

Safety Instrumented Systems

Safety Messages	page S-1
Certification	page S-2
3051S Safety-Certified Identification	page S-2
Installation	page S-2
Commissioning	page S-2
HART Communicator	page S-3
Operation and Maintenance	page S-6
Specifications	page S-7

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.

Warnings

⚠ WARNING
<p>Explosions can result in death or serious injury.</p> <ul style="list-style-type: none">• Do not remove the transmitter covers in explosive environments when the circuit is live.• Transmitter covers must be fully engaged to meet explosionproof requirements.• Before connecting a communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or nonincendive field wiring practices.
⚠ WARNING
<p>Electrical shock can result in death or serious injury.</p> <ul style="list-style-type: none">• Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

Rosemount 3051S Safety-Certified

CERTIFICATION

The 3051S is certified by TÜV to IEC 61508 for non-redundant use in SIL 1 and SIL 2 Safety Instrumented Systems and redundant use in SIL 3 Safety Instrumented Systems.

3051S SAFETY-CERTIFIED IDENTIFICATION

This document pertains to the first generation of the safety-certified 3051S pressure transmitter that has the yellow safety-certified circuit board and output code B in the model number.

To identify a safety-certified transmitter:

1. Remove the electronics housing cover.
2. Verify that the electronics casing is yellow.

NOTE

There are two versions of safety-certified 3051S pressure transmitters. For transmitters with option code QT in the model code, please refer to the 3051S Series Reference Manual 00809-0100-4801.

INSTALLATION

No special installation is required in addition to the standard installation practices outlined in this document. Always ensure a proper seal by installing the electronics housing cover(s) so that metal contacts metal.

The loop should be designed so the terminal voltage does not drop below 12 Vdc when the transmitter output is 22.5 mA.

If desired, position the security switch to the "ON" position to prevent accidental or deliberate change of configuration data during normal operation.

COMMISSIONING

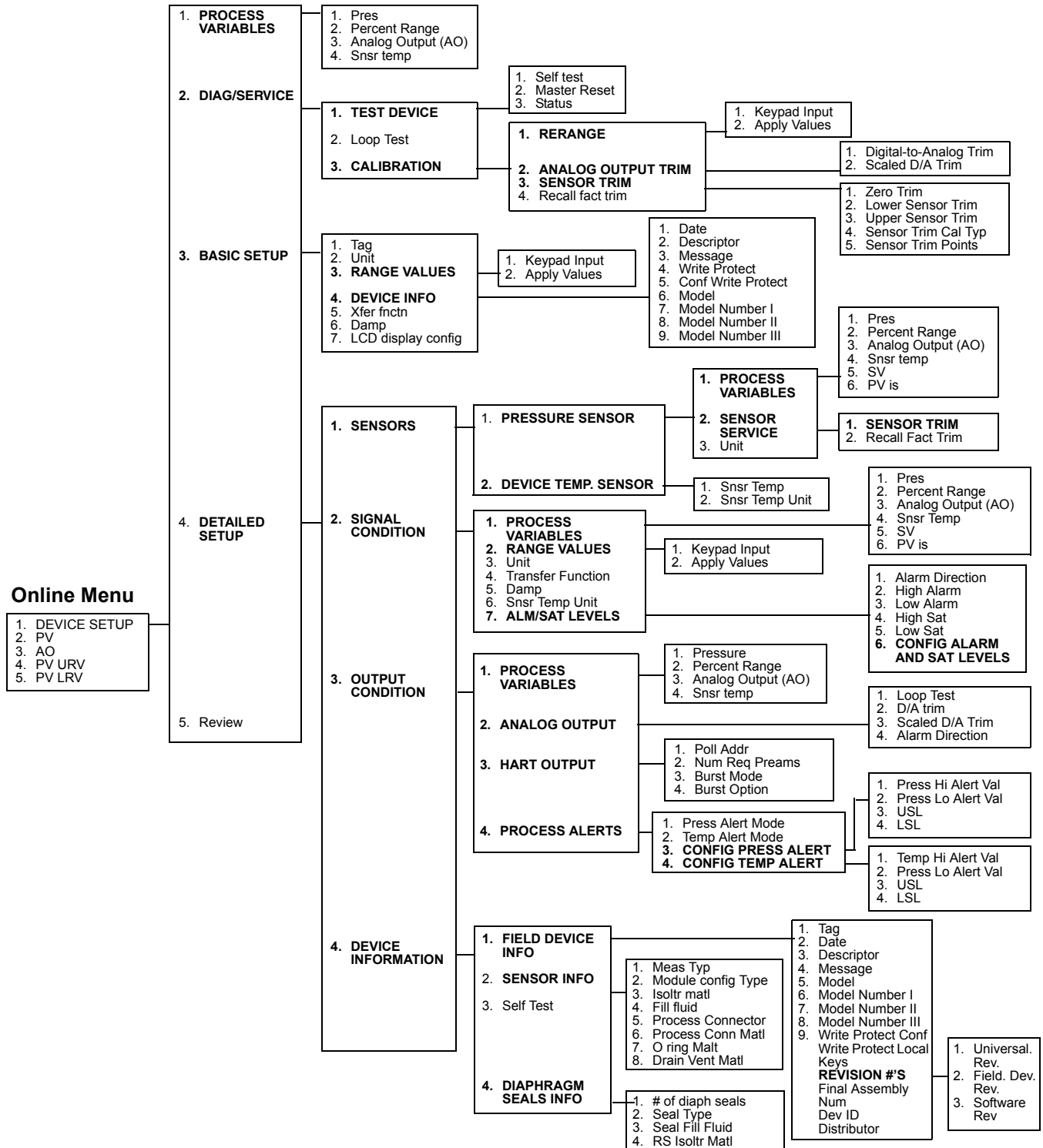
Use the HART "Menu Tree" on page S-3 and "HART Fast Key Sequence" on page S-4 to configure the 3051S Safety-Certified Transmitter.

For more information on the 375 Field Communicator see document 00809-0100-4276. AMS help can be found in the AMS on-line guides within the AMS system.

HART COMMUNICATOR

DD revision 3051S Safety-Certified Dev. 1 Rev 1 is required.

Menu Tree



Rosemount 3051S Safety-Certified

HART Fast Key Sequence

Function	Safety Transmitter
Alarm Level Configuration	1, 4, 2, 7, 6
Alarm and Saturation Levels Configuration	1, 4, 2, 7, 6
Analog Output Alarm Direction Configuration	1, 4, 2, 7, 6
Analog Output Trim	1, 2, 3, 2
Burst Mode On/Off	1, 4, 3, 3, 3
Burst Options	1, 4, 3, 3, 4
Damping	1, 3, 6
Date	1, 3, 4, 1
Descriptor	1, 3, 4, 2
Digital To Analog Trim (4-20 mA Output)	1, 2, 3, 2, 1
Field Device Information	1, 4, 4, 1
LCD Display Configuration	1, 3, 7
Loop Test	1, 2, 2
Lower Sensor Trim	1, 2, 3, 3, 2
Master Reset	1, 2, 1, 2
Message	1, 3, 4, 3
Number of Requested Preambles	1, 4, 3, 3, 2
Pressure Alert Configuration	1, 4, 3, 4, 3
Poll Address	1, 4, 3, 3, 1
Poll a Multidropped Transmitter	Left Arrow, 3, 1, 1
Remapping	1, 4, 3, 6
Rerange- Keypad Input	1, 2, 3, 1, 1
Saturation Level Configuration	1, 4, 2, 7, 6
Scaled D/A Trim (4–20 mA Output)	1, 2, 3, 2, 2
Self Test (Transmitter)	1, 2, 1, 1
Sensor Information	1, 4, 4, 2
Sensor Temperature	1, 1, 4
Sensor Trim	1, 2, 3, 3
Sensor Trim Points	1, 2, 3, 3, 5
Status	1, 2, 1, 3
Tag	1, 3, 1
Temperature Alert Configuration	1, 4, 3, 4, 4
Transfer Function (Setting Output Type)	1, 3, 5
Transmitter Security (Write Protect)	1, 3, 4, 5
Units (Process Variable)	1, 3, 2
Upper Sensor Trim	1, 2, 3, 3, 3
Zero Trim	1, 2, 3, 3, 1

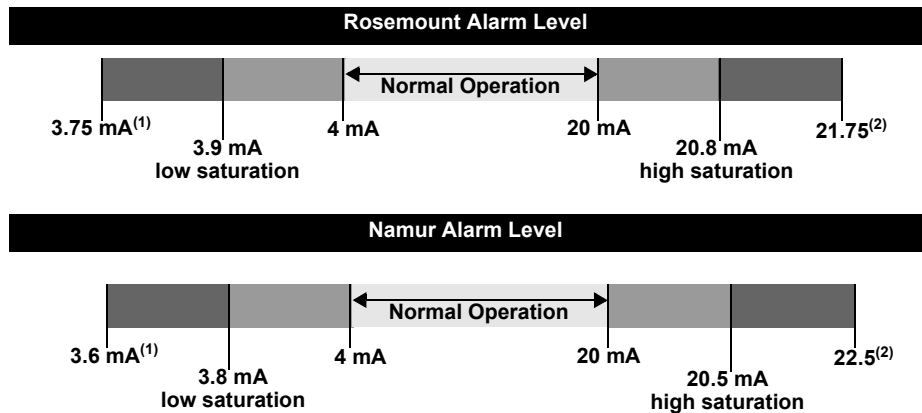
Damping and Alarm Levels

User-selected damping will affect the transmitters ability to respond to changes in the applied process. The *damping value + response time* should not exceed the loop requirements.

NOTES

1. 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. DCS or safety logic solver should be configured to match transmitter configuration. Figure S-1 identifies the two alarm levels available and their operation values. Position the alarm switch to the required HI or LO alarm position. With a HART communicator, select the alarm and saturation levels using the following HART fast keys 1 *Device Setup*, 4 *Detailed Setup*, 2 *Signal Condition*, 7 *ALM/SAT Levels*, 6 *Config Alarm and Sat Levels*.

Figure S-1. Alarm Levels



(1) Transmitter Failure, hardware alarm in LO position.

(2) Transmitter Failure, hardware alarm in HI position.

NOTE

Some detected faults are indicated on the analog output at a level above high alarm regardless of the alarm switch selection.

Rosemount 3051S Safety-Certified

OPERATION AND MAINTENANCE

Proof Test

The following proof tests are recommended. Proof test results and corrective actions taken must be documented at

www.emersonprocess.com/rosemount/safety/certtechdocumentation.htm in the event that an error is found in the safety functionality.

Use “HART Fast Key Sequence” on page S-4 to perform a Loop Test, Analog Output Trim, or Sensor Trim.

Proof Test 1

Conducting an analog output Loop Test satisfies the proof test requirements and will detect more than 50% of DU failures not detected by the 3051S automatic diagnostics.

Required Tools: HART host/communicator and mA meter.

1. On HART host/communicator enter the Fast Key Sequence 1, 2, 2.
2. Select “4 Other.”
3. Enter the milliampere value representing a high alarm state.
4. Check the reference meter to verify the mA output corresponds to the entered value.
5. Enter the milliampere value representing a low alarm state.
6. Check the reference meter to verify the mA output corresponds to the entered value.
7. Document the test results per your requirements.

Proof Test 2

This proof test, when combined with Proof Test 1, will detect over 99% of DU failures not detected by the 3051S automatic diagnostics.

Required Tools: HART host/communicator and pressure calibration equipment.

1. Perform a minimum two point sensor calibration check using the 4-20mA range points as the calibration points.
2. Check the reference mA meter to verify the mA output corresponds to the pressure input value.
3. If necessary, use one of the “Trim” procedures available in the 3051S reference manual to calibrate.
4. Document the test results per your requirements.

NOTE

The user determines the proof-test requirements for impulse piping.

Inspection

Visual Inspection

Not required

Special Tools

Not required

Product Repair

All failures detected by the transmitter diagnostics or by the proof-test must be reported. Feedback can be submitted electronically at www.emersonprocess.com/rosemount/safety/certtechdocumentation.htm.

The 3051S is repairable by major component replacement.

SPECIFICATIONS

The 3051S Safety-Certified Pressure Transmitter must be operated in accordance to the functional and performance specifications provided in the 3051S reference manual. The 3051S Safety-Certified Pressure Transmitter specifications are the same as the 3051S with the following exceptions:

Power Supply

- Terminal Supply Voltage 12-42.4 Vdc

Reference Accuracy

Models	Classic ^{(1) (2)}
3051S_CD, CG	Ranges 2 - 4 ±0.055% of span. For spans less than 10:1, $\pm \left[0.015 + 0.005 \left(\frac{URL}{span} \right) \right]$ % of span Range 5 ±0.065% of span. For spans less than 10:1, $\pm \left[0.015 + 0.005 \left(\frac{URL}{span} \right) \right]$ % of span Range 1 ±0.10% of span. For spans less than 15:1, $\pm \left[0.025 + 0.005 \left(\frac{URL}{span} \right) \right]$ % of span Range 0 ±0.10% of span. For spans less than 2:1 = ±0.05% of URL
3051S_T	Ranges 1 - 4 ±0.055% of span. For spans less than 10:1, $\pm \left[0.0065 \left(\frac{URL}{span} \right) \right]$ % of span Range 5 ±0.065% of span. For spans less than 10:1, $\pm \left[0.0065 \left(\frac{URL}{span} \right) \right]$ % of span
3051S_CA	Ranges 1 - 4 ±0.055% of span. For spans less than 10:1, $\pm \left[0.0065 \left(\frac{URL}{span} \right) \right]$ % of span Range 0 ±0.075% of span. For spans less than 5:1, $\pm \left[0.025 + 0.01 \left(\frac{URL}{span} \right) \right]$ % of span
3051S_L	±0.065% of span. For spans less than 10:1, $\pm \left[0.015 + 0.005 \left(\frac{URL}{span} \right) \right]$ % of span

(1) Stated reference accuracy equations include terminal based linearity, hysteresis, and repeatability.
 (2) For the 3051S Safety-Certified Pressure Transmitter, follow Classic transmitter specifications. Rangedown is limited to 10:1 with the exception of range 0. The 3051S2CD0 is limited to 2:1 rangedown, 3051S2CA0 is limited to 5:1 rangedown.

Rosemount 3051S Safety-Certified

Dynamic Performance

Process Variable Response Time

3051S Safety-Certified, Ranges 2 - 5	220 milliseconds
Range 1:	375 milliseconds
Range 0:	820 milliseconds
3051S_T:	220 milliseconds
3051S_L:	See <i>Instrument Toolkit™</i>

Update Rate 3051S Safety-Certified 11 times per second

3051S Safety-Certified Transmitter Failure Values

Safety accuracy: 2.0%⁽¹⁾

Safety response time: 1.5 seconds

Self-diagnostics Test Interval: At least once per hour

Failure Rate Data

The FMEDA report includes failure rates and common cause Beta factor estimates. This report is available at www.emersonprocess.com/rosemount/safety/certtechdocumentation.htm.

Product Life

50 years – based on worst case component wear-out mechanisms – not based on wear-out of process wetted materials

Report any safety related product information at

www.emersonprocess.com/rosemount/safety/certtechdocumentation.htm.

(1) A 2% variation of the transmitter mA output is allowed before a safety trip. Trip values in the DCS or safety logic solver should be derated by 2%.

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Emerson Process Management

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA
T (U.S.) 1 800 999 9307
T (International) (952) 906 8888
F (952) 949 7001

www.rosemount.com

Emerson Process Management GmbH & Co.
Argelsrieder Feld 3
82234 Wessling
Germany
Tel 49 (8153) 9390
Fax 49 (8153) 939172

Emerson Process Management Asia Pacific Private Limited
1 Pandan Crescent
Singapore 128461
T (65) 6777 8211
F (65) 6777 0947
Enquiries@AP.EmersonProcess.com

Beijing Rosemount Far East Instrument Co., Limited
No. 6 North Street,
Hepingli, Dong Cheng District
Beijing 100013, China
T (86) (10) 6428 2233
F (86) (10) 6422 8586

