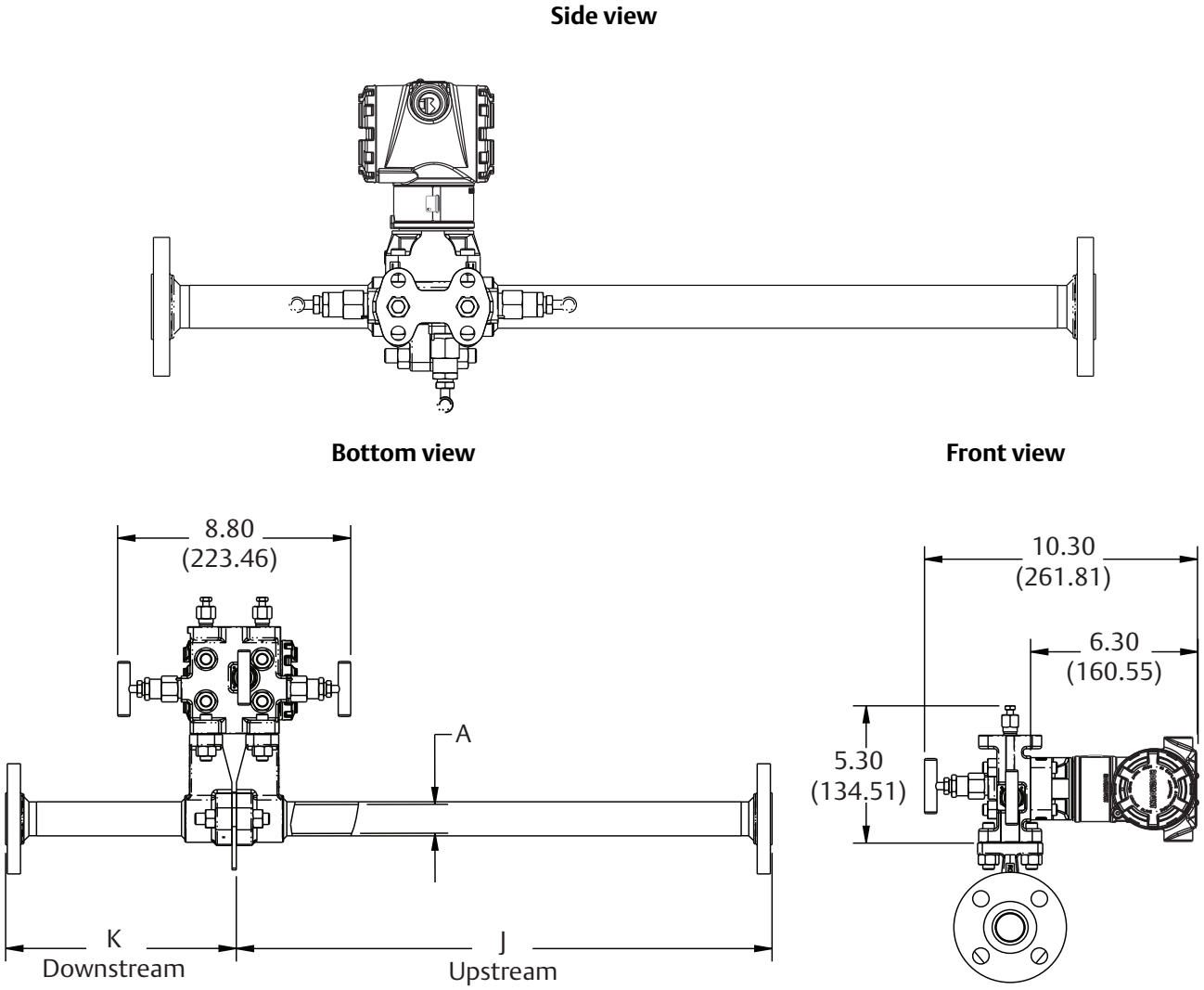
Figure A-15. Rosemount 3051CFC Compact Orifice Flowmeter



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-16. Rosemount 3051CFP Integral Orifice Flowmeter



A. Bore diameter (B.D.)

Dimensions are in inches (millimeters).

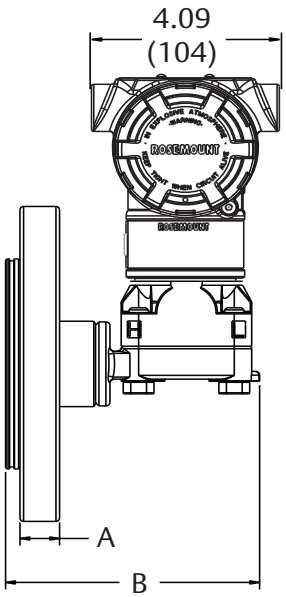
Dimension	Line size		
	½-in. (15 mm)	1-in. (25 mm)	1½-in. (40 mm)
J (Beveled/Threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF Class 150, weld neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
J (RF 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).

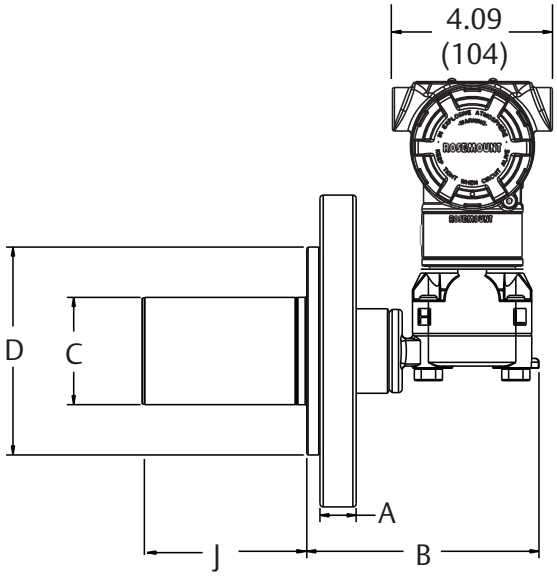
Figure A-17. Rosemount 3051L

2-in. flange configuration (flush mount only)



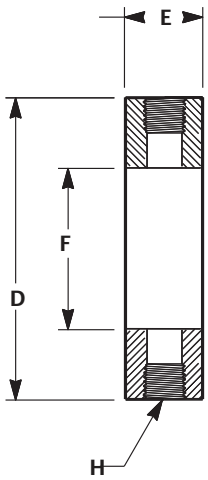
A. Flange thickness
B. See Table A-16.
C. Extension diameter

3- and 4-in. flange configuration



D. O.D. gasket surface
E. 2-, 4-, or 6-in. extension (only available with 3- and 4-in., DN80, and DN100 flange configurations)

Optional flushing connection ring (lower housing)



D. O.D. gasket surface
E. Lower housing
F. Process side
G. Bolt circle diameter
H. Flushing connection
I. Outside diameter

Diaphragm assembly and mounting flange

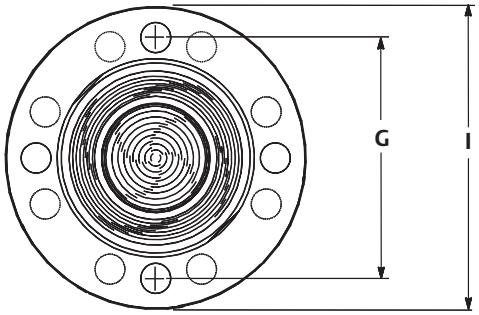
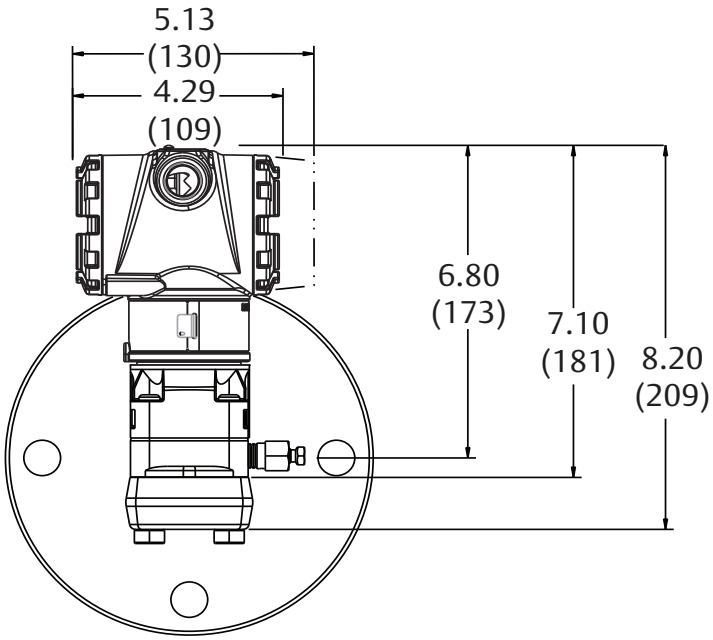


Figure A-18. Diaphragm Assembly and Mounting Flange



Dimensions are in inches (millimeters).

Table A-15. Rosemount 3051L Dimensional Specifications

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

Dimensions are in inches (millimeters)

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

Class[1]	Pipe size	Process side G	Lower housing F		C
			1/4-in. NPT	1/2-in. NPT	
ASME B16.5 (ANSI) 150	2 (51)	2.12 (54)	0.97 (25)	1.31 (33)	5.65 (143)
	3 (76)	3.60 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	4 (102)	3.60 (91)	0.97 (25)	1.31 (33)	5.65 (143)
ASME B16.5 (ANSI) 300	2 (51)	2.12 (54)	0.97 (25)	1.31 (33)	5.65 (143)
	3 (76)	3.60 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	4 (102)	3.60 (91)	0.97 (25)	1.31 (33)	5.65 (143)
ASME B16.5 (ANSI) 600	2 (51)	2.12 (54)	0.97 (25)	1.31 (33)	7.65 (194)
	3 (76)	3.60 (91)	0.97 (25)	1.31 (33)	7.65 (194)
DIN 2501 PN 10–40	DN 50	2.40 (61)	0.97 (25)	1.31 (33)	5.65 (143)
DIN 2501 PN 25/40	DN 80	3.60 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	DN 100	3.60 (91)	0.97 (25)	1.31 (33)	5.65 (143)
DIN 2501 PN 10/16	DN 100	3.60 (91)	0.97 (25)	1.31 (33)	5.65 (143)

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

A.10 Ordering information

Table A-16. Rosemount 3051C Coplanar Pressure Transmitters Ordering Information

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

Model[1]	Transmitter type			
3051C	Coplanar Pressure Transmitter			
Measurement type				
D	Differential			★
G	Gage			★
A[2]	Absolute			
Pressure range				
	Differential (Rosemount 3051CD)	**Gage (Rosemount 3051CG)**	**Absolute (Rosemount 3051CA)**	
1	–25 to 25 inH_2O (-62,16 to 62,16 mbar)	–25 to 25 inH_2O (-62,16 to 62,16 mbar)	0 to 30 psia (0 to 2,06 bar)	★
2	–250 to 250 inH_2O (-621,60 to 621,60 mbar)	–250 to 250 inH_2O (-621,60 to 621,60 mbar)	0 to 150 psia (0 to 10,34 bar)	★
3	–1000 to 1000 inH_2O (-2,48 to 2,48 bar)	–393 to 1000 inH_2O (-0,97 to 2,48 bar)	0 to 800 psia (0 to 55,15 bar)	★
4	–300 to 300 psi (-20,68 to 20,68 bar)	–14.2 to 300 psi (-0,97 to 20,68 bar)	0 to 4000 psia (0 to 275,79 bar)	★
5	–2000 to 2000 psi (-137,89 to 137,89 bar)	–14.2 to 2000 psi (-0,97 to 137,89 bar)	N/A	★
0[3]	–3 to 3 inH_2O (-7,46 to 7,46 mbar)	N/A	N/A	
Transmitter output				
A[4]	4–20 mA with Digital Signal Based on HART Protocol			★
F	FOUNDATION Fieldbus Protocol			★
W[5]	PROFIBUS® PA Protocol			★
X[6]	Wireless (requires wireless options and engineered polymer housing)			★
M[7]	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[8]	Coplanar	Cast C-276	Alloy C-276	★
4	Coplanar	Alloy 400	Alloy 400/K-500	★
5	Coplanar	Plated CS	SST	★
7[8]	Coplanar	SST	Alloy C-276	★
8[8]	Coplanar	Plated CS	Alloy C-276	★
0	Alternate process connection			★

Table A-16. Rosemount 3051C Coplanar Pressure Transmitters Ordering Information

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

Isolating diaphragm			
2[8]	316L SST		★
3[8]	Alloy C-276		★
4[9]	Alloy 400		
5[9]	Tantalum (available on Rosemount 3051CD and CG, Ranges 2–5 only; not available on Rosemount 3051CA)		
6[9]	Gold-plated Alloy 400 (use in combination with O-ring Option Code B)		
7[9]	Gold-plated 316 SST		
O-ring			
A	Glass-filled PTFE		★
B	Graphite-filled PTFE		★
Sensor fill fluid			
1	Silicone		★
2[9]	Inert (Differential and Gage only)		★
Housing material		**Conduit entry size**	
A	Aluminum	1/2–14 NPT	★
B	Aluminum	M20 × 1.5	★
J	SST	1/2–14 NPT	★
K	SST	M20 × 1.5	★
P[10]	Engineered Polymer	No conduit entries	★
D[11]	Aluminum	G1/2	
M[11]	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, 2.4GHz *Wireless*HART	★
Antenna and SmartPower™		
WP5	Internal antenna, compatible with green power module (I.S. power module sold separately)	★

HART Revision configuration[4] (requires HART Protocol Output Code A)

HR5	Configured for HART Revision 5	★
HR7	Configured for HART Revision 7	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★

Table A-16. Rosemount 3051C Coplanar Pressure Transmitters Ordering Information

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

Plantweb control functionality[12]		
A01	FOUNDATION Fieldbus Control Function Block Suite	★
Plantweb diagnostic functionality		
DA0[13]	Power Advisory HART Diagnostic	★
D01[12]	FOUNDATION Fieldbus Diagnostics Suite	★
Alternate flange[14]		
H2	Traditional flange, 316 SST, SST drain/vent	★
H3[8]	Traditional flange, Alloy C, Alloy C-276 drain/vent	★
H4	Traditional flange, Cast Alloy 400, Alloy 400/K-500 drain/vent	★
H7[8]	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 316 SST drain/vent	★
FB	Level flange, SST, 2 in., ANSI Class 300, vertical mount 316 SST drain/vent	★
FC	Level flange, SST, 3 in., ANSI Class 150, vertical mount 316 SST drain/vent	★
FD	Level flange, SST, 3 in., ANSI Class 300, vertical mount 316 SST drain/vent	★
FP	DIN level flange, SST, DN 50, PN 40, vertical mount 316 SST drain/vent	★
FQ	DIN level flange, SST, DN 80, PN 40, vertical mount 316 SST drain/vent	★
HK[15]	DIN-compliant traditional flange, SST, 10mm adapter/manifold bolting 316 SST	
HL	DIN-compliant traditional flange, SST, 12mm adapter/manifold bolting 316 SST	
Manifold assembly[16]		
S5	Assemble to Rosemount 305 Integral Manifold	★
S6	Assemble to Rosemount 304 Manifold or Connection System	★
Integral mount primary element[15][16]		
S3	Assemble to Rosemount 405 Compact Orifice Plate	★
S4[17]	Assemble to Rosemount Annubar™ or Rosemount 1195 Integral Orifice	★
Seal assemblies[16]		
S1[18]	Assemble to one Rosemount 1199 Seal	★
S2[19]	Assemble to two Rosemount 1199 Seals	★

Table A-16. Rosemont 3051C Coplanar Pressure Transmitters Ordering Information

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

Mounting bracket[20]		
B4	Coplanar flange bracket, all SST, 2-in. pipe and panel	★
B1	Traditional flange bracket, CS, 2-in. pipe	★
B2	Traditional flange bracket, CS, panel	★
B3	Traditional flange flat bracket, CS, 2-in. pipe	★
B7	Traditional flange bracket, B1 with SST bolts	★
B8	Traditional flange bracket, B2 with SST bolts	★
B9	Traditional flange bracket, B3 with SST bolts	★
BA	Traditional flange bracket, B1, all SST	★
BC	Traditional flange bracket, B3, all SST	★
Product certifications		
E8	ATEX Flameproof and Dust Certification	★
I1[21]	ATEX Intrinsic Safety and Dust	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION Fieldbus or PROFIBUS PA protocol only	★
N1	ATEX Type n Certification and Dust	★
K8	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
E4[22]	TIIS Flame-proof	★
E5	FM Explosion-proof, Dust Ignition-Proof	★
I5[23]	FM Intrinsically Safe, Nonincendive	★
IE	FM FISCO Intrinsically Safe; for FOUNDATION Fieldbus or PROFIBUS PA protocol only	★
K5	FM Explosion-proof, Dust Ignition-Proof, Intrinsically Safe, and Division 2	★
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
I6[10]	CSA Intrinsic Safety	★
K6	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6, E8, and I1)	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
N7	IECEx Type n Certification	★
K7	IECEx Flame-proof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7, and E7)	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
IB	INMETRO FISCO intrinsically safe; for FOUNDATION Fieldbus or PROFIBUS PA protocols only	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
N3	China Type n	★
EM	Technical Regulations Customs Union (EAC) Flameproof	★

Table A-16. Rosemount 3051C Coplanar Pressure Transmitters Ordering Information

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

IM	Technical Regulations Customs Union (EAC) Intrinsic Safety	★
KM	Technical Regulations Customs Union (EAC) Flameproof and Intrinsic Safety	★
KB	FM and CSA Explosion-proof, Dust Ignition Proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★
KD	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
Drinking water approval[24]		
DW	NSF drinking water approval	★
Shipboard approvals[9]		
SBS	American Bureau of Shipping	★
SBV[25]	Bureau Veritas (BV)	★
SDN	Det Norske Veritas	★
SLL	Lloyds Register (LR)	★
Custody transfer[13]		
C5	Measurement Canada Accuracy Approval (limited availability depending on transmitter type and range; contact an Emerson representative)	★
Bolting material		
L4	Austenitic 316 SST bolts	★
L5	ASTM A 193, Grade B7M bolts	★
L6	Alloy K-500 bolts	★
Display and interface options		
M4[26]	LCD display with Local Operator Interface	★
M5	LCD display	★
Calibration certificate		
Q4	Calibration certificate	★
QG[27]	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[13]		
QS	Prior-use certificate of FMEDA data	★
QT	Safety certified to IEC 61508 with certificate of FMEDA	★
Configuration buttons		
D4[13]	Analog zero and span	★
DZ[28]	Digital zero trim	★

Table A-16. Rosemount 3051C Coplanar Pressure Transmitters Ordering Information

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

Transient protection[9][29]		
T1	Transient protection terminal block	★
Software configuration[28]		
C1	Custom software configuration (completed Rosemount 3051 Pressure Transmitter Configuration Data Sheet for wired and Rosemount 3051 Wireless Configuration Data Sheet required with order)	★
Low power output		
C2	0.8–3.2 Vdc Output with Digital Signal Based on HART Protocol (available with Output code M only)	★
Gage pressure calibration		
C3	Gage calibration (Model 3051CA4 only)	★
Alarm levels[13]		
C4	Analog output levels compliant with NAMUR Recommendation NE 43, Alarm High	★
CN	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	Rosemount standard low alarm	★
Pressure testing		
P1	Hydrostatic testing with certificate	
Cleaning process area		
P2	Cleaning for special service	
P3	Cleaning for <1 PPM Chlorine/Fluorine	
Flange adapters[30]		
DF	1/2–14 NPT flange adapter(s)	★
Vent/drain valves		
D7	Coplanar flange without drain/vent ports	
Conduit plug[9][31]		
DO	316 SST Conduit Plug	★
RC1/4 RC1/2 process connection[32]		
D9	RC ¼ flange with RC 1/2 flange adapter - SST	
Max static line pressure		
P9	4500 psig (310,26 bar) static pressure limit (Rosemount 3051CD Ranges 2–5 only)	★
Ground screw[9][33]		
V5	External ground screw assembly	★

Table A-16. Rosemount 3051C Coplanar Pressure Transmitters Ordering Information

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

Surface finish		
Q16	Surface finish certification for sanitary remote seals	★
Toolkit total system performance reports		
QZ	Remote seal system performance calculation report	★
Conduit electrical connector(9)		
GE	M12, 4-pin, male connector (eurofast®)	★
GM	A size mini, 4-pin, male connector (minifast®)	★
NACE® certificate(34)		
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: 3051CD 2 A 2 2 A 1 A B4		

1. Select Configuration Buttons (option code D4 or DZ) or Local Operator Interface (option code M4) if local configuration buttons are required.
2. If ordered with Wireless output code X, only Range 1–4, 316L SST diaphragm material (code 2), silicone fill fluid (code 1) and wireless housing (code P) are available.
3. Rosemount 3051CD0 is only available with output code A and X. For output code A, only process flange code 0 (Alternate flange H2, H7, HJ or HK), isolating diaphragm code 2, O ring code A and bolting option L4 are available. For output code X, only process flange code 0 (Alternate flange H2), isolating diaphragm code 2, O ring code A and bolting option L4 are available.
4. Option HR5 configures the HART output to HART Revision 5. Option HR7 configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 or 7 if desired. HART Revision 5 is the default HART output.
5. For local addressing and configuration, M4 (Local Operator Interface) is required.
6. Available approvals are FM Intrinsically Safe, (Option Code I5), CSA Intrinsically Safe (Option Code I6), ATEX Intrinsic Safety (Option Code I1), IECEx Intrinsic Safety (Option Code I7) and EAC Intrinsic Safety (option code IM).
7. Only available with C6, E2, E5, I5, K5, KB and E8 product certifications. Not available with GE, GM, SBS, DA0, M4, D4, DZ, QT, HR5, HR7, CR, CS, CT.
8. 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.
9. Not available with Wireless Output (code X).
10. Only available with Wireless Output (code X).
11. Not available with Product certifications options E8, K8, E5, K5, C6, K6, E7, K7, E2, K2, E3, KB, and KD.
12. Only valid with FOUNDATION Fieldbus Output Code F.
13. Only available with HART 4–20 mA Output (code A).
14. Requires 0 code in Materials of Construction for Alternate Process Connection.
15. Not valid with Option Code P9 for 4500 psi Static Pressure.
16. "Assemble-to" items are specified separately and require a completed model number.
17. Process flange limited to coplanar (Option Codes 2, 3, 5, 7, 8) or Traditional (Option Codes H2, H3, H7).
18. Not valid with Option Code D9 for RC 1/2 adapters.
19. Not valid for Option Codes DF and D9 for adapters.
20. Panel mounting bolts are not supplied.
21. Dust approval not applicable to Output Code X. See " IEC 62591 (WirelessHART® Protocol)" on page 226for wireless approvals.
22. Only available with output codes A - 4–20mA HART, F - FOUNDATION Fieldbus, and W - PROFIBUS PA. Also only available with G 1/2 housing thread types.
23. Nonincendive certification not provided with Wireless output option code (X).
24. Not available with Alloy C-276 isolator (code 3), tantalum isolator (code 5), all cast C-276 flanges, all plated CS flanges, all DIN flanges, all Level flanges, assemble-to manifolds (codes S5 and S6), assemble-to seals (codes S1 and S2), assemble-to primary elements (codes S3 and S4), surface finish certification (code Q16), and remote seal system report (code QZ).
25. Only available with product certifications E7, E8, I1, I7, IA, K7, K8, KD, N1, N7
26. Not available with FOUNDATION Fieldbus (Output Code F), Wireless (Output Code X), or Low Power Output (output code M).
27. Contact an Emerson representative for availability.
28. Only available with HART 4–20 mA Output (output code A) and Wireless Output (output code X).
29. The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA, IB, and IE.
30. Not valid with Alternate Process Connection options S3, S4, S5, and S6.
31. Transmitter is shipped with a 316 SST Conduit plug (uninstalled) in place of standard carbon steel conduit plug.
32. Not available with Alternate Process Connection; DIN Flanges and Level Flanges.
33. The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.
34. NACE compliant wetted materials are identified by Footnote 8.

Table A-17. Rosemount 3051T In-Line Pressure Transmitter Ordering Information

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

Model[1]	**Transmitter type**		
3051T	In-line pressure transmitter		
Pressure type			
G	Gage		★
A[2]	Absolute		★
Pressure range			
	Gage (Rosemount 3051TG)[3]	**Absolute (Rosemount 3051TA)**	
1	–14.7 to 30 psi (–1,01 to 2,06 bar)	0 to 30 psia (0 to 2,06 bar)	★
2	–14.7 to 150 psi (–1,01 to 10,34 bar)	0 to 150 psia (0 to 10,34 bar)	★
3	–14.7 to 800 psi (–1,01 to 55,15 bar)	0 to 800 psia (0 to 55,15 bar)	★
4	–14.7 to 4000 psi (–1,01 to 275,79 bar)	0 to 4000 psia (0 to 275,79 bar)	★
5	–14.7 to 10000 psi (–1,01 to 689,47 bar)	0 to 10000 psia (0 to 689,47 bar)	★
Transmitter output			
A[4]	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION Fieldbus Protocol		★
W[5]	PROFIBUS PA Protocol		★
X[6]	Wireless (requires wireless options and engineered polymer housing)		★
M[7]	Low-power 1-5 Vdc with digital signal based on HART Protocol		
Process connection style			
2B	1/2–14 NPT female		★
2C[8]	G1/2 A DIN 16288 male (Range 1–4 only)		★
2F[9]	Coned and threaded, compatible with Autoclave Type F-250-C (Range 5 only)		
61[9]	Non-threaded instrument flange (Range 1–4 only)		
Isolating diaphragm		**Process connection wetted parts material**	
2[10]	316L SST	316L SST	★
3[10]	Alloy C-276	Alloy C-276	★
Sensor fill fluid			
1	Silicone		★
2[9]	Inert		★

Table A-17. Rosemount 3051T In-Line Pressure Transmitter Ordering Information

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

Housing material		Conduit entry size	
A	Aluminum	1/2–14 NPT	★
B	Aluminum	M20 × 1.5	★
J	SST	1/2–14 NPT	★
K	SST	M20 × 1.5	★
P[11]	Engineered polymer	No conduit entries	★
D[12]	Aluminum	G1/2	
M[12]	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, 2.4GHz *Wireless*HART	★
Antenna and SmartPower		
WP5	Internal antenna, compatible with green power module (I.S. power module sold separately)	★

HART Revision configuration[4] (requires HART Protocol Output Code A)

HR5	Configured for HART Revision 5	★
HR7	Configured for HART Revision 7	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Plantweb control functionality		
A01	FOUNDATION Fieldbus Control Function Block Suite	★
Plantweb diagnostic functionality		
DA0[21]	Power Advisory HART Diagnostic	★
D01	FOUNDATION Fieldbus Diagnostics Suite	★
Integral assembly[13]		
S5	Assemble to Rosemount 306 Integral Manifold	★
Diaphragm seal assemblies[13]		
S1	Assemble to one Rosemount 1199 Seal	★

Table A-17. Rosemount 3051T In-Line Pressure Transmitter Ordering Information

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

Mounting bracket[14]		
B4	Bracket for 2-in. pipe or panel mounting, all SST	★
Product certifications		
E8	ATEX Flameproof and Dust Certification	★
I1[15]	ATEX Intrinsic Safety and Dust	★
IA	ATEX Intrinsic Safety for FISCO; for FOUNDATION Fieldbus or PROFIBUS PA protocols only	★
N1	ATEX Type n Certification and Dust	★
K8	ATEX Flame-proof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
E4[16]	TIIS Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5[17]	FM Intrinsically Safe, Nonincendive	★
IE	FM FISCO Intrinsically Safe; for FOUNDATION Fieldbus or PROFIBUS PA protocols only	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
I6[11]	CSA Intrinsic Safety	★
K6	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6, E8, and I1)	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
N7	IECEx Type n Certification	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7, and E7)	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
IB	INMETRO FISCO intrinsically safe; for FOUNDATION Fieldbus or PROFIBUS PA protocols only	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
N3	China Type n	★
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	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★
KD	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
Drinking water approval[18]		
DW	NSF drinking water approval	★

Table A-17. Rosemount 3051T In-Line Pressure Transmitter Ordering Information

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

Shipboard approvals[9]		
SBS	American Bureau of Shipping	★
SBV[19]	Bureau Veritas (BV)	★
SDN	Det Norske Veritas	★
SLL[19]	Lloyds Register (LR)	★
Custody transfer		
C5	Measurement Canada Accuracy Approval (limited availability depending on transmitter type and range. Contact an Emerson representative)	★
Calibration certification		
Q4	Calibration certificate	★
QG[20]	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[21]		
QS	Prior-use certificate of FMEDA data	★
QT	Safety certified to IEC 61508 with certificate of FMEDA	★
Configuration buttons[21]		
D4	Analog zero and span	★
DZ	Digital zero trim	★
Display and interface options		
M4[22]	LCD display with local operator interface	★
M5	LCD display	★
Wireless SST sensor module[11]		
WSM	Wireless SST sensor module	★
Conduit plug[9][23]		
DO	316 SST conduit plug	★
Transient terminal block[9][24]		
T1	Transient protection terminal block	★
Software configuration[21]		
C1	Custom software configuration (completed Rosemount 3051 Pressure Transmitter Configuration Data Sheet for wired and Rosemount 3051 Wireless Configuration Data Sheet required with order)	★

Table A-17. Rosemount 3051T In-Line Pressure Transmitter Ordering Information

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

Low power output		
C2	0.8-3.2 Vdc output with digital signal based on HART Protocol (available with Output code M only)	
Alarm levels[21]		
C4	Analog output levels compliant with NAMUR recommendation NE 43, Alarm High	★
CN	Analog output levels compliant with NAMUR recommendation NE 43, 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	Rosemount standard low alarm	★
Pressure testing		
P1	Hydrostatic testing with certificate	
Cleaning process area[25]		
P2	Cleaning for special service	
P3	Cleaning for <1 PPM Chlorine/Fluorine	
Ground screw[9][26]		
V5	External ground screw assembly	★
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[9]		
GE	M12, 4-pin, male connector (eurofast)	★
GM	A size mini, 4-pin, male connector (minifast)	★
NACE certificate[27]		
Q15	Certificate of compliance to NACE MR0175/ISO15156 for wetted materials	★
Q25	Certificate of compliance to NACE MR0103 for wetted materials	★
Typical model number: 3051T G 5 F 2A 2 1 A B4		

1. Select Configuration Buttons (option code D4 or DZ) or Local Operator Interface (option code M4) if local configuration buttons are required.
2. 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 polymer housing (code P).
3. Rosemount 3051TG lower range limit varies with atmospheric pressure.
4. Option HR5 configures the HART output to HART Revision 5. Option HR7 configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 or 7 if desired. HART Revision 5 is the default HART output.
5. For local addressing and configuration, M4 (Local Operator Interface) is required.
6. Requires wireless options and engineered polymer housing. Available approvals are FM Intrinsically Safe, (Option Code I5), CSA Intrinsically Safe (Option Code I6), ATEX Intrinsic Safety (Option Code I1), IECEx Intrinsic Safety (Option Code I7), and EAC Intrinsic Safety (Option Code IM).
7. Only available with C6, E2, E5, I5, K5, KB and E8 product certifications. Not available with GE, GM, SBS, DA0, M4, D4, DZ, QT, HR5, HR7, CR, CS, CT.
8. Wireless Output (code X) only available in G1/2 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).
9. Not available with Wireless Output (output code X).
10. 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.

11. Only available with Wireless Output (output code X).
12. Not available with Product certifications options E8, K8, E5, K5, C6, K6, E7, K7, E2, K2, E3, KB, KD.
13. "Assemble-to" items are specified separately and require a completed model number.
14. Panel mounting bolts are not supplied.
15. Dust approval not applicable to output code X. See " IEC 62591 (WirelessHART® Protocol)" on page 226 for wireless approvals.
16. Only available with output codes A - 4-20 mA HART, F - FOUNDATION Fieldbus, and W - PROFIBUS PA. Also only available with G1/2 housing thread types.
17. Nonincendive certification not provided with Wireless output option code (X).
18. Not available with Alloy C-276 isolator (option code 3), Assemble-to manifolds (option code S5), assemble-to seals (option code S1), surface finish certification (option code Q16), and remote seal system report (option code QZ).
19. Only available with product certifications E7, E8, I1, I7, IA, K7, K8, KD, N1, N7.
20. Contact an Emerson representative for availability.
21. Only available with HART 4-20 mA output (output code A).
22. Not available with FOUNDATION Fieldbus (output code F) and Wireless output (output code X) or Low Power (output code M).
23. Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug.
24. The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA, IB, and IE.
25. Not valid with Alternate Process Connection S5.
26. The V5 option is not needed with T1 option; external ground screw assembly is included with the T1 option.
27. NACE compliant wetted materials are identified by Footnote 10.

Table A-18. Rosemount 3051CFA Annubar Flowmeter Ordering Information

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

Model[1]	Product description	
3051CFA	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)	★
140	14-in. (350 mm)	
160	16-in. (400 mm)	
180	18-in. (450 mm)	
200	20-in. (500 mm)	
240	24-in. (600 mm)	
300	30-in. (750 mm)	
360	36-in. (900 mm)	
420	42-in. (1066 mm)	
480	48-in. (1210 mm)	
600	60-in. (1520 mm)	
720	72-in. (1820 mm)	
780	78-in (1950 mm)	
840	84-in. (2100 mm)	
900	90-in. (2250 mm)	
960	96-in (2400 mm)	

Table A-18. Rosemount 3051CFA Annubar Flowmeter Ordering Information

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

Pipe I.D. range		
C	Range C from the Pipe I.D. range codes table	★
D	Range D from the Pipe I.D. range codes table	★
A	Range A from the Pipe I.D. range codes table	
B	Range B from the Pipe I.D. range codes table	
E	Range E from the Pipe I.D. range codes table	
Z	Non-standard Pipe I.D. range codes or line sizes greater than 12 inches	
Pipe material/mounting assembly material		
C	Carbon steel (A105)	★
S	316 Stainless Steel	★
0	No mounting (customer supplied)	★
G	Chrome-Moly Grade F-11	
N	Chrome-Moly Grade F-22	
J	Chrome-Moly Grade F-91	
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	★
L	Flange-Lok	
G	Gear-Drive Flo-Tap	
M	Manual Flo-Tap	
Sensor material		
S	316 Stainless Steel	★
H	Alloy C-276	
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	★
A9[(2)]	Class 900 RF ANSI	

Table A-18. Rosemount 3051CFA Annubar Flowmeter Ordering Information

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

AF[2]	Class 1500 RF ANSI			
AT[2]	Class 2500 RF ANSI			
R1	Class 150 RTJ flange			
R3	Class 300 RTJ flange			
R6	Class 600 RTJ flange			
R9[2]	Class 900 RTJ flange			
RF[2]	Class 1500 RTJ flange			
RT[2]	Class 2500 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			★
	Packing gland – Required for Flo-Tap models			
	Packing gland material	**Rod material**	**Packing material**	
J[3]	Stainless steel packing gland/cage nipple	Carbon steel	PTFE	
K[3]	Stainless steel packing gland/cage nipple	Stainless steel	PTFE	
L[3]	Stainless steel packing gland/cage nipple	Carbon steel	Graphite	
N[3]	Stainless steel packing gland/cage nipple	Stainless steel	Graphite	
R	Alloy C-276 packing gland/cage nipple	Stainless steel	Graphite	
Isolation valve for Flo-Tap models				
0	Not applicable or customer supplied			★
1	Gate valve, carbon steel			
2	Gate valve, stainless steel			
5	Ball valve, carbon steel			
6	Ball valve, stainless steel			
Temperature measurement				
T	Integral RTD – not available with flanged model greater than class 600			★
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. NPT)			★
6	Direct-mount, high temperature 5-valve manifold – not available with flanged model greater than class 600#			
8	Remote-mount SW connections (1/2-in.)			
Differential pressure range				
1	0 to 25 in H_2O (0 to 62,16 mbar)			★
2	0 to 250 in H_2O (0 to 621,60 mbar)			★
3	0 to 1000 in H_2O (0 to 2,48 bar)			★

Table A-18. Rosemount 3051CFA Annubar Flowmeter Ordering Information

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

Transmitter output			
A[4]	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION Fieldbus Protocol		★
W[5]	PROFIBUS PA Protocol		★
X[6]	Wireless (requires wireless options and engineered polymer housing)		★
M[7]	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	SST	M20 × 1.5	★
P[8]	Engineered polymer	No conduit entries	★
D[9]	Aluminum	G1/2	
M[9]	SST	G1/2	
Transmitter performance class			
1	1.8% flow rate accuracy, 8:1 flow turndown, 5-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, 2.4GHz *Wireless*HART	★
Antenna and SmartPower		
WP5	Internal antenna, compatible with green power module (I.S. power module sold separately)	★

HART Revision configuration[4] (requires HART Protocol Output Code A)

HR5	Configured for HART Revision 5	★
HR7	Configured for HART Revision 7	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Pressure testing[10]		
P1	Hydrostatic testing with certificate	
PX	Extended hydrostatic testing	
Special cleaning		
P2	Cleaning for special services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material testing		
V1	Dye penetrant exam	

Table A-18. Rosemount 3051CFA Annubar Flowmeter Ordering Information

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

Material examination		
V2	Radiographic examination	
Flow calibration		
W1	Flow calibration (Average K)	
Special inspection		
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★
Surface finish		
RL	Surface finish for Low Pipe Reynolds number in gas and steam	★
RH	Surface finish for High Pipe Reynolds numbering liquid	★
Material traceability certification		
Q8[(11)]	Material traceability certification per EN 10474:2004 3.1	★
Code conformance[(12)]		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
Materials conformance		
J5[(13)]	NACE MR-0175/ISO 15156	
Country certification		
J6	European Pressure Directive (PED)	★
J1	Canadian Registration	
Installed in flanged pipe spool section		
H3	150 flanged connection with Rosemount standard length and schedule	
H4	300 flanged connection with Rosemount standard length and schedule	
H5	600 flanged connection with Rosemount standard length and schedule	
Instrument connections for remote mount options		
G2	Needle valves, stainless steel	★
G6	OS&Y gate valve, stainless steel	★
G1	Needle valves, carbon steel	
G3	Needle valves, Alloy C-276	
G5	OS&Y gate valve, carbon steel	
G7	OS&Y gate valve, Alloy C-276	
Special shipment		
Y1	Mounting hardware shipped separately	★
Special dimensions		
VM	Variable mounting	
VT	Variable tip	
VS	Variable length spool section	

Table A-18. Rosemount 3051CFA Annubar Flowmeter Ordering Information

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

Plantweb control functionality[14]		
A01	FOUNDATION Fieldbus Control Function Block Suite	★
Plantweb diagnostic functionality		
DA0[15]	Power Advisory HART Diagnostic	★
D01[14]	FOUNDATION Fieldbus Diagnostics Suite	★
Product certifications		
E8	ATEX Flameproof, Dust	★
I1[16]	ATEX Intrinsic Safety and Dust	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION Fieldbus or PROFIBUS PA protocols only	★
N1	ATEX Type n and Dust	★
K8	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5[17]	FM Intrinsically Safe, Nonincendive	★
IE	FM FISCO Intrinsically Safe; for FOUNDATION Fieldbus or PROFIBUS PA protocols only	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of E5 and I5)	★
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
I6[8]	CSA Intrinsically Safe	★
K6	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6, E8, and I1)	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
N7	IECEx Type n	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7 and E7)	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
IB	INMETRO FISCO intrinsically safe; for FOUNDATION Fieldbus or PROFIBUS PA protocols only	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★
KD	CSA, FM, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
Sensor fill fluid and O-ring options		
L1[18]	Inert sensor fill fluid (silicone fill fluid is standard)	★
L2	Graphite-filled (PTFE) O-ring	★
LA[18]	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	★
Shipboard approvals[18]		
SBS	American Bureau of Shipping	★
SLL[19]	Lloyds Register (LR)	
Display and interface options		
M4[20]	LCD display with local operator interface	★
M5	LCD display	★

Table A-18. Rosemount 3051CFA Annubar Flowmeter Ordering Information

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

Transmitter calibration certification		
Q4	Calibration certificate for transmitter	★
Quality certification for safety[15]		
QS	Prior-use certificate of FMEDA data	★
QT	Safety certified to IEC 61508 with certificate of FMEDA	★
Transient protection[18][21]		
T1	Transient terminal block	★
Manifold for remote mount option		
F2	3-valve manifold, stainless steel	★
F6	5-valve manifold, stainless steel	★
F1	3-valve manifold, carbon steel	
F3	3-valve manifold, Alloy C-276	
F5	5-valve manifold, carbon steel	
F7	5-valve manifold, Alloy C-276	
Lower power output		
C2	0.8-3.2 Vdc output with digital signal based on HART Protocol (available with Output code M only)	
Alarm levels[15]		
C4	NAMUR alarm and saturation levels, high alarm	★
CN	NAMUR alarm and saturation levels, low alarm	★
CR	Custom alarm and saturation signal levels, high alarm	★
CS	Custom alarm and saturation signal levels, low alarm	★
CT	Rosemount standard low alarm	★
Configuration buttons		
D4[15]	Analog zero and span	★
DZ[22]	Digital zero trim	★
Ground screw[18][23]		
V5	External ground screw assembly	★
Typical model number: 3051CFA D L 060 D C H P S 2 T1 0 0 0 3 2 A A 1		

1. Select Configuration Buttons (option code D4 or DZ) or Local Operator Interface (option code M4) if local configuration buttons are required.
2. Available in remote mount applications only.
3. The cage nipple is constructed of 304 SST.
4. Option HR5 configures the HART output to HART Revision 5. Option HR7 configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 or 7 if desired. HART Revision 5 is the default HART output.
5. For local addressing and configuration, M4 (Local Operator Interface) is required.
6. Requires wireless options and engineered polymer housing. Available approvals are FM Intrinsically Safe, (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).
7. Only available with C6, E2, E5, I5, K5, KB and E8 approval. Not available with GE, GM, SBS, DA0, M4, D4, DZ, QT, HR5, HR7, CR, CS, and CT.
8. Only available with Wireless Output (output code X).
9. Not available with Product certifications options E8, K8, E5, K5, C6, K6, E7, K7, E2, K2, E3, KB, and KD.
10. Applies to assembled flowmeter only, mounting not tested.
11. Instrument Connections for Remote Mount Options and Isolation Valves for Flo-tap Models are not included in the Material Traceability Certification.
12. Not available with Transmitter Connection Platform 6.
13. 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.
14. Only valid with FOUNDATION Fieldbus output (output code F).
15. Only available with 4-20 mA HART output (output Code A).
16. Dust approval not applicable to output code X. See " IEC 62591 (WirelessHART® Protocol)" on page 226 for wireless approvals.
17. Nonincendive certification not provided with Wireless output option code (X).
18. Not available with Wireless Output (output code X).

19. Only available with product certifications E7, E8, I1, I7, IA, K7, K8, KD, N1, and N7.
20. Not available with FOUNDATION Fieldbus (Output Code F) or Wireless Output (output code X) or Low Power (output code M).
21. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification codes IA, IB, and IE.
22. Only available with 4-20 mA HART output (output code A) and Wireless output (Output Code X).
23. The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

Table A-19. Rosemount 3051CFC Compact Flowmeter Ordering Information

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

Model[1]	Product description	
3051CFC	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[2]	1/2-in. (15 mm)	★
010[2]	1-in. (25 mm)	★
015[2]	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[3]	10-in. (250 mm)	★
120[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	★
R	Remote thermowell and RTD	
Transmitter connection platform		
3	Direct-mount	★
7	Remote-mount, NPT connections	★

Table A-19. Rosemount 3051CFC Compact Flowmeter Ordering Information

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

Differential pressure range		
1	0 to 25 in H_2O (0 to 62,16 mbar)	★
2	0 to 250 in H_2O (0 to 621,60 mbar)	★
3	0 to 1000 in H_2O (0 to 2,48 bar)	★
Transmitter output		
A[5]	4–20 mA with digital signal based on HART Protocol	★
F	FOUNDATION Fieldbus Protocol	★
W[6]	PROFIBUS PA Protocol	★
X[7]	Wireless (requires wireless options and engineered polymer housing)	★
M[8]	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	SST	M20 × 1.5 ★
P[9]	Engineered polymer	No conduit entries ★
D[10]	Aluminum	G1/2
M[10]	SST	G1/2
Transmitter performance class		
1	Up to ±1.65% flow rate accuracy, 8:1 flow turndown, 5-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, 2.4GHz *Wireless*HART	★
Antenna and SmartPower		
WP5	Internal antenna, compatible with green power module (I.S. power module sold separately)	★

HART Revision Configuration[5] (requires HART Protocol Output Code A)

HR5	Configured for HART Revision 5	★
HR7[5]	Configured for HART Revision 7	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★

Table A-19. Rosemount 3051CFC Compact Flowmeter Ordering Information

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

Installation accessories		
AB	ANSI alignment ring (150) (only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	★
AC	ANSI alignment ring (300) (only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	★
AD	ANSI alignment ring (600) (only required for 10-in. (250 mm) and 12-in. (300mm) 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		
FE	Flange adapters 316 SST (1/2-in NPT)	★
High temperature application		
HT	Graphite valve packing (Tmax = 850 °F)	
Flow calibration[(11)]		
WC	Flow calibration, 3 pt, Conditioning Orifice Option C (all pipe schedules)	
WD[(12)]	Flow calibration, 10 pt, Conditioning Option C (All Schedules), Annubar Option A (Schedule 40)	
Pressure testing		
P1	Hydrostatic testing with certificate	
Special cleaning		
P2[(13)]	Cleaning for special services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Special inspection		
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★
Transmitter calibration certification		
Q4	Calibration certificate for transmitter	★
Quality certification for safety[(14)]		
QS	Prior-use certificate of FMEDA data	★
QT	Safety certified to IEC 61508 with certificate of FMEDA	★
Material traceability certification		
Q8	Material traceability certification per EN 10204:2004 3.1	★

Table A-19. Rosemount 3051CFC Compact Flowmeter Ordering Information

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

Code conformance		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
J4	ANSI/ASME B31.8	
Materials conformance[15]		
J5	NACE MR-0175/ISO 15156	
Country certification		
J1	Canadian Registration	
Product certifications		
E8	ATEX Flameproof, Dust	★
I1[16]	ATEX Intrinsic Safety and Dust	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION Fieldbus or PROFIBUS PA protocols only	★
N1	ATEX Type n and Dust	★
K8	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5[17]	FM Intrinsically Safe, Nonincendive	★
IE	FM FISCO Intrinsically Safe; for FOUNDATION Fieldbus or PROFIBUS PA protocols only	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of E5 and I5)	★
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
I6[9]	CSA Intrinsically Safe	★
K6	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6, E8, and I1)	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
N7	IECEx Type n	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7 and E7)	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
IB	INMETRO FISCO intrinsically safe; for FOUNDATION Fieldbus or PROFIBUS PA protocols only	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★
KD	CSA, FM, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★

Table A-19. Rosemount 3051CFC Compact Flowmeter Ordering Information

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

Sensor fill fluid and O-ring options		
L1[18]	Inert sensor fill fluid	★
L2	Graphite-filled (PTFE) O-ring	★
LA[18]	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	★
Shipboard approvals[18]		
SBS	American Bureau of Shipping	★
SLL[19]	Lloyds Register (LR)	
Display and interface options		
M4[20]	LCD display with Local Operator Interface	★
M5	LCD display	★
Transient protection[18][21]		
T1	Transient terminal block	★
Manifold for remote mount option		
F2	3-valve manifold, stainless steel	★
F6	5-valve manifold, stainless steel	★
Plantweb control functionality[22]		
A01	FOUNDATION Fieldbus Control Function Block Suite	★
Plantweb diagnostic functionality		
DA0[14]	Power Advisory HART Diagnostic	★
D01[22]	FOUNDATION Fieldbus Diagnostic Suite	★
Low power output		
C2	0.8-3.2 Vdc output with digital signal based on HART Protocol (available with Output code M only)	
Alarm levels[14]		
C4	NAMUR alarm and saturation levels, high alarm	★
CN	NAMUR alarm and saturation levels, low alarm	★
CR	Custom alarm and saturation signal levels, high alarm	★
CS	Custom alarm and saturation signal levels, low alarm	★
CT	Rosemount standard low alarm	★
Ground screw[18][23]		
V5	External ground screw assembly	★

Table A-19. Rosemount 3051CFC Compact Flowmeter Ordering Information

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

Configuration buttons		
D4[14]	Analog zero and span	★
DZ[24]	Digital zero trim	★
Typical model number: 3051CFC D C S 060 N 065 0 3 2 A A 1 WC E5 M5		

1. Select Configuration Buttons (option code D4 or DZ) or Local Operator Interface (option code M4) if local configuration buttons are required.
2. Available with Primary Element Technology P only.
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. Option HR5 configures the HART output to HART Revision 5. Option HR7 configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 or 7 if desired. HART Revision 5 is the default HART output.
6. For local addressing and configuration, M4 (Local Operator Interface) is required.
7. Requires wireless options and engineered polymer housing. Available approvals are FM Intrinsically Safe, (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).
8. Only available with C6, E2, E5, I5, K5, KB and E8 approval. Not available with GE, GM, SBS, DA0, M4, D4, DZ, QT, HR5, HR7, CR, CS, and CT.
9. Only available with Wireless Output (output code X).
10. Not available with Product certifications options E8, K8, E5, K5, C6, K6, E7, K7, E2, K2, E3, KB, and KD.
11. Available with Primary Element Technology C only.
12. For Annubar option A, consult factory for pipe schedules other than schedule 40.
13. Available with Primary Element Technology C or P only.
14. Only available with HART 4–20 mA Output (output code A).
15. 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.
16. Dust approval not applicable to output code X. See " IEC 62591 (WirelessHART® Protocol)" on page 226 for wireless approvals.
17. Nonincendive certification not provided with Wireless output option code (X).
18. Not available with Wireless output (output code X).
19. Only available with product certifications E7, E8, I1, I7, IA, K7, K8, KD, N1, and N7.
20. Not available with output code F - FOUNDATION Fieldbus or Wireless output (output code X) or Low Power (output code M).
21. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA, IB, and IE.
22. Only valid with FOUNDATION Fieldbus (output code F).
23. The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.
24. Only available with 4–20 mA HART Output (output code A) and Wireless output (output code X).

Table A-20. Rosemount 3051CFP Integral Flowmeter Ordering Information

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

Model	Product description	
3051CFP[1]	Integral orifice flowmeter	
Measurement type		
D	Differential pressure	★
Body material		
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 remote thermowell and RTD)	★
S1[2]	Socket weld body (not available with remote 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	★
H	Alloy C-276	
M	Alloy 400	

Table A-20. Rosemount 3051CFP Integral Flowmeter Ordering Information

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

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	★
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	★
D4	Direct-mount, 3-valve manifold, Alloy C-276	
D6	Direct-mount, 5-valve manifold, Alloy C-276	
D7	Direct-mount, high temperature, 5-valve manifold, SST	
R4	Remote-mount, 3-valve manifold, Alloy C-276	
R6	Remote-mount, 5-valve manifold, Alloy C-276	

Table A-20. Rosemount 3051CFP Integral Flowmeter Ordering Information

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

Differential pressure ranges			
1	0 to 25 in H_2O (0 to 62,16 mbar)		★
2	0 to 250 in H_2O (0 to 621,60 mbar)		★
3	0 to 1000 in H_2O (0 to 2,48 bar)		★
Transmitter output			
A[3]	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION Fieldbus Protocol		★
W[4]	PROFIBUS PA Protocol		★
X[5]	Wireless		★
M[6]	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	SST	M20 × 1.5	★
P[7]	Engineered polymer	No conduit entries	★
D[8]	Aluminum	G1/2	
M[8]	SST	G1/2	
Transmitter performance class			
1	up to ±1.8% flow rate accuracy, 8:1 flow turndown, 5-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, 2.4GHz *Wireless*HART	★
Antenna and SmartPower		
WP5	Internal antenna, compatible with green power module (I.S. power module sold separately)	★

HART revision configuration[3] (requires HART Protocol Output Code A)

HR5	Configured for HART Revision 5	★
HR7	Configured for HART Revision 7	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★

Table A-20. Rosemount 3051CFP Integral Flowmeter Ordering Information

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

Transmitter body/bolt material		
GT	High temperature (850 °F/454 °C)	
Temperature sensor[9]		
RT	Thermowell and RTD	
Optional connection		
G1	DIN 19213 transmitter connection	★
Pressure testing[10]		
P1	Hydrostatic testing with certificate	
Special cleaning		
P2	Cleaning for special services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material testing		
V1	Dye penetrant exam	
Material examination		
V2	Radiographic examination	
Flow calibration[11]		
WD	Discharge coefficient verification	
Special inspection		
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★
Material traceability certification		
Q8	Material traceability certification per EN 10204:2004 3.1	★
Code conformance[12]		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
J4	ANSI/ASME B31.8	
Materials conformance[13]		
J5	NACE MR-0175/ISO 15156	
Country certification		
J6	European Pressure Directive (PED)	★
J1	Canadian Registration	

Table A-20. Rosemount 3051CFP Integral Flowmeter Ordering Information

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

Transmitter calibration certification		
Q4	Calibration certificate for transmitter	★
Quality certification for safety[14]		
QS	Prior-use certificate of FMEDA data	★
QT[14]	Safety certified to IEC 61508 with certificate of FMEDA	★
Product certifications		
E8	ATEX Flameproof, Dust	★
I1[15]	ATEX Intrinsic Safety and Dust	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION Fieldbus or PROFIBUS PA protocols only	★
N1	ATEX Type n and Dust	★
K8	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5[16]	FM Intrinsically Safe, Nonincendive	★
IE	FM FISCO Intrinsically Safe; for FOUNDATION Fieldbus or PROFIBUS PA protocols only	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of E5 and I5)	★
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
I6[7]	CSA Intrinsically Safe	★
K6	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6, E8, and I1)	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
N7	IECEx Type n	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7 and E7)	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
IB	INMETRO FISCO intrinsically safe; for FOUNDATION Fieldbus or PROFIBUS PA protocols only	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★
KD	CSA, FM, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
Sensor fill fluid and O-ring options[17]		
L1	Inert sensor fill fluid	★
L2	Graphite-filled (PTFE) O-ring	★
LA	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	★

Table A-20. Rosemount 3051CFP Integral Flowmeter Ordering Information

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

Shipboard approvals[17]		
SBS	American Bureau of Shipping	★
SLL[18]	Lloyds Register (LR)	
Display and interface options		
M4[19]	LCD display with Local Operator Interface	★
M5	LCD display	★
Transient protection[17][20]		
T1	Transient terminal block	★
Plantweb control functionality[21]		
A01	FOUNDATION Fieldbus Control Function Block Suite	★
Plantweb diagnostic functionality		
DA0[14]	Power Advisory HART Diagnostic	★
D01[21]	FOUNDATION Fieldbus Diagnostic Suite	★
Low power output		
C2	0.8-3.2 Vdc output with digital signal based on HART Protocol (available with Output code M only)	
Alarm levels[14]		
C4	NAMUR alarm and saturation levels, high alarm	★
CN	NAMUR alarm and saturation levels, low alarm	★
CR	Custom alarm and saturation signal levels, high alarm	★
CS	Custom alarm and saturation signal levels, low alarm	★
CT	Rosemount standard low alarm	★
Ground screw[17][22]		
V5	External ground screw assembly	★
Configuration buttons		
D4[14]	Analog zero and span	★
DZ[23]	Digital zero trim	★
Typical model number: 3051CFP D S 010 W1 S 0500 D3 2 A A 1 E5 M5		

1. Select Configuration Buttons (option code D4 or DZ) or Local Operator Interface (option code M4) if local configuration buttons are required.
2. To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.
3. Option HR5 configures the HART output to HART Revision 5. Option HR7 configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 or 7 if desired. HART Revision 5 is the default HART output.
4. For local addressing and configuration, M4 (Local Operator Interface) is required.
5. Requires wireless options and engineered polymer housing. Available approvals are FM Intrinsically Safe, (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).
6. Only available with C6, E2, E5, I5, K5, KB and E8 approval. Not available with GE, GM, SBS, DA0, M4, D4, DZ, QT, HR5, HR7, CR, CS, and CT.
7. Only available with Wireless Output (output code X).
8. Not available with Product certifications options E8, K8, E5, K5, C6, K6, E7, K7, E2, K2, E3, KB, and KD.
9. Thermowell Material is the same as the body material.
10. Does not apply to Process Connection codes T1 and S1.
11. Not available for bore sizes 0010, 0014, 0020, 0034, 0066, or 0109.

12. Not available with DIN Process Connection codes D1, D2, or D3.
13. 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.
14. Only available with HART 4–20 mA output (Option code A).
15. Dust approval not applicable to output code X. See " IEC 62591 (WirelessHART® Protocol)" on page 226 for wireless approvals
16. Nonincendive certification not provided with Wireless output option code (X).
17. Not available with Wireless Output (output code X).
18. Only available with product certifications E7, E8, I1, I7, IA, K7, K8, KD, N1, and N7.
19. Not available with FOUNDATION Fieldbus (Output Code F) or Wireless output (output code X) or Low Power (output code M).
20. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA, IB, and IE.
21. Only valid with FOUNDATION Fieldbus Output Code F.
22. The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.
23. Only available with 4–20 mA output (Output Code A) and Wireless output (Output Code X).

Table A-21. Rosemount 3051L Level Transmitters Ordering Information

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

Model[1]	Transmitter type			
3051L	Level transmitter			
Pressure range				
2	–250 to 250 inH_2O (–621,60 to 621,60 mbar)			★
3	–1000 to 1000 inH_2O (-2,48 to 2,48 bar)			★
4	–300 to 300 psi (-20,68 to 20,68 bar)			★
Transmitter output				
A[2]	4–20 mA with digital signal based on HART Protocol			★
F	FOUNDATION Fieldbus Protocol			★
W[3]	PROFIBUS PA Protocol			★
X[4]	Wireless (requires wireless options and engineered polymer housing)			★
M[5]	Low-power 1-5 Vdc with digital signal based on HART Protocol			
Process connection size, material, extension length (high side)				
Code	**Process connection size**	**Material**	**Extension length**	
G0[6]	2-in./DN 50/A	316L SST	Flush mount only	★
H0[6]	2-in./DN 50	Alloy C-276	Flush mount only	★
J0	2-in./DN 50	Tantalum	Flush mount only	★
A0[6]	3-in./DN 80	316L SST	Flush mount	★
A2[6]	3-in./DN 80	316L SST	2-in./50 mm	★
A4[6]	3-in./DN 80	316L SST	4-in./100 mm	★
A6[6]	3-in./DN 80	316L SST	6-in./150 mm	★
B0[6]	4-in./DN 100	316L SST	Flush mount	★
B2[6]	4-in./DN 100	316L SST	2-in./50 mm	★
B4[6]	4-in./DN 100	316L SST	4-in./100 mm	★
B6[6]	4-in./DN 100	316L SST	6-in./150 mm	★
C0[6]	3-in./DN 80	Alloy C-276	Flush mount	★
C2[6]	3-in./DN 80	Alloy C-276	2-in./50 mm	★
C4[6]	3-in./DN 80	Alloy C-276	4-in./100 mm	★
C6[6]	3-in./DN 80	Alloy C-276	6-in./150 mm	★
D0[6]	4-in./DN 100	Alloy C-276	Flush mount	★
D2[6]	4-in./DN 100	Alloy C-276	2-in./50 mm	★
D4[6]	4-in./DN 100	Alloy C-276	4-in./100 mm	★
D6[6]	4-in./DN 100	Alloy C-276	6-in./150 mm	★
E0	3-in./DN 80	Tantalum	Flush mount only	★
F0	4-in./DN 100	Tantalum	Flush mount only	★

Table A-21. Rosemount 3051L Level Transmitters Ordering Information

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

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	★
C	3-in.	ANSI/ASME B16.5 Class 300	CS	★
D	4-in.	ANSI/ASME B16.5 Class 300	CS	★
P	2-in.	ANSI/ASME B16.5 Class 600	CS	★
E	3-in.	ANSI/ASME B16.5 Class 600	CS	★
X[(6)]	2-in.	ANSI/ASME B16.5 Class 150	316 SST	★
F[(6)]	3-in.	ANSI/ASME B16.5 Class 150	316 SST	★
G[(6)]	4-in.	ANSI/ASME B16.5 Class 150	316 SST	★
Y[(6)]	2-in.	ANSI/ASME B16.5 Class 300	316 SST	★
H[(6)]	3-in.	ANSI/ASME B16.5 Class 300	316 SST	★
J[(6)]	4-in.	ANSI/ASME B16.5 Class 300	316 SST	★
Z[(6)]	2-in.	ANSI/ASME B16.5 Class 600	316 SST	★
L[(6)]	3-in.	ANSI/ASME B16.5 Class 600	316 SST	★
Q	DN 50	PN 10-40 per EN 1092-1	CS	★
R	DN 80	PN 40 per EN 1092-1	CS	★
S	DN 100	PN 40 per EN 1092-1	CS	★
V	DN 100	PN 10/16 per EN 1092-1	CS	★
K[(6)]	DN 50	PN 10-40 per EN 1092-1	316 SST	★
T[(6)]	DN 80	PN 40 per EN 1092-1	316 SST	★
U[(6)]	DN 100	PN 40 per EN 1092-1	316 SST	★
Mounting flange size, rating, material (high side)				
	Size	**Rating**	**Material**	
W[(6)]	DN 100	PN 10/16 per EN 1092-1	316 SST	★
7[(6)]	4 in.	ANSI/ASME B16.5 Class 600	316 SST	★
1	N/A	10K per JIS B2238	CS	
2	N/A	20K per JIS B2238	CS	
3	N/A	40K per JIS B2238	CS	
4[(6)]	N/A	10K per JIS B2238	316 SST	
5[(6)]	N/A	20K per JIS B2238	316 SST	
6[(6)]	N/A	40K per JIS B2238	316 SST	

Table A-21. Rosemount 3051L Level Transmitters Ordering Information

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

Seal fill fluid (high side)		**Specific gravity**	**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)	★
H	Inert (Halocarbon)	1.85	–49 to 320 °F (–45 to 160°C)	★
G	Glycerine and water	1.13	5 to 203 °F (-15 to 95 °C)	★
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)	★

Low pressure side					
	Configuration	**Flange adapter**	**Diaphragm material**	**Sensor fill fluid**	
11[6]	Gage	SST	316L SST	Silicone	★
21	Differential	SST	316L SST	Silicone	★
22[6]	Differential	SST	Alloy *C-276*	Silicone	★
2A[7]	Differential	SST	316L SST	Inert (Halocarbon)	★
2B[6][7]	Differential	SST	Alloy *C-276*	Inert (Halocarbon)	★
31[6]	Tuned-System™ assembly with remote seal	None	316L SST	Silicone (requires Option Code S1)	★

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	SST	M20 ×1.5	★
P[8]	Engineered polymer	No conduit entries	★
D[9]	Aluminum	G1/2	
M[9]	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, 2.4GHz *Wireless*HART	★
Antenna and SmartPower		
WP5	Internal antenna, compatible with green power module (I.S. power module sold separately)	★

Table A-21. Rosemount 3051L Level Transmitters Ordering Information

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

HART Revision configuration[2] (requires HART Protocol Output Code A)

HR5	Configured for HART Revision 5	★
HR7[2]	Configured for HART Revision 7	★

Options (include with selected model number)

Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Plantweb control functionality[10]		
A01	FOUNDATION Fieldbus Control Function Block Suite	★
Plantweb diagnostic functionality		
DA0[11]	Power Advisory HART Diagnostic	★
D01[10]	FOUNDATION Fieldbus Diagnostics Suite	★
Seal assemblies[12]		
S1	Assembled to one Rosemount 1199 Seal	★
Product certifications		
E8	ATEX Flameproof and Dust Certification	★
I1[13]	ATEX Intrinsic Safety and Dust	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION Fieldbus or PROFIBUS PA protocols only	★
N1	ATEX Type n Certification and Dust	★
K8	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
E4[14]	TIIS Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5[15]	FM Intrinsically Safe, Nonincendive	★
IE	FM FISCO Intrinsically Safe; for FOUNDATION Fieldbus or PROFIBUS PA protocols only	★
K5	FM Explosion-proof, Dust Ignition-Proof, Intrinsically Safe, and Division 2	★
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
I6[8]	CSA Intrinsic Safety	★
K6	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6, E8, and I1)	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
N7	IECEx Type n Certification	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7 and E7)	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★

Table A-21. Rosemount 3051L Level Transmitters Ordering Information

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

IB	INMETRO FISCO intrinsically safe; for FOUNDATION Fieldbus or PROFIBUS PA protocols only	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
N3	China Type n	★
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	★
KB	FM and CSA Explosion-proof, Dust Ignition Proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★
KD	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
Shipboard approvals[7]		
SBS	American Bureau of Shipping	★
SBV[16]	Bureau Veritas (BV)	
SDN	Det Norske Veritas	
SLL[16]	Lloyds Register (LR)	
Bolting material		
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[17]	LCD display with Local Operator Interface	★
M5	LCD display	★
Calibration certification		
Q4	Calibration certificate	★
QP	Calibration certificate and tamper evident seal	★
QG[11]	Calibration certificate and GOST Verification Certificate	★
Material traceability certification		
Q8	Material traceability certification per EN 10204 3.1	★
Quality certification for safety[11]		
QS	Prior-use certificate of FMEDA data	★
QT	Safety certified to IEC 61508 with certificate of FMEDA	★
Toolkit total system performance reports		
QZ	Seal system performance calculation report	★

Table A-21. Rosemount 3051L Level Transmitters Ordering Information

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

Conduit electrical connector[7]				
GE	M12, 4-pin, male connector (eurofast)			★
GM	A size mini, 4-pin, male connector (minifast)			★
Configuration buttons[11]				
D4	Analog zero and span			★
DZ	Digital zero trim			★
Transient protection[7][18]				
T1	Transient protection			★
Software configuration[19]				
C1	Custom software configuration (completed Rosemount 3051 Pressure Transmitter Configuration Data Sheet for wired and Rosemount 3051 Wireless Configuration Data Sheet required with order)			★
Low power output				
C2	0.8-3.2 Vdc output with digital signal based on HART Protocol (available with Output code M only)			
Alarm levels[11]				
C4	NAMUR alarm and saturation levels, high alarm			★
CN	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	Rosemount standard low alarm			★
Conduit plug[7]				
DO	316 SST conduit plug			★
Ground screw[7][19]				
V5	External ground screw assembly			★
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	Alloy C-276	1	1/4–18 NPT	★
F4	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	★

Table A-21. Rosemount 3051L Level Transmitters Ordering Information

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

NACE certificate[20]		
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: 3051L 2 A A0 D 21 A A F1		

1. Select Configuration Buttons (option code D4 or DZ) or Local Operator Interface (option code M4) if local configuration buttons are required.
2. Option HR5 configures the HART output to HART Revision 5. Option HR7 configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 or 7 if desired. HART Revision 5 is the default HART output.
3. Option code M4 - LCD Display with Local Operator Interface required for local addressing and configuration.
4. Requires wireless options and engineered polymer housing. Available approvals are FM Intrinsically Safe, (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), IECEx Intrinsic Safety (option code I7) and EAC Intrinsic Safety (option code IM).
5. Only available with C6, E2, E5, I5, K5, KB and E8 approval. Not available with GE, GM, SBS, DA0, M4, D4, DZ, QT, HR5, HR7, CR, CS, and CT.
6. 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.
7. Not available with Wireless output (output code X).
8. Only available with Wireless output (output code X).
9. Not available with Product certifications options E8, K8, E5, K5, C6, K6, E7, K7, E2, K2, E3, KB, and KD.
10. Only valid with FOUNDATION Fieldbus output (output code F).
11. Contact an Emerson representative for availability.
12. “Assemble-to” items are specified separately and require a completed model number.
13. Dust approval not applicable to output code X. See “ IEC 62591 (WirelessHART® Protocol)” on page 226or wireless approvals.
14. Only available with output codes A - 4-20 mA HART, F - FOUNDATION Fieldbus, and W - PROFIBUS PA. Also only available with G^1/2 housing thread types.
15. Nonincendive certification not provided with Wireless output option code (X).
16. Only available with product certifications E7, E8, I1, I7, IA, K7, K8, KD, N1, and N7.
17. Not available with FOUNDATION Fieldbus (Output Code F) or Wireless output (Output Code X) or Low Power (Output Code M).
18. The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA, IB, and IE.
19. The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.
20. NACE compliant wetted materials are identified by Footnote 6.

A.11 Options

Standard configuration

Unless otherwise specified, transmitter is shipped as follows:

Engineering units Differential/gage: Absolute/Rosemount 3051TA/3051TG Model:	 inH$_2$O (range 0, 1, 2, and 3) psi (range 4 and 5) psi (all ranges)
4 mA[1]:	0 (engineering units above)
20 mA[1]:	Upper range limit
Output:	Linear
External buttons:	None
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:	None
Alarm[1]:	High
Software tag:	(Blank)
Damping:	0.4 seconds[2]

1. Not applicable to FOUNDATION Fieldbus, PROFIBUS PA, or wireless.
2. For fieldbus protocols, default damping is 1 second.

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 3051 Configuration Data Sheet for HART protocol.

For wireless, refer to the Rosemount 3051 Wireless Configuration Data Sheet.[1]

Tagging (3 options available)

- Standard SST hardware tag is wired to the transmitter. Tag character height is 0.125 in. (3,18 mm), 56 characters maximum.
- Tag may be permanently stamped on transmitter nameplate upon request, 56 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

Commissioning tag[2]

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

Optional Rosemount 304, 305, or 306 Integral Manifolds

Factory assembled to Rosemount 3051C and 3051T Transmitters. Refer to the following Rosemount Manifolds Product Data Sheet for additional information.

Other seals

Refer to Rosemount DP Level Transmitters and1199 Diaphragm Seal System Product Data Sheet for additional information.

1. Not applicable to FOUNDATION Fieldbus or PROFIBUS PA protocols.
2. Only applicable to FOUNDATION Fieldbus.

Output information

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

Pressure			
atm	inH_2O at 4 °C[2]	g/cm^2	psi
mbar	mmH_2O	kg/cm^2	torr
bar	mmHg	Pa	cmH_2O at 4 °C[1][2]
inH_20	mmH_2O at 4 °C[2]	kPa	mH_2Oat 4 °C[1][2]
inHg	ftH_2O	MPa[2]	ftH_2Oat60 °F[1][2]
hPa[1][2]	inH_2O at 60 °F[2]	kg/m^2[1][2]	cmHg at 0 °C[1][2]
mHg at 0 °C[1][2]	psf[1][2]	ftH_2O at 4 °C[1][2]	

1. Field configurable only, not available for factory calibration or custom configuration (option code C1 “Software configuration”).
2. Not available with Low Power (output option code M) or PROFIBUS PA (output option code W).

Display and interface options

The LCD display provides diagnostic messages for local troubleshooting and have 90-degree rotation capability for easy viewing.

M4 Digital Display with Local Operator Interface (LOI)

- Available for 4–20 mA HART and PROFIBUS PA

M5 Digital Display

- 2-Line, 5-digit LCD display for low power output
- 2-Line, 8-digit LCD display for 4–20 mA HART, 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

Configuration buttons

Rosemount 3051 will ship with no buttons unless option D4 (Analog Zero and Span), DZ (Digital Zero), or M4 (LOI) for local configuration buttons are specified.

The Rosemount 3051 Wireless Transmitter is available with a Digital Zero button installed with or without the LCD display digital display.

Transient protection (option code T1)

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

6 kV crest (0.5 ms - 100 kHz)

3 kA crest (8 × 20 ms)

6 kV crest (1.2 × 50 ms)

Bolts for flanges and adapters

- Options permit bolts for flanges and adapters to be obtained in various materials
- 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

Conduit plug

DO 316 SST Conduit Plug

Single 316 SST conduit plug replaces carbon steel plug

Rosemount 3051C Coplanar Flange and 3051T 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

Rosemount 3051C 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

Spare parts

Rosemount 3051C Gage and Differential Sensor Modules (min. span/range)			Silicone fill	Inert fill
			Part number	Part number
Note: One spare part is recommended for every 50 transmitters. Note: Listed by range and process isolator order numbers.				
	Gage pressure range	**Differential pressure range**		
Range 1	**–25 to 25 in H_2O/0.5 in H_2O**	**–25 to 25 in H_2O/0.5 in H_2O**		
316L SST			03031-1045-0012	03031-1145-0012
Alloy C-276			03031-1045-0013	03031-1145-0013
Alloy 400			03031-1045-0014	03031-1145-0014
Gold-plated Alloy 400			03031-1045-0016	03031-1145-0016
Gold-plated 316 SST			03031-1045-0017	03031-1145-0017
Range 2	**–250 to 250 inH_2O/2.5 inH_2O**	**–250 to 250 inH_2O/2.5 inH_2O**		
316L SST			03031-1045-0022	03031-1145-0022
Alloy C-276			03031-1045-0023	03031-1145-0023
Alloy 400			03031-1045-0024	03031-1145-0024
Tantalum			03031-1045-0025	03031-1145-0025
Gold-plated Alloy 400			03031-1045-0026	03031-1145-0026
Gold-plated 316 SST			03031-1045-0027	03031-1145-0027
Range 3	**–407 to 1000 inH_2O/10 inH_2O**	**–1000 to 1000 inH_2O/10 inH_2O**		
316L SST			03031-1045-0032	03031-1145-0032
Alloy C-276			03031-1045-0033	03031-1145-0033
Alloy 400			03031-1045-0034	03031-1145-0034
Tantalum			03031-1045-0035	03031-1145-0035
Gold-plated Alloy 400			03031-1045-0036	03031-1145-0036
Gold-plated 316 SST			03031-1045-0037	03031-1145-0037
Range 4	**–14.2 to 300 psi/3 psi**	**-300 to 300 psi/3 psi**		
316L SST			03031-1045-2042	03031-1145-2042
Alloy C-276			03031-1045-2043	03031-1145-2043
Alloy 400			03031-1045-2044	03031-1145-2044
Tantalum			03031-1045-2045	03031-1145-2045
Gold-plated Alloy 400			03031-1045-2046	03031-1145-2046
Gold-plated 316 SST			03031-1045-2047	03031-1145-2047

Range 5	**–14.2 to 2000 psi/20 psi**	**-2000 to 2000psi/20 psi**	
316L SST		03031-1045-2052	03031-1145-2052
Alloy C-276		03031-1045-2053	03031-1145-2053
Alloy 400		03031-1045-2054	03031-1145-2054
Tantalum		03031-1045-2055	03031-1145-2055
Gold-plated Alloy 400		03031-1045-2056	03031-1145-2056
Gold-plated 316 SST		03031-1045-2057	03031-1145-2057

Rosemount 3051C Absolute Sensor Modules (min. span/range)	**Silicone fill**	**Inert fill**
	Part number	**Part number**
Note: One spare part is recommended for every 50 transmitters. Note: Listed by range and process isolator order numbers.		
Range 1, 0 to 30 psia/0.3 psia		
316L SST	03031-2020-0012	N/A
Alloy C-276	03031-2020-0013	N/A
Alloy 400	03031-2020-0014	N/A
Gold-plated Alloy 400	03031-2020-0016	N/A
Gold-plated 316 SST	03031-2020-0017	N/A
Range 2, 0 to 150/1.5 psia		
316L SST	03031-2020-0022	N/A
Alloy C-276	03031-2020-0023	N/A
Alloy 400	03031-2020-0024	N/A
Gold-plated Alloy 400	03031-2020-0026	N/A
Gold-plated 316 SST	03031-2020-0027	N/A
Range 3, 0 to 800 psia/8 psia		
316L SST	03031-2020-0032	N/A
Alloy C-276	03031-2020-0033	N/A
Alloy 400	03031-2020-0034	N/A
Gold-plated Alloy 400	03031-2020-0036	N/A
Gold-plated 316 SST	03031-2020-0037	N/A
Range 4, 0 to 400 psia/40 psia		
316L SST	03031-2020-0042	N/A
Alloy C-276	03031-2020-0043	N/A
Alloy 400	03031-2020-0044	N/A
Gold-plated Alloy 400	03031-2020-0046	N/A
Gold-plated 316 SST	03031-2020-0047	N/A

Rosemount 3051T Sensor Modules (min. span/range)		Silicone fill	Inert fill
		Part number	Part number
Note: One spare part is recommended for every 50 transmitters.			
Range 1	**Gage pressure range**		
	0-0.3/30 psig		
Aluminum, 316L SST Isolator			
1/4–18 NPT female		03031-3112-3112	03031-3112-1112
1/2–14 NPT female		03031-3102-3112	03031-3102-1112
G1/2 A DIN 16288 male		03031-3132-3112	03031-3132-1112
Aluminum, Alloy C-276 Isolator			
1/4–18 NPT female		03031-3112-3113	03031-3112-1113
1/2–14 NPT female		03031-3102-3113	03031-3102-1113
SST, 316L SST Isolator			
1/4–18 NPT female		03031-3111-3112	03031-3111-1112
1/2–14 NPT female		03031-3101-3112	03031-3101-1112
SST, AlloyC-276 Isolator			
1/4–18 NPT female		03031-3111-3113	03031-3111-1113
1/2–14 NPT female		03031-3101-3113	03031-3101-1113
Range 2	**0-1.5/150 psig**		
Aluminum, 316L SST Isolator			
1/4–18 NPT female		03031-3112-3122	03031-3112-1122
1/2–14 NPT female		03031-3102-3122	03031-3102-1122
G1/2 A DIN 16288 male		03031-3132-3122	03031-3132-1122
Aluminum, Alloy C-276 Isolator			
1/4–18 NPT female		03031-3112-3122	03031-3112-1123
1/2–14 NPT female		03031-3102-3122	03031-3102-1123
G1/2 A DIN 16288 male		03031-3132-3122	03031-3132-1123
Aluminum, Alloy C-276 Isolator			
1/4–18 NPT female		03031-3112-3123	03031-3112-1123
1/2–14 NPT female		03031-3102-3123	03031-3102-1123
SST, 316L SST Isolator			
1/4–18 NPT female		03031-3111-3122	03031-3111-1122
1/2–14 NPT female		03031-3101-3122	03031-3101-1122
SST, AlloyC-276 Isolator			
1/4–18 NPT female		03031-3111-3123	03031-3111-1123
1/2–14 NPT female		03031-3101-3123	03031-3101-1123

Range 3	**0-8/800 psig**		
Aluminum, 316L SST Isolator			
1/4–18 NPT female		03031-3112-3132	03031-3112-1132
1/2–14 NPT female		03031-3102-3132	03031-3102-1132
G1/2 A DIN 16288 male		03031-3132-3132	03031-3132-1132
Aluminum, Alloy C-276 Isolator			
1/4–18 NPT female		03031-3112-3133	03031-3112-1133
1/2–14 NPT female		03031-3102-3133	03031-3102-1133
SST, 316L SST Isolator			
1/4–18 NPT female		03031-3111-3132	03031-3111-1132
1/2–14 NPT female		03031-3101-3132	03031-3101-1132
SST, AlloyC-276 Isolator			
1/4–18 NPT female		03031-3111-3133	03031-3111-1133
1/2–14 NPT female		03031-3101-3133	03031-3101-1133
Range 4	**0-40/4,000 psig**		
Aluminum, 316L SST Isolator			
1/4–18 NPT female		03031-3112-3142	03031-3112-1142
1/2–14 NPT female		03031-3102-3142	03031-3102-1142
G1/2 A DIN 16288 male		03031-3132-3142	03031-3132-1142
Aluminum, Alloy C-276 Isolator			
1/4–18 NPT female		03031-3112-3143	03031-3112-1143
1/2–14 NPT female		03031-3102-3143	03031-3102-1143
SST, 316L SST Isolator			
1/4–18 NPT female		03031-3111-3142	03031-3111-1142
1/2–14 NPT female		03031-3101-3142	03031-3101-1142
SST, AlloyC-276 Isolator			
1/4 –18 NPT female		03031-3111-3143	03031-3111-1143
1/2 –14 NPT female		03031-3101-3143	03031-3101-1143
Range 1	**Absolute pressure range**		
	0-0.3/30 psia		
Aluminum, 316L SST Isolator			
1/4 –18 NPT female		03031-3112-3012	03031-3112-1012
1/2 –14 NPT female		03031-3102-3012	03031-3102-1012
G1/2 A DIN 16288 male		03031-3132-3012	03031-3132-1012
Aluminum, Alloy C-276 Isolator			
1/4 –18 NPT female		03031-3112-3013	03031-3112-1013
1/2 –14 NPT female		03031-3102-3013	03031-3102-1013

SST, 316L SST Isolator		
1/4 –18 NPT female	03031-3111-3012	03031-3111-1012
1/2 –14 NPT female	03031-3101-3012	03031-3101-1012
SST, AlloyC-276 Isolator		
1/4 –18 NPT female	03031-3111-3013	03031-3111-1013
1/2 –14 NPT female	03031-3101-3013	03031-3101-1013
Range 2	**0-1.5/150 psia**	
Aluminum, 316L SST Isolator		
1/4 –18 NPT female	03031-3112-3022	03031-3112-1022
1/2 –14 NPT female	03031-3112-3022	03031-3102-1022
G1/2 A DIN 16288 male	03031-3132-3022	03031-3132-1022
Aluminum, Alloy C-276 Isolator		
1/4 –18 NPT female	03031-3112-3023	03031-3112-1023
1/2 –14 NPT female	03031-3102-3023	03031-3102-1023
SST, 316L SST Isolator		
1/4 –18 NPT female	03031-3111-3022	03031-3111-1022
1/2 –14 NPT female	03031-3101-3022	03031-3101-1022
SST, AlloyC-276 Isolator		
1/4–18 NPT female	03031-3111-3023	03031-3111-1023
1/2 –14 NPT female	03031-3101-3023	03031-3101-1023
Range 3	**0-8/800 psia**	
Aluminum, 316L SST Isolator		
1/4–18 NPT female	03031-3112-3032	03031-3112-1032
1/2 –14 NPT female	03031-3102-3032	03031-3102-1032
G1/2 A DIN 16288 male	03031-3132-3032	03031-3132-1032
Aluminum, Alloy C-276 Isolator		
1/4 –18 NPT female	03031-3112-3033	03031-3112-1033
1/2 –14 NPT female	03031-3102-3033	03031-3102-1033
SST, 316L SST Isolator		
1/4 –18 NPT female	03031-3111-3032	03031-3111-1032
1/2 –14 NPT female	03031-3101-3032	03031-3101-1032
SST, AlloyC-276 Isolator		
1/4 –18 NPT female	03031-3111-3033	03031-3111-1033
1/2 –14 NPT female	03031-3101-3033	03031-3101-1033
Range 4	**0-40/4,000 psia**	
Aluminum, 316L SST Isolator		
1/4 –18 NPT female	03031-3112-3042	03031-3112-1042

1/2 –14 NPT female	03031-3102-3042	03031-3102-1042
G1/2 A DIN 16288 male	03031-3132-3042	03031-3132-1042
Aluminum, Alloy C-276 Isolator		
1/4 –18 NPT female	03031-3112-3043	03031-3112-1043
1/2 –14 NPT female	03031-3102-3043	03031-3102-1043
SST, 316L SST Isolator		
1/4 –18 NPT female	03031-3111-3042	03031-3111-1042
1/2 –14 NPT female	03031-3101-3042	03031-3101-1042
SST, AlloyC-276 Isolator		
1/4 –18 NPT female	03031-3111-3043	03031-3111-1043
1/2 –14 NPT female	03031-3101-3043	03031-3101-1043
Range 5	**0-2000/10,000 psia**	
Aluminum, 316L SST Isolator		
1/4 –18 NPT female	03031-3112-3052	03031-3112-1052
1/2 –14 NPT female	03031-3102-3052	03031-3102-1052
Autoclave type F-250-C	03031-3122-3052	03031-3122-1052
Aluminum, Alloy C-276 Isolator		
1/4 –18 NPT female	03031-3112-3053	03031-3112-1053
1/2 –14 NPT female	03031-3102-3053	03031-3102-1053
SST, 316L SST Isolator		
1/4 –18 NPT female	03031-3111-3052	03031-3111-1052
1/2 –14 NPT female	03031-3101-3052	03031-3101-1052
Autoclave type F-250-C	03031-3121-3052	03031-3121-1052
SST, AlloyC-276 Isolator		
1/4 –18 NPT female	03031-3111-3053	03031-3111-1053
1/2 –14 NPT female	03031-3101-3053	03031-3101-1053

Rosemount 3051 upgrade kits	**Part number**
Upgrade kits convert legacy Rosemount 3051 devices to the newest version. The following come with electronics board and respective configuration buttons (if applicable).	
Aluminum/SST	
4–20 mA HART with no configuration buttons	03031-0020-3100
4–20 mA HART with digital zero trim	03031-0020-3110
4–20 mA HART with analog zero and span	03031-0200-3120
Rosemount 3051 FOUNDATION Fieldbus upgrade kits	
Use these kits when upgrading a FOUNDATION Fieldbus Device Rev 7 device equipped with an LCD display meter to Device Rev 8. The kit includes electronics, LCD display, and optionally, cover.	
Electronics, display, no cover	03031-0020-5109
Electronics, display, aluminum cover	03031-0020-5209

Electronics, display, 316 SST cover	03031-0020-5309
Use these part when upgrading a FOUNDATION Fieldbus 3051 Device Rev 7 device to a 3051 Device Rev 8 device. Also use as spare electronics for 3051 Device Rev 8.	
FOUNDATION Fieldbus Rev 8	03031-0020-5100
Rosemount 3051 LOI upgrade kit	**Part number**
Upgrade kits convert legacy 3051 devices to the newest version. The following come with electronics board, LOI display, and LOI configuration buttons. Order display cover if needed.	
4–20 mA HART with LOI	03031-0020-3139
Rosemount 3051 LCD display	
These LCD displays are only compatible with the newest version of the 3051. The following come with an 3051 LCD display and a housing cover	
4–20mA HART - Aluminum	03031-0199-0011
4–20 mA HART - 316 SST	03031-0199-0021
FOUNDATION Fieldbus Device Rev 8	03031-0199-0003
FOUNDATION Fieldbus Device Rev 8 LCD Display (Aluminum)	03031-0199-0013
FOUNDATION Fieldbus Device rev 8 LCD Display (316 SST)	03031-0199-0023
Rosemount 3051 LOI display	
These LOI display are only compatible with the newest version of the Rosemount 3051. The following come with an 3051 LOI display an a housing cover	
4–20 mA HART - Aluminum	03031-0199-0021
4–20 mA HART - 316 SST	03031-0199-0022
Terminal block assemblies	
4–20mA HART Output	
Standard terminal block	03031-0332-0015
Transient terminal block (option T1)	03031-0332-0012
Electrical housings (without terminal block)	
Standard - Aluminum	
1/2 - 14 NPT conduit entry	03031-2302-0001
M20 conduit entry	03031-2302-0002
G1/2 conduit entry	03031-2302-0004
Standard - 316 SST	
1/2 - 14 NPT conduit entry	03031-2322-0001
M20 conduit entry	03031-2322-0002
Housing conduit plugs	
1/2 NPT conduit plug	03031-0544-0003
M20 conduit plug	03031-0544-0001
G1/2 conduit plug	03031-0544-0004

Housing covers (include O-ring)	Part number
HART and Device Rev 8 FOUNDATION Fieldbus electronics cover - Aluminum	03031-0292-0003
HART and Device Rev 8 FOUNDATION Fieldbus electronics cover - 316 SST	03031-0292-0004
HART and Device Rev 8 FOUNDATION Fieldbus LCD display cover - Aluminum	03031-0193-0002
HART and Device Rev 8 FOUNDATION Fieldbus LCD display cover - 316 SST	03031-0193-0012
HART LCD display cover - Aluminum	03031-0193-0002
HART LCD display cover - 316 SST	03031-0193-0012
Miscellaneous hardware	
Local zero and span kit	03031-0293-0002
External ground screw assembly (option V5)	03031-0383-0001
Flanges	
Differential Coplanar Flange	
316 SST	03031-0388-0022
Cast Alloy C-276	03031-0388-0023
Cast Alloy 400	03031-0388-0024
Nickel-plated carbon steel	03031-0388-0025
Gage/Absolute Coplanar Flange	
316 SST	03031-0388-1022
Cast Alloy C-276	03031-0388-1023
Cast Alloy 400	03031-0388-1024
Nickel-plated carbon steel	03031-0388-1025
Coplanar flange alignment screw (package of 12)	03031-0309-0001
Traditional Flange	
316 SST	03031-0320-0002
Cast Alloy C-276	03031-0320-0003
Cast Alloy 400	03031-0320-0004
316 SST - DIN compliant (Option Code HJ)	03031-1350-0012
Level Flange, Vertical Mount	
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 kits (each kit contains parts for one DP transmitter or two GP/AP transmitters)	Part number
CS bolts, glass-filled PTFE O-Rings	
SST adapters	03031-1300-0002
Cast Alloy C-276 adapters	03031-1300-0003
Alloy 400 adapters	03031-1300-0004
Nickel-plated carbon steel adapters	03031-1300-0005
SST bolts, glass-filled PTFE O-Rings	
SST adapters	03031-1300-0012
Cast Alloy C-276 adapters	03031-1300-0013
Alloy 400 adapters	03031-1300-0014
Nickel-plated carbon steel adapters	03031-1300-0015
CS bolts, graphite-filled PTFE O-Rings	
SST adapters	03031-1300-0102
Cast Alloy C-276 adapters	03031-1300-0103
Alloy 400 adapters	03031-1300-0104
Nickel-plated carbon steel adapters	03031-1300-0105
SST bolts, graphite-filled PTFE O-Rings	
SST adapters	03031-1300-0112
Cast Alloy C-276 adapters	03031-1300-0113
Alloy 400 adapters	03031-1300-0114
Nickel-plated carbon steel adapters	03031-1300-0115
Flange adapters	
1/2–14 NPT Adapters	
316 SST	02024-0069-0002
Cast Alloy C-276	02024-0069-0003
Cast Alloy 400	02024-0069-0004
Nickel-plated carbon steel	02024-0069-0005
Socket weld adapters	
316 SST	02024-0069-1002
Cast Alloy C-276	02024-0069-1003
Cast Alloy 400	02024-0069-1004
O-Ring packages (package of 12)	**Part number**
Electronics housing, cover	03031-0232-0001
Electronics housing, module	03031-0233-0001
Process flange, glass-filled PTFE (white)	03031-0234-0001
Process flange, graphite-filled PTFE (black)	03031-0234-0002
Flange adapter, glass-filled PTFE (light brown)	03031-0242-0001

Flange adapter, graphite-filled PTFE (black)	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
Alloy K-500	03031-0312-0004
Flange/adapter bolt kit (73 mm [2.88-in.]) (set of 4)	
Carbon steel	03031-0306-0001
316 SST	03031-0306-0002
ASTM A 193, Grade B7M	03031-0306-0003
Alloy K-500	03031-0306-0004
TRADITIONAL FLANGE	
Differential flange/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
Alloy K-500	03031-0307-0004
Gage/absolute flange/adapter bolt kit (44 mm [1.75-in.]) (set of 6)	
Carbon steel	03031-0307-1001
316 SST	03031-0307-1002
ASTM A 193, Grade B7M	03031-0307-1003
Alloy K-500	03031-0307-1004
Conventional manifold/traditional flange bolts	
Carbon steel	Use bolts supplied with manifold
316 SST	Use bolts supplied with manifold
Level Flange, Vertical Mount Bolt Kit (Set of 4)	
Carbon steel	03031-0395-0001
316 SST	03031-0395-0002
Drain/vent valve kits (each kit contains parts for one transmitter)	
Differential drain/vent Kits	
316 SST stem and seat kit	01151-0028-0022
Alloy C-276 stem and seat kit	01151-0028-0023
Alloy K-500 stem and Alloy 400 seat kit	01151-0028-0024
316 SST ceramic ball drain/vent kit	03031-0378-0022
Alloy C-276 ceramic ball drain/vent kit	03031-0378-0023
Alloy 400/K-500 ceramic ball drain/vent kit	03031-0378-0024

Gage/absolute drain/vent kits	
316 SST stem and seat kit	01151-0028-0012
Alloy C-276 stem and seat kit	01151-0028-0013
Alloy K-500 stem and Alloy 400 seat kit	01151-0028-0014
316 SST ceramic ball drain/vent kit	03031-0378-0012
Alloy C-276 ceramic ball drain/vent kit	03031-0378-0013
Alloy 400/K-500 ceramic ball drain/vent kit	03031-0378-0014
Mounting brackets	**Part number**
Rosemount 3051C and 3051L Coplanar Flange Bracket kit	
B4 bracket, SST, 2-in. pipe mount, SST bolts	03031-0189-0003
Rosemount 3051T Inline Bracket Kit	
B4 bracket, SST, 2-in. pipe mount, SST bolts	03031-0189-0004
Rosemount 3051C Traditional Flange Bracket Kits	
B1 bracket, 2-in. pipe mount, CS bolts	03031-0313-0001
B2 bracket, panel mount, CS bolts	03031-0313-0002
B3 flat bracket, 2-in. pipe mount, CS bolts	03031-0313-0003
B7 (B1 bracket, SST bolts)	03031-0313-0007
B8 (B2 bracket, SST bolts)	03031-0313-0008
B9 (B3 bracket, SST bolts)	03031-0313-0009
BA (SST B1 bracket, SST bolts)	03031-0313-0011
BC (SST B3 bracket, SST bolts)	03031-0313-0013

Appendix B Product Certifications

Rev 1.7

B.1 European directive information

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

B.2 Ordinary location certification

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

B.3 North America

E5 USA Explosionproof (XP) and Dust-Ignitionproof (DIP)
Range 1-5
Certificate: 0T2H0.AE
Standards: FM Class 3600 - 2011, FM Class 3615 - 2006, FM Class 3810 - 2005, ANSI/NEMA 250 - 2003
Markings: XP CL I, DIV 1, GP B, C, D; DIP CL II, DIV 1, GP E, F, G; CL III; T5(–50 °C ≤ T_a ≤ +85 °C); Factory Sealed; Type 4X
Range 6
Certificate: 1053834
Standards: ANSI/ISA 12.27.01-2003, CSA Std. C22.2 No. 30 -M1986, CSA Std. C22.2 No.142-M1987, CSA Std. C22.2 No. 213 - M1987
Markings: XP Class I, Division 1, Groups B, C and D, T5, (–50 °C ≤ Ta ≤ 85°C) Suitable for Class I, Zone 1, Group I IB+H2, T5; DIP Class II and Class III, Division 1, Groups E, F and G, T5, (–50 °C ≤ Ta ≤ 85°C); Type 4X; Factory Sealed; Single Seal (See drawing 03031-1053)

I5 USA Intrinsic Safety (IS) and Nonincendive (NI)
Range 1-5
Certificate: FM16US0120X
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 03031-1019; NI CL 1, DIV 2, GP A, B, C, D; T4(–50 °C ≤ T_a ≤ + 70 °C) [HART], T5(–50 °C ≤ T_a ≤ +40 °C) [HART]; T4(–50 °C ≤ T_a ≤ +60 °C) [Fieldbus/PROFIBUS]; Type 4x

Special Conditions for Safe Use (X):

1. The Rosemount 3051 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.
2. The Rosemount 3051 Transmitter with the transient terminal block (Option code T1) will not pass the 500Vrms dielectric strength test and this must be taken into account during installation.

Range 6
Certificate: 1053834
Standards: ANSI/ISA 12.27.01-2003, CSA Std. C22.2 No.142-M1987, CSA Std. C22.2. No.157-92
Markings: IS Class I, II, III, Division 1 Groups A, B, C, D, E, F, and G when connected in accordance with Rosemount drawing 03031-1024, Suitable for Class I, Zone 0 Group IIC; Class I, Division 2, Groups A, B, C and D; NIFW; Suitable for Class I Zone 2, Group IIC; HART: T4 (–60 °C ≤ T_a ≤ 70 °C); T5 (–60 °C ≤ T_a ≤ 40 °C) Fieldbus/PROFIBUS: T4 (–60 °C ≤ T_a ≤ 60 °C) Type 4X; Factory Sealed; Single Seal (See drawing 03031-1053)

IE USA FISCO
Range 1-5
Certificate: FM16US0120X
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 03031-1019 (–50 °C ≤ T_a ≤ +60 °C); Type 4x

Special Conditions for Safe Use (X):

1. The Rosemount 3051 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.
2. The Rosemount 3051 Transmitter with the transient terminal block (option code T1) will not pass the 500 Vrms dielectric strength test and this must be taken into account during installation.

Range 6
Certificate: 1053834
Standards: ANSI/ISA 12.27.01-2003, CSA Std. C22.2 No.142-M1987, CSA Std. C22.2. No.157-92
Markings: IS Class I, Division 1 Groups A, B, C, D, T4 (–60 °C ≤ T_a ≤ +60 °C) when connected in accordance with Rosemount drawing 03031-1024, Suitable for Class I, Zone 0 Group IIC; Type 4X; Factory Sealed; Single Seal (See drawing 03031-1053)

C6 Canada Explosionproof, Dust-Ignitionproof, Intrinsic Safety and Nonincendive
Certificate: 1053834
Standards: ANSI/ISA 12.27.01-2003, CSA Std. C22.2 No. 30 -M1986, CSA Std. C22.2 No.142-M1987, CSA Std. C22.2. No.157-92, CSA Std. C22.2 No. 213 - M1987
Markings: Explosionproof for Class I, Division 1, Groups B, C and D; Suitable for Class I, Zone 1, Group IIB+H2, T5 (–50 °C ≤ T_a ≤ 85 °C); Dust-Ignitionproof Class II, III, Division 1, Groups E, F, G, T5 (–50 °C ≤ T_a ≤ 85 °C); Class III Division 1; Intrinsically Safe Class I, Division 1 Groups A, B, C, D when connected in accordance with Rosemount drawing 03031-1024, Temperature Code T4; Suitable for Class I, Zone 0; Class I Division 2 Groups A, B, C and D, T5 (–50 °C ≤ T_a ≤ 85 °C); Suitable for Class I Zone 2, Group IIC; Type 4X; Factory Sealed; Single Seal (See drawing 03031-1053)

E6 Canada Explosionproof, Dust-Ignitionproof and Division 2
Certificate: 1053834
Standards: ANSI/ISA 12.27.01-2003, CSA Std. C22.2 No. 30 -M1986, CSA Std. C22.2 No.142-M1987, CSA Std. C22.2 No. 213 - M1987
Markings: Explosionproof Class I, Division 1, Groups B, C and D; Suitable for Class I, Zone 1, Group IIB+H2, T5(–50°C ≤ T_a ≤ 85°C); Dust-Ignitionproof for Class II and Class III, Division 1, Groups E, F and G; T5 (–50 °C ≤ T_a ≤ 85 °C); Class I, Division 2, Groups A, B, C and D; T5 (–50 °C ≤ T_a ≤ 85 °C); Suitable for Class I Zone 2, Group IIC; Type 4X; Factory Sealed; Single Seal (See drawing 03031-1053)

B.4 Europe

E8 ATEX Flameproof and Dust
Certificate: KEMA00ATEX2013X; Baseefa11ATEX0275X
Standards: EN60079-0:2012 + A11:2013, EN60079-1:2014, EN60079-26:2015, EN60079-31:2009
Markings: ⟨Ex⟩ II 1/2 G Ex db IIC T6...T4 Ga/Gb, T6 (–60 °C ≤ T_a ≤+70°C), T4/T5(–60 °C ≤ T_a ≤ +80 °C);
⟨Ex⟩ II 1 D Ex ta IIIC T95 °C T_{500}105 °C Da (-20 °C ≤ T_a ≤ +85 °C)

Table B-1. Process Temperature

Temperature class	Process temperature
T6	–60 °C to +65 °C
T5	–60 °C to +80 °C
T4	–60 °C to +120 °C

Special Conditions for Safe Use (X):

1. This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. Flameproof joints are not intended for repair.
3. Non-standard paint options may cause risk from electrostatic discharge. Avoid installations that could cause electrostatic build-up on painted surfaces, and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.
4. Some variants of the equipment have reduced markings on the nameplate. Refer to the Certificate for full equipment marking.

I1 ATEX Intrinsic Safety and Dust
Certificate: BAS97ATEX1089X; Baseefa11ATEX0275X
Standards: EN60079-0:2012, EN60079-11:2012, EN60079-31:2009
Markings: HART: ⟨Ex⟩ II 1 G Ex ia IIC T5/T4 Ga, T5 (-60 °C ≤ T_a ≤ +40 °C), T4(-60 °C ≤ T_a ≤ +70 °C)
Fieldbus/PROFIBUS: ⟨Ex⟩ II 1 G Ex ia IIC Ga T4(-60°C ≤ T_a ≤ +60°C)
DUST: ⟨Ex⟩ II 1 D Ex ta IIIC T95 °C T_{500} 105 °C Da (-20 °C ≤ T_a ≤ +85 °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	0.9 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. The apparatus is not capable of withstanding the 500 V insulation test required by clause 6.3.12 of EN60079-11:2012. This must be taken into account when installing the apparatus.
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 or abrasion if located in Zone 0.
3. Some variants of the equipment have reduced markings on the nameplate. Refer to the Certificate for full equipment marking.

IA ATEX FISCO
Certificate: BAS97ATEX1089X
Standards: EN60079-0:2012, EN60079-11:2009
Markings: ⟨Ex⟩ II 1 G Ex ia IIC T4 Ga (–60 °C ≤ T_a ≤ + 60 °C)

Table B-3. Input Parameters

Parameters	FISCO
Voltage U_i	17.5 V
Current I_i	380 mA
Power P_i	5.32 W
Capacitance C_i	<5 nF
Inductance L_i	<10 µH

Special Conditions for Safe Use (X):

1. The apparatus is not capable of withstanding the 500 V insulation test required by clause 6.3.12 of EN60079-11:2012. This must be taken into account when installing the apparatus.
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 or abrasion if located in Zone 0.

N1 ATEX Type n and Dust
Certificate: BAS00ATEX3105X; Baseefa11ATEX0275X
Standards: EN60079-0:2012, EN60079-15:2010, EN60079-31:2009
Markings: ⟨Ex⟩ II 3 G Ex nA IIC T5 Gc (–40 °C ≤ T_a ≤ + 70 °C); ⟨Ex⟩ II 1 D Ex ta IIIC T95 °C T_{500} 105 °C Da (–20 °C ≤ T_a ≤ +85 °C)

Special Conditions for Safe Use (X):

1. This apparatus is not capable of withstanding the 500 V insulation test that is required by clause 6.8.1 of EN60079-15. This must be taken into account when installing the apparatus.
2. Some variants of the equipment have reduced markings on the nameplate. Refer to the Certificate for full equipment marking.

B.5 International

E7 IECEx Flameproof and Dust
Certificate: IECEx KEM 09.0034X; IECEx BAS 10.0034X
Standards: IEC60079-0:2011, IEC60079-1:2014-06, IEC60079-26:2014-10,IEC60079-31:2008
Markings: Ex db IIC T6...T4 Ga/Gb, T6(–60 °C ≤ T_a ≤ +70 °C), T4/T5(–60 °C ≤ T_a ≤ +80 °C); Ex ta IIIC T95 °C T_{500}105 °C Da (-20 °C ≤ T_a ≤ +85 °C)

Table B-4. Process Temperature

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

Special Conditions for Safe Use (X):

1. This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. Flameproof joints are not intended for repair.
3. Non-standard paint options may cause risk from electrostatic discharge. Avoid installations that could cause electrostatic build-up on painted surfaces, and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.
4. Some variants of the equipment have reduced markings on the nameplate. Refer to the Certificate for full equipment marking.

I7 IECEx Intrinsic Safety
Certificate: IECEx BAS 09.0076X
Standards: IEC60079-0:2011, IEC60079-11:2011
Markings: HART: Ex ia IIC T5/T4 Ga, T5(-60 °C ≤ T_a ≤ +40 °C), T4(-60 °C ≤ T_a ≤ +70 °C)
Fieldbus/PROFIBUS: Ex ia IIC T4(–60 °C ≤ T_a ≤ +60 °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	0.9 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 apparatus is fitted with an optional 90V transient suppressor, it is not capable of withstanding the 500 V insulation test required by clause 6.3.12 of IEC60079-11. This must be taken into account when installing the apparatus.
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 or abrasion if located in Zone 0.

IECEx Mining (Special A0259)
Certificate: IECEx TSA 14.0001X
Standards: IEC60079-0:2011, IEC60079-11:2011
Markings: Ex ia I Ma (–60 °C ≤ T_a ≤ +70 °C)

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	0.9 W	1.3 W	5.32 W
Capacitance C_i	0.012 µF	0 µF	<5 nF
Inductance L_i	0 mH	0 mH	<10 µH

Special Conditions for Safe Use (X):

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

N7 IECEx Type n
Certificate: IECEx BAS 09.0077X
Standards: IEC60079-0:2011, IEC60079-15:2010
Markings: Ex nA IIC T5 Gc (-40 °C ≤ T_a ≤ +70 °C)

Special Conditions for Safe Use (X):

1. The apparatus is not capable of withstanding the 500 V insulation test required by IEC60079-15. This must be taken into account when installing the apparatus.

B.6 Brazil

E2 INMETRO Flameproof
Certificate: UL-BR 13.0643X
Standards: ABNT NBR IEC60079-0:2008 + Errata 1:2011, ABNT NBR IEC60079-1:2009 + Errata 1:2011, ABNT NBR IEC60079-26:2008 + Errata 1:2008
Markings: Ex db IIC T6...T4 Ga/Gb, T6(–60 °C ≤ T_a ≤ +70 °C), T4/T5(–60 °C ≤ T_a ≤ +80 °C)

Special Conditions for Safe Use (X):

1. This device contains a thin wall diaphragm less than 1 mm thickness that forms a boundary between 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 will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. Flameproof joints are not intended for repair.
3. Non-standard paint options may cause risk from electrostatic discharge. Avoid installations that could cause electrostatic build-up on painted surfaces, and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.

I2 INMETRO Intrinsic Safety
Certificate: UL-BR 13.0584X
Standards: ABNT NBR IEC60079-0:2008 + Errata 1:2011, ABNT NBR IEC60079-11:2009
Markings: HART: Ex ia IIC T5/T4 Ga, T5(–60 °C ≤ T_a ≤ +40°C), T4(–60 °C ≤ T_a ≤ +70 °C)
Fieldbus/PROFIBUS: Ex ia IIC T4 Ga (–60 °C ≤ T_a ≤ +60 °C)

Table B-6. Input Parameters

Parameter	HART	Fieldbus/PROFIBUS
Voltage U_i	30 V	30 V
Current I_i	200 mA	300 mA
Power P_i	0.9 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 90V transient suppressor, it is not capable of withstanding the 500 V insulation test required by ABNT NBR IRC 60079-11. This must be taken into account when installing the equipment.
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 or abrasion if located in Zone 0.

IB INMETRO FISCO
Certificate: UL-BR 13.0584X
Standards: ABNT NBR IEC60079-0:2008 + Errata 1:2011, ABNT NBR IEC60079-11:2009
Markings: Ex ia IIC T4 Ga (-60 °C ≤ T_a ≤ +60 °C)

Table B-7. Input Parameters

Parameters	FISCO
Voltage U_i	17.5 V
Current I_i	380 mA
Power P_i	5.32 W
Capacitance C_i	<5 nF
Inductance L_i	<10 µH

Special Conditions for Safe Use (X):

1. If the equipment is fitted with an optional 90V transient suppressor, it is not capable of withstanding the 500 V insulation test required by ABNT NBR IEC 60079-11. This must be taken into account when installing the equipment.
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 or abrasion if located in Zone 0.

B.7 China

E3 China Flameproof
Certificate: GYJ14.1041X; GYJ15.1368X [Flowmeters]
Standards: GB12476-2000; GB3836.1-2010, GB3836.2-2010, GB3836.20-2010
Markings: Ex d IIC T6/T5 Ga/Gb, T6(–50 °C ≤ T_a ≤ +65 °C), T5(–50 °C ≤ T_a ≤ +80 °C)

Special Conditions for Safe Use (X):

1. The relation between ambient temperature arrange and temperature class is as follows:

Ta	Temperature Class
–50 °C~ +80 °C	T5
–50 °C~ +65 °C	T6

   When used in a combustible dust environment, the maximum ambient temperature is 80 °C.
2. The earth connection facility in the enclosure should be connected reliably.
3. Cable entry certified by notified body with type of protection Ex d IIC in accordance with GB3836.1-2000 and GB3836.2-2000, should be applied when installed in a hazardous location. When used in combustible dust environment, cable entry in accordance with IP66 or higher level should be applied.
4. Obey the warning “Keep tight when the circuit is alive.”
5. End users are not permitted to change any internal components.
6. During installation, use and maintenance of this product, observe the following standards: GB3836.13-1997, GB3836.15-2000, GB3836.16-2006, GB50257-1996, GB12476.2-2006, GB15577-2007

I3 China Intrinsic Safety
Certificate: GYJ13.1362X; GYJ15.1367X [Flowmeters]
Standards: GB3836.1-2010, GB3836.4-2010, GB3836.20-2010, GB12476.1-2000
Markings: Ex ia IIC Ga T4/T5

Special Conditions for Safe Use (X):

1. Symbol “X” is used to denote specific conditions of use:
   a. If the apparatus is fitted with an optional 90 V transient suppressor, it is not capable of withstanding the 500 V insulation test for one minute. This must be taken into account when installing the apparatus.
   b. 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	T5	–60 °C ≤ T_a ≤ +40 °C
HART	T4	–60 °C ≤ T_a ≤ +70 °C
Fieldbus/PROFIBUS/ FISCO	T4	–60 °C ≤ T_a ≤ +60 °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	0.9 W	1.3 W	5.32 W
Capacitance C_i	0.012 µF	0 µF	<5 nF
Inductance L_i	0 mH	0 mH	<10 µH

Note
FISCO parameters apply to both Group IIC and IIB.

[For Flowmeters] When Rosemount 644 Temperature Transmitter is used, the Rosemount 644 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 Transmitter and associated apparatus. The cables between Rosemount 644 Transmitter 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. Transmitters comply with the requirements for FISCO field devices specified in IEC60079-27:2008. For the connection of an intrinsically safe circuit in accordance with FISCO Model, FISCO parameters are listed in the table above.
5. 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.
6. 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.
7. End users are not permitted to change any intern components but to settle the problem in conjunction with the manufacturer to avoid damage to the product.
8. During installation, use and maintenance of this product, observe the following standards: GB3836.13-1997, GB3836.15-2000, GB3836.16-2006, GB50257-1996, GB12476.2-2006, GB15577-2007

N3 China Type n
Certificate: GYJ15.1105X
Standards: GB3836.1-2010, GB3836.8-2003
Markings: Ex nA nL IIC T5 Gc (-40 °C ≤ T_a ≤ +70 °C)

Special Condition for Safe Use (X):

1. Symbol "X" is used to denote specific conditions of use: The apparatus is not capable of withstanding the 500 V test to earth for one minute. The must be taken into consideration during installation.

B.8 Japan

E4 Japan Flameproof
Certificate: TC20577, TC20578, TC20583, TC20584 [HART]; TC20579, TC20580, TC20581, TC20582 [Fieldbus]
Markings: Ex d IIC T5

B.9 Technical Regulations Customs Union (EAC)

EM EAC Flameproof
Certificate: RU C-US.GB05.B.01197
Markings: Ga/Gb Ex d IIC T5/T6 X, T5(–60 °C ≤ T_a ≤ +80°C), T6(–60 °C ≤ T_a ≤ +65 °C)

Special Condition for Safe Use (X):

1. See certificate for special conditions.

IM EAC Intrinsically Safe
Certificate: RU C-US.GB05.B.01197
Markings: HART: 0Ex ia IIC T4/T5 Ga X, T4(–60 °C ≤ T_a ≤ +70 °C), T5(-60 °C ≤ T_a ≤ +40 °C)
Fieldbus/PROFIBUS: 0Ex ia IIC T4 Ga X (–60 °C ≤ T_a ≤ +60 °C)

Special Condition for Safe Use (X):

1. See certificate for special conditions.

B.10 Combinations

K2 Combination of E2 and I2
K5 Combination of E5 and I5
K6 Combination of C6, E8, and I1
K7 Combination of E7, I7, and N7
K8 Combination of E8, I1, and N1
KB Combination of E5, I5, and C6
KD Combination of E8, I1, E5, I5, and C6
KM Combination of EM and IM

B.11 Conduit plugs and adapters

IECEx Flameproof and Increased Safety
Certificate: IECEx FMG 13.0032X
Standards: IEC60079-0:2011, IEC60079-1:2007, IEC60079-7:2006-2007
Markings: Ex de IIC Gb

ATEX Flameproof and Increased Safety
Certificate: FM13ATEX0076X
Standards: EN60079-0:2012, EN60079-1:2007, IEC60079-7:2007
Markings: II 2 G Ex de IIC Gb

Table B-8. Conduit Plug Thread Sizes

Thread	Identification mark
M20 × 1.5	M20
1/2 –14 NPT	1/2 NPT

Table B-9. Thread Adapter Thread Sizes

Male Thread	Identification mark
M20 × 1.5 – 6H	M20
1/2–14 NPT	1/2 –14 NPT
3/4 –14 NPT	3/4 –14 NPT
Female Thread	**Identification mark**
M20 × 1.5 – 6H	M20
1/2–14 NPT	1/2–14 NPT
G1/2	G1/2

Special Conditions for Safe Use (X):

1. When the thread adapter or blanking plug is used with an enclosure in type of protection increased safety "e" the entry thread shall be suitably sealed in order to maintain the ingress protection rating (IP) of the enclosure.
2. The blanking plug shall not be used with an adapter.
3. Blanking Plug and Threaded Adapter shall be either NPT or Metric thread forms. G1/2 thread forms are only acceptable for existing (legacy) equipment installations.

B.12 Additional Certifications

SBS American Bureau of Shipping (ABS) Type Approval
Certificate: 09-HS446883A-5-PDA
Intended Use: Marine & Offshore Applications - Measurement of either gauge or absolute pressure for liquid, gas and vapor.

SBV Bureau Veritas (BV) Type Approval
Certificate: 23155
Requirements: Bureau Veritas Rules for the Classification of Steel Ships
Application: Class notations: AUT-UMS, AUT-CCS, AUT-PORT and AUT-IMS; Pressure transmitter type 3051 cannot be installed on diesel engines

SDN Det Norske Veritas (DNV) Type Approval
Certificate: TAA000004F
Intended Use: DNV GL Rules for Classification - Ships and offshore units
Application:

Location Classes	
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

C5 Custody Transfer - Measurement Canada Accuracy Approval
Certificate: AG-0226; AG-0454; AG-0477

B.13 IEC 62591 (*Wireless*HART® Protocol)

B.13.1 Approved Manufacturing Locations

Emerson — Chanhassen, Minnesota USA
Fisher-Rosemount GmbH & Co. — Wessling, Germany
Emerson Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China

B.13.2 European Directive Information

The most recent revision of the EC declaration of conformity can be found at Emerson.com/Rosemount.

B.13.3 Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

B.13.4 FCC and IC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation. This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

B.13.5 Ordinary Location Certification for FM

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

B.13.6 North American Certifications

Factory Mutual (FM) approvals

I5 FM Intrinsically Safe
Certificate: 3046325
Standards: Class 3600:2011, Class 3610:2010, Class 3810: 2005, ANSI/ISA 60079-02009, ANSI/ISA 60079-11:2009 ANSI/NEMA 250:2003, ANSI/IEC 60529:2004
Markings: Intrinsically Safe for Class I, Division I, Groups A, B, C, D
Zone Marking: Class I Zone 0, AEx ia IIC T4 (-40 °C to 70 °C) Intrinsically Safe when installed according to Rosemount Drawing 03031-1062 Enclosure Type 4X/IP66/IP67/IP68

Special Conditions for Safe Use (X):

1. The inline pressure sensor may contain more than 10% 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.
2. The surface resistivity of the transmitter is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.
3. The Rosemount 3051 Wireless Pressure Transmitter shall only be used with the 701PGNKF Rosemount SmartPower Battery Pack.

CSA - Canadian Standards Association

I6 CSA Intrinsically Safe
Certificate: 2526009
Standards: CSA C22.2 No. 0-M91, CSA C22.2 No. 94-M91, CSA C22.2 No. 142-M1987, CSA C22.2 No. 157-92, CSA C22.2 No. 60529-05
Markings: Intrinsically Safe For Class I, Division I, Groups A, B, C, D T4 (-40 °C to 70 °C) Intrinsically safe when installed according to Rosemount drawing 03031-1063 Enclosure Type 4X/IP66/IP68

B.13.7 European Certifications

I1 ATEX Intrinsic Safety
Certificate: Baseefa12ATEX0228X
Standards: EN60079-11:2012, EN60079-0:2012
Markings: Ex ia IIC T4 Ga (-40 °C ≤ Ta ≤ 70 °C)
 II 1G IP66/68 CE 1180

Special Condition for Safe Use (X):

1. The plastic enclosure may constitute a potential electrostatic ignition risk and must not be rubbed or cleaned with a dry cloth.
2. The Model 701PGNKF Power Module may be replaced in a hazardous area. The Power Module has a surface resistivity greater than 1GΩ and must be properly installed in the wireless device enclosure. Care must be taken during transportation to and from the point of installation tc prevent electrostatic charge build-up.

I7 IECEx Intrinsic Safety
Certificate: IECEx BAS 12.0124X
Standards: IEC60079-11:2011, IEC60079-0:2011
Markings: Ex ia IIC T4 Ga (-40 °C ≤ Ta ≤ 70 °C) IP66/68

Special Conditions for Safe Use (X):

1. The plastic enclosure may constitute a potential electrostatic ignition risk and must not be rubbed or cleaned with a dry cloth.
2. The Model 701PGNKF Power Module may be replaced in a hazardous area. The Power Module has a surface resistivity greater than 1GΩ and must be properly installed in the wireless device enclosure. Care must be taken during transportation to and from the point of installation to prevent electrostatic charge build-up.

B.14 Pipe I.D. range codes

For pipes with an Inner Diameter (I.D.) Range/Pipe Wall Thickness not found in this table or with a line size greater than 12-in. (300 mm), choose option code Z and specify the exact pipe dimensions (I.D. and Pipe Wall Thickness) on the DP Flow Configuration Data Sheet (. The Emerson sizing program will determine this code, based on the application piping.

	Line size			I.D. range	Pipe wall thickness		I.D. range code
	Nominal	Max. O.D.	Option code		ANSI pipes	Non-ANSI pipes	
	2-in. (50 mm)	2.625-in. (66.68 mm)	020	1.784 to 1.841-in. (45.31 to 46.76 mm)	0.065 to 0.545-in. (1.7 to 13.8 mm)	0.065 to 0.488-in. (1.7 to 12.4 mm)	A
				1.842 to 1.938-in. (46.79 to 49.23 mm)		0.065 to 0.449-in. (1.7 to 11.4 mm)	B
				1.939 to 2.067-in. (49.25 to 52.50 mm)		0.065 to 0.417-in. (1.7 to 10.6 mm)	C
				2.068 to 2.206-in. (52.53 to 56.03 mm)		0.065 to 0.407-in. (1.7 to 10.3 mm)	D
	2 1/2-in. (63.5 mm)	3.188-in. (80.98 mm)	025	2.207 to 2.322-in. (56.06 to 58.98 mm)	0.083 to 0.563-in. (2.1 to 14.3 mm)	0.083 to 0.448-in. (2.1 to 11.4 mm)	B
				2.323 to 2.469-in. (59.00 to 62.71 mm)		0.083 to 0.417-in. (2.1 to 10.6 mm)	C
				2.470 to 2.598-in. (62.74 to 65.99 mm)		0.083 to 0.435-in. (2.1 to 11.0 mm)	D
				2.599 to 2.647-in. (66.01 to 67.23 mm)		0.083 to 0.515-in. (2.1 to 13.1 mm)	E
	3-in. (80 mm)	3.75-in. (95.25 mm)	030	2.648 to 2.751-in. (67.26 to 69.88 mm)	0.083 to 0.563-in. (2.1 to 14.3 mm)	0.083 to 0.460-in. (2.1 to 11.7 mm)	A
				2.752 to 2.899-in. (69.90 to 73.63 mm)		0.083 to 0.416-in. (2.1 to 10.6 mm)	B
				2.900 to 3.068-in. (73.66 to 77.93 mm)		0.083 to 0.395-in. (2.1 to 10.0 mm)	C
				3.069 to 3.228-in. (77.95 to 81.99 mm)		0.083 to 0.404-in (2.1 to 10.3 mm)	D
	3 1/2-in. (89 mm)	4.25-in. (107.95 mm)	035	3.229 to 3.333-in. (82.02 to 84.66 mm)	0.120 to 0.600-in. (3.0 to 15.2 mm)	0.120 to 0.496-in. (3.0 to 12.6 mm)	B
				3.334 to 3.548-in. (84.68 to 90.12 mm)		0.120 to 0.386-in. (3.0 to 9.8 mm)	C
				3.549 to 3.734-in. (90.14 to 94.84 mm)		0.120 to 0.415-in. (3.0 to 10.5 mm)	D
	4-in. (100 mm)	5.032-in. (127.81 mm)	040	3.735 to 3.825-in. (94.87 to 97.16 mm)	0.120 to 0.600-in. (3.0 to 15.2 mm)	0.120 to 0.510-in. (3.0 to 13.0 mm)	B
				3.826 to 4.026-in. (97.18 to 102.26 mm)		0.120 to 0.400-in. (3.0 to 10.2 mm)	C
				4.027 to 4.237-in. (102.29 to 107.62 mm)		0.120 to 0.390-in. (3.0 to 9.9 mm)	D
				4.238 to 4.437-in. (107.65 to 112.70 mm)		0.120 to 0.401-in. (3.0 to 10.2 mm)	E

	Line size			I.D. range	Pipe wall thickness		I.D. range code
	Nominal	Max. O.D.	Option code		ANSI pipes	Non-ANSI pipes	
	5-in. (125 mm)	6.094-in. (154.79 mm)	050	4.438 to 4.571-in. (112.73 to 116.10 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.481-in. (3.4 to 12.2 mm)	A
				4.572 to 4.812-in. (116.13 to 122.22 mm)		0.134 to 0.374-in. (3.4 to 9.5 mm)	B
				4.813 to 5.047-in. (122.25 to 128.19 mm)		0.134 to 0.380-in. (3.4 to 9.7 mm)	C
				5.048 to 5.249-in. (128.22 to 133.32 mm)		0.134 to 0.413-in. (3.4 to 10.5 mm)	D
Sensor Size 1	6-in. (150 mm)	6.93-in. (176.02 mm)	060	5.250 to 5.472-in. (133.35 to 138.99 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.3919-in. (3.4 to 9.9 mm)	A
				5.473 to 5.760-in. (139.01 to 146.30 mm)		0.134 to 0.327-in. (3.4 to 8.3 mm)	B
				5.761 to 6.065-in. (146.33 to 154.05 mm)		0.134 to 0.31-in. (3.4 to 7.9 mm)	C
				6.066 to 6.383-in. (154.08 to 162.13 mm)		0.134 to 0.297-in. (3.4 to 7.5 mm)	D
Sensor Size 2	6-in. (150 mm)	6.93-in. (176.02 mm)	060	5.250 to 5.472-in. (133.35 to 139.99 mm)	0.134 to 1.354-in. (3.4 to 34.4 mm)	0.134 to 1.132-in. (3.4 to 28.7 mm)	A
				5.473 to 5.760-in. (139.01 to 146.30 mm)		0.134 to 1.067-in. (3.4 to 27.1 mm)	B
				5.761 to 6.065-in. (146.33 to 154.05 mm)		0.134 to 1.05-in. (3.4 to 26.7 mm)	C
				6.066 to 6.383-in. (154.08 to 162.13 mm)		0.134 to 1.037-in. (3.4 to 26.3 mm)	D
Sensor Size 1	7-in. (180 mm)	7.93-in. (201.42 mm)	070	6.384 to 6.624-in. (162.15 to 168.25 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.374-in. (3.4 to 9.5 mm)	B
				6.625 to 7.023-in. (168.28 to 178.38 mm)		0.134 to 0.216-in. (3.4 to 5.5 mm)	C
				7.024 to 7.392-in. (178.41 to 187.76 mm)		0.134 to 0.246-in. (3.4 to 6.2 mm)	D
Sensor Z2	7-in. (180 mm)	7.93-in. (201.42 mm)	070	6.384 to 6.624-in. (162.15 to 168.25 mm)	0.134 to 1.354-in. (3.4 to 34.4 mm)	0.134 to 1.114-in. (3.4 to 28.3 mm)	B
				6.625 to 7.023-in. (168.28 to 178.38 mm)		0.134 to 0.956-in. (3.4 to 24.3 mm)	C
				7.024 to 7.392-in. (178.41 to 187.76 mm)		0.134 to 0.986-in. (3.4 to 25.0 mm)	D
Sensor Size 1	8-in. (200 mm)	9.688-in. (246.08 mm)	080	7.393 to 7.624-in. (187.78 to 193.65 mm)	0.250 to 0.73-in. (6.4 to 18.5 mm)	0.250 to 0.499-in. (6.4 to 12.6 mm)	B
				7.625 to 7.981-in. (193.68 to 202.72 mm)		0.250 to 0.374-in. (6.4 to 9.5 mm)	C
				7.982 to 8.400-in. (202.74 to 213.36 mm)		0.250 to 0.312-in. (6.4 to 7.9 mm)	D
				8.401 to 8.766-in. (213.39 to 222.66 mm)		0.250 to 0.364-in. (6.4 to 9.2 mm)	E

	Line size			I.D. range	Pipe wall thickness		I.D. range code
	Nominal	Max. O.D.	Option code		ANSI pipes	Non-ANSI pipes	
Sensor Size 2	8-in. (200 mm)	9.688-in. (246.08 mm)	080	7.393 to 7.624-in. (187.78 to 193.65 mm)	0.250 to 1.47-in. (6.4 to 37.3 mm)	0.250 to 1.239-in. (6.4 to 31.4 mm)	B
				7.625 to 7.981-in. (193.68 to 202.72 mm)		0.250 to 1.114-in. (6.4 to 28.3 mm)	C
				7.982 to 8.400-in. (202.74 to 213.36 mm)		0.250 to 1.052-in. (6.4 to 26.7 mm)	D
				8.401 to 8.766-in. (213.39 to 222.66 mm)		0.250 to 1.104-in. (6.4 to 28.0 mm)	E
	10-in. (250 mm)	11.75-in. (298.45 mm)	100	8.767 to 9.172-in. (222.68 to 232.97 mm)	0.250 to 1.470-in. (6.4 to 37.3 mm)	0.250 to 1.065-in. (6.4 to 27.1 mm)	A
				9.173 to 9.561-in. (232.99 to 242.85 mm)		0.250 to 1.082-in. (6.4 to 27.5 mm)	B
				9.562 to 10.020-in. (242.87 to 254.51 mm)		0.250 to 1.012-in. (6.4 to 25.7 mm)	C
				10.021 to 10.546-in. (254.53 to 267.87 mm)		0.250 to 0.945-in. (6.4 to 24.0 mm)	D
				10.547 to 10.999-in. (267.89 to 279.37 mm)		0.250 to 1.018-in. (6.4 to 25.9 mm)	E
	12-in. (300 mm)	13.0375-in. (331.15 mm)	120	11.000 to 11.373-in. (279.40 to 288.87 mm)	0.250 to 1.470-in. (6.4 to 37.3 mm)	0.250 to 1.097-in. (6.4 to 27.9 mm)	B
				11.374 to 11.938-in. (288.90 to 303.23 mm)		0.250 to 0.906-in. (6.4 to 23.0 mm)	C
				11.939 to 12.250-in. (303.25 to 311.15 mm)		0.250 to 1.159-in. (6.4 to 29.4 mm)	D

B.15 Approval drawings

B.15.1 Factory mutual 03031-1019

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

REVISIONS

REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AF	ADD FISCO DETAILS	RTC1021913	N.J.H.	7/9/06
AG	ADD FISCO ENTITY PARAMETERS TO SHT 12	RTC1022876	N.J.H.	10/27/06
AH	UPDATE FOR HART 7	RTC1051594	D.R.S.	8/22/11

ENTITY APPROVALS FOR

3051C
3051L
3051H
3051CA
3051T
3051G

OUTPUT CODE A (4-20 mA HART) I.S. SEE SHEETS 2-4
OUTPUT CODE M (LOW POWER) I.S. SEE SHEETS 5-6
OUTPUT CODE F/W (FIELDBUS) I.S. SEE SHEETS 7-10
ALL OUTPUT CODES NONINCENDIVE SEE SHEET 12

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. MIKE DOBE 03/21/89

CHK'D

APP'D. KELLY ORTH 03/22/89

APP'D. GOVT.

EMERSON. Process Management

ROSEMOUNT®
8200 Market Boulevard • Chanhassen, MN 55317 USA

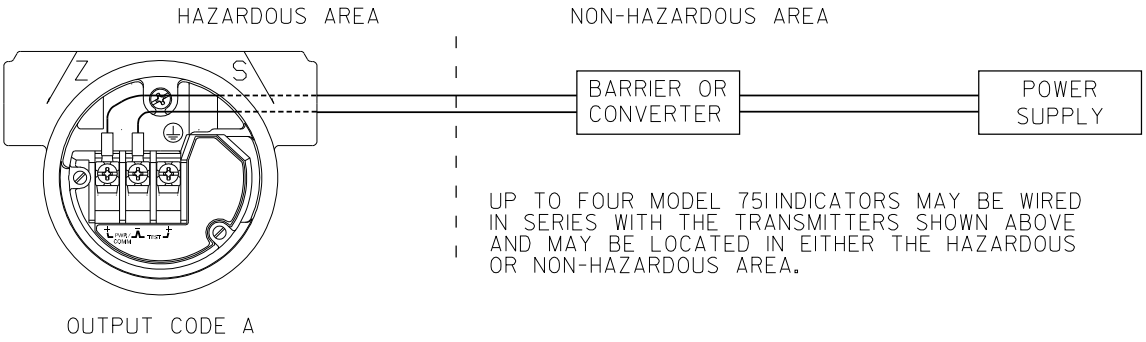
TITLE INDEX OF I.S. & NONINCENDIVE F.M. FOR 3051C/L/P/H/T AND 3001C/S

SIZE A | FSCM NO | DWG NO. 03031-1019

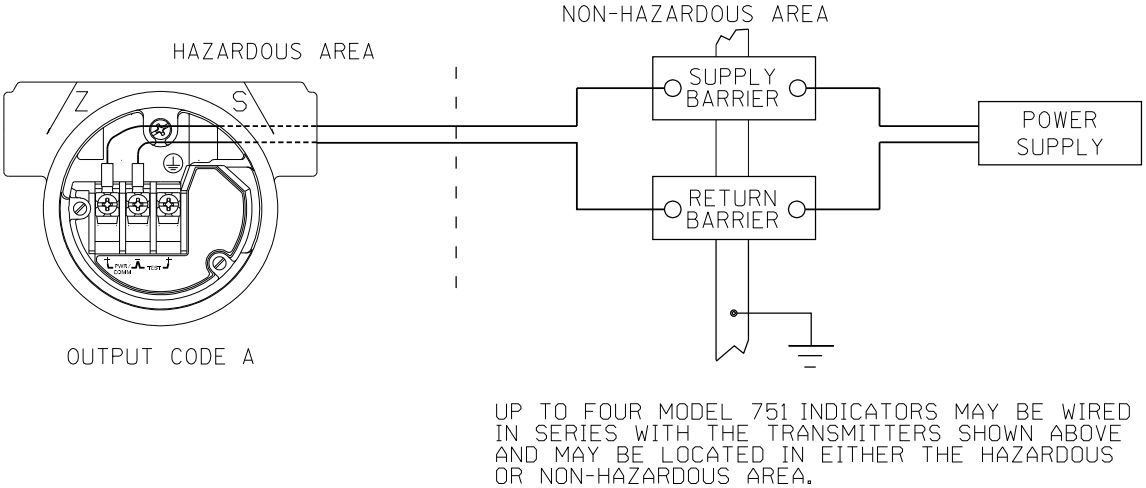
SCALE N/A | WT. | SHEET 1 OF 13

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

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



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



Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. MIKE DOBE	SIZE A	FSCM NO	DWG NO. 03031-1019
ISSUED	SCALE N/A	WT. ———	SHEET 2 OF 13

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

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

FOR OUTPUT CODE A

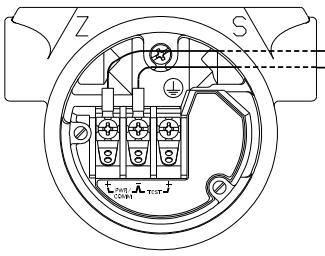
NOTE: ENTITY PARAMETERS LISTED APPLY ONLY TO ASSOCIATED APPARATUS WITH LINEAR OUTPUT.

CLASS I, DIV. 1, GROUPS A AND B

V_{MAX} = 30V	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 30V
I_{MAX} = 165mA	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 165mA
P_{MAX} = 1 WATT	$(\frac{V_T \times I_T}{4})$ OR $(\frac{V_{OC} \times I_{SC}}{4})$ 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

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 = .01μf	C_A IS GREATER THAN .01μf
L_I =10μH	L_A IS GREATER THAN 10μH



HAZARDOUS AREA

NON-HAZARDOUS AREA

ASSOCIATED APPARATUS

(SEE SHEET 2)

OUTPUT CODE A

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

DR. MIKE DOBE	SIZE A	FSCM NO	DWG NO. 03031-1019
ISSUED	SCALE N/A	WT. ———	SHEET 3 OF 13

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

MODEL 3051G

FOR OUTPUT CODE A

CLASS I, DIV. 1, GROUPS A AND B

V_{MAX} = 30V	Vt or Voc IS LESS THAN OR EQUAL TO 30V
I_{MAX} = 165mA	It or Isc IS LESS THAN OR EQUAL TO 165mA
P_{MAX} = 1 WATT	(Voc X Isc/4) or (Vt X It/4) IS LESS THAN OR EQUAL TO 1 WATT
C_I = 0.01 µF	C_A IS GREATER THAN 0.01 µF + C_{CABLE}
L_I = 10 µH	L_A IS GREATER THAN 10 µH + L_{CABLE}

CLASS I, DIV. 1, GROUPS C AND D

V_{MAX} = 30V	Vt or Voc IS LESS THAN OR EQUAL TO 30V
I_{MAX} = 225mA	It or Isc IS LESS THAN OR EQUAL TO 225mA
P_{MAX} = 1 WATT	(Voc X Isc/4) or (Vt X It/4) IS LESS THAN OR EQUAL TO 1 WATT
C_I = 0.01 µF	C_A IS GREATER THAN 0.01 µF + C_{CABLE}
L_I = 10 µH	L_A IS GREATER THAN 10 µH + L_{CABLE}

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03031-1019
ISSUED	SCALE N/A	WT. ———	SHEET 4 OF 13

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

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} = 165mA	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 165mA
P_{MAX} = 1 WATT	$(\frac{V_T \times I_T}{4})$ OR $(\frac{V_{OC} \times I_{SC}}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
C_I = .042μf	C_A IS GREATER THAN .042μf
L_I =10μH	L_A IS GREATER THAN 10μH

✳ FOR T1 OPTION:

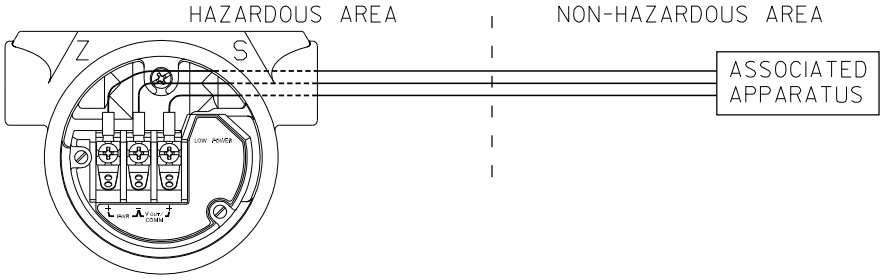
L_I =0.75mH	L_A IS GREATER THAN 0.75mH

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 = .042μf	C_A IS GREATER THAN .042μf
L_I =10μH	L_A IS GREATER THAN 10μH

✳ FOR T1 OPTION:

L_I =0.75mH	L_A IS GREATER THAN 0.75mH



OUTPUT CODE M

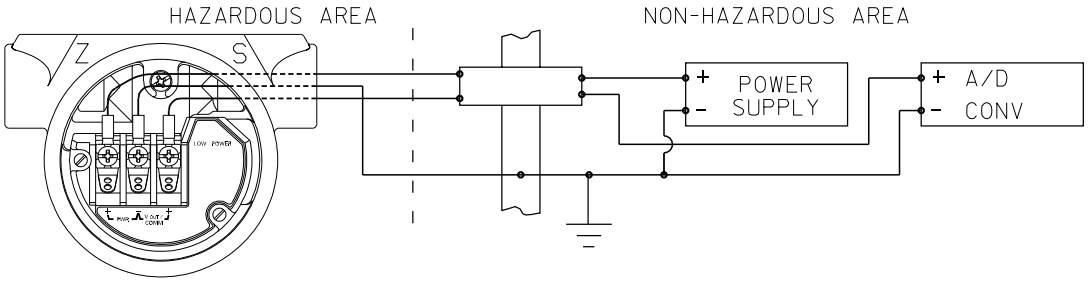
Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

DR. MIKE DOBE	SIZE A	FSCM NO	DWG NO. 03031-1019
ISSUED	SCALE N/A	WT. ———	SHEET 5 OF 13

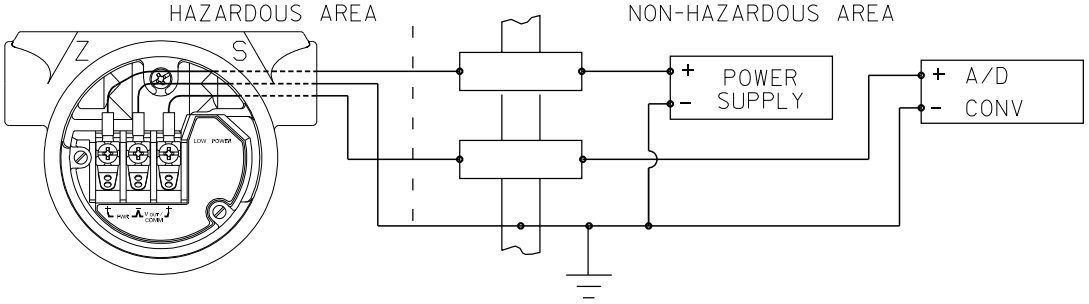
REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AH				

CIRCUIT DIAGRAM 3
ONE DUAL CHANNEL BARRIER



OUTPUT CODE M

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



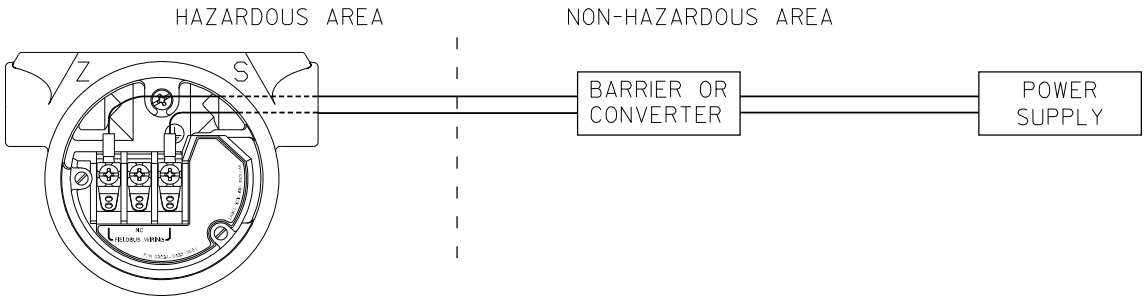
OUTPUT CODE M

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. SANDI MANSON	SIZE A	FSCM NO	DWG NO. 03031-1019
ISSUED	SCALE N/A	WT. ———	SHEET 6 OF 13

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

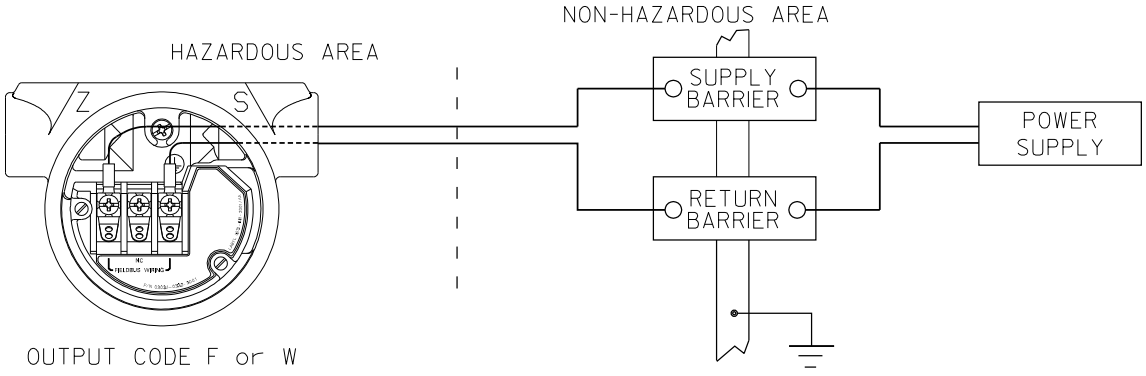
3051 WITH FOUNDATION FIELDBUS OR PROFIBUS. (OUTPUT CODE F OR W)

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



OUTPUT CODE F or W

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



OUTPUT CODE F or W

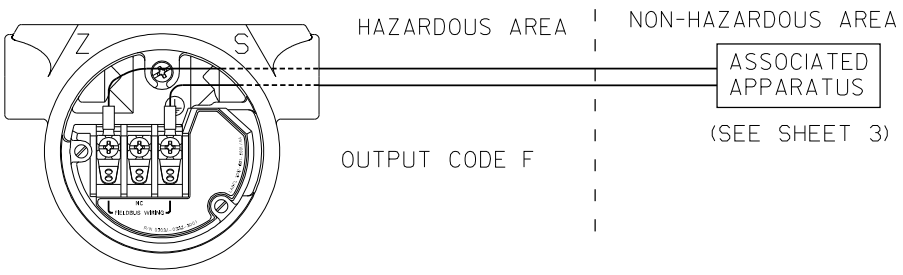
Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03031-1019
ISSUED	SCALE N/A	WT. ———	SHEET 7 OF 13

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

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



Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03031-1019
ISSUED	SCALE N/A	WT. ———	SHEET 8 OF 13

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

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

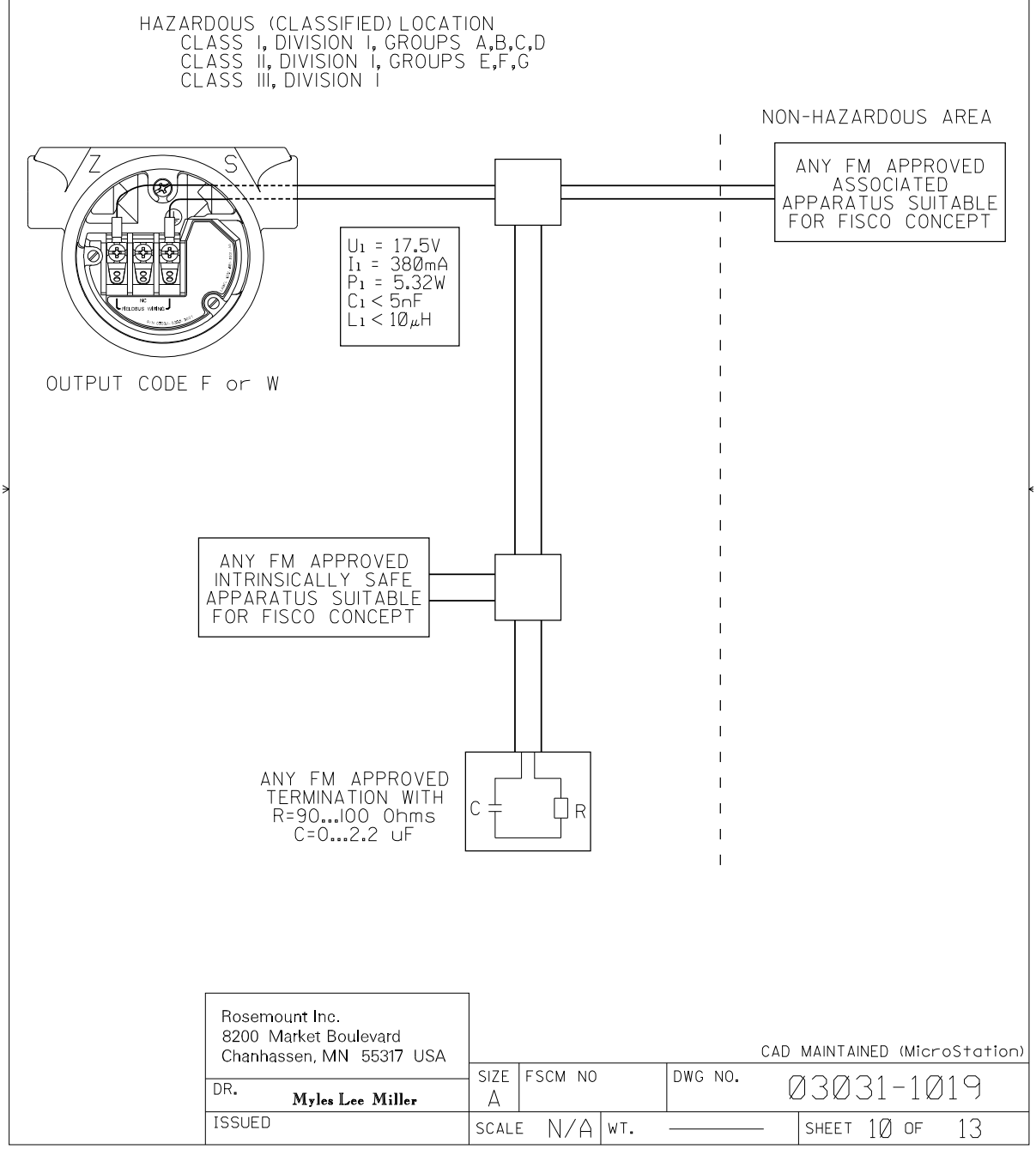
AN ALLOWED TERMINATION MIGHT ALREADY BE LINKED IN THE ASSOCIATED APPARATUS. DUE TO I.S. REASONS, THE NUMBER OF PASSIVE APPARATUS CONNECTED TO THE BUS SEGMENT IS NOT LIMITED. IF THE RULES ABOVE ARE FOLLOWED, UP TO A TOTAL LENGTH OF 1000 m (THE SUMMATION OF TRUNK AND ALL SPUR CABLES), THE INDUCTANCE AND 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. 03031-1019
ISSUED	SCALE N/A	WT. ———	SHEET 9 OF 13

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

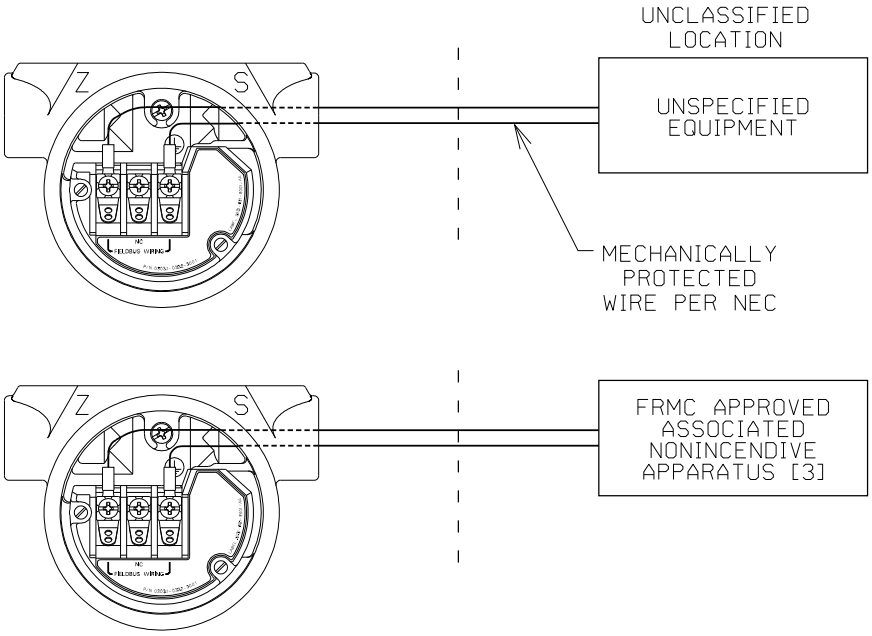


Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03031-1019
ISSUED	SCALE N/A	WT. ———	SHEET 10 OF 13

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

ROSEMOUNT INC. MODEL 3051 PRESSURE TRANSMITTER FRMC DIV 2 INSTALLATION OPTIONS

CLASS I, DIV. 2 HAZARDOUS (CLASSIFIED)
LOCATION SUITABLE FOR CLASS II, III, DIV. 2



NOTES:
FRMC DIV. 2 INSTALLATION OPTIONS

[3] ASSOCIATED NONINCENDIVE APPARATUS PARAMETERS LIMITS
V_{OC} OR $V_T \leq V_{MAX}$
$C_A \geq C_{CABLE} + C_1$
$L_A \geq L_{CABLE} + L_1$

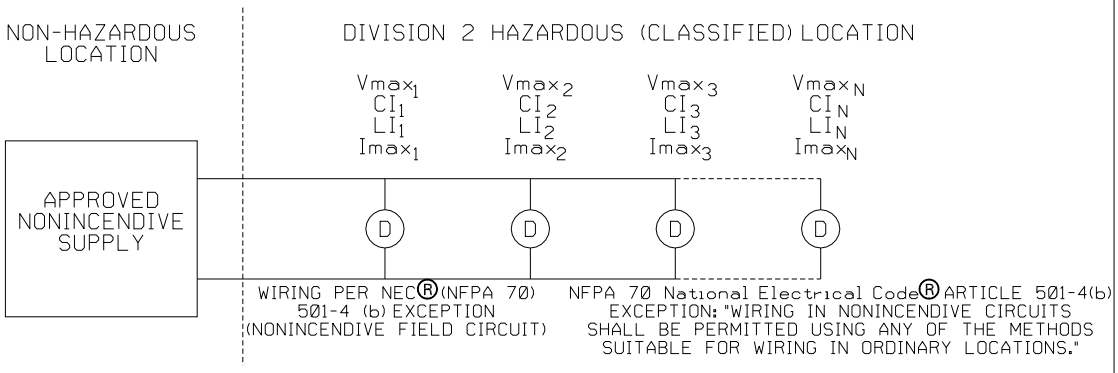
[8] MUST BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE FOR WIRING IN DIVISION 2 HAZARDOUS (CLASSIFIED) LOCATIONS.

[9] DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS.

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03031-1019
ISSUED	SCALE N/A	WT. ———	SHEET 11 OF 13

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

NONINCENDIVE FIELD CIRCUIT
CLASS I, DIV. 2 LOCATIONS



IN NORMAL OPERATION
DEVICES CONTROL THROUGH-CURRENT

ROSEMOUNT 3051

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 <= C_{i1} + C_{i2} +... + C_{iN} + Ccable

La <= L_{i1} + L_{i2} +... + L_{iN} + 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 ($Isignal_1$, $Isignal_2$,...., $Isignal_N$)

	4-20mA/HART	1-5Vdc	FIELDBUS (F or W)
Vmax	42.4V	12V	30V
Maximum normal operating current	22mA	3mA	27mA
Ca	.010uF	.042uF	0uF
La	10uH	.75mH	0uH

ROSEMOUNT 3051 TRANSMITTERS ARE CURRENT CONTROLLERS ON INDIVIDUAL PARALLEL BRANCHES WITH RESPECT TO THE POWER SUPPLY. IN NONINCENDIVE INSTALLATIONS THE Imax FOR EACH TRANSMITTER IS NOT RELATED TO THE MAXIMUM CURRENT OF THE POWER SUPPLY (Isc) IN THE SAME MANNER AS FOR TRANSMITTER INSTALLED PER I.S. REQUIREMENTS, BECAUSE NONINCENDIVE REQUIREMENTS INCLUDE ONLY NORMAL OPERATING CONDITIONS.

REFERENCE: APPENDIX A7.3 (FM3611)

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. Jon Steffens	SIZE A	FSCM NO	DWG NO. 03031-1019
ISSUED	SCALE N/A	WT. ————	SHEET 12 OF 13

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

GENERAL NOTES:

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

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)	
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03031-1019	
ISSUED	SCALE N/A	WT. ———	SHEET 13 OF 13	

B.15.2 Canadian Standards Association (CSA) 03031-1024

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

REVISIONS

REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AC	REM It, Vt FROM ENTITY PARAMETERS	RTC1009279	W.C.R.	7/11/00
AD	ADD FISCO FIELDBUS	RTC1012624	J.P.W.	4/4/02
AE	UPDATE FOR HART 7	RTC1052064	D.R.S.	10/5/11

APPROVALS FOR

3051C
3051L
3051H
3051CA
3051T

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,M,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 2.

AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2.

CAD MAINTAINED (MicroStation)

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

-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. Mike Dobe 08/27/90

CHK'D

APP'D. GLEN MONZO 8/31/90

APP'D. GOVT.

EMERSON. Process Management

ROSEMOUNT®
8200 Market Boulevard • Chanhassen, MN 55317 USA

TITLE INDEX OF I.S. CSA FOR 3151C/L/H/T

SIZE A | FSCM NO | DWG NO. 03031-1024

SCALE N/A | WT. ——— | SHEET 1 OF 9

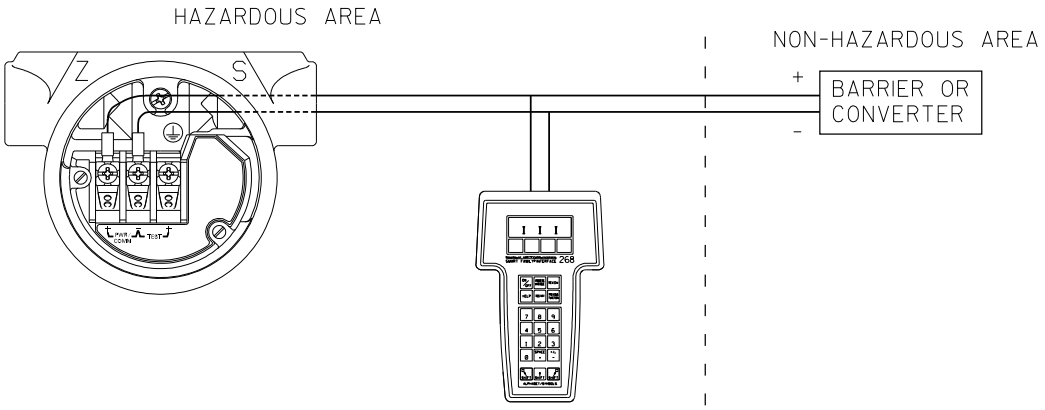
REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AE				

CSA INTRINSIC SAFETY APPROVALS

CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

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



ROSEMOUNT
MODEL 275/375/475 SMART
FAMILY INTERFACE

** 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.

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. Mike Dobe 08/27/90	SIZE A	FSCM NO	DWG NO. 03031-1024
ISSUED	SCALE N/A	WT.	SHEET 2 OF 9

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

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 275/375/475 SMART FAMILY INTERFACE.

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. Mike Dobe	SIZE A	FSCM NO	DWG NO. 03031-1024
ISSUED	SCALE N/A	WT. ———	SHEET 3 OF 9

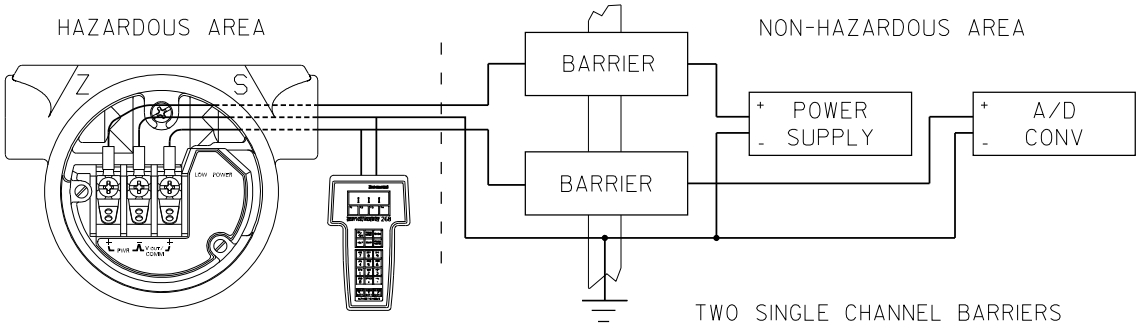
REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AE				

CSA INTRINSIC SAFETY APPROVALS

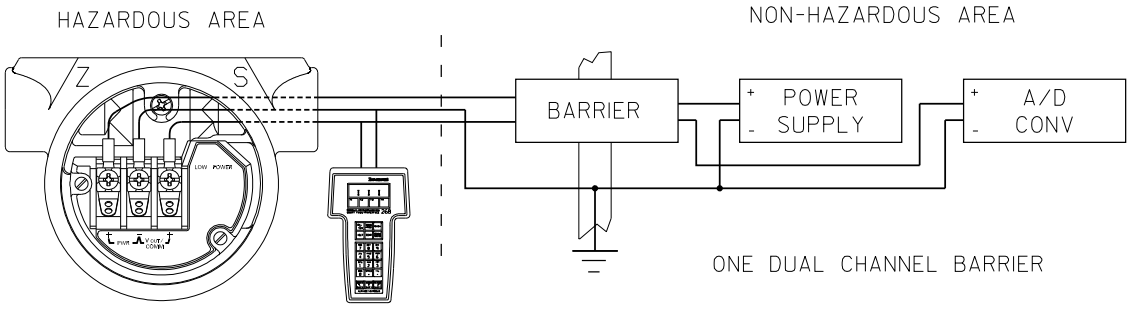
305IC LOW POWER CIRCUIT CONNECTION WITH INTRINSIC SAFETY BARRIERS

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE
LOWPOWER, ("M" OUTPUT CODE)



ROSEMOUNT MODEL 275/375/475



ROSEMOUNT MODEL 275/375/475

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.

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)	
DR. SANDI MANSON	SIZE A	FSCM NO	DWG NO. 03031-1024	
ISSUED	SCALE N/A	WT. ———	SHEET 4 OF 9	

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

FIELDBUS, ("F" or "W" OUTPUT CODE)

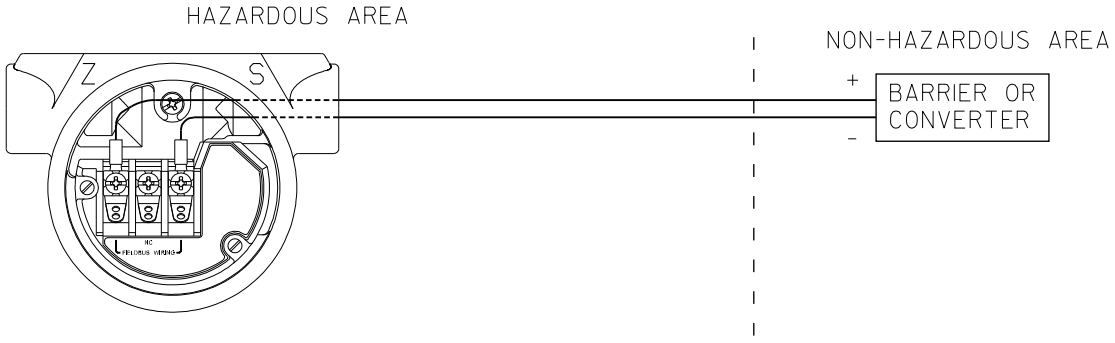
DEVICE	PARAMETERS	APPROVED FOR CLASS I, DIV.I
CSA APPROVED SAFETY BARRIER	30 V OR LESS 300 OHMS OR MORE 28 V OR LESS 235 OHMS OR MORE 25 V OR LESS 160 OHMS OR MORE 22 V OR LESS 100 OHMS OR MORE	GROUPS A, B, C, D

CSA INTRINSIC SAFETY APPROVALS

CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE
FIELDBUS, ("F" or "W" OUTPUT CODE)



WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2.

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03031-1024
ISSUED	SCALE N/A	WT. ———	SHEET 5 OF 9

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

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:

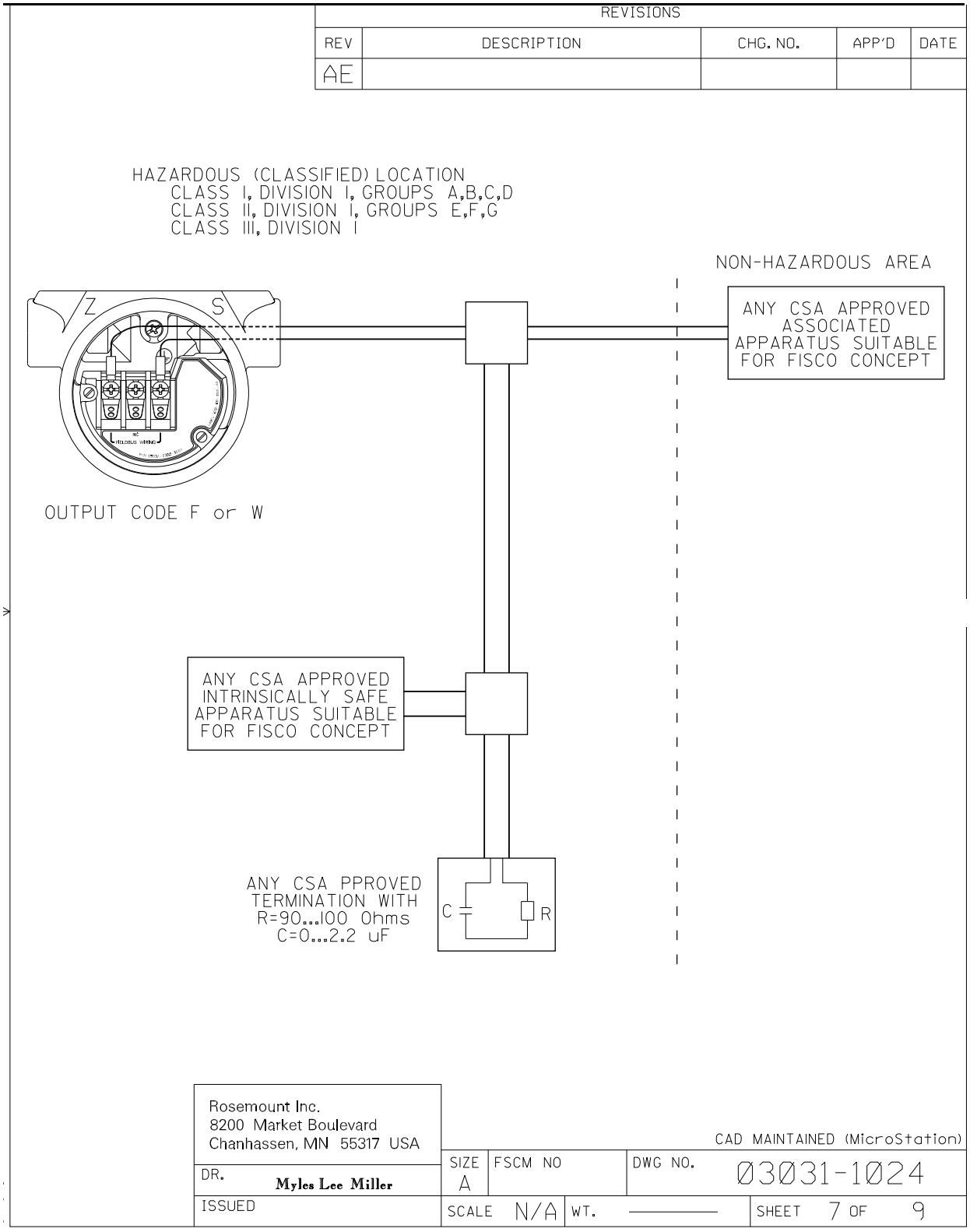
R = 90...100 OHMS C = 2.2μF

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.

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03031-1024
ISSUED	SCALE N/A	WT. ———	SHEET 6 OF 9


REVISIONS
REV
DESCRIPTION
CHG. NO.
APP'D
DATE
AE
HAZARDOUS (CLASSIFIED) LOCATION
CLASS I, DIVISION I, GROUPS A,B,C,D
CLASS II, DIVISION I, GROUPS E,F,G
CLASS III, DIVISION I
NON-HAZARDOUS AREA
Z
S
ANY CSA APPROVED ASSOCIATED APPARATUS SUITABLE FOR FISCO CONCEPT
OUTPUT CODE F or W
ANY CSA APPROVED INTRINSICALLY SAFE APPARATUS SUITABLE FOR FISCO CONCEPT
ANY CSA PPROVED TERMINATION WITH R=90...100 Ohms C=0...2.2 uF
C
R
Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA
CAD MAINTAINED (MicroStation)
DR. Myles Lee Miller
SIZE A
FSCM NO
DWG NO. 03031-1024
ISSUED
SCALE N/A
WT.
SHEET 7 OF 9

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

3051 I.S. ENTITY PARAMETERS. (OUTPUT CODE A,F,M or W)

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

V_{MAX} = 30V	V_{OC} IS LESS THAN OR EQUAL TO 30V
I_{MAX} = 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

V_{MAX} = 30V	V_{OC} IS LESS THAN OR EQUAL TO 30V
I_{MAX} = 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 = 0μf	C_A IS GREATER THAN 0μf + C CABLE
L_I = 0μH	L_A IS GREATER THAN 0μH + L CABLE

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

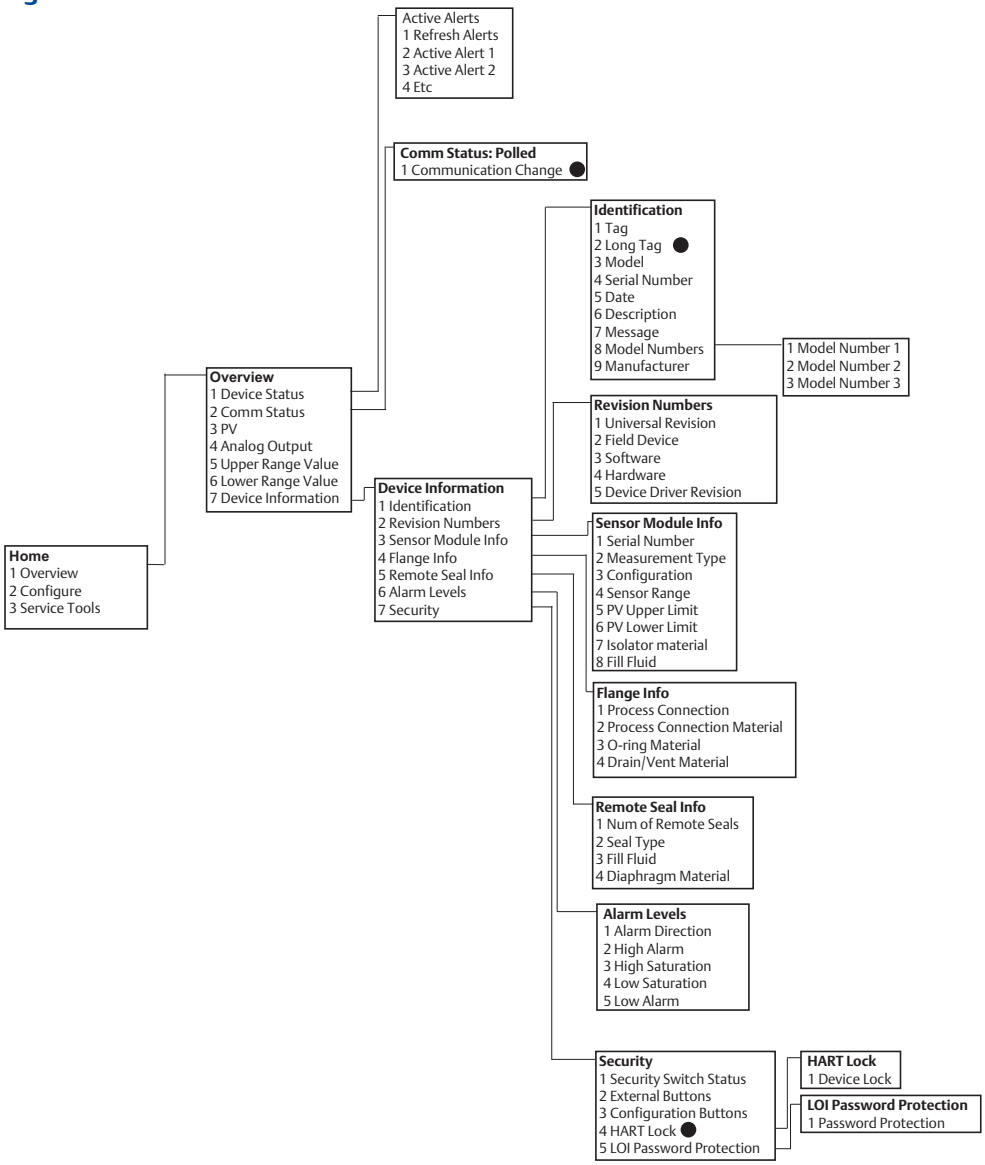
Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA			CAD MAINTAINED (MicroStation)
DR. JON STEFFENS	SIZE A	FSCM NO	DWG NO. 03031-1024
ISSUED	SCALE N/A	WT. ———	SHEET 8 OF 9

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

Appendix C Field Communicator Menu Trees and Fast Keys

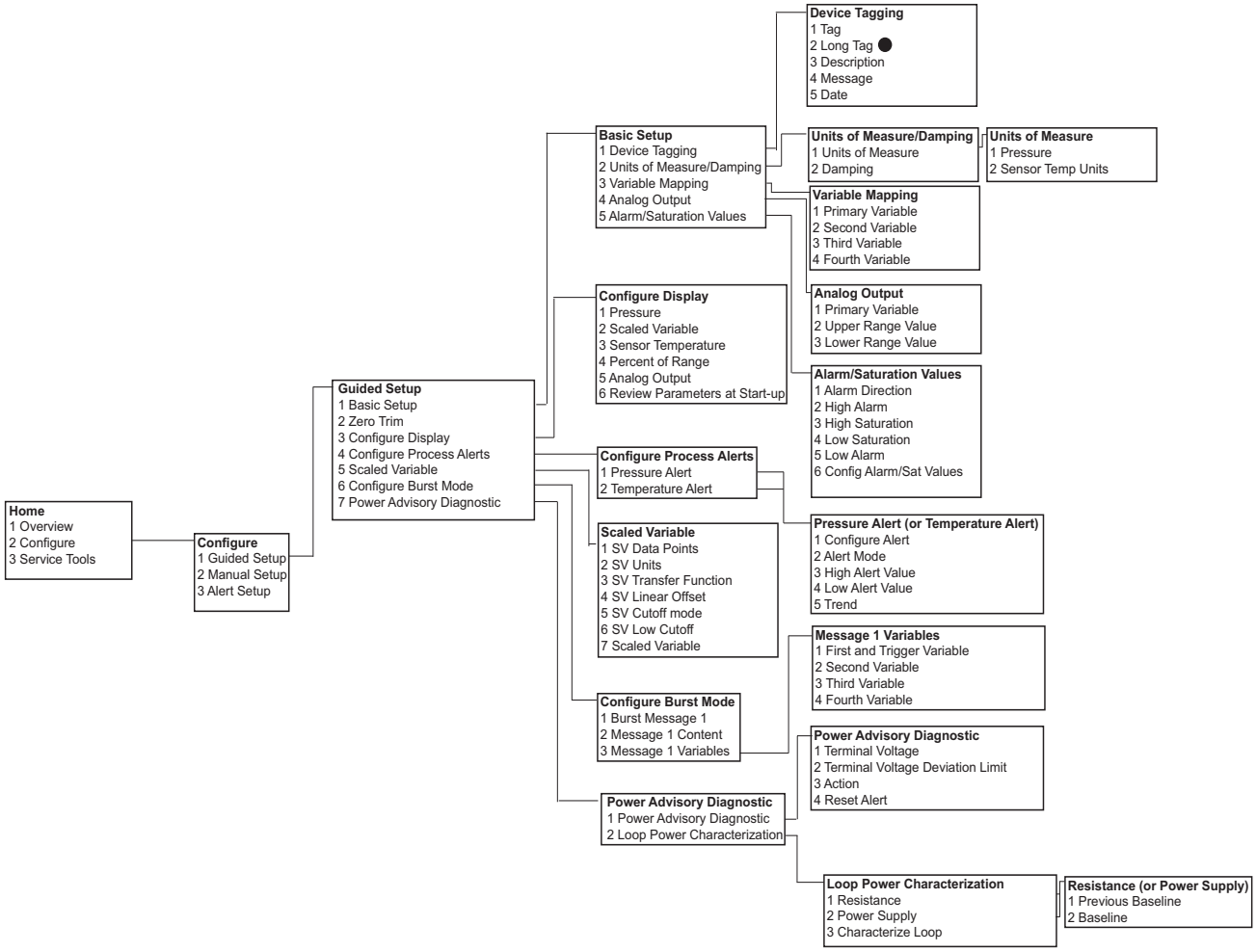
C.1 Field Communicator menu trees

Figure C-1. Overview



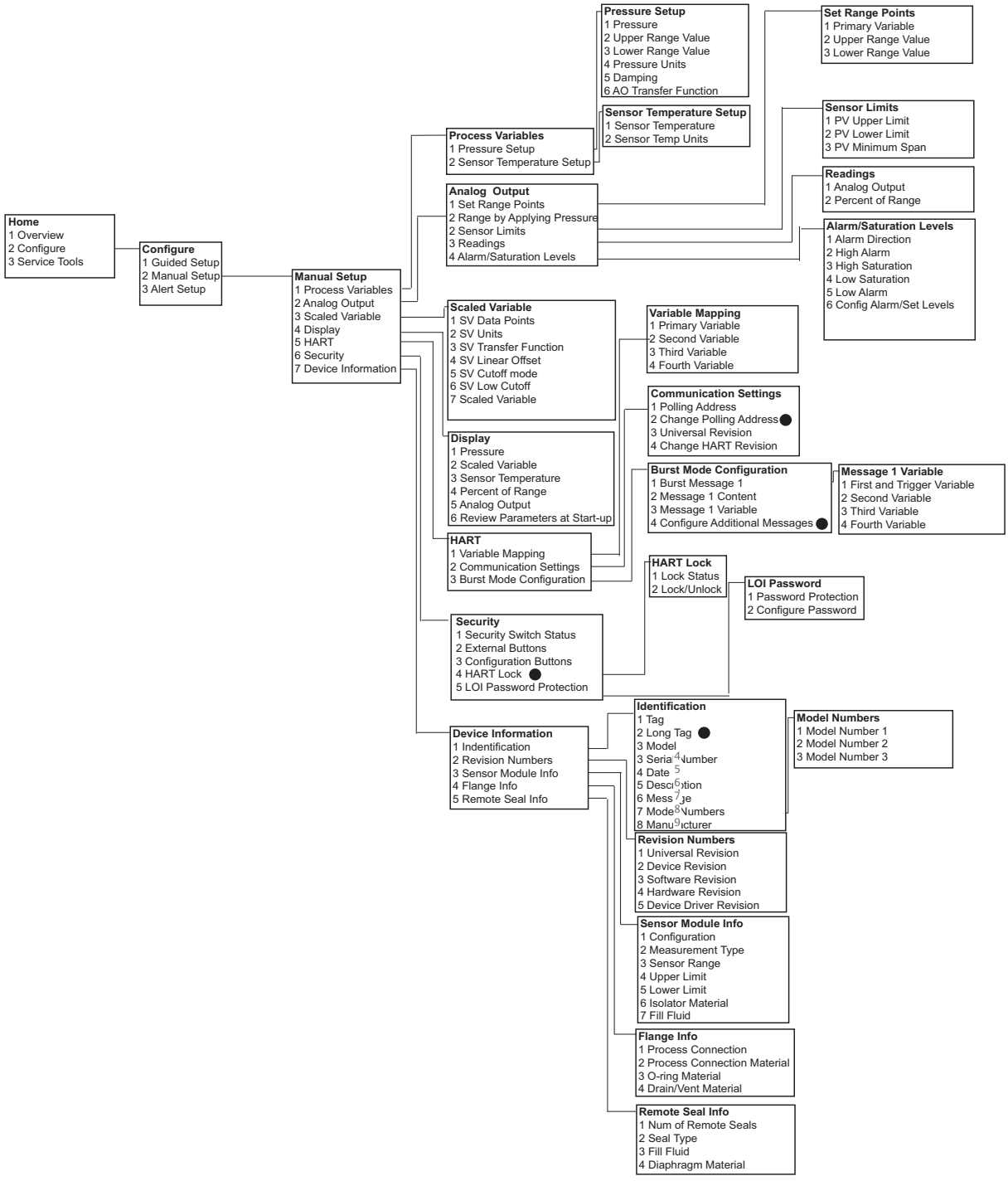
Selections with black circle are only available in HART Revision 7 mode. Selection will not appear in HART Revision 5 DD.

Figure C-2. Configure - Guided Setup



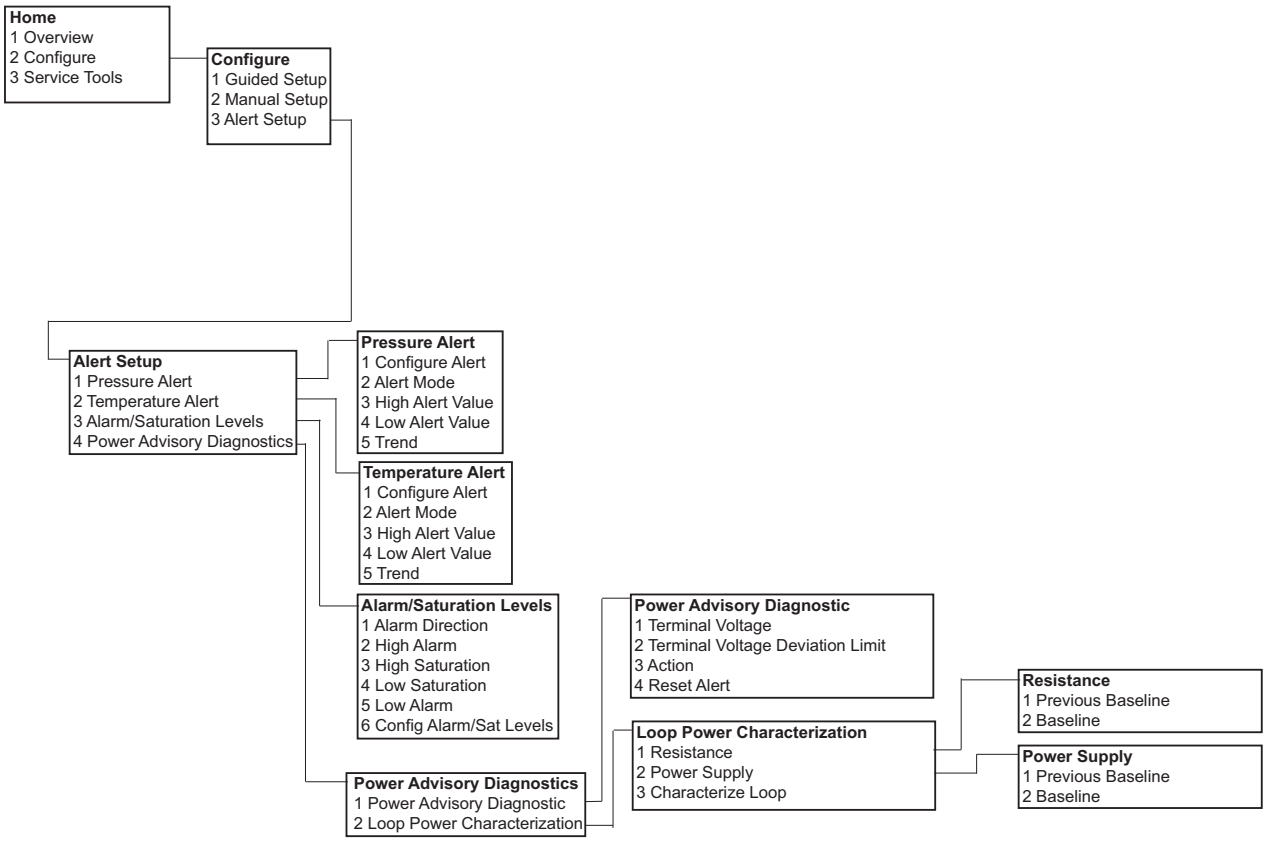
Selections with black circle are only available in HART Revision 7 mode. Selection will not appear in HART Revision 5 DD.

Figure C-3. Configure - Manual Setup



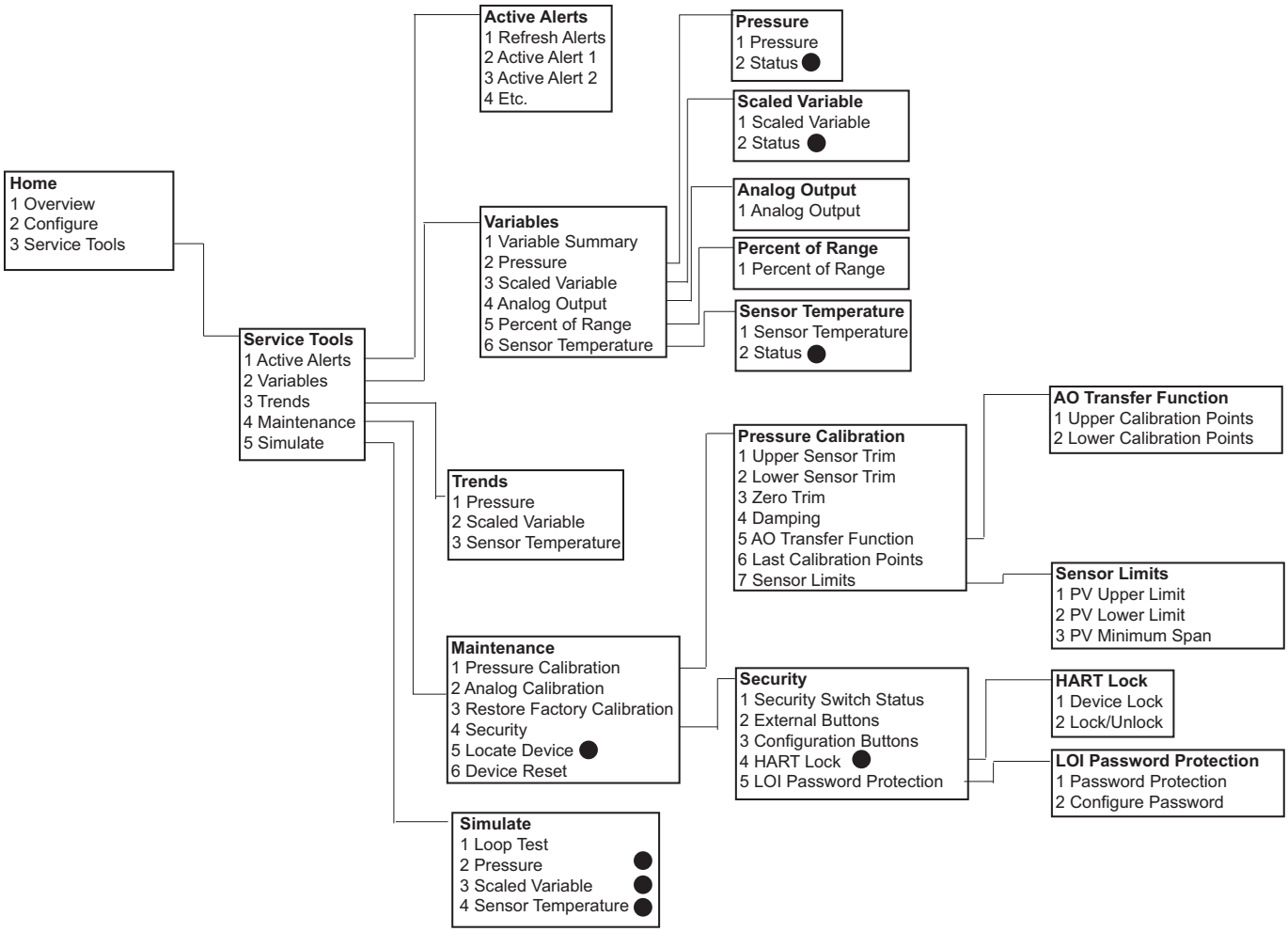
Selections with black circle are only available in HART Revision 7 mode. Selection will not appear in HART Revision 5 DD.

Figure C-4. Configure - Alert Setup



Selections with black circle are only available in HART Revision 7 mode. Selection will not appear in HART Revision 5 DD.

Figure C-5. Service Tools



Selections with black circle are only available in HART Revision 7 mode. Selection will not appear in HART Revision 5 DD.

C.2 Field Communicator fast keys

- A (✓) indicates the basic configuration parameters. At minimum these parameters should be verified as a part of configuration and startup.
- A (7) indicates availability only in HART revision 7 mode.

Table C-1. Device Revision 9 and 10 (HART7), DD Revision 1 Fast Key sequence

	Function	Fast Key Sequence	
		HART 7	HART 5
✓	Alarm and Saturation Levels	2, 2, 2, 5	2, 2, 2, 5
✓	Damping	2, 2, 1, 1, 5	2, 2, 1, 1, 5
✓	Primary Variable	2, 2, 5, 1, 1	2, 2, 5, 1, 1
✓	Range Values	2, 2, 2, 1	2, 2, 2, 1
✓	Tag	2, 2, 7, 1, 1	2, 2, 7, 1, 1
✓	Transfer Function	2, 2, 1, 1, 6	2, 2, 1, 1, 6
✓	Pressure Units	2, 2, 1, 1, 4	2, 2, 1, 1, 4
	Date	2, 2, 7, 1, 5	2, 2, 7, 1, 4
	Descriptor	2, 2, 7, 1, 6	2, 2, 7, 1, 5
	Digital to Analog Trim (4 - 20 mA Output)	3, 4, 2, 1	3, 4, 2, 1
	Digital Zero Trim	3, 4, 1, 3	3, 4, 1, 3
	Display Configuration	2, 2, 4	2, 2, 4
	LOI Password Protection	2, 2, 6, 5	2, 2, 6, 4
	Loop Test	3, 5, 1	3, 5, 1
	Lower Sensor Trim	3, 4, 1, 2	3, 4, 1, 2
	Message	2, 2, 7, 1, 7	2, 2, 7, 1, 6
	Pressure Trend	3, 3, 1	3, 3, 1
	Rerange with Keypad	2, 2, 2, 1	2, 2, 2, 1
	Scaled D/A Trim (4–20 mA Output)	3, 4, 2, 2	3, 4, 2, 2
	Scaled Variable	2, 2, 3	2, 2, 3
	Sensor Temperature Trend	3, 3, 3	3, 3, 3
	Switch HART Revision	2, 2, 5, 2, 4	2, 2, 5, 2, 3
	Upper Sensor Trim	3, 4, 1, 1	3, 4, 1, 1
✓	Long Tag	2, 2, 7, 1, 2	
✓	Locate Device	3, 4, 5	
✓	Simulate Digital Signal	3, 5	

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