Quick Start Guide
00825-0100-4591, Rev BA
March 2018

Rosemount™ 2051HT Hygienic Pressure Transmitter

with 4–20 mA HART® Revision 5 and 7 Protocol

Note
Before installing the transmitter, confirm the correct device driver is loaded on the host systems. See page 3 for system readiness.

EMERSON

NOTICE

This guide provides basic guidelines for the Rosemount 2051HT Transmitter. It does not provide instructions for configuration, diagnostics, maintenance, service, troubleshooting, Explosion-proof, Flameproof, or intrinsically safe (I.S.) installations.

⚠ 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.

Before connecting a HART®-based communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.

Process leaks may cause harm or result in death.

To avoid process leaks, only use the gasket designed to seal with the corresponding flange adapter.

Electrical shock can result in death or serious injury.

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

Conduit/cable entries

- Aluminum housings: Unless marked, the conduit/cable entries in the transmitter housing use a 1/2–14 NPT thread form.
- Stainless steel (SST) housings: conduit/cable entries can be determined by crossing referencing the model string printed on the transmitter with the ordering table listed in the Product Data Sheet. Conduit type is not cast into the transmitter housing to minimize surface irregularities.
- Only use plugs, adapters, glands, or conduit with a compatible thread form when closing these entries.

Contents

1.0   System readiness

1.1   Confirm HART Revision capability

- If using HART based control or asset management systems, confirm the HART capability of those systems prior to transmitter installation. Not all systems are capable of communicating with HART Revision 7 protocol. This transmitter can be configured for either HART Revision 5 or 7.
- For instructions on how to change the HART Revision of your transmitter, see page 11.

1.2   Confirm correct device driver

- Verify the latest device driver (DD/DTM™) is loaded on your systems to ensure proper communications.
- Download the latest device driver at Emerson.com or FieldCommGroup.org.

Rosemount 2051 device revisions and drivers

Table 1 provides the information necessary to ensure you have the correct device driver and documentation for your device.

Table 1. Rosemount 2051 Device Revisions and Files

	Identify device		Find device driver		Review instruction	Review functionality
Software release date	NAMUR software revision[1]	HART software revision[2]	HART universal revision	Device revision	Reference manual	Changes to software
Dec-11	1.0.0	01	7	10	Rosemount 2051 Pressure Transmitter Reference Manual	N/A
			5	9		

1. NAMUR software revision is located on the hardware tag of the device. In accordance with NE53, revisions of the least significant level X (of 1.0.X) do not change functionality or operation of the device and will bot be reflected in this device revision history.
2. HART software revision can be read using a HART capable configuration tool.

2.0   Transmitter installation

2.1   Mount the transmitter

Orient the transmitter to desired orientation before mounting. Transmitter must not be securely mounted or clamped in place when changing transmitter orientation.

Conduit entry orientation

When installing a Rosemount 2051HT, it is recommended installing so the conduit entry faces downward towards the ground to maximize drain ability when cleaning.

Environmental seal for housing

Thread sealing (PTFE) tape or paste on male threads of conduit is required to provide a water/dust tight conduit seal and meets requirements of NEMA® Type 4X, IP66, IP68, and IP69K. Consult factory if other Ingress Protection ratings are required.

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

Note
IP69K rating only available on units with a SST housing and option code V9 in the model string.

Note
For aluminum housings ordered with M20 conduit entries, transmitters shipped will have $1/2$ NPT threads machined into the housing and a $1/2$ NPT to M20 thread adapter will be provided. Considerations for environmental sealing listed above should be taken into account when installing the thread adapter.

In-line gage transmitter orientation

The low side pressure port (atmospheric reference) on the in-line gage transmitter is located on the neck of the transmitter via a protected gage vent (See Figure 1).

Keep the vent path free from obstructions including but not limited to paint, dust, and viscous fluids by mounting the transmitter so the process can drain away.

Recommended installations have a conduit entry facing the ground so the gage vent is pointing parallel to the ground.

Figure 1. In-line Protected Gage Vent Low Side Pressure Port
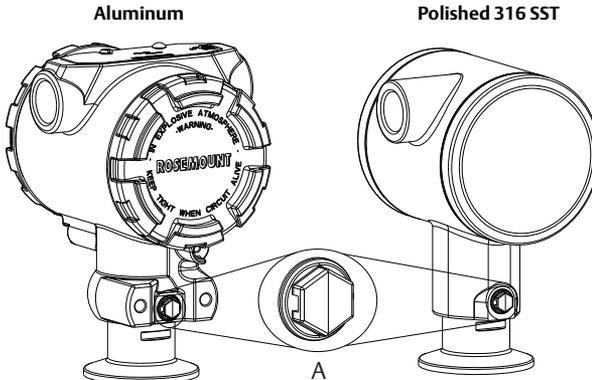
A. Low side pressure port (atmospheric reference)

Clamping

When installing clamp, follow recommended torque values provided by gasket manufacturer.[1]

2.2   Set the switches

Set alarm and security switch configuration before installation as shown in Figure 2.

- The alarm switch sets the analog output alarm to high or low.
    - Default alarm is high.
- The security switch allows (unlocked symbol) or prevents (locked symbol) any configuration of the transmitter.
    - Default security is off (unlocked symbol).

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 alarm switches into the preferred position using a small screwdriver.

4. Reattach the transmitter cover. It is recommended that the cover be tightened until there is no gap between the cover and the housing.

    The covers must only be capable of being released or removed with the aid of a tool to comply with applicable ordinary locations requirements.

Figure 2. Transmitter Electronics Board

Without LCD display   With LOI or LCD display

Aluminum

Polished 316 SST

A. Alarm
B. Security

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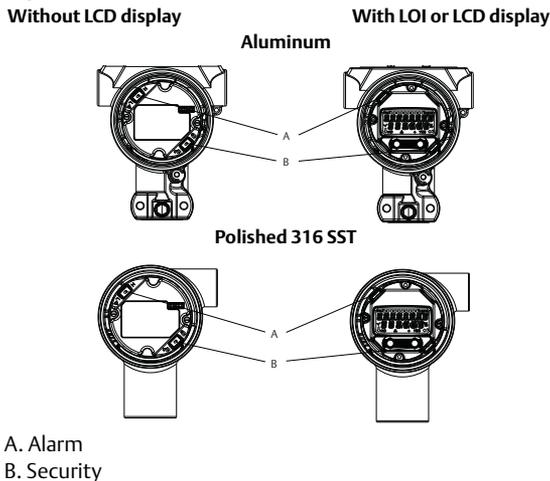
1. *To maintain transmitter performance, torquing a 1.5-in. Tri-Clamp beyond 50 in-lb is not recommended on pressure ranges below 20 psi.*

2.3   Connect the wiring and power up

Figure 3. Transmitter Wiring Diagrams (4–20 mA)

Aluminum

Polished 316 SST
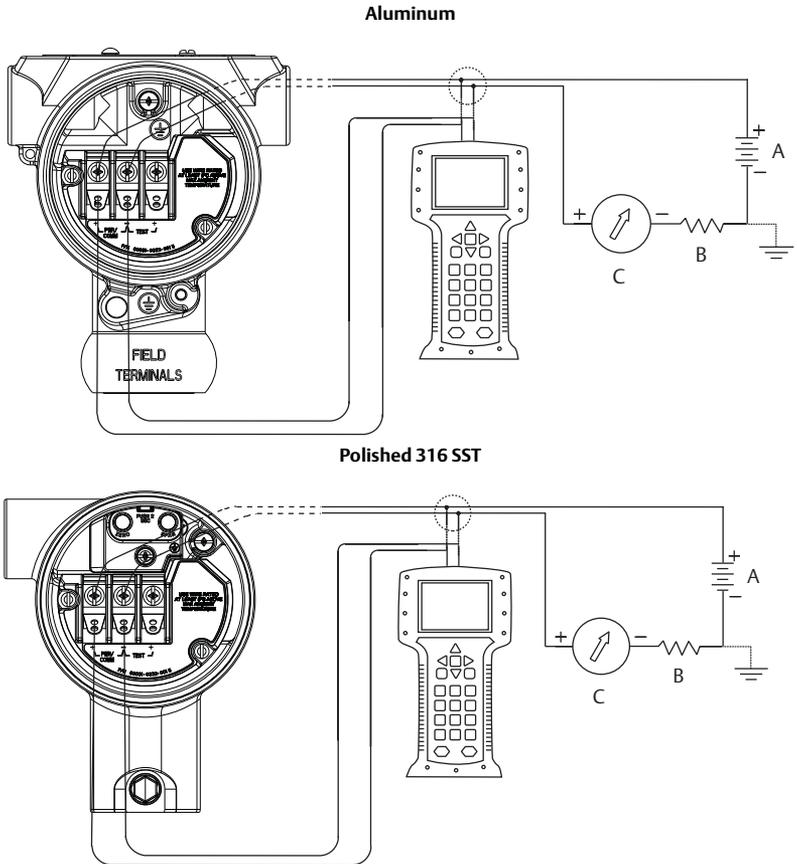
A. 24 Vdc supply
B. $R_L \geq 250$
C. Current meter (optional)

Shielded twisted pair cable should be used for best results. Use 24 AWG or larger wire that does not exceed 5,000 ft. (1500 m) in length. If applicable, install wiring with a drip loop. Arrange the drip loop so the bottom is lower than the conduit connections and the transmitter housing.

⚠ CAUTION

- Installation of the transient protection terminal block does not provide transient protection unless the Rosemount 2051HT case is properly grounded.
- Do not run signal wiring in conduit or open trays with power wiring, or near heavy electrical equipment.
- Do not connect the powered signal wiring to the test terminals. Power could damage the test diode in the terminal block.

Use the following steps to wire the transmitter:

1. Remove the housing cover on the FIELD TERMINALS side.

2. Connect the positive lead to the "+" terminal (PWR/COMM) and the negative lead to the "−" terminal.

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 a ferrule wire terminal is not recommended as the connection may be more susceptible to loosening over time or under vibration

4. Ground housing to fulfill local grounding regulations.

5. Ensure proper grounding. It is important the instrument cable shield be:
- Trimmed close and insulated from touching the transmitter housing
- Connected to the next shield if cable is routed through a junction box
- Connected to a good earth ground at the power supply end

6. If transient protection is needed, refer to section "Grounding for transient terminal block " for grounding instructions.

7. Plug and seal unused conduit connections.

8. Reattach the transmitter covers. It is recommended that the cover be tightened until there is no gap between the cover and the housing.

   The covers must only be capable of being released or removed with the aid of a tool to comply with applicable ordinary locations requirements.

Figure 4. Wiring
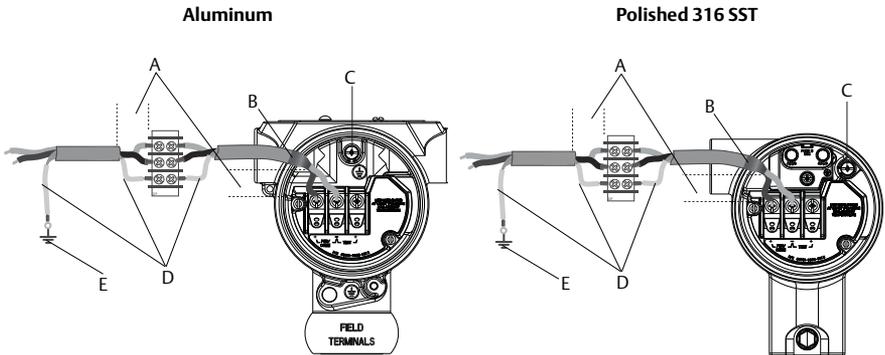
A. Minimize distance
B. Trim shield and insulate
C. Protective grounding terminal
D. Insulate shield
E. Connect shield back to the power supply ground

Grounding for transient terminal block

Ground termination is provided on the outside of the electronics housing and inside the terminal compartment. These grounds are used when the transient protection terminal blocks are installed. It is recommended that 18 AWG or larger wire is used to connect housing ground to earth ground (internal or external).

If the transmitter is currently not wired for power up and communication, follow Connect the wiring and power up , step 1 through 8. When the transmitter is properly wired, refer to Figure 4 for internal and external transient grounding locations.

Note
The Rosemount 2051HT polished 316 SST housing only provides ground termination inside the terminal compartment.

2.4   Verify configuration

Verify the configuration using any HART capable configuration tool or Local Operator Interface (LOI) - option code M4. Configuration instructions for a Field Communicator and LOI are included in this step.

Verifying configuration with a Field Communicator

A Rosemount 2051 DD must be installed on the Field Communicator to verify configuration. Fast Key sequences for the latest DD are shown in Table 2 on page 9. For Fast Key sequences using legacy DD's, contact your local Emerson™ representative.

Note
Emerson recommends installing the latest DD to access the complete functionality. Visit
Emerson.com/Field-Communicator for information on updating the DD Library.

1. Verify device configuration using the Fast Key sequences in Table 2.
   ■ A check (✓) indicates the basic configuration parameters. At minimum,
     these parameters should be verified as part of configuration and startup.

Table 2. 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, 7	2, 2, 2, 5, 7
✓	Damping	2, 2, 1, 1, 5	2, 2, 1, 1, 5
✓	Range Values	2, 2, 2	2, 2, 2
✓	Tag	2, 2, 7, 1, 1	2, 2, 7, 1, 1
✓	Transfer Function	2, 2, 1, 1, 6	2, 2, 1, 1, 6
✓	Units	2, 2, 1, 1, 4	2, 2, 1, 1, 4
	Burst Mode	2, 2, 5, 3	2, 2, 5, 3
	Custom Display Configuration	2, 2, 4	2, 2, 4
	Date	2, 2, 7, 1, 4	2, 2, 7, 1, 3
	Descriptor	2, 2, 7, 1, 5	2, 2, 7, 1, 4
	Digital to Analog Trim (4–20 mA output)	3, 4, 2	3, 4, 2
	Disable Configuration Buttons	2, 2, 6, 3	2, 2, 6, 3
	Rerange with Keypad	2, 2, 2, 1	2, 2, 2, 1
	Loop Test	3, 5, 1	3, 5, 1
	Lower Sensor Trim	3, 4, 1, 2	3, 4, 1, 2
	Message	2, 2, 7, 1, 6	2, 2, 7, 1, 5
	Scaled D/A Trim (4–20 mA output)	3, 4, 2	3, 4, 2
	Sensor Temperature/Trend	3, 3, 2	3, 3, 2
	Upper Sensor Trim	3, 4, 1, 1	3, 4, 1, 1
	Digital Zero Trim	3, 4, 1, 3	3, 4, 1, 3
	Password	2, 2, 6, 5	2, 2, 6, 4
	Scaled Variable	3, 2, 2	3, 2, 2
	HART Revision 5 to HART Revision 7 switch	2, 2, 5, 2, 3	2, 2, 5, 2, 3
	Long Tag[1]	2, 2, 7, 1, 2	N/A
	Find Device[1]	3, 4, 5	N/A
	Simulate Digital Signal[1]	3, 4, 5	N/A

1. Only available in HART Revision 7 mode.

Verifying configuration with LOI

The optional LOI can be used for commissioning the device. The LOI is a two-button design with internal and external/rear buttons. On a polished stainless steel housing, buttons are located internally both on the display and terminal side of the transmitter. On an aluminum housing, buttons are located on the display and externally underneath the top metal tag. To activate the LOI, push any button. LOI button functionality is shown on the bottom corners of the display. See Table 3 and Figure 5 for button operation and menu information.

Table 3. LOI Button Operation

Button	EXIT MENU? NO YES	EXIT MENU
Left	No	SCROLL
Right	Yes	ENTER

Figure 5. LOI Menu
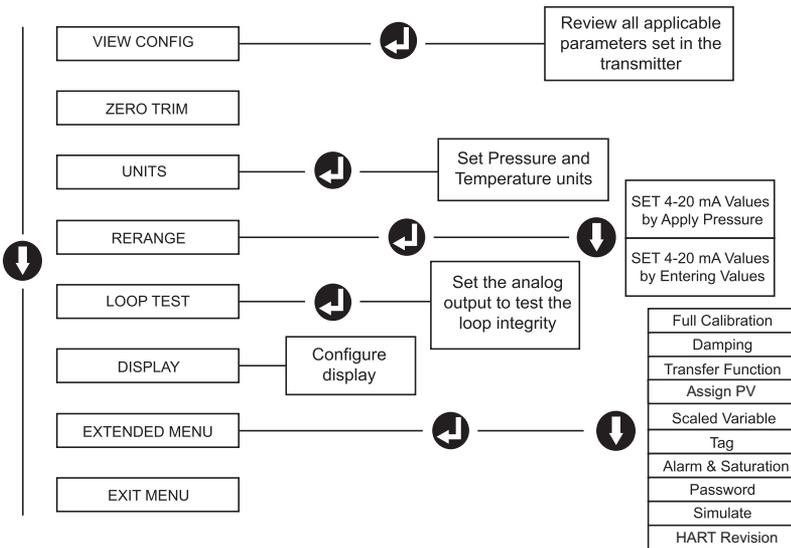
Switch HART Revision mode

If the HART configuration tool is not capable of communicating with HART Revision 7, the Rosemount 2051 will load a generic menu with limited capability. The following procedures will switch the HART Revision mode from the generic menu:

1. *Manual Setup > Device Information > Identification > Message*

    a.To change to HART Revision 5, Enter: **HART5** in the *Message* field.
    b.To change to HART Revision 7, Enter: **HART7** in the *Message* field.

Note
See Table 2 on page 9 to change HART Revision when the correct device driver is loaded.

2.5   Trim the transmitter

Devices are calibrated by the factory. Once installed, it is recommended to perform a zero trim on gage transmitters to eliminate error due to mounting position or static pressure effects. A zero trim can be performed using either a Field Communicator or configuration buttons.

Note
When performing a zero trim, ensure the equalization valve is open and all wet legs are filled to the correct level.

⚠ CAUTION

It is not recommended to zero an absolute transmitter, Rosemount 2051HTA model.

1. Choose your trim procedure.
    a. Analog zero trim – Sets the analog output to 4 mA.
    b. Also referred to as a "rerange," it sets the lower range value (LRV) equal to the measured pressure.
    c. The display and digital HART output remains unchanged.
    d. Digital zero trim – Recalibrates the sensor zero.
    e. The LRV is unaffected. The pressure value will be zero (on display and HART output). 4 mA point may not be at zero.
    f. This requires the factory calibrated zero pressure is within a range of 3% of the URV [0 ± 3% x URV].

Example

URV = 250 inH$_2$O
Applied Zero Pressure = ± 0.03x 250 inH$_2$O = ± 7.5 inH$_2$O (compared to factory settings) values outside this range will be rejected by the transmitter

Trimming with a Field Communicator

1. Connect the Field Communicator, see "Connect the wiring and power up" on page 6 for instructions.

2. Follow the HART menu to perform the desired zero trim.

|	**Analog zero (set 4 mA)**	**Digital zero**
Fast Key sequence	3, 4, 2	3, 4, 1, 3

Trimming with configuration buttons

A zero trim is to be performed using one of the three possible sets of configuration buttons located above the terminal block or under the top tag.

To access the configuration buttons on a polished stainless steel housing, remove the terminal side housing cover.

To access the configuration buttons on an aluminum housing, loosen the screw on the top tag and slide the tag on the top of the transmitter.

Figure 6. External or Rear/Terminal-Side Configuration Buttons
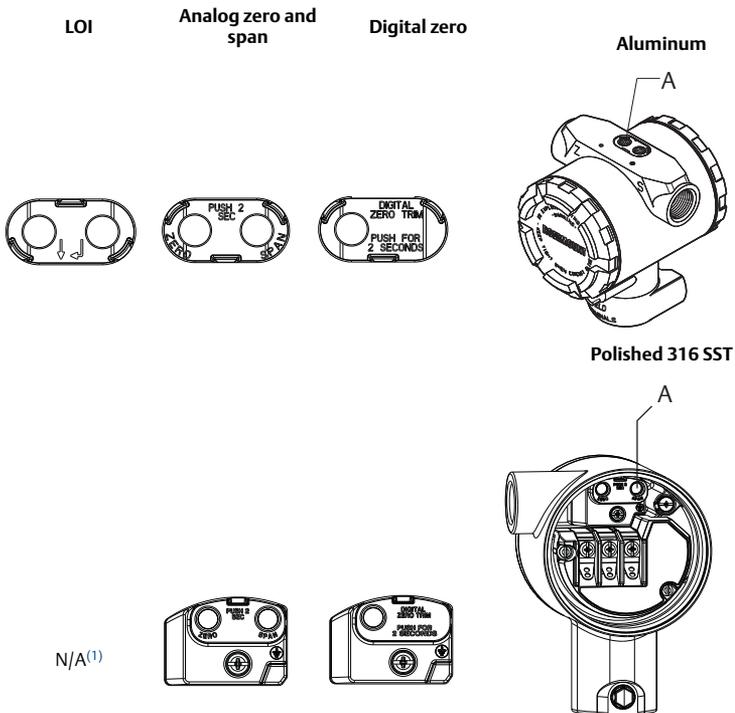
A. Configuration buttons

1. LOI buttons (option M4) only offer front facing buttons on SST housing (option 1). Options D4 and DZ can still be purchased for rear/terminal-side facing buttons.

Use the following procedures to perform a zero trim:

Perform trim with LOI (option M4)

1. Set the transmitter pressure.
2. See Figure 5 on page 10 for the operating menu.
   a. Perform an analog zero trim by selecting **Rerange**.
   b. Perform a digital zero trim by selecting **Zero Trim**.

Perform trim with analog zero and span (option D4)

1. Set the transmitter pressure.
2. Press and hold the **Zero** button for two seconds to perform an analog zero trim.

Perform trim with digital zero (option DZ)

1. Set the transmitter pressure.
2. Press and hold the **Zero** button for two seconds to perform a digital zero trim.

3.0   Product certifications

3.1   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.

3.2   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).

3.3   Installing Equipment in North America

The US National Electrical Code® (NEC) and the Canadian Electrical Code (CEC) permit the use of Division marked equipment in Zones and Zone marked equipment in Divisions. The markings must be suitable for the area classification, gas, and temperature class. This information is clearly defined in the respective codes.

3.4   Additional Certifications

3-A®

All Rosemount 2051HT transmitters with the following connections are 3-A approved and labeled

T32: $1^1/_2$-in. Tri-Clamp
T42: 2-in. Tri-Clamp

If process connection B11 is selected, please reference the ordering table of the Rosemount 1199 Diaphragm Seal Product Data Sheet for availability of 3-A certifications.

A 3-A certificate of compliance is available by selecting option code QA.

EHEDG

All Rosemount 2051HT transmitters with the following connections are EHEDG approved and labeled:

T32: $1^1/_2$-in. Tri-Clamp
T42: 2-in. Tri-Clamp

If process connection B11 is selected, please reference the ordering table of the Rosemount 1199 Diaphragm Seal Product Data Sheet for availability of EHEDG certifications.

An EHEDG certificate of compliance is available by selecting option code QE.

Ensure gasket selected for installation is approved to meet both application and EHEDG certification requirements. Transmitters and all associated accessories must be installed following EHEDG guidelines to ensure the assembly meets EHEDG certification requirements.

Figure 7. Declaration of Conformity

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EU Declaration of Conformity
No: RMD 1115 Rev. A

CE

We,

Rosemount Inc.
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declare under our sole responsibility that the product,

Rosemount™ 2051HT Pressure Transmitters

manufactured by,

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317-9685
USA

to which this declaration relates, is in conformity with the provisions of the European Union Directives, including the latest amendments, as shown in the attached schedule.

Assumption of conformity is based on the application of the harmonized standards and, when applicable or required, a European Union notified body certification, as shown in the attached schedule.

(signature)

Chris LaPoint
(name)

Vice President of Global Quality
(function)

6-Feb-18; Shakopee, MN USA
(date of issue & place)

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EU Declaration of Conformity
No: RMD 1115 Rev. A

EMC Directive (2014/30/EU)
Rosemount 2051HT Pressure Transmitters
Harmonized Standards: EN 61326-1:2013, EN 61326-2-3:2013

RoHS Directive (2011/65/EU)
Rosemount 2051HT Pressure Transmitters
Harmonized Standard: EN 50581:2012
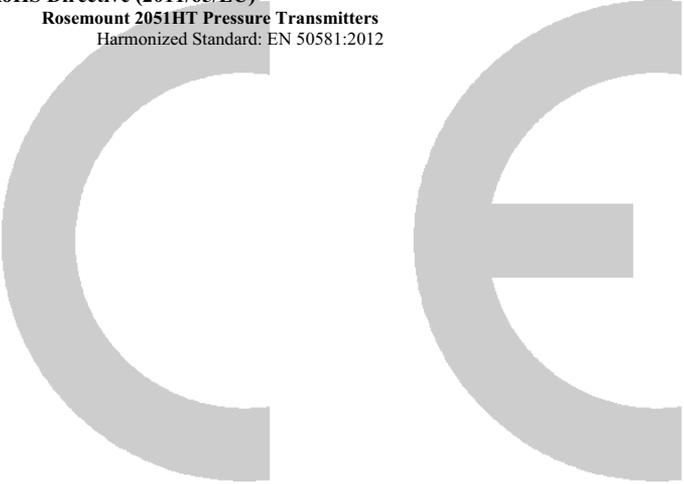
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含有China RoHS管控物质超过最大浓度限值的部件型号列表Rosemount 2051HT
List of Rosemount 2051HT Parts with China RoHS Concentration above MCVs

部件名称 Part Name	有害物质 / Hazardous Substances					
	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr +6)	多溴联苯 Polybrominated biphenyls (PBB)	多溴联苯醚 Polybrominated diphenyl ethers (PBDE)
电子组件 Electronics Assembly	X	O	O	O	O	O
壳体组件 Housing Assembly	X	O	O	X	O	O
传感器组件 Sensor Assembly	X	O	O	X	O	O

本表格系依据SJ/T11364的规定而制作.
This table is proposed in accordance with the provision of SJ/T11364.

O: 意为该部件的所有均质材料中该有害物质的含量均低于GB/T 26572所规定的限量要求.
O: Indicate that said hazardous substance in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

X: 意为在该部件所使用的所有均质材料里，至少有一类均质材料中该有害物质的含量高于GB/T 26572所规定的限量要求.
X: Indicate that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.

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