Rosemount[™] 2051HT Hygienic Pressure Transmitter

with PROFIBUS® Protocol







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1 About this guide

1.1 Safety messages

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.

A 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

- 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.
- Do not attempt to loosen or remove flange bolts while the transmitter is in service.

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.
- Before connecting a handheld 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.

Physical access

- Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.
- Physical security is an important part of any security program and fundamental to protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

A WARNING

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.

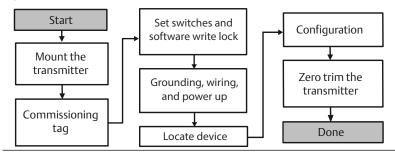
For safe assembly of manifold to traditional flange, bolts must break back plane of flange web (i.e., bolt hole) but must not contact sensor module housing.

Physical access

- Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.
- Physical security is an important part of any security program and fundamental to protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

2 Transmitter installation

Figure 2-1: Installation Flowchart



2.1 Mount the transmitter

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

2.1.1 Conduit entry orientation

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

2.1.2 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

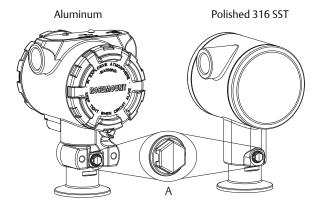
For aluminum housings ordered with M20 conduit entries, transmitters shipped will have NPT threads machined into the housing and a NPT to M20 thread adapter will be provided. Considerations for environmental sealing listed above should be taken into account when installing the thread adapter.

2.1.3 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 2-2).

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 port is pointing parallel to the ground.





A. Low side pressure port (atmospheric reference)

2.1.4 Clamping

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

Note

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

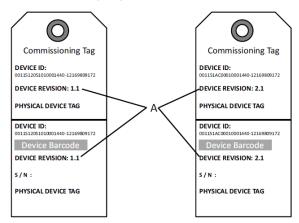
2.2 Commissioning (paper) tag

To identify which device is at a particular location use the removable tag provided with the transmitter. Ensure the physical device tag (PD tag field) is properly entered in both places on the removable commissioning tag and tear off the bottom portion for each transmitter.

Note

The device description loaded in the host system must be at the same revision as this device.

Figure 2-3: Commissioning Tag



A. Device revision

Note

The device description loaded in the host system must be at the same revision as this device. The device description can be downloaded from the host system website or Emerson.com/Rosemount by selecting Download Device Drivers under Product Quick Links. You can also visit Fieldbus.org and select End User Resources.

2.3 Setting security switch

Prerequisites

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

- 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 procedures to change the switch configuration:

Procedure

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

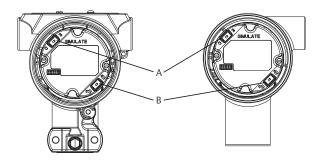
- Remove the housing cover opposite the field terminal side. Do not remove the instrument cover in explosive atmospheres when the circuit is live.
- 3. Slide the security and simulate switches into the preferred position.
- 4. Reattach transmitter housing cover; it is recommended the cover be tightened until there is no gap between the cover and housing to comply with explosion proof requirements.

2.4 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.

Figure 2-4: Transmitter Electronics Board

Aluminum Polished 316 SST



- A. Simulate switch
- B. Security switch

2.5 Connect the wiring and power up

Use copper wire of sufficient size to ensure the voltage across the transmitter power terminals does not drop below 9 Vdc. Power supply voltage can be variable, especially under abnormal conditions such as when operating on battery backup. A minimum of 12 Vdc under normal operating conditions is recommended. Shielded twisted pair type A cable is recommended.

Use the following steps to wire the transmitter:

Procedure

1. To power the transmitter, connect the power leads to the terminals indicated on the terminal block label.

Note

The Rosemount 2051 power terminals are polarity insensitive, which means the electrical polarity of the power leads does not matter when connecting to the power terminals. If polarity sensitive devices are connected to the segment, terminal polarity should be followed. When wiring to the screw terminals, the use of crimped legs is recommended.

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. No additional power is needed.

Note

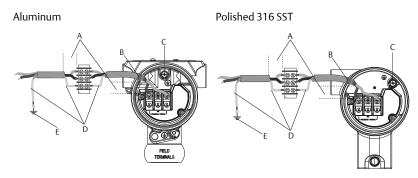
The use of a pin or a ferrule wire terminal is not recommended as the connection may be more susceptible to loosening over time or under vibration.

- 3. Ensure proper grounding. It is important the instrument cable shield be:
- 4. Trimmed close and insulated from touching the transmitter housing.
- Connected to the next shield if cable is routed through a junction box.
- 6. Connected to a good earth ground at the power supply end.
- 7. If transient protection is needed, refer to section "Signal ground wiring" for grounding instructions.
- 8. Pluq and seal unused conduit connections.
- 9. 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.

Example

Figure 2-5: Wiring



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

2.5.1 Signal ground wiring

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.

Procedure

- 1. Remove the field terminals housing cover.
- 2. Connect the wiring pair and ground as indicated in Figure 2-5.
 - 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.

- 3. Continuously connect the cable shields to the power supply ground.
 - a) 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,

- 4. Replace the housing 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.
- 5. Plug and seal unused conduit connections.

Note

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

3 Basic configuration

3.1 Configuration tasks

The transmitter can be configured via either the local operator interface (LOI) - option code M4, or via a Class 2 Master (DD or DTM™ based). The two basic configuration tasks for the PROFIBUS PA Pressure transmitter are:

Procedure

- 1. Assign address
- 2. Configure engineering units (scaling).

Note

Rosemount 2051 PROFIBUS Profile 3.02 devices are set to identification number adaptation mode when shipped from the factory. This mode allows the transmitter to communicate with any Profibus control host with either the generic Profile GSD (9700) or Rosemount 2051 specific GSD (3333) loaded on the host; therefore, it is not required to change the transmitter identification number at startup.

3.2 Assign address

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

Address can be set via either:

- LOI see Table 3-1
- Class 2 Master see Class 2 Master manual for setting address

3.3 Configure engineering units

Unless otherwise requested, the transmitter ships with the following settings:

- Measurement mode: Pressure
- Engineering units: Inches H₂O
- Scaling: None

Engineering units should be confirmed or configured before installation. Units can be configured for pressure, flow, or level measurement.

Measurement type, Units, Scaling, and Low Flow Cutoff (when applicable) can be set via either:

- I OI see Table 3-1
- Class 2 master see Table 3-2 for parameter configuration

3.4 Configuration tools

Local operator interface (LOI)

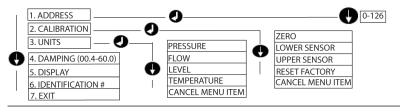
When ordered, the LOI can be used for commissioning the device. To activate the LOI, push either configuration button located under the top tag of the transmitter, or use the push buttons located on the LCD. See Table Table 3-1 for operation and menu information. The security jumper prevents changes made using the LOI.

Tabl	le 3-1	I: LOI	Button	Operation
-------------	--------	--------	---------------	-----------

Button ⁽¹⁾	Action	Navigation	Character Entry	Save?
0	Scroll	Moves down menu categories	Changes character value ⁽²⁾	Changes between Save and Cancel
1	Enter	Selects menu category	Enters character and advances	Saves

- (1) Reverse scroll also available (scroll + enter).
- (2) Characters blink when they can be changed.

Figure 3-1: LOI Menu



3.5 Class 2 Master

The Rosemount 2051 Profibus DD and DTM files are available at Emerson.com or by contacting your local salesperson. See Table 3-2 for steps to configure the transmitter for Pressure measurement. See the Rosemount 2051 Reference Manual for Level configuration instructions.

Table 3-2: Pressure Configuration via Class 2 Master

Steps	Actions		
Set blocks to Out of Service	Put Transducer Block into Out of Service mode		
Set blocks to Out of Service	Put Analog Input Block into Out of Service mode		
Select Measurement Type	Set Primary Value type to Pressure		
	Set Engineering Units		
Select Units	Primary and secondary units must match		
Select office	Configure engineering units under analog output block		
	Set Scale In in Transducer Block to 0–100		
	Set Scale Out in Transducer Block to 0–100		
Enter Scaling	Set PV Scale in Analog Input Block to 0–100		
3	Set Out Scale in Analog Input Block to 0–100		
	Set Linearization in Analog Input Block to No Linearization		
Set blocks to Auto	Put Transducer Block into Auto mode		
Set blocks to Auto	Put Analog Input Block into Auto mode		

3.6 Host integration

Control host (Class 1)

The Rosemount 2051 device utilizes condensed status as recommended by the Profile 3.02 specification and NE 107. See manual for condensed status bit assignment information.

The appropriate GSD file must be loaded on the control host - Rosemount 2051 specific (rmt3333.gsd) or Profile 3.02 Generic (pa139700.gsd). These files can be found on Emerson.com or Profibus.com.

Configuration host (class 2)

The appropriate DD or DTM file must be installed in the configuration host. These files can be found at Emerson.com.

4 Product certifications

Rev 1.2

4.1 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.

4.2 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).

4.3 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.

4.4 Hazardous Locations Certifications

Note

Device ambient temperature ratings and electrical parameters may be limited to the levels dictated by the hazardous location certificate parameters.

4.5 North America

4.5.1 I5 USA Intrinsic Safety (IS) and Nonincendive (NI)

Certificate: FM16US0231X (HART)

Standards: FM Class 3600 – 2011, FM Class 3610 – 2010, FM Class 3611

- 2004, FM Class 3810 - 2005, ANSI/NEMA 250 - 2008

Markings: IS CL I, DIV 1, GP A, B, C, D; CL II, DIV 1, GP E, F, G; Class III; DIV

1 when connected per Rosemount drawing 02051-1009; Class I, Zone 0; AEx ia IIC T4; NI CL 1, DIV 2, GP A, B, C, D;

 $T4(-50 \,^{\circ}\text{C} \le T_a \le +70 \,^{\circ}\text{C})$; Type 4x

Specific Condition of Use:

 The Model 2051 transmitter housing contains aluminum and is considered a potential risk of ignition by impact or friction. Care must

be taken into account during installation and use to prevent impact and friction.

Certificate: 2041384 (HART/Fieldbus/PROFIBUS®)

Standards: ANSI/ISA 12.27.01-2003, CSA Std. C22.2 No.142-M1987, CSA

Std. C22.2. No.157-92

Markings: IS CL I, DIV 1, GP A, B, C, D; CL II, DIV 1, GP E, F, G; Class III; DIV

1 when connected per Rosemount drawing 02051-1009; Class I, Zone 0; AEx ia IIC T4; NI CL 1, DIV 2, GP A, B, C, D;

 $T4(-50 \,^{\circ}\text{C} \le T_a \le +70 \,^{\circ}\text{C})$; Type 4x

4.5.2 I6 Canada Intrinsic Safety

Certificate: 2041384

Standards: CSA Std. C22.2 No. 142 - M1987, CSA Std. C22.2 No. 213 -

M1987, CSA Std. C22.2 No. 157 - 92, CSA Std. C22.2 No. 213 - M1987, ANSI/ISA 12.27.01 - 2003, CAN/CSA-E60079-0:07,

CAN/CSA-E60079-11:02

Markings: Intrinsically safe for Class I, Division 1, Groups A, B, C, and D

when connected in accordance with Rosemount drawing 02051-1008. Ex ia IIC T3C. Single Seal. Enclosure Type 4X

4.6 Europe

4.6.1 I1 ATEX Intrinsic Safety

Certificate: Baseefa08ATEX0129X

Standards: EN60079-0:2012+A11:2013, EN60079-11:2012

Markings: Ex II 1 G Ex ia IIC T4 Ga $(-60 \,^{\circ}\text{C} \le T_a \le +70 \,^{\circ}\text{C})$

Table 4-1: Input Parameters

Parameter	HART	Fieldbus/PROFIBUS
Voltage U _i	30 V	30 V
Current I _i	200 mA	300 mA
Power P _i	1 W	1.3 W
Capacitance C _i	0.012 μF	0 μF
Inductance L _i	0 mH	0 mH

Specific Conditions of Safe Use (X):

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

2. The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact and abrasion when located in Zone 0 from earth test and this must be taken into account during installation.

4.7 International

4.7.1 I7 IECEx Intrinsic Safety

Certificate: IECEx BAS 08.0045X

Standards: IEC 60079-0:2011, IEC 60079-11:2011

Markings: Ex ia IIC T4 Ga $(-60 \,^{\circ}\text{C} \le T_a \le +70 \,^{\circ}\text{C})$

Table 4-2: Input Parameters

Parameter	HART	Fieldbus/PROFIBUS
Voltage U _i	30 V	30 V
Current I _i	200 mA	300 mA
Power P _i	1 W	1.3 W
Capacitance C _i	0.012 μF	0 μF
Inductance L _i	0 mH	0 mH

Specific Conditions of Safe Use (X):

- 1. If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of withstanding the 500 V isolation from earth test and this must be taken into account during installation.
- 2. The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact and abrasion when located in Zone 0.
- 3. The equipment contains thin wall diaphragms. The installation, maintenance and use shall take into account the environmental conditions to which the diaphragms will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

4.8 Additional Certifications

3-A®

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

T32: 1½-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: 1½-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.

4.9 Rosemount 2051HT Declaration of Conformity





EU Declaration of ConformityNo: RMD 1115 Rev. C



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

Regulation (EC) No. 1935/2004 on materials and articles intended to come into contact with food

Regulation (EC) No. 2023/2006 on good manufacturing practice for materials and articles intended to come into contact with food (GMP).

The surface and material in contact with food consist of the below materials:

Product Description		Food Contact Materials	
2051HT	Pressure Transmitter	316L SST	

The user is responsible for testing the suitability of the units for the intended application. The customer is responsible for deciding whether the specific phrasings regarding the intended application comply with the applicable laws

ATEX Directive (2014/34/EU)

Rosemount 2051HT Pressure Transmitters

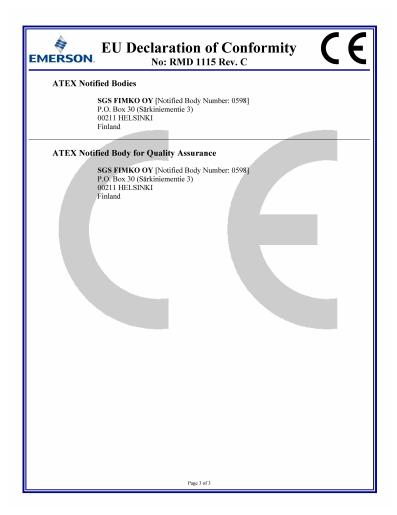
BASEEFA08ATEX0129X - Intrinsic Safety Certificate

Equipment Group II Category 1 G

Ex ia IIC T4 Ga, T4(-20°C ≤ Ta ≤ +70°C)

Harmonized Standards: EN 60079-0: 2012 + A11: 2013 EN 60079-11: 2012

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4.10 China RoHS

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

	有害物质 / Hazardous Substances					
部件名称 Part Name	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr +6)	多澳联苯 Polybrominated biphenyls (PBB)	多澳联苯醚 Polybrominated diphenyl ethers (PBDE)
电子组件 Electronics Assembly	x	0	0	0	0	0
壳体组件 Housing Assembly	0	0	0	0	0	0
传感器组件 Sensor Assembly	х	0	0	0	0	0

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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