Safety Manual
00809-0700-4801, Rev CA
March 2021

Rosemount™ 3051S Series of Instrumentation

Pressure, Flow, and Level Measurement

ROSEMOUNT™

EMERSON™

Safety messages

NOTICE

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

See listed technical assistance contacts.

Customer Central

Technical support, quoting, and order-related questions.

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

Asia Pacific- 65 777 211

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

North American Response Center

Equipment service needs.

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

Outside of these areas, contact your local Emerson representative.

NOTICE

The content of this document is based on the English language version. Any differences in non-English versions should be resolved in favor of the most current English version.

Contents

1 Introduction

1.1 Using this manual

This document provides information about how to install, commission, and proof test a Rosemount 3051S, Rosemount 3051S Advanced Diagnostics, Rosemount 3051S MultiVariable™, and Rosemount 3051S Electronic Remote Sensor (ERS™) System to comply with safety instrumented systems (SIS) requirements.

NOTICE

This manual assumes that the following conditions apply:

- transmitter has been installed correctly and completely according to the instructions in the transmitter Reference Manual and Quick Start Guide
- installation complies with all applicable safety requirements
- operator is trained in local and corporate safety standards

Related documents

All product documentation is available at Emerson.com.

For more information, reference the following documents:

Transmitter	Document
Rosemount 3051S Rosemount 3051S with Advanced Diagnostics	Reference Manual
Rosemount 3051S	Quick Start Guide
Rosemount 3051S with Advanced Diagnostics	Quick Start Guide
Rosemount 3051SMV MultiVariable Transmitter	Reference Manual
	Quick Start Guide
Rosemount 3051S Electronic Remote Sensor (ERS) System	Reference Manual
	Quick Start Guide

2 Installation and commissioning

Use this section to install and commission a Rosemount 3051S Pressure, Flow, and Level Transmitter with SIS features.

2.1 Installation wiring considerations

Refer to the product reference manual for specifications and recommendations for proper installation.

2.2 IEC 61508 relevant requirements

The Rosemount 3051S Pressure Transmitter, Rosemount 3051S Advanced Diagnostics, Rosemount 3051S MultiVariable™ Transmitter, and Rosemount 3051S Electronic Remote Sensor (ERS™) System are all certified per the relevant requirements of IEC 61508 or the Route 2_H approach.

Systematic capability	Random capability
SIL 3 capable	Type B Element Route 1H: SIL 2@HFT=0 SIL 3@HFT=1 (SFF ≥ 90%)(1) Route 2H (low demand): SIL 2@HFT=0 SIL 3@HFT=1 (SFF < 90%) Route 2H (high demand): SIL 2@HFT=0 SIL 3@HFT=1 (SFF < 90%)(2)

(1) Rosemount 3051S MultiVariable Transmitter not available with Route 1H.
(2) Only available with the Rosemount 3051S Advanced Diagnostics Transmitter (DA2 option).

2.3 Failure rates according to IEC 61508 in FIT

FIT = 1 failure/10^9 hours

Table 2-1: Failure Rates for Rosemount 3051S Pressure Transmitter (Software Rev. 7.0 and Above)

Transmitter	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
Rosemount 3051S Coplanar DP and Gage	0	82	274	40
Rosemount 3051S Coplanar Absolute, In-line Gage and Absolute	0	80	260	37
Rosemount 3051S Flow Meter based on 1195, 405, or 485 primaries	0	90	274	51
Rosemount 3051S Level Transmitter (w/o additional seal)	0	82	274	74

Table 2-2: Failure Rates for Rosemount 3051S Pressure Transmitter, Option Code DA2 (Software Rev. 7.0 and Above)

Transmitter	Λ_{SD}	Λ_{SU}	Λ_{DD}	Λ_{DU}
Rosemount 3051S Coplanar DP and Gage	0	6	685	34
Rosemount 3051S Coplanar DP and Gage with PATC enabled	0	6	699	20
Rosemount 3051S Coplanar Absolute, In-line Gage and Absolute	0	6	681	34
Rosemount 3051S Coplanar Absolute, In-line Gage and Absolute with PATC enabled	0	6	695	20
Rosemount 3051S Flow Meter based on 1195, 405, or 485 primaries	0	14	685	45
Rosemount 3051S Level Transmitter (w/o additional seal)	0	6	702	51

Table 2-3: Failure Rates for Rosemount 3051SMV MultiVariable Transmitter (Software Rev. 3.0 and Above)

Transmitter	Λ_{SD}	Λ_{SU}	Λ_{DD}	Λ_{DU}
Rosemount 3051SMV_P1	0	74	902	104
Rosemount 3051SMV_P2	0	74	642	73
Rosemount 3051SMV_P3, 3051SMV_P5, 3051SMV_P6	0	74	880	81
Rosemount 3051SMV_P4, 3051SMV_P7, 3051SMV_P8	0	74	620	50
Rosemount 3051SMV_M1	0	74	987	150
Rosemount 3051SMV_M2	0	74	727	119
Rosemount 3051SMV_M3	0	74	831	127
Rosemount 3051SMV_M4	0	74	705	95
Rosemount 3051SFA1, 3051SFC1, 3051SFP1 – High Trip (normal conditions)	0	82	987	161
Rosemount 3051SFA1, 3051SFC1, 3051SFP1 – Low Trip (normal conditions)	0	84	987	159
Rosemount 3051SFA2, 3051SFC2, 3051SFP2 – High Trip (normal conditions)	0	82	727	130
Rosemount 3051SFA2, 3051SFC2, 3051SFP2 – Low Trip (normal conditions)	0	84	727	128
Rosemount 3051SFA3, 3051SFC3, 3051SFP3 – High Trip (normal conditions)	0	82	831	138
Rosemount 3051SFA3, 3051SFC3, 3051SFP3 – Low Trip (normal conditions)	0	84	831	136
Rosemount 3051SFA4, 3051SFC4, 3051SFP4 – High Trip (normal conditions)	0	82	705	106

Table 2-3: Failure Rates for Rosemount 3051SMV MultiVariable Transmitter (Software Rev. 3.0 and Above) *(continued)*

Transmitter	Λ_{SD}	Λ_{SU}	Λ_{DD}	Λ_{DU}
Rosemount 3051SFA4, 3051SFC4, 3051SFP4 – Low Trip (normal conditions)	0	84	705	104
Rosemount 3051SFA5, 3051SFC5, 3051SFP5 – High Trip (normal conditions)	0	82	902	115
Rosemount 3051SFA5, 3051SFC5, 3051SFP5 – Low Trip (normal conditions)	0	84	902	113
Rosemount 3051SFA6, 3051SFC6, 3051SFP6 – High Trip (normal conditions)	0	82	642	84
Rosemount 3051SFA6, 3051SFC6, 3051SFP6 – Low Trip (normal conditions)	0	84	642	82
Rosemount 3051SFA7, 3051SFC7, 3051SFP7 – High Trip (normal conditions)	0	82	880	92
Rosemount 3051SFA7, 3051SFC7, 3051SFP7 – Low Trip (normal conditions)	0	84	880	90

Table 2-4: Failure Rates for Rosemount 3051S Electronic Remote Sensors (ERS) System (Software Rev. 57 and Above)

Transmitter	Λ_{SD}	Λ_{SU}	Λ_{DD}	Λ_{DU}
Rosemount 3051SAM Models for ERS System (no seals)				
Primary – Coplanar Differential and Coplanar Gage Secondary – Coplanar Differential and Coplanar Gage	0	319	897	131
Primary – Coplanar Differential and Coplanar Gage Secondary – Coplanar Absolute, In-line Gage and In-line Absolute	0	237	996	114
Primary – Coplanar Absolute, In-line Gage and In-line Absolute Secondary – Coplanar Differential and Coplanar Gage	0	237	996	114
Primary – Coplanar Absolute, In-line Gage and In-line Absolute Secondary – Coplanar Absolute, In-line Gage and In-line Absolute	0	156	1095	97
Rosemount 3051SAL Models for ERS System				
Primary – Coplanar Differential and Coplanar Gage Secondary – Coplanar Differential and Coplanar Gage	0	350	897	169
Primary – Coplanar Differential and Coplanar Gage Secondary – Coplanar Absolute, In-line Gage and In-line Absolute	0	268	996	151
Primary – Coplanar Absolute, In-line Gage and In-line Absolute Secondary – Coplanar Differential and Coplanar Gage	0	268	996	151

Table 2-4: Failure Rates for Rosemount 3051S Electronic Remote Sensors (ERS) System (Software Rev. 57 and Above) ***(continued)***

Transmitter	Λ_{SD}	Λ_{SU}	Λ_{DD}	Λ_{DU}
Primary – Coplanar Absolute, In-line Gage and In-line Absolute Secondary – Coplanar Absolute, In-line Gage and In-line Absolute	0	186	1095	134
Rosemount 3051SAL and 3051SAM (w/ attached 1199 seal) Models for ERS System				
Primary – Coplanar Differential and Coplanar Gage Secondary – Coplanar Differential and Coplanar Gage	0	355	897	175
Primary – Coplanar Differential and Coplanar Gage Secondary – Coplanar Absolute, In-line Gage and In-line Absolute	0	273	996	158
Primary – Coplanar Absolute, In-line Gage and In-line Absolute Secondary – Coplanar Differential and Coplanar Gage	0	273	996	158
Primary – Coplanar Absolute, In-line Gage and In-line Absolute Secondary – Coplanar Absolute, In-line Gage and In-line Absolute	0	191	1095	140

2.4 SIS-certified firmware versions

Emerson maintains an SIS-compliant modification process. Changes made after initial release do not affect overall SIS certification.

Version information can be viewed on the handheld communicator or AMS at **Home** → **Overview** → **Device information** → **Revisions**.

2.5 Safety precautions

Prior to making any changes to any Rosemount 3051S Transmitter, such as changing the configuration or replacing the sensor, take appropriate action to avoid a false trip by electronically bypassing the safety Programmable Logic Controller (PLC).

Important
Ensure alternate means are in place to maintain the process in a safe state.

⚠ WARNING

If the transmitter is in a classified area, do not open the wiring compartment unless the power to the transmitter has been removed or unless the area has been declassified. Contact customer support for further information.
Prior to placing the transmitter online and removing the bypass from the safety PLC, verify the transmitter configuration and all safety parameters.

2.6 Installation in SIS applications

Installations are to be performed by qualified personnel. No special installation is required in addition to the standard installation practices outlined in the applicable product manual.

Environmental and operational limits are available in the product manual.

The loop should be designed so the terminal voltage does not drop below the following values when the transmitter output is 23.0 mA:

- Rosemount 3051S: 10.5 Vdc
- Rosemount 3051S with Advanced Diagnostics (option code DA2): 12 Vdc
- Rosemount 3051SMV MultiVariable™: 12 Vdc
- Rosemount 3051S Electronic Remote Sensor (ERS™) System: 16 Vdc

2.7 Configuring in SIS applications

Use any HART® capable configuration tool to communicate with and verify configuration of the transmitter.

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

2.7.1 Damping

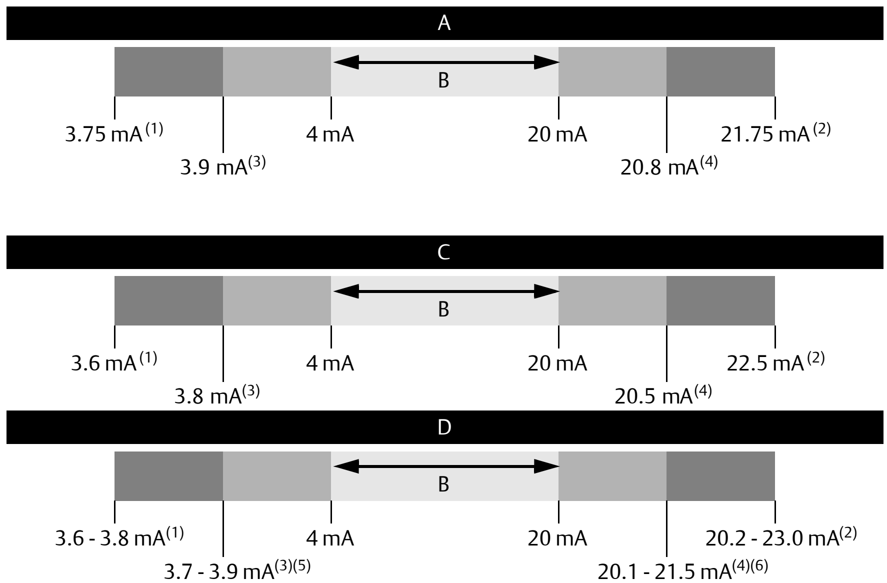
User-selected damping will affect the transmitter's ability to respond to changes in the applied process. The damping value + response time must not exceed the loop requirements.

2.7.2 Alarm and saturation levels

DCS or safety logic solver should be configured to handle both High alarm and Low alarm. In addition, the transmitter must be configured for High or Low alarm.

Figure 2-1 identifies the alarm levels available and their operation values.

Figure 2-1: Alarm Levels and Operation Values



A. Rosemount alarm level
B. Normal operation
C. Namur alarm level
D. Custom alarm level

1. Transmitter failure, hardware or software alarm in Low position.
2. Transmitter failure, hardware or software alarm in High position.
3. Low saturation
4. High saturation
5. High alarm must be at least 0.1 mA higher than the high saturation value.
6. Low alarm must be at least 0.1 mA lower than the low saturation value.

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

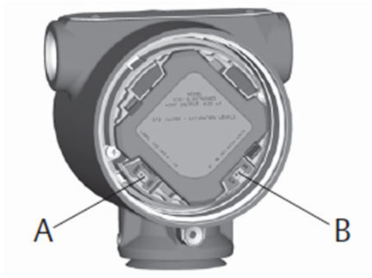
Configure alarm and saturation levels

Use this procedure to configure alarm and saturation levels with a Field Communicator or AMS Device Manager.

Procedure

1. Select **Home** → **Configure** → **Manual setup** → **Configure alarm and saturation levels**.
2. Configure alarm direction.

- To configure alarm direction for fail high, position the Plantweb housing switch in the **HI** position.
- To configure alarm direction for fail low, position the Plantweb housing switch in the **LO** position.



A. Security

B. Alarm

⚠ CAUTION

If hardware security switches are not installed, security should be **ON** in the software to prevent accidental or deliberate change of configuration data during normal operation.

2.7.3 Diagnostics

The Rosemount 3051S has multiple diagnostic features related to transmitter operation and performance. The transmitter performs each diagnostic at least every 60 minutes. If the diagnostics detect a failure or fault condition, the transmitter will change the 4-20 mA analog output if applicable. The applicable product manual provides a complete list of these diagnostics and corresponding changes.

2.7.4 Enable or disable product security

If hardware security switches are installed, the security switch should be in the **ON** position during normal operation. Follow this procedure to set hardware security.

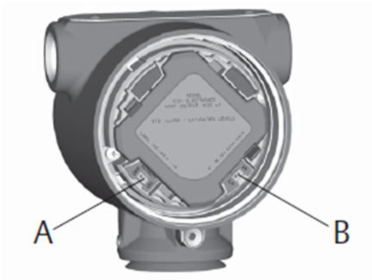
⚠ WARNING

Do not remove the transmitter covers in explosive atmospheres when the circuit is live.

Procedure

1. Select **Home** → **Overview** → **Device information** → **Security**.
2. If the transmitter is live, set the loop to manual and remove power.
3. Remove the electronics compartment cover, opposite the field terminal side on the Plantweb housing.

4. Reposition the switches as desired for the specific housing compartment. Slide the security and alarm switches into the preferred position by using a small screwdriver. (An LCD display or an adjustment module must be in place to activate the switches).



A. Security

B. Alarm

⚠ CAUTION

If hardware security switches are not installed, security should be **ON** in the software to prevent accidental or deliberate change of configuration data during normal operation.

5. Re-install the transmitter cover. Transmitter covers must be fully engaged to meet explosion-proof requirements.

3 Proof tests

Proof tests detect transmitter failures that are not detected by transmitter diagnostics, mainly undetected failures that prevent the safety instrumented function from operating correctly.

Reliability calculations for your transmitter model's safety instrumented functions determine the frequency of proof testing, or the proof test interval.

The proof tests must be performed at least as frequently as the calculation specifies to maintain the required safety instrumented function integrity.

Table 3-1: Rosemount 3051S Transmitter

Type	Meas. type(1)	Proof test coverage (%) of DU	Remaining DU failures	Test coverage		Can be performed remotely
				Output circuitry	Meas. electronics	
Comprehensive	A	92	3	Yes	Yes	No
	B	95	2	Yes	Yes	No
Partial	A	52	19	Yes	No	Yes
	B	62	14	Yes	No	Yes

(1) A = Coplanar, B = Inline

Table 3-2: Rosemount 3051S Transmitter with Advanced Diagnostics (option DA2)

Type	Meas. type(1)	Proof test coverage (%) of DU	Remaining DU failures	Test coverage		Can be performed remotely
				Output circuitry	Meas. electronics	
Comprehensive	A, B	87	4	Yes	Yes	No
Partial	A, B	78	7	Yes	No	Yes
Partial w/PATC	A, B	78	4	Yes	No	Yes

(1) A = Coplanar, B = Inline

Table 3-3: Rosemount 3051SMV MultiVariable™ Transmitter

Type	Meas. type(1)	Proof test coverage (%) of DU	Remaining DU failures	Test coverage		Can be performed remotely
				Output circuitry	Meas. electronics	
Comprehensive	A, B	90	Refer to page 8	Yes	Yes	No
Partial	A, B	48		Yes	No	Yes

(1) A = Coplanar, B = Inline

Table 3-4: Rosemount 3051S Electronic Remote Sensor (ERS™) System

Type	Meas. type[1]	Proof test coverage (%) of DU	Remaining DU failures	Test coverage		Can be performed remotely
				Output circuitry	Meas. electronics	
Comprehensive	A, B	87	Refer to page 9	Yes	Yes	No

(1) A = Coplanar, B = Inline

3.1 Partial proof test

The partial proof test consists of a power cycle plus reasonability checks of the transmitter output.

3.1.1 Perform partial proof test

Prerequisites

Ensure there are no alarms or warnings present in the transmitter: **Service Tools** → **Alerts**.

Procedure

1. Bypass the safety function and take appropriate action to avoid a false trip.
2. Simulate 4.00 mA output and verify loop current.
    a) Select **Service Tools** → **Simulate**.
    b) Select **Loop Test**.
    c) Select **4 mA** and then select **Start**.
    d) Measure loop current (I.e. reading at the safety logic solver or using the TEST terminal).

    Note
    The inaccuracy of the safety logic solver or current meter needs to be considered.

    e) Verify the current deviation is within the safety deviation of 2% (+-0.32 mA).
    f) Select **Stop** to end loop test.
3. Simulate 20.00 mA output and verify loop current.
    a) Select **Service Tools** → **Simulate**.
    b) Select **Loop Test**.
    c) Select **20 mA** and then select **Start**.
    d) Measure loop current (i.e. reading at the safety logic solver or using the TEST terminal).

Note
The inaccuracy of the safety logic solver or current meter needs to be considered.

e) Verify the current deviation is within the safety deviation of 2% (+-0.32 mA).

f) Select **Stop** to end loop test.

4. Remove the bypass and otherwise restore normal operation.
5. Place the security switch in the locked position.

3.2 Comprehensive proof test

The comprehensive proof test consists of performing the same steps as the simple suggested proof test but with a two-point verification of the pressure sensor.

3.2.1 Perform comprehensive proof test

Prerequisites

Ensure there are no alarms or warnings present in the transmitter: **Service Tools** → **Alerts**.

Procedure

1. Bypass the safety function and take appropriate action to avoid a false trip.
2. Simulate 4.00 mA output and verify loop current.
   a) Select **Service Tools** → **Simulate**.
   b) Select **Loop Test**.
   c) Select **4 mA** and then select **Start**.
   d) Measure loop current (I.e. reading at the safety logic solver or using the TEST terminal).

   Note
   The inaccuracy of the safety logic solver or current meter needs to be considered.

   e) Verify the current deviation is within the safety deviation of 2% (+-0.32 mA).
   f) Select **Stop** to end loop test.
3. Simulate 20.00 mA output and verify loop current.
   a) Select **Service Tools** → **Simulate**.
   b) Select **Loop Test**.
   c) Select **20 mA** and then select **Start**.
   d) Measure loop current (i.e. reading at the safety logic solver or using the TEST terminal).

Note
The inaccuracy of the safety logic solver or current meter needs to be considered.

---

e) Verify the current deviation is within the safety deviation of 2% (+-0.32 mA).

f) Select **Stop** to end loop test.

4. Inspect the transmitter for any leaks, visible damage or contamination.
5. Perform a two-point verification of the sensor over the full working range and verify the current output at each point.

   a) Select **Service Tools** → **Variables** → **All Variables**.

   b) Apply a pressure to the transmitter equivalent to the low end of the measurement range.

   Note
   For the Rosemount 3051S Electronic Remote Sensor (ERS™) System, remaining steps should be completed for both PHI and PLO and a zero trim should be performed on the DP.

   ---

   c) Verify the current pressure or output reading with an independent measurement is within the safety deviation of 2%.

   Note
   The inaccuracy of the safety logic solver or current meter needs to be considered.

   ---

   d) Apply a pressure to the transmitter equivalent to the high end of the measurement range.

   e) Verify the current pressure or output reading with an independent measurement is within the safety deviation of 2%.

6. Remove the bypass and otherwise restore normal operation.
7. Place the security switch in the locked position.

3.3 Partial proof test – PATC Diagnostics enabled

When the Power Advisory and Transmitter Power Consumption (PATC) diagnostics are enabled and alarm values configured, the testing functionality of the partial and comprehensive proof test are performed automatically by the device. This eliminates the need for the partial, and simplifies the comprehensive proof test, and thereby reduces the total proof test workload.

3.3.1 Perform partial proof test

Prerequisites

Ensure there are no alarms or warnings present in the transmitter: **Service Tools** → **Alerts**.

Procedure

1. Bypass the safety function and take appropriate action to avoid a false trip.
2. Simulate 4.00 mA output and verify loop current.
    a) Select **Service Tools** → **Simulate**.
    b) Select **Loop Test**.
    c) Select **4 mA** and then select **Start**.
    d) Measure loop current (I.e. reading at the safety logic solver or using the TEST terminal).

    Note
    The inaccuracy of the safety logic solver or current meter needs to be considered.

    e) Verify the current deviation is within the safety deviation of 2% (+-0.32 mA).
    f) Select **Stop** to end loop test.
3. Inspect the transmitter for any leaks, visible damage or contamination.
4. Perform a two-point verification of the transmitter over the full working range.
    a) Select **Service Tools** → **Variables** → **All Variables**.
    b) Apply a pressure to the transmitter equivalent to the low end of the measurement range.

    Note
    For the Rosemount 3051S Electronic Remote Sensor (ERS™) System, remaining steps should be completed for both PHI and PLO and a zero trim should be performed on the DP.

    c) Verify the current pressure or output reading with an independent measurement is within the safety deviation of 2%.

    Note
    The inaccuracy of the safety logic solver or current meter needs to be considered.

    d) Apply a pressure to the transmitter equivalent to the high end of the measurement range.
    e) Verify the current pressure or output reading with an independent measurement is within the safety deviation of 2%.
5. Remove the bypass and otherwise restore to normal operation.
6. Place the security switch in the locked position.

4 Operating considerations

4.1 Reliability data

Safety deviation	The percent a failure could drift to be defined as a safe/ dangerous failure is ±2%
Self-diagnostic test interval	At least once every 60 minutes
Transmitter response time	Reference Appendix A in the device reference manual
Useful lifetime	50 years – based on worst case component wear-out mechanisms – not based on wear-out of process wetted materials derived from the FMEDA

4.1.1 FMEDA report

The Failure Mode, Effects, and Diagnostics Analysis (FMEDA) report is used to calculate the failure rate. An FMEDA report for the Rosemount 3051S Pressure Transmitters contain:

- All failure rates and failure modes
- Common cause factors for applications with redundant devices that should be included in reliability calculations
- Expected lifetime of your pressure transmitter, as the reliability calculations are valid only for the lifetime of the equipment

The FMEDA report can be obtained with the following products:

- Rosemount 3051S Transmitter
- Rosemount 3051S with Advanced Diagnostics
- Rosemount 3051S MultiVariable Transmitter
- Rosemount 3051S with Electronic Remote Sensor (ERS) System

4.1.2 Environmental and application limits

See the transmitter Product Data Sheet for performance, environmental, and hazardous area limitations.

Using pressure transmitters outside environmental or application limits invalidates the reliability data in the FMEDA report.

Table 4-1: Transmitter Response Time

3051S_C 3051SF_D	3051S_T	3051SMV_ _1 or 2 3051SF_1, 2, 5, or 6	3051SMV_ _3 or 4 3051SF_3, 4, or 7	ERS System (3051SAM)
DP Ranges 2–5: 100 ms Range 1: 255 ms Range 0: 700 ms	100 ms	DP Range 1: 310 ms DP Range 2: 170 ms DP Range 3: 155 ms AP and GP: 240 ms	DP Ranges 2–5: 145 ms DP Range 1: 300 ms DP Range 0: 745 ms	360 ms

4.2 Failure reporting

If you detect any failures that compromise safety, contact customer service.

See Emerson.com for complete contact information.

4.3 Equipment replacement or disposal

Follow the guidelines for equipment disposal as outlined in the product manual.

A Terms and definitions

λ_{DU}	Dangerous Undetected
λ_{DD}	Dangerous Detected
λ_{SU}	Safe Undetected
λ_{SD}	Safe Detected
Diagnostic test interval	The time from when a dangerous failure/condition occurs until the device has set the safety related output in a safe state (total time required for fault detection and fault reaction).
Element	Term defined by IEC 61508 as “part of a subsystem comprising a single component or any group of components that performs one or more element safety functions”
FIT	Failure In Time per billion hours
FMEDA	Failure Modes, Effects and Diagnostic Analysis
HART® protocol	Highway Addressable Remote Transducer
HFT	Hardware Fault Tolerance
High demand mode	The safety function is only performed on demand, in order to transfer the EUC (Equipment Under Control) into a specified safe state, and where the frequency of demands is greater than one per year (IEC 61508-4).
Low demand mode	The safety function is only performed on demand, in order to transfer the EUC into a specified safe state, and where the frequency of demands is no greater than one per year (IEC 61508-4).
PFD_{AVG}	Average Probability of Failure on Demand
PFH	Probability of dangerous Failure per Hour: the term "probability" is misleading, as IEC 61508 defines a rate.
Proof test coverage factor	The effectiveness of a proof test is described using the coverage factor which specifies the share of detected dangerous undetected failures (λ_{DU}). The coverage factor is an indication of a proof test’s effectiveness to detect dangerous undetected faults.
Safety deviation	The maximum allowed deflection of the safety output due to a failure within the device (expressed as a percentage of span). Any failure causing the device output to change less than the Safety Deviation is considered as a "No Effect" failure. All failures causing the device output to change more than the Safety Deviation and with the device output still within the active range (non-alarm state) are considered dangerous failures.

Note
The Safety Deviation is independent of the normal performance specification or any additional application specific measurement error.

SIF Safety Instrumented Function

SIL Safety Integrity Level – a discrete level (one out of four) for specifying the safety integrity requirements of the safety instrumented functions to be allocated to the safety instrumented systems. SIL 4 has the highest level of safety integrity, and SIL 1 has the lowest level.

SIS Safety Instrumented System – an instrumented system used to implement one or more safety instrumented functions. An SIS is composed of any combination of sensors, logic solvers, and final elements.

Systematic capability A measure (expressed on a scale of SC 1 to SC 4) of the confidence that the systematic safety integrity of an element meets the requirements of the specified SIL, in respect of the specified element safety function, when the element is applied in accordance with the instructions specified in the compliant item safety manual for the element.

Transmitter response time The time from a step change in the process until transmitter output reaches 90% of its final steady state value (step response time as per IEC 61298-2).

Type B device Complex device using controllers or programmable logic, as defined by the standard IEC 61508.

Useful lifetime Reliability engineering term that describes the operational time interval where the failure rate of a device is relatively constant. It is not a term which covers product obsolescence, warranty, or other commercial issues.

The useful lifetime is highly dependent on the element itself and its operating conditions (IEC 61508-2).

00809-0700-4801
Rev. CA
2021

ROSEMOUNT™

EMERSON™