# Rosemount<sup>™</sup> 3051HT Hygienic Pressure Transmitter

with PROFIBUS® PA Protocol







#### Safety messages

### **NOTICE**

This guide provides basic guidelines for the Rosemount 3051HT 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 device in an explosive environment must be in accordance with appropriate local, national, and international standards, codes, and practices.

In an explosion-proof/flameproof installation, do not remove the transmitter covers when power is applied to the unit.

Ensure device is installed in accordance with intrinsically safe or non-incendive field practices.

Before connecting a handheld communicator in an explosive atmosphere, ensure the instruments are installed in accordance with intrinsically safe or non-incendive field wiring practices.

Verify that the operating environment of the gauge is consistent with the appropriate hazardous locations certifications.

#### Electrical shock can result in death or serious injury.

Care must be taken during transportation of power module to prevent electrostatic charge build-up.

Device must be installed to ensure a minimum antenna separation distance of 8 in. (20 cm) from all persons.

#### Process leaks may cause harm or result in death.

Handle the device carefully.

#### 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.

#### Failure to follow safe installation guidelines could result in death or serious injury.

Ensure only qualified personnel perform the installation.

Apply wrench only to the flats, not on housing.

The battery is not replaceable in a hazardous location.

# **A** CAUTION

Keep the vent path free of any obstruction, including but not limited to paint, dust, and lubrication by mounting the device so the process can drain away.

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

Keep the vent path free of any obstruction, including but not limited to paint, dust, and lubrication by mounting the device so the process can drain away.

Absolute pressure devices are calibrated at the factory. Trimming adjusts the position of the factory characterization curve. It is possible to degrade performance of the device if any trim is done improperly or with inaccurate equipment.

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.

#### **Contents**

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# 1 Transmitter installation

### 1.1 Mount the transmitter

Place the transmitter to the 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 3051HT, it is recommended installing so a conduit entry faces downward or parallel to the ground to maximize drainability when cleaning.

### **Environmental seal for housing**

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

#### Note

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

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

### In-line gauge 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 1-1).

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.

Aluminum Polished 316 SST

Figure 1-1: 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.

#### Note

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

# 1.2 Setting the security switch

The security switch allows ( $\hat{\mathbf{b}}$ ) or prevents ( $\hat{\mathbf{b}}$ ) any configuration of the transmitter.

#### Note

Default security is off (16).

#### Setting the simulate switch

The security switch can be enabled or disabled in the software.

#### **Procedure**

- 1. If the transmitter is installed, secure the loop, and remove power.
- 2. Remove the housing cover opposite the field terminal side.

### **A WARNING**

### Explosions could result in death or serious injury.

In an explosion-proof/flameproof installation, do not remove the transmitter covers when power is applied to the unit.

- 3. Slide the security switch into the preferred position.
- Reattach the transmitter housing cover.
   Tighten the cover until there is no gap between the cover and housing to comply with explosion proof requirements.

# 1.3 The security and simulate switches

The security and simulate switches are located on the electronics.

Aluminum Polished 316 SST

Figure 1-2: Transmitter Electronics Board

- A. Simulate switch
- B. Security switch

# 1.4 Connect the wiring and power up

Procedure to connect the wiring and power up the transmitter.

#### **Prerequisites**

 Use copper wire of sufficient size to ensure the voltage across the transmitter power terminals does not drop below 9 Vdc. A minimum of 12 Vdc under normal operating conditions is recommended. Shielded twisted pair Type A cable is recommended.

 Power supply voltage can be variable, especially under abnormal conditions such as when operating on battery backup.

#### **Procedure**

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

#### Note

The Rosemount 3051 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

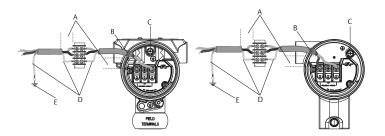
The use of a pin or a ferrule wire terminal is not recommended as the connection may be more susceptible to loosening over time or under vibration.

- 3. Ensure proper grounding. It is important the instrument cable shield be:
  - a) Trimmed close and insulated from touching the transmitter housing.
  - b) Connected to the next shield if cable is routed through a junction box.
  - c) Connected to a good earth ground at the power supply end.
- 4. If transient protection is needed, refer to section Signal ground wiring for grounding instructions.
- 5. Plug and seal unused conduit connections.
- 6. Reattach the transmitter covers.
  - a) 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 1-3: Wiring

Aluminum

Polished 316 SST



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

### 1.4.1 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 1-3
  - 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.

#### Note

The Rosemount 3051HT polished 316 SST housing only provides ground termination inside the terminal compartment.

# **2** Basic configuration

# 2.1 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<sup>™</sup> based). The two basic configuration tasks for the PROFIBUS<sup>®</sup> PA Pressure transmitter are:

#### **Procedure**

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

#### Note

Rosemount 3051 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 3051 specific GSD (4444) loaded on the host; therefore, it is not required to change the transmitter identification number at startup.

# 2.2 Assign address

The Rosemount 3051 Pressure 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 2-1
- Class 2 Master see manual for setting address

# 2.3 Configure engineering units

Unless otherwise requested, the Rosemount 3051 Pressure Transmitter ships with the following settings:

- Measurement mode: Pressure
- Engineering units: Inches H<sub>2</sub>O
- 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:

- LOI see Table 2-1
- Class 2 master see Table 2-2 for parameter configuration

# 2.4 Configuration tools

### Local operator interface (LOI)

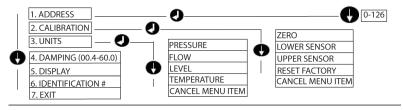
When ordered, the LOI can be used for commissioning the device. To activate the LOI, push either configuration button located under the top tag of the transmitter, or use the push buttons located on the LCD. See Table Table 2-1 for operation and menu information. The security jumper prevents changes made using the LOI.

**Table 2-1: LOI Button Operation** 

Button <sup>(1)</sup>	Action	Navigation	Character entry	Save?
0	Scroll	Moves down menu categories	Changes character value <sup>(2)</sup>	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 2-1: LOI Menu



# 2.5 Class 2 Master

The Rosemount 3051 PROFIBUS® DD and DTM files are available at Emerson.com or by contacting your local salesperson. See Table 2-2 for steps to configure the transmitter for Pressure measurement. See the Rosemount 3051 Reference Manual for Flow or Level configuration instructions.

Table 2-2: Pressure Configuration via Class 2 Master

Steps	Actions
Set blocks to Out of Service	Put Transducer Block into Out of Service mode
	Put Analog Input Block into Out of Service mode
Select Measurement Type	Set Primary Value type to Pressure
Select Units	Set Engineering Units
	Primary and secondary units must match
	Configure engineering units under analog output block
Enter Scaling	Set Scale In in Transducer Block to 0 - 100
	Set Scale Out in Transducer Block to 0 - 100
	Set PV Scale in Analog Input Block to 0 - 100
	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
	Put Analog Input Block into Auto mode

# 2.6 Host integration

# Control host (Class 1)

The Rosemount 3051 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 3051 specific (rmt4444.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.

# 3 Product certifications

Rev. 1.6

# 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.

# 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).

Altitude	Pollution degree	
5000 m max	4 (metallic enclosure)	
	2 (non-metallic enclosure)	

# 3.3 Installing Equipment in North America

The US National Electrical Code<sup>®</sup> (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 USA

# **15 Intrinsic Safety; Nonincendive**

Certificate: 1053834

**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 03031-1024, CL I ZONE 0 AEx ia IIC T4; NI CL 1, DIV 2, GP A, B, C, D T5; T4 (-20 °C  $\leq$  T<sub>a</sub>  $\leq$  +70 °C) [HART]; T4(-20 °C  $\leq$ 

 $T_a \le +60 \,^{\circ}\text{C}$ ) [Fieldbus]; Type 4x

# 3.5 Canada

# **16 Intrinsic Safety**

Certificate: 1053834

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

Std. C22.2. No.157-92, CSA Std. C22.2 No. 213 - M1987

**Markings:** 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; Type 4X; Factory Sealed; Single Seal (See drawing

03031-1053)

# 3.6 Europe

### **I1 ATEX Intrinsic Safety**

Certificate: BAS97ATEX1089X

**Standards:** EN 60079-0:2012 + A11:2013, EN 60079-11:2012

**Markings:** HART<sup>™</sup>:  **(a)** II 1 G Ex ia IIC T5/T4 Ga, T5(-20 °C ≤ Ta ≤ +40 °C),

 $T4(-20 \,^{\circ}\text{C} \le T_a \le +70 \,^{\circ}\text{C})$  Fieldbus: 2 II 1 G Ex ia IIC Ga  $T4(-20 \,^{\circ}\text{C})$ 

 $^{\circ}C \le T_a \le +60 ^{\circ}C)$ 

### **Table 3-1: Input Parameters**

Parameter	HART	Fieldbus/ PROFIBUS®
Voltage U <sub>i</sub>	30 V	30 V
Current I <sub>i</sub>	200 mA	300 mA
Power P <sub>i</sub>	0.9 W	1.3 W
Capacitance C <sub>i</sub>	0.012 μF	0 μF
Inductance L <sub>i</sub>	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.

### 3.7 International

### 17 IECEx Intrinsic Safety

**Certificate:** IECEx BAS 09.0076X

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

**Markings:** HART<sup>™</sup>: Ex ia IIC T5/T4 Ga, T5( $-20 \,^{\circ}$ C ≤ T<sub>a</sub> ≤ +40  $\,^{\circ}$ C), T4( $-20 \,^{\circ}$ C

 $\leq T_a \leq +70 \,^{\circ}\text{C}$ 

PROFIBUS<sup>®</sup>: Ex ia IIC T4 ( $-20 \, ^{\circ}\text{C} \le T_a \le +60 \, ^{\circ}\text{C}$ )

Parameter	PROFIBUS
Voltage U <sub>i</sub>	30 V
Current I <sub>i</sub>	300 mA
Power P <sub>i</sub>	1.3 W
Capacitance C <sub>i</sub>	0 μF
Inductance L <sub>i</sub>	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.

### 3.8 Brazil

# **12 INMETRO Intrinsic Safety**

Certificate: UL-BR 13.0584X

Standards: ABNT NBR IEC60079-0:2008 + Errata 1:2011, ABNT NBR

IEC60079-11:2009

**Markings:** HART<sup>™</sup>: Ex ia IIC T5/T4 Ga, T5( $-20 \,^{\circ}\text{C} \le T_a \le +40 \,^{\circ}\text{C}$ ), T4( $-20 \,^{\circ}\text{C}$ 

 $\leq$  Ta  $\leq$  +70 °C) Fieldbus: Ex ia IIC T4 Ga (-20 °C  $\leq$  T<sub>a</sub>  $\leq$  +60 °C)

	HART	PROFIBUS®
Voltage U <sub>i</sub>	30 V	30 V
Current I <sub>i</sub>	200 mA	300 mA
Power P <sub>i</sub>	0.9 W	1.3 W
Capacitance C <sub>i</sub>	0.012 μF	0 μF
Inductance L <sub>i</sub>	0 mH	0 mH

### Special Conditions for Safe Use (X):

1. If the equipment is fitted with an optional 90 V 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 protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if equipment requires EPL Ga.

# 3.9 Additional certifications

### 3-A®

All Rosemount 3051HT 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, see reference the ordering table of the Rosemount 1199 Diaphragm Seal PDS (00813-0100-4016) for availability of 3-A certifications.

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

#### **EHEDG**

All Rosemount 3051HT 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, see reference the ordering table of the Rosemount 1199 Diaphragm Seal PDS (00813-0100-4016) 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.

#### **ASME-BPE**

All Rosemount 3051HT Transmitters with option F2 and the following connections are designed to ASME-BPE SF4 standards<sup>(1)</sup>:

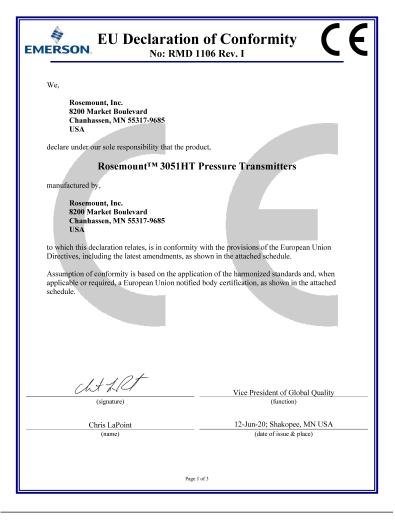
T32: 1½-in. Tri Clamp

T42: 2-in. Tri Clamp

A self-certified certificate of compliance to ASME-BPE is also available (option QB)

<sup>(1)</sup> Per Clause SD-2.4.4.2 (m), suitability of painted aluminum housings to be determined by end user.

### Figure 3-1: Rosemount 3051HT Declaration of Conformity



### Figure 3-2: Rosemount 3051HT Declaration of Conformity



EMC Directive (2014/30/EU)

Models 3051HT Pressure Transmitters

Harmonized Standards: EN 61326-1:2013, EN 61326-2-3:2013

RoHS Directive (2011/65/EU)
Models 3051HT 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		
3051HT	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)

Model 3051HT Pressure Transmitter

BAS97ATEX1089X - Intrinsic Safety

Equipment Group II Category 1 G Ex ia IIC T5/T4 Ga

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

ATEX Notified Body

SGS FIMKO OY [Notified Body Number: 0598] P.O. Box 30 (Särkiniementie 3) 00211 HELSINKI

Finland

ATEX Notified Body for Quality Assurance

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Figure 3-3: Rosemount 3051HT Declaration of Conformity



#### **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 3051HT List of 3051HT 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)	多溴联苯 Polybrominated biphenyls (PBB)	多溴联苯醚 Polybrominated diphenyl ethers (PBDE)
电子组件 Electronics Assembly	x	0	0	0	0	0
壳体组件 Housing Assembly	x	0	0	Х	0	0
传感器组件 Sensor Assembly	x	0	0	Х	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.

X: 歐为在该部件所使用的所有均嚴材料里,至少有一类均质材料中该有害物质的含量高于GB/T 26572所規定的限量要求. 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.

部件名称 Part Name	组装备件说明 Spare Parts Descriptions for Assemblies	
电子组件 Electronics Assembly	电子线路板组件 Electronic Board Assemblies 端子块组件 Terminal Block Assemblies 升级套件 Upgrade Kits 液晶显示屏或本地操作界面 LCD or LOI Display	
壳体组件 Housing Assembly	电子外壳 Electrical Housing	
传感器组件 Sensor Assembly	传感器模块 Sensor Module	

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.



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