

# Rosemount 2051 Pressure Transmitter

## with 4-20 mA HART and 1-5 Vdc Low Power Protocol



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# Rosemount 2051 Pressure Transmitter

## 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.

For technical assistance, contacts are listed below:

### 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 8211

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### North American Response Center

Equipment service needs.

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

Outside of these areas, contact your local Emerson Process Management representative.

## ⚠ 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 Process Management Sales Representative.

*Rosemount 2051 Pressure Transmitters may be protected by one or more of the following: U.S. Patent Nos. 4466290; 4612812; 4791352; 4798089; 4818994; 4866435; 4878012; 4988990; 4926340; 5083091; 5122794; 5166678; 5248167; 5278543; 5287746; 5329818; 5333504; 5585777; 6017143; 6119047; 6295875; Des. 317266; Des. 318432; Des 342456. May depend on model. Other U.S. and foreign patents issued and pending.*



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# Section 1 Introduction

## USING THIS MANUAL

The sections in this manual provide information on installing, operating, and maintaining Rosemount 2051 pressure transmitters with HART<sup>®</sup> protocol. The sections are organized as follows:

- **Section 2: Installation** contains mechanical and electrical installation instructions, and field upgrade options.
- **Section 3: Configuration** provides instruction on commissioning and operating Rosemount 2051 transmitters. Information on software functions, configuration parameters, and online variables is also included.
- **Section 4: Operation and Maintenance** contains operation and maintenance techniques.
- **Section 5: Troubleshooting** provides troubleshooting techniques for the most common operating problems.
- **Appendix A: Reference Data** supplies reference and specification data, as well as ordering information.
- **Appendix B: Approval Information** contains intrinsic safety approval information, European ATEX directive information, and approval drawings.
- **Appendix C: Glossary**

## SERVICE SUPPORT

To expedite the return process outside of the United States, contact the nearest Emerson Process Management representative.

Within the United States, call the Emerson Process Management Instrument and Valves Response Center using the 1-800-654-RSMT (7768) toll-free number. This center, available 24 hours a day, will assist you with any needed information or materials.

The center will ask for product model and serial numbers, and will provide a Return Material Authorization (RMA) number. The center will also ask for the process material to which the product was last exposed.

### CAUTION

Individuals who handle products exposed to a hazardous substance can avoid injury if they are informed of and understand the hazard. If the product being returned was exposed to a hazardous substance as defined by OSHA, a copy of the required Material Safety Data Sheet (MSDS) for each hazardous substance identified must be included with the returned goods.

Emerson Process Management Instrument and Valves Response Center representatives will explain the additional information and procedures necessary to return goods exposed to hazardous substances.

## **MODELS COVERED**

The following Rosemount 2051 Pressure Transmitters are covered by this manual:

### **Rosemount 2051C Coplanar™ Pressure Transmitter**

#### **2051CD - Differential Pressure Transmitter**

Measures differential pressure up to 2000 psi (137,9 bar)

#### **2051CG - Gage Pressure Transmitter**

Measures gage pressure up to 2000 psi (137,9 bar)

### **Rosemount 2051T In-Line Pressure Transmitter**

#### **2051TG - Gage Pressure Transmitter**

Measures gage pressure up to 10000 psi (689,5 bar)

#### **2051TA - Absolute Pressure Transmitter**

Measures absolute pressure up to 10000 psi (689,5 bar)

### **Rosemount 2051L Liquid Level Pressure Transmitter**

#### **2051L - Flange-Mounted Liquid Level Transmitter**

Provides precise level and specific gravity measurements up to 300 psi (20,7 bar) for a wide variety of tank configurations

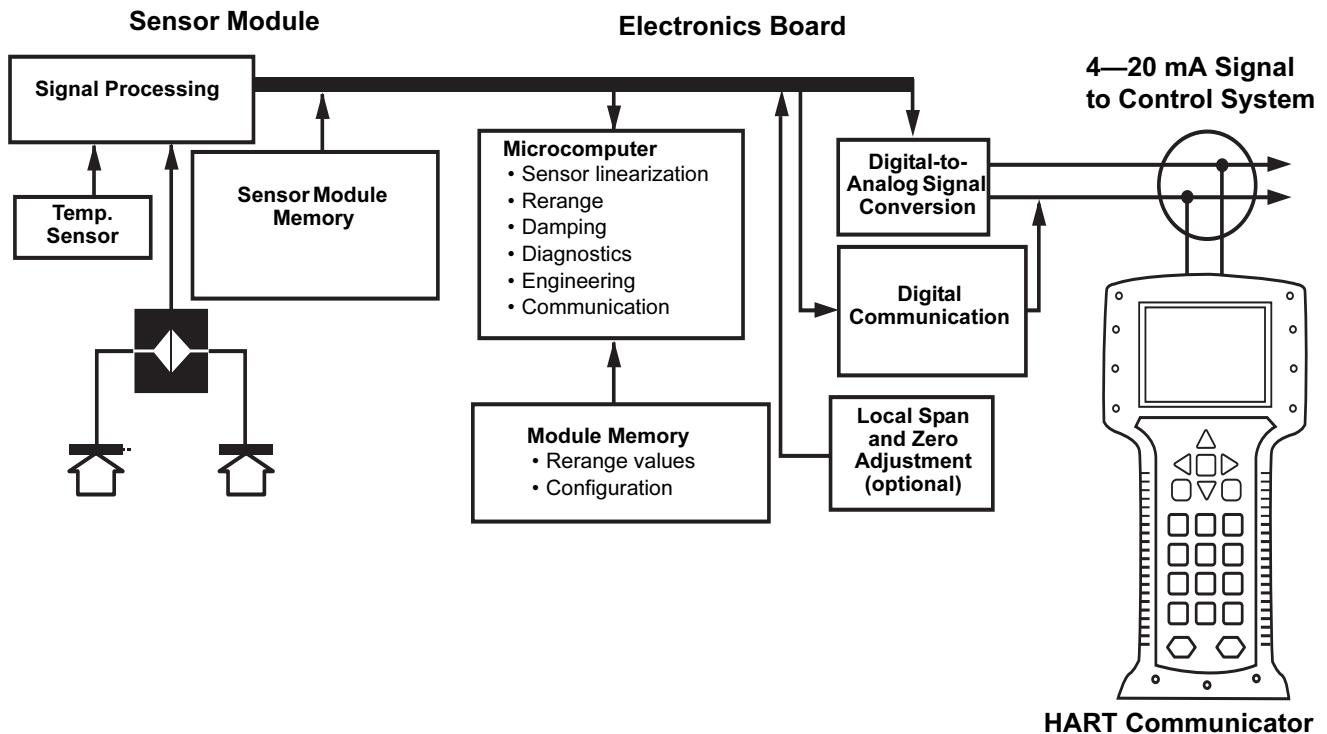
**TRANSMITTER  
 OVERVIEW**

The Rosemount 2051C Coplanar design is offered for Differential Pressure (DP) and Gage Pressure (GP) measurements where it utilizes Emerson Process Management capacitance sensor technology. Piezoresistive sensor technology is utilized in the Rosemount 2051T measurements.

The major components of the Rosemount 2051C are the sensor module and the electronics housing. The sensor module contains the oil filled sensor system (isolating diaphragms, oil fill system, and sensor) and the sensor electronics. The sensor electronics are installed within the sensor module and include a temperature sensor (RTD), a memory module, and the capacitance to digital signal converter (C/D converter). The electrical signals from the sensor module are transmitted to the output electronics in the electronics housing. The electronics housing contains the output electronics board, the local zero and span buttons, and the terminal block. The basic block diagram of the Rosemount 2051CD is illustrated in Figure 1-1.

For the Rosemount 2051C design, pressure is applied to the isolating diaphragms, the oil deflects the center diaphragm, which then changes the capacitance. This capacitance signal is then changed to a digital signal in the C/D converter. The microprocessor then takes the signals from the RTD and C/D converter calculates the correct output of the transmitter. This signal is then sent to the D/A converter, which converts the signal back to an analog signal and superimposes the HART signal on the 4-20 mA output.

Figure 1-1. Block diagram of operation





# HART Reference Card

00829-0100-4101, Rev AA

July 2009

Rosemount 2051

## Rosemount 2051 Pressure Transmitter with 4-20 mA HART and 1-5 Vdc Low Power Protocol

A check (✓) indicates the basic configuration parameters. At minimum, these parameters should be verified as part of the configuration and startup procedure.

**Table 1. HART Communicator Fast Key Sequence**

Function	4-20 mA HART	1-5 Vdc HART Low Power
✓ Alarm and Saturation Levels	1, 4, 2, 7	N/A
Analog Output Alarm Type	1, 4, 3, 2, 4	1, 4, 3, 2, 4
Burst Mode Control	1, 4, 3, 3, 3	1, 4, 3, 3, 3
Burst Operation	1, 4, 3, 3, 4	1, 4, 3, 3, 4
Custom Meter Configuration	1, 3, 7, 2	N/A
Custom Meter Value	1, 4, 3, 4, 3	N/A
✓ Damping	1, 3, 6	1, 3, 6
Date	1, 3, 4, 1	1, 3, 4, 1
Descriptor	1, 3, 4, 2	1, 3, 4, 2
Digital To Analog Trim (4-20 mA Output)	1, 2, 3, 2, 1	1, 2, 3, 2, 1
Disable Local Span/Zero Adjustment	1, 4, 4, 1, 7	1, 4, 4, 1, 7
Field Device Information	1, 4, 4, 1	1, 4, 4, 1
Full Trim	1, 2, 3, 3	1, 2, 3, 3
Keypad Input – Rerange	1, 2, 3, 1, 1	1, 2, 3, 1, 1
Local Zero and Span Control	1, 4, 4, 1, 7	1, 4, 4, 1, 7
Loop Test	1, 2, 2	1, 2, 2
Lower Sensor Trim	1, 2, 3, 3, 2	1, 2, 3, 3, 2
Message	1, 3, 4, 3	1, 3, 4, 3
Meter Options	1, 4, 3, 4	N/A
Number of Requested Preambles	1, 4, 3, 3, 2	1, 4, 3, 3, 2
Poll Address	1, 4, 3, 3, 1	1, 4, 3, 3, 1
Poll a Multidropped Transmitter	Left Arrow, 4, 1, 1	Left Arrow, 4, 1, 1
✓ Range Values	1, 3, 3	1, 3, 3
Rerange	1, 2, 3, 1	1, 2, 3, 1



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Function	4-20 mA HART	1-5 Vdc HART Low Power
Scaled D/A Trim (4–20 mA Output)	1, 2, 3, 2, 2	1, 2, 3, 2, 2
Self Test (Transmitter)	1, 2, 1, 1	1, 2, 1, 1
Sensor Info	1, 4, 4, 2	1, 4, 4, 2
Sensor Temperature	1, 1, 4	1, 1, 4
Sensor Trim Points	1, 2, 3, 3, 5	1, 2, 3, 3, 4
Status	1, 2, 1, 2	1, 2, 1, 2
✓ Tag	1, 3, 1	1, 3, 1
✓ Transfer Function (Setting Output Type)	1, 3, 5	1, 3, 5
Transmitter Security (Write Protect)	1, 3, 4, 4	1, 3, 4, 4
Trim Analog Output	1, 2, 3, 2	1, 2, 3, 2
✓ Units (Process Variable)	1, 3, 2	1, 3, 2
Upper Sensor Trim	1, 2, 3, 3, 3	1, 2, 3, 3, 3
Zero Trim	1, 2, 3, 3, 1	1, 2, 3, 3, 1

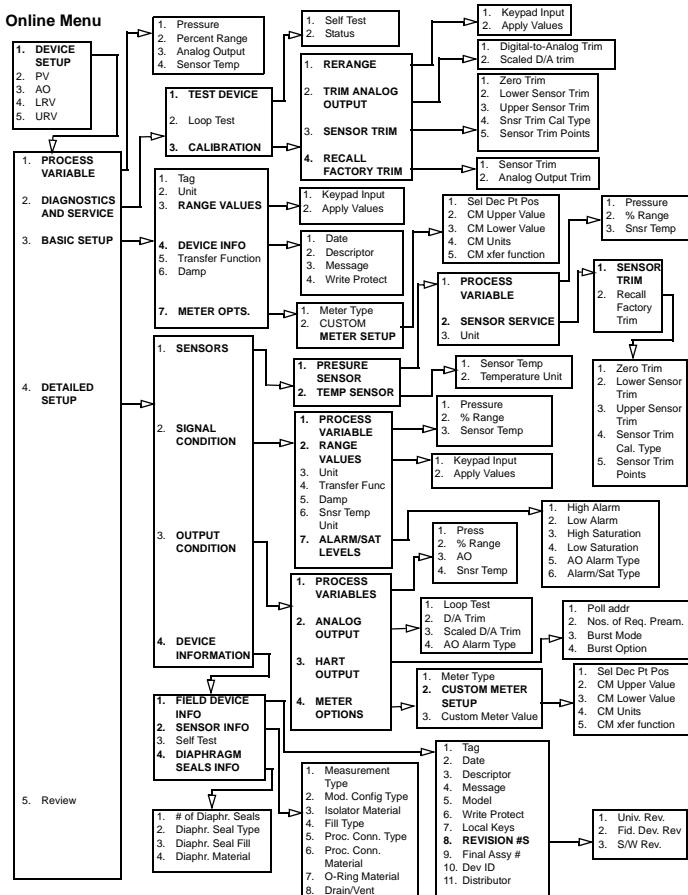
# HART Reference Card

00829-0100-4101, Rev AA

July 2009

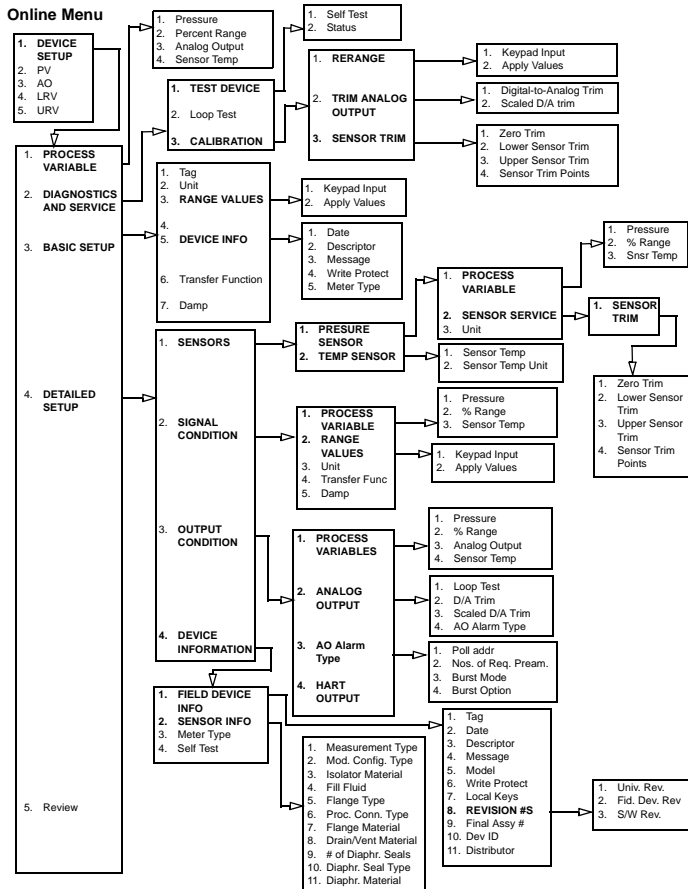
Rosemount 2051

Figure 1. Menu Tree for the 2051, 4-20 mA HART



## Rosemount 2051

Figure 2. Menu Tree for the 2051, 1-5 Vdc HART Low Power



 **WARNING**

Read the entire manual before working with the product. The manual is document number 00809-0100-4101 and can be found at [www.rosemount.com](http://www.rosemount.com). For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

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