

Rosemount™ 3051S Series of Instrumentation

High Pressure Solutions



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Section 1 Introduction

1.1 Using this manual

This manual is intended to be used as a supplement to the Rosemount 3051S Reference Manuals. Since the Rosemount 3051S High Static Differential Pressure Transmitter (Rosemount 3051SHP) and Rosemount 3051S utilize similar components, certain sections of this manual will be linked to the corresponding Rosemount 3051S Reference Manual section. Any information that differs from the Rosemount 3051S product will be covered within this manual.

The sections in this manual provide information on installing, operating, and maintaining the Rosemount 3051SHP. The sections are organized as follows:

- [Section 1: Introduction](#) provides an introduction to the pressure transmitter, how to use the manual, models covered by this manual, and other support information for the transmitter.
- [Section 2: Installation](#) contains instructions for mounting the transmitter, connecting it to the process, and wiring the transmitter.
- [Section 3: Configuration](#) provides instruction on commissioning and operating Rosemount 3051SHP transmitters from a bench computer or a hand held field device. Information on software functions, configuration parameters, and on line variables are also included.
- [Section 4: Operation and Maintenance](#) contains techniques to maintain the transmitter, and disassembly/assembly directions.
- [Section 5: Troubleshooting](#) provides troubleshooting techniques for the most common operating issues.
- [Section 6: Safety Instrumented Systems](#) contains identification, commissioning, maintenance, and operations information for the Rosemount 3051SHP SIS Safety Transmitter.
- [Section 7: Advanced HART Diagnostics](#) contains procedures for installation, configuration, and operation of the Rosemount 3051SHP HART Diagnostics option.
- [Section 8: Specifications and Reference Data](#) supplies reference and specification data, as well as ordering information.
- [Section 9: Product Certifications](#) contains intrinsic safety approval information, European ATEX directive information, and approval drawings.

1.2 Product recycling/disposal

Recycling of equipment and packaging should be taken into consideration and disposed of in accordance with local and national legislation/regulations.

Section 2 Installation

NOTICE

This section provides basic guidelines for Rosemount 3051SHP. It does not provide instructions for configuration, diagnostics, maintenance, service, troubleshooting, Explosion-proof, Flameproof, or intrinsically safe (I.S.) installations. This manual is also available electronically on Emerson.com/Rosemount.

Shipping considerations for wireless products

The unit was shipped to you without the power module installed. Remove the power module prior to shipping the unit.

Each power module contains two “C” size primary lithium batteries. Primary lithium batteries are regulated in transportation by the U.S. Department of Transportation, and are also covered by IATA (International Air Transport Association), ICAO (International Civil Aviation Organization), and ARD (European Ground Transportation of Dangerous Goods). It is the responsibility of the shipper to ensure compliance with these or any other local requirements. Consult current regulations and requirements before shipping.

⚠ 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 “[Product Certifications](#)” on [page 52](#) for any restrictions associated with a safe installation.

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.

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.

To avoid process leaks, ensure secure connection with coned-and-threaded connection.

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

Unless marked, the conduit/cable entries in the transmitter housing use a 1/2–14 NPT thread form. Entries marked “M20” are M20 x 1.5 thread form. On devices with multiple conduit entries, all entries will have the same thread form. Only use plugs, adapters, glands, or conduit with a compatible thread form when closing these entries.

When installing in a hazardous location, use only appropriately listed or Ex certified flameproof/dust plugs, adapters, or glands in cable/conduit entries.

⚠ WARNING

Wireless/power module considerations

- The power module may be replaced in a hazardous area. The power module has surface resistivity greater than one gigaohm and must be properly installed in the wireless device enclosure. Care must be taken during transportation to and from the point of installation to prevent electrostatic charge build-up.
- This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions. This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation. This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

2.1 System readiness

Note

The system readiness information is for the selectable HART 5/HART 7 Advanced Diagnostics (option code DA2) version of the transmitter only.

2.1.1 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 the [Rosemount 3051S Reference Manual](#).

2.1.2 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.

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

Table 1-1. Device Revisions and Files

| Software release date | Identify device | | Find device driver | | Review instructions | Review functionality |
|-----------------------|--|---------------------------------------|-------------------------|--------------------------------|------------------------|--|
| | NAMUR software revision ⁽¹⁾ | HART software revision ⁽²⁾ | HART universal revision | Device revision ⁽³⁾ | Manual document number | Changes to software |
| Apr-16 | 1.0.0 | 20 | 7 | 4 | 00809-0100-4801 | HART Revision 5 and 7 selectable |
| | | | 5 | 3 | | |
| Oct-10 | N/A | 12 | 5 | 3 | 00809-0100-4801 | Added Power Advisory, mA Output, Power Consumption, Coefficient of Variation |

Table 1-1. Device Revisions and Files

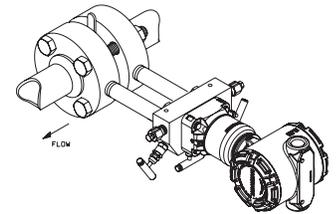
| | Identify device | | Find device driver | | Review instructions | Review functionality |
|--------|-----------------|---------|--------------------|---|---------------------|--|
| May-07 | N/A | 7 | 5 | 2 | 00809-0100-4801 | Update Statistical Process Monitoring Capability |
| Sep-06 | N/A | 4, 5, 6 | 5 | 1 | 00809-0100-4801 | N/A |

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 not be reflected in the review functionality column.
2. HART software revision can be read using a HART capable configuration tool.
3. Device driver file names use Device and DD Revision, e.g. 10_01. HART Protocol is designed to enable legacy device driver revisions to continue to communicate with new HART devices. To access new functionality, the new device driver must be downloaded. It is recommended to download new device driver files to ensure full functionality.

2.2 Mount the transmitter

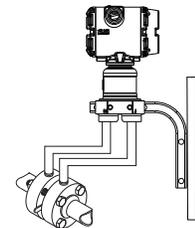
2.2.1 Liquid flow applications

1. Place taps to the side of the line.
2. Mount beside or below the taps.



2.2.2 Gas flow applications

1. Place taps in the top or side of the line.
2. Mount beside or above the taps.

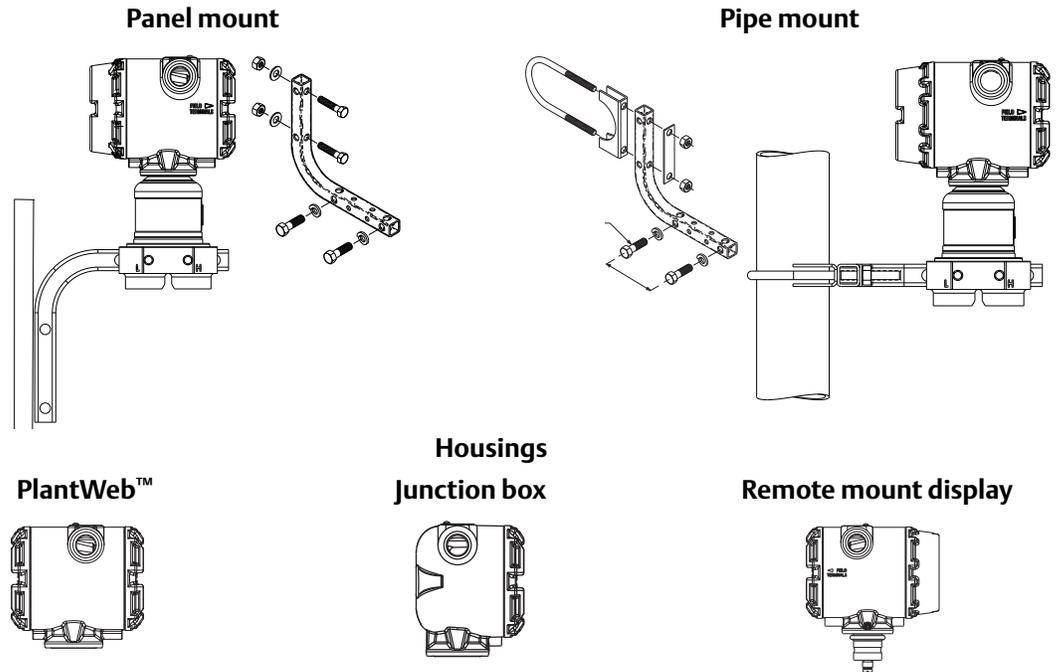


Note

Bracket required to support the transmitter and the 1/4-in. tubing going into the transmitter.

2.2.3 Using a mounting bracket

The images below provide instructions on how to properly mount the transmitter using the Emerson™ provided mounting brackets. Use only bolts provided with the transmitter or sold as Emerson spare parts. Bolts should be tightened to a torque of 125 in-lb.



2.2.4 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, and IP68. 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

IP 68 is not available with wireless output.

2.2.5 Installing high pressure coned and threaded connection

The transmitter comes with an autoclave connection designed for high pressure applications. Follow the steps below to properly connect the transmitter to your process:

1. Apply a small amount of process-compatible lubricant to the gland nut threads.
2. Slip the gland nut onto the tube, then thread the collar onto the tube end (the collar is reverse threaded).
3. Apply a small amount of process-compatible lubricant applied to the tube cone to help prevent galling and facilitate sealing. Insert the tubing into the connection and tighten gland nut finger tight.

4. Tighten the gland nut to a torque of 25 ft-lb.

Note

A weep hole has been designed into the transmitter for safety and leak detection. If fluid begins to leak from the weep hole after torquing, isolate the process pressure, disconnect the transmitter, and reseal until the leak is resolved.

All Rosemount 3051SHP Transmitters come with 316L SST tagging.

2.2.6 Wireless considerations (if applicable)

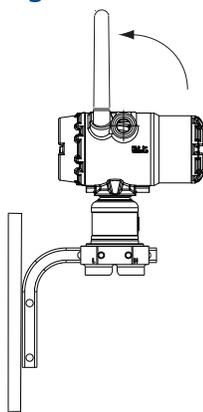
Power up sequence

The power module should not be installed on any wireless device until the Emerson Smart Wireless Gateway (Gateway) has been installed and functioning properly. See “Power up transmitter” on page 11 for more details.

Antenna position

Position the antenna vertically, either straight up or straight down (see Figure 1-1 on page 7). The antenna should be approximately 3 ft. (1 m) from any large structure or building to allow clear communication to other devices.

Figure 1-1. Antenna Position



High gain, remote antenna mounting instructions (WN wireless option only)

The high gain, remote antenna option provides flexibility for mounting the transmitter based on wireless connectivity, lightning protection, and current work practices (see Figure 1-2 on page 9).

⚠ WARNING

When installing the remote mount antenna for the transmitter, always use established safety procedures to avoid falling or contact with high-power electrical lines.

Install remote antenna components for the transmitter in compliance with local and national electrical codes and use best practices for lightning protection.

Before installing consult with the local area electrical inspector, electrical officer, and work area supervisor.

The remote antenna option is specifically engineered to provide installation flexibility while optimizing wireless performance and local spectrum approvals. To maintain wireless performance and avoid non-compliance with spectrum regulations, do not change the length of cable or the antenna type.

If the supplied remote mount antenna kit is not installed per these instructions, Emerson is not responsible for wireless performance or non-compliance with spectrum regulations.

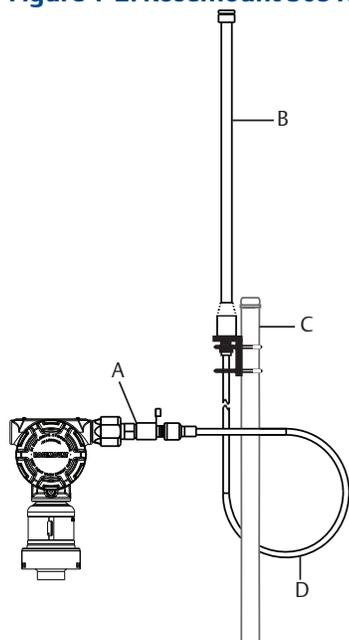
The high gain, remote mount antenna kit includes coaxial sealant for the cable connections for the lightning arrestor and antenna.

Find a location where the remote antenna has optimal wireless performance. Ideally this will be 15–25 ft. (4,6–7,6 m) above the ground or 6 ft. (2 m) above obstructions or major infrastructure. To install the remote antenna use the following procedure:

1. Mount the antenna on a 1.5- to 2-in. pipe mast using the supplied mounting equipment.
2. Connect the lightning arrestor directly to the top of the transmitter.
3. Install the grounding lug, lock washer, and nut on top of lightning arrestor.
4. Connect the antenna to the lightning arrestor using the supplied LMR-400 coaxial cable ensuring the drip loop is not closer than 1 ft. (0,3 m) from the lightning arrestor.
5. Use the coaxial sealant to seal each connection between the wireless field device, lightning arrestor, cable, and antenna.
6. Ensure the mounting mast and lightning arrestor are grounded according to local/national electrical code.

Any spare lengths of coaxial cable should be placed in 12-in. (0,3 m) coils.

Figure 1-2. Rosemount 3051SHP with High Gain, Remote Antenna

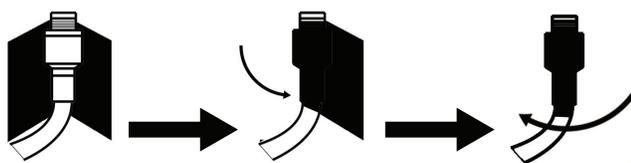


- A. Lightning arrester
- B. Antenna
- C. Mounting mast
- D. Drip loop

Note: Weather proofing is required!

The remote mount antenna kit includes coaxial sealant for weather proofing the cable connections for the lightning arrester, antenna, and the transmitter. Coaxial sealant must be applied to guarantee performance of the wireless field network. See Figure 1-3 for details on how to apply coaxial sealant.

Figure 1-3. Applying Coaxial Sealant to Cable Connections

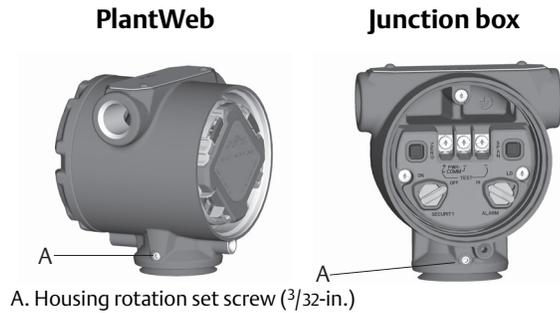


2.3 Consider housing rotation

To improve field access to wiring or to better view the optional LCD display:

1. Loosen the housing rotation set screw.
2. First rotate the housing clockwise to the desired location. If the desired location cannot be achieved due to thread limit, rotate the housing counter clockwise to the desired location (up to 360° from thread limit).
3. Retighten the housing rotation set screw up to 30 in-lb.
4. For wireless, consider access to the power module when selecting housing rotation.

Figure 1-4. Transmitter Housing Set Screw



A. Housing rotation set screw ($\frac{3}{32}$ -in.)

Note

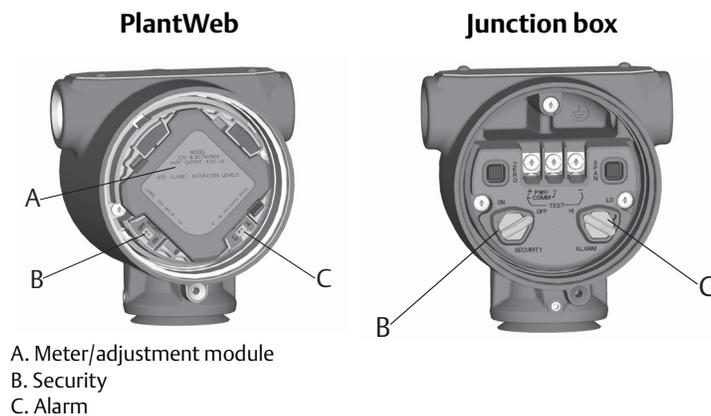
Do not rotate the housing more than 180° without first performing a disassembly procedure. Over-rotation may sever the electrical connection between the sensor module and the feature board electronics.

2.4 Set switches and jumpers

If alarm and security adjustment option is not installed, the transmitter will operate normally with the default alarm condition alarm “high” and the security “off”.

1. Do not remove the transmitter covers in explosive atmospheres when the circuit is live. If the transmitters is live, set the loop to manual and remove power.
2. Remove the electronics compartment cover. On the PlantWeb housing the cover is opposite the field terminals side, or on the junction box housing remove the terminal block cover. Do not remove the housing cover in explosive environments.
3. On the PlantWeb housing, slide the security and alarm switches into the preferred position by using a small screwdriver (an LCD display or an adjustment module must be in place to activate the switches). On the junction box housing pull the pins out and rotate 90° into desired position to set the security and alarm.
4. Reinstall the housing cover so that metal contacts metal to meet explosion-proof requirements.

Figure 1-5. Transmitter Switch and Jumper Configuration



A. Meter/adjustment module
B. Security
C. Alarm

2.5 Power up transmitter

This section provides the steps needed to power up transmitters. These steps are unique based on the specific protocol used.

- Steps for HART transmitters begin on [page 11](#).
- Steps for FOUNDATION™ Fieldbus transmitters begin on [page 17](#).
- Steps for *WirelessHART*® transmitter begin on [page 18](#).

2.5.1 Connect wiring and power up for wired HART configuration

Use the following steps to wire the transmitter:

1. Remove and discard orange conduit plugs.
2. Remove the housing cover labeled “Field Terminals.”
3. Connect the positive lead to the “+” terminal, and the negative lead to the “-” terminal.

Note

Do not connect the power across the test terminals. Power could damage the test diode in the test connection. Twisted pairs yield best results. Use 24 AWG to 14 AWG wire and do not exceed 5,000 feet (1500 meters). For single compartment housing (Junction Box housing), shielded signal wiring should be used in high EMI/RFI environments.

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

5. If the optional process temperature input is not installed, plug and seal the unused conduit connection. If the optional process temperature input is being utilized, see [“Install optional process temperature input \(Pt 100 RTD sensor\)” on page 16](#) for more information.

Note

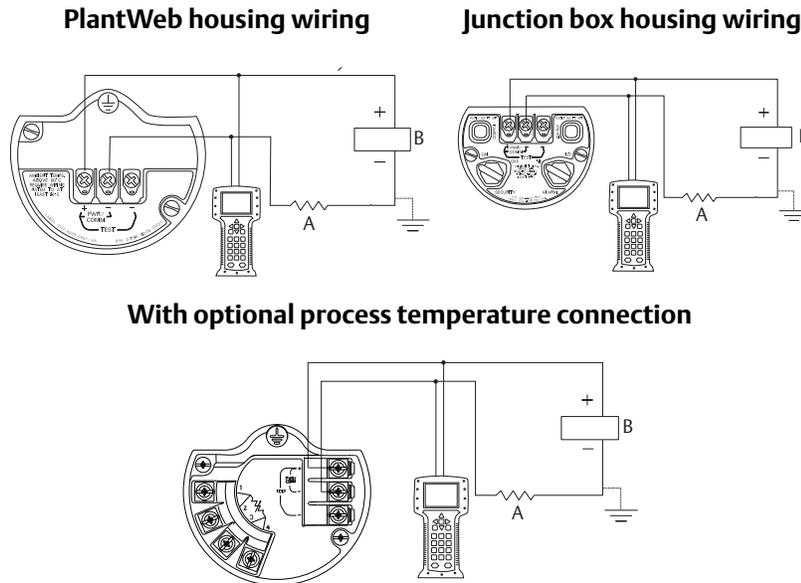
When the enclosed threaded plug is utilized in the conduit opening, it must be installed with a minimum thread engagement in order to comply with explosion-proof requirements. For straight threads, a minimum of seven threads must be engaged. For tapered threads, a minimum of five threads must be engaged.

6. 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.
7. Reinstall the housing cover and tighten so the cover is fully seated with metal to metal contact between the housing and cover in order to meet explosion proof requirements.



[Figure 1-6](#) shows the wiring connections necessary to power a wired HART transmitter and enable communications with a handheld Field Communicator.

Figure 1-6. Transmitter Wiring



A. $R_L \geq 250 \Omega$
B. Power supply

Note

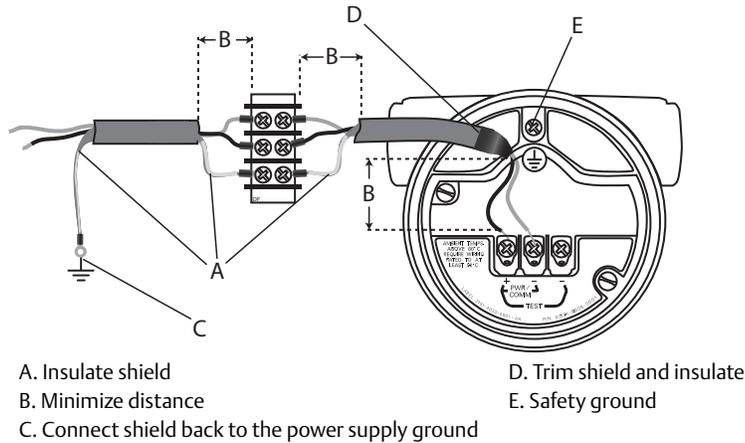
Installation of the transient protection terminal block does not provide transient protection unless the transmitter case is properly grounded.

Signal wiring grounding

Do not run signal wiring in conduit or open trays with power wiring, or near heavy electrical equipment. Grounding terminations are provided on the sensor module and inside the terminal compartment. These grounds are used when transient protection terminal blocks are installed or to fulfill local regulations. See [Step 2](#) below for more information on how the cable shield should be grounded.

1. Remove the field terminals housing cover.
2. Connect the wiring pair and ground as indicated in [Figure 1-7](#). The cable shield should:
 - Be trimmed close and insulated from touching the transmitter housing
 - Continuously connect to the termination point
 - Be connected to a good earth ground at the power supply end

Figure 1-7. Wiring



3. Replace the housing cover. It is recommended the cover be tightened until there is no gap between the cover and the housing.

Note

When the enclosed threaded plug is utilized in the conduit opening, it must be installed with a minimum thread engagement in order to comply with explosion-proof requirements. For straight threads, a minimum of seven threads must be engaged. For tapered threads, a minimum of five threads must be engaged.

4. Plug and seal unused conduit connections with the provided conduit plug.

Remote display wiring and power up (if applicable)

The remote mount display and Interface system consists of a local transmitter and a remote mount LCD display assembly. The local transmitter assembly includes a junction box housing with a three-position terminal block integrally mounted to a sensor module. The remote mount LCD display assembly consists of a dual compartment PlantWeb housing with a seven position terminal block. See [Figure 1-8 on page 14](#) for complete wiring instructions. The following is a list of necessary information specific to the remote mount display system:

- Each terminal block is unique for the remote display system.
- A 316 SST housing adapter is permanently secured to the remote mount LCD display PlantWeb housing, providing an external ground and a means for field mounting with the provided mounting bracket.
- A cable is required for wiring between the transmitter and remote mount LCD display. The cable length is limited to 100 ft.
- 50 ft. (option M8) or 100 ft. (option M9) cable is provided for wiring between the transmitter and remote mount LCD display. Option M7 does not include cable; see recommended specifications.

Cable type

It is recommended that Madison AWM Style 2549 cable is used in this installation. Other comparable cables may be used as long as it has independent dual twisted shielded pair wires with an outer shield. The power wires must be 22 AWG minimum and the CAN communication wires must be 24 AWG minimum.

Cable length

The cable length is up to 100 ft. depending upon cable capacitance.

Cable capacitance

The capacitance from the CAN communications line to the CAN return line as wired must be less than 5000 picofarads total. This allows up to 50 picofarads per foot for a 100 foot cable.

Intrinsic safety consideration

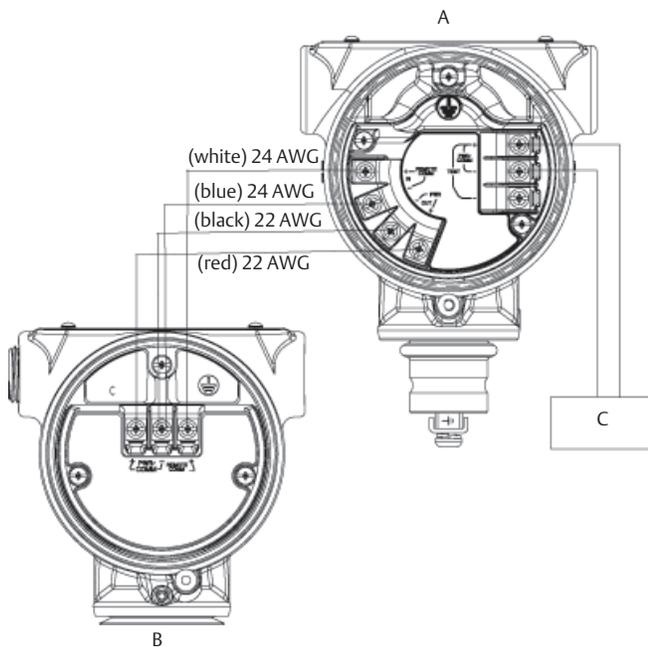
The transmitter assembly with remote display has been approved with Madison AWM Style 2549 cable. Alternate cable may be used as long as the transmitter with remote display and cable is configured according to the installation control drawing or certificate. Refer to appropriate approval certificate or control drawing in the Rosemount 3051S [Reference Manual](#) for remote cable IS requirements.



Important

Do not apply power to the remote communications terminal. Follow wiring instructions carefully to prevent damage to system components.

Figure 1-8. Remote Mount Display Wiring



- A. Remote mount display
- B. Junction box housing
- C. 4–20 mA

Note

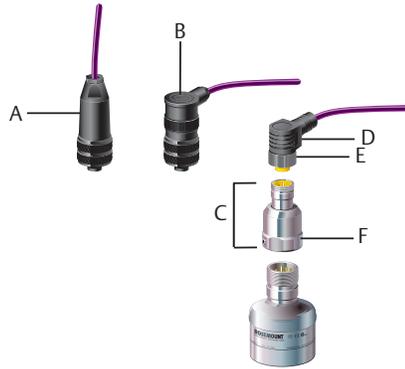
Wire colors provided on [Figure 1-8](#) are per Madison AWM Style 2549 cable. Wire color may vary depending on cable selected.

Madison AWM Style 2549 cable includes a ground shield. This shield must be connected to earth ground at either the sensor module or the remote display, but not both.

Quick connect wiring (if applicable)

As standard, the quick connect arrives properly assembled to the sensor module and is ready for installation. Cordsets and field wireable connectors (in shaded area) are sold separately.

Figure 1-9. Rosemount Quick Connect Exploded View



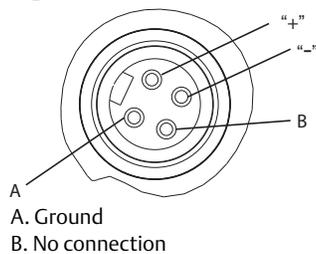
- A. Straight field wireable connector⁽¹⁾⁽²⁾
 - B. Right angle field wireable connector⁽²⁾⁽⁴⁾
 - C. Quick connect housing
 - D. Cordset⁽³⁾
 - E. Coupling nut
 - F. Quick connect coupling nut
1. Order part number 03151-9063-0001.
 2. Field wiring supplied customer.
 3. Supplied by cordset vendor.
 4. Order part number 03151-9063-0002.

Important

If quick connect is ordered as a 300S spare housing or is removed from the sensor module, follow the instructions below for proper assembly prior to field wiring.

1. Place the quick connect onto the sensor module. To ensure proper pin alignment, remove coupling nut prior to installing quick connect onto the sensor module.
2. Place coupling nut over quick connect and wrench tighten to a maximum of 300 in-lb (34 N-m).
3. Tighten the set screw up to 30 in-lb using a $\frac{3}{32}$ -in. hex wrench.
4. Install cordset/field wireable connectors onto the quick connect. Do not over tighten.

Figure 1-10. Quick Connect Housing Pin-Out



- A. Ground
- B. No connection

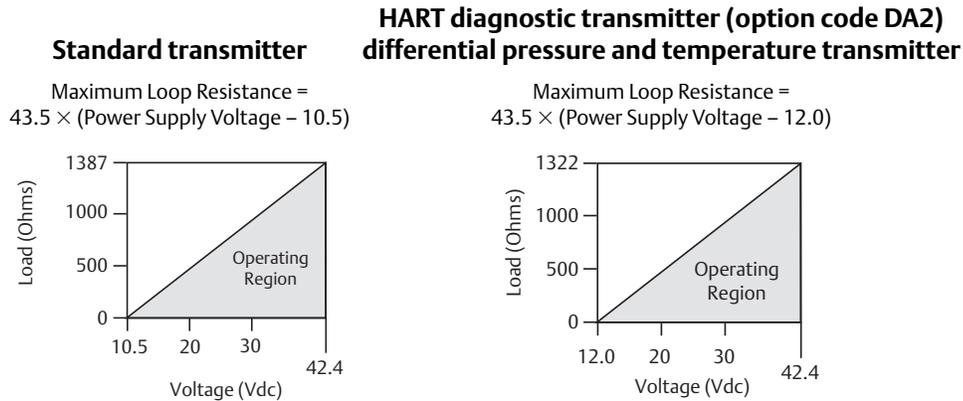
Note

For other wiring details, refer to pin-out drawing and the cordset manufacturer's installation instructions.

Power supply

The DC power supply should provide power with less than two percent ripple. The total resistance load is the sum of the resistance of the signal leads and the load resistance of the controller, indicator, and related pieces. Note the resistance of intrinsic safety barriers, if used, must be included.

Figure 1-11. Load Limitation



The Field Communicator requires a minimum loop resistance of 250 Ω for communication.

2.5.2 Install optional process temperature input (Pt 100 RTD sensor)

Note

To meet ATEX/IECEX Flameproof certification, only ATEX/IECEX Flameproof cables (Temperature Input Code C30, C32, C33, or C34) may be used.

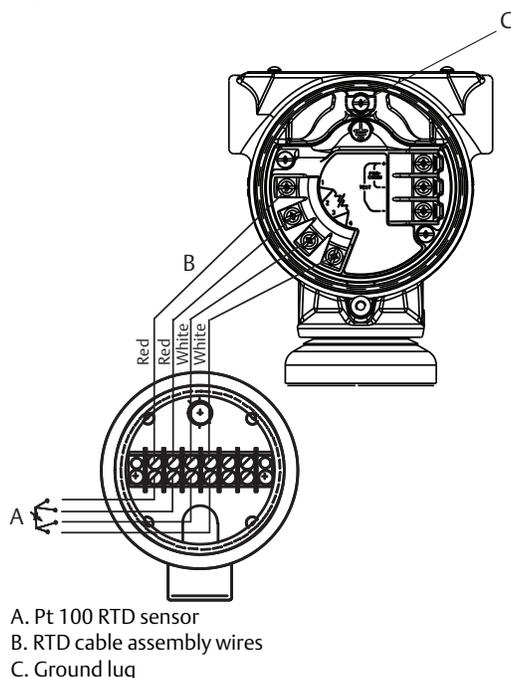
1. Mount the Pt 100 RTD sensor in the appropriate location.

Note

Use shielded four-wire cable for the process temperature connection.

2. Connect the RTD cable to the transmitter by inserting the cable wires through the unused housing conduit and connect to the four screws on the transmitter terminal block. An appropriate cable gland should be used to seal the conduit opening around the cable.
3. Connect the RTD cable shield wire to the ground lug in the housing.

Figure 1-12. Transmitter RTD Wiring Connection



2.5.3 Connect wiring and power up FOUNDATION Fieldbus transmitter

Cable connection

The segment cable can enter the transmitter through either conduit connection on the housing. Cable entering the housing vertically should be avoided. Drip loops are recommended for installations where moisture can accumulate and enter the terminal compartment.

Power supply

The transmitter requires between 9 and 32 Vdc (9 and 15 Vdc for FISCO) at the terminals to operate and provide complete functionality.

Power conditioner

A fieldbus segment requires a power conditioner to isolate the power supply filter and decouple the segment from other segments attached to the same power supply.

Signal termination

Every fieldbus segment requires terminators at each end of the segment. Failure to properly terminate segments may cause communication errors with devices on the segment.

Transient protection

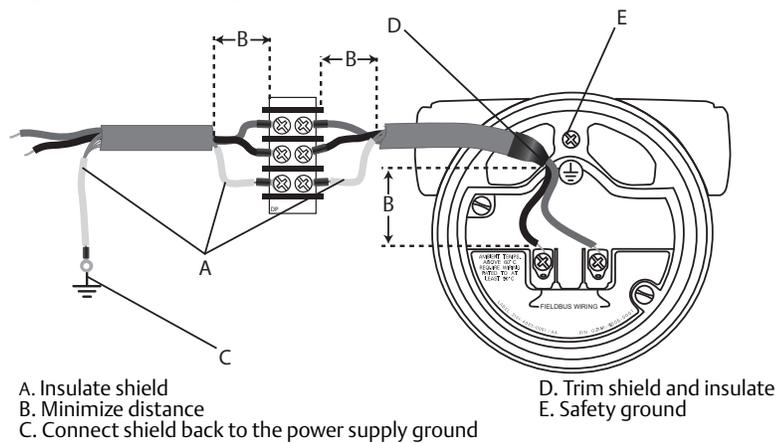
Transient protection devices require the transmitter be grounded for proper operation. Refer to “Grounding” on page 18 for further information.

Grounding

Grounding terminations are provided on the sensor module and inside the terminal compartment. These grounds are used when transient protect terminal blocks are installed or to fulfill local regulations.

1. Remove the field terminals housing cover.
2. Connect the wiring pair and ground as indicated in [Figure 1-13](#).
 - a. The terminals are not polarity sensitive.
 - b. The cable shield should:
 - Be trimmed close and insulated from touching the transmitter housing
 - Continuously connect to the termination point
 - Be connected to a good earth ground at the power supply end

Figure 1-13. Wiring



3. Replace the housing cover. It is recommended the cover be tightened until there is no gap between the cover and the housing.
4. Plug and seal the unused conduit connection with the provided conduit plug.

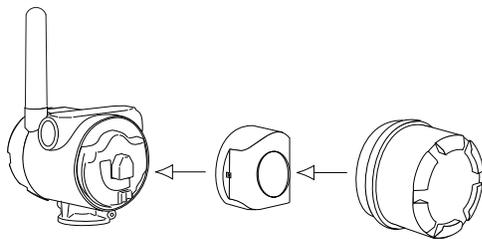
NOTICE

When installing in hazardous locations, the enclosed conduit plug must be installed in the unused conduit opening per all local installation codes and standards.

2.5.4 Connect the power module for *WirelessHART* transmitter

The power module should not be installed on any wireless device until the Gateway is installed and functioning properly. This transmitter uses the black power module (order model number 701PBKKF). Wireless devices should also be powered up in order of proximity from the Gateway, beginning with the closest. This will result in a simpler and faster network installation. Enable active advertising on the Gateway to ensure new devices join the network faster. For more information, see the Emerson Wireless Gateway 1420 [Reference Manual](#).

1. Remove the housing cover on the field terminal side.
2. Connect the black power module.



2.6 Verify configuration

Use any compliant master to communicate with and verify configuration of the transmitter. Make sure to download the latest device driver from the [Device Install Kit site](#). Refer to [Table 1-2](#) below for the latest device revision for each potential configuration.

Configuration can be verified using two methods:

1. By using the Field Communicator
2. Via AMS™ Device Manager

Fast Keys for using a Field Communicator are provided below in [Table 1-3](#).

To verify *WirelessHART* operation with an local display (LCD), refer to [page 21](#); verification can also be done at the device via the LCD display.

Table 1-2. Device Revisions

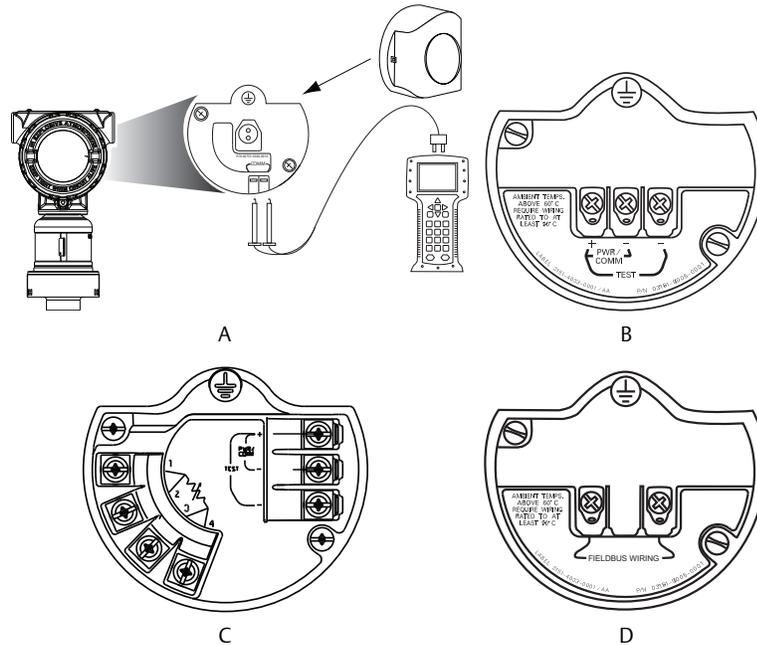
| Device configuration | Device revision |
|--|-----------------|
| Rosemount 3051SHP HART (wired) | Rev. 7 |
| Rosemount 3051SHP FOUNDATION Fieldbus | Rev. 23 |
| Rosemount 3051SHP <i>WirelessHART</i> | Rev. 3 |
| Rosemount 3051SHP MultiVariable™ | Rev. 1 |
| Rosemount 3051SHP HART Diagnostics (DA2) | Rev. 3 |

2.6.1 Verify with Field Communicator

Connecting to a Field Communicator

For the Field Communicator to interface with the transmitter, power must be supplied to the transmitter. For wireless configuration, the communicator connections are located behind the power module on the terminal block (see [Figure 1-14](#), image A). For wired configurations, the connections are on the terminal block (see [Figure 1-14](#), image B, C, or D).

Figure 1-14. Field Communicator Connections



- A. WirelessHART terminal block
- B. HART and DA2 terminal block
- C. Multivariable terminal block
- D. FOUNDATION Fieldbus terminal block

2.6.2 Fast Key sequence for critical parameters

Basic configuration parameters can be verified using a Field Communicator. At a minimum, the parameters below should be verified as part of the configuration and startup procedure.

Note

If no Fast Key sequence is provided, that parameter is not required to be verified for that configuration.

Table 1-3. Fast Key Sequences

| Function | HART Fast Keys | FOUNDATION Fieldbus Fast Keys | WirelessHART Fast Keys | Differential pressure and temperature measurement | Advanced Diagnostics |
|---------------------|----------------|-------------------------------|------------------------|---|----------------------|
| Damping | 2, 2, 1, 5 | 2, 1, 2 | 2, 2, 2, 4 | 1, 3, 7 | 2, 2, 1, 1, 3 |
| DP Zero Trim | 3, 4, 1, 3 | 2, 1, 1 | 2, 1, 2 | 1, 2, 4, 3, 1 | 3, 4, 1, 1, 1, 3 |
| DP Units | 2, 2, 1, 2 | 3, 2, 1 | 2, 2, 2, 3 | 1, 3, 3, 1 | 2, 1, 1, 1, 2, 1 |
| Range Analog Output | 2, 2, 1, 4 | N/A | N/A | 1, 2, 4, 1 | 3, 4, 1, 2, 3 |
| Tag | 2, 2, 5, 1 | 4, 1, 3 | 2, 2, 9, 1 | 1, 3, 1 | 2, 1, 1, 1, 1, 1 |
| Transfer | 2, 2, 1, 4 | N/A | 2, 2, 4, 2 | 1, 3, 6 | 2, 2, 1, 1, 4 |

For instructions on how to configure an AI block in your FOUNDATION Fieldbus transmitter, refer to the Rosemount 3051S FOUNDATION Fieldbus [Reference Manual](#).

Verify WirelessHART operation using the Local display (LCD)

The LCD display will show the output values based on the wireless update rate. Refer to the Rosemount 3051S Wireless [Reference Manual](#) for error codes and other LCD display messages. Press and hold the **Diagnostic** button for at least five seconds to display the *TAG*, *Device ID*, *Network ID*, *Network Join Status*, and *Device Status* screens.

| Searching for network | Joining network | Connected with limited bandwidth | Connected |
|---|---|---|--|
|  |  |  |  |

Note

It may take several minutes for the device to join the network. For advanced troubleshooting of the wireless network or Gateway, see the Rosemount 3051S WirelessHART [Reference Manual](#), Emerson Wireless Gateway 1410 [Reference Manual](#), Emerson Wireless Gateway 1420 [Reference Manual](#) or [Quick Start Guide](#).

2.7 Trim the transmitter

Transmitters are shipped fully calibrated per request or by the factory default of full scale (lower range value = zero, upper range value = upper range limit).

2.7.1 Zero trim

A zero trim is a single-point adjustment used for compensating mounting position and line pressure effects. When performing a zero trim, ensure the equalizing valve is open and all wet legs are filled to the correct level.

- If zero offset is less than 3% of true zero, follow the [Using the Field Communicator](#) instructions below to perform a zero trim.
- If zero offset is greater than 3% of true zero, follow the [Using the transmitter zero adjustment button](#) instructions below to rerange.
- If hardware adjustments are not available, see the Rosemount 3051S [Reference Manual](#) to perform a rerange using the Field Communicator.

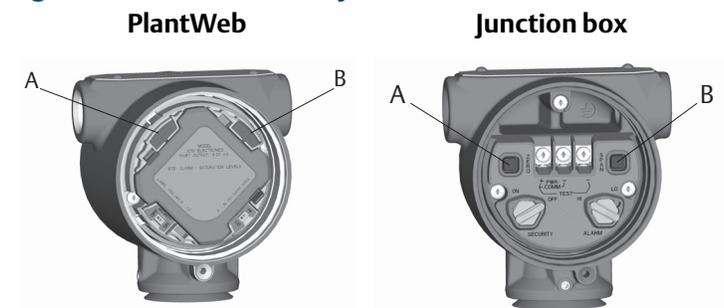
Using the Field Communicator

1. Equalize or vent the transmitter and connect Field Communicator.
2. At the menu, input the Fast Key sequence (see [Table 1-3](#)).
3. Follow the commands to perform a zero trim.

Using the transmitter zero adjustment button

Push and hold the **Zero** adjustment button for at least two seconds but no longer than ten seconds.

Figure 1-15. Transmitter Adjustment Buttons



A. Zero
B. Span

2.8 Safety instrumented systems installation

For safety certified installations, refer to the Rosemount 3051S [Reference Manual](#) for installation procedure and system requirements.

Section 3 Configuration

- For configuration details using HART®, reference the Rosemount™ 3051S HART [Reference Manual](#).
- For configuration details using Fieldbus, reference the Rosemount 3051S FOUNDATION™ Fieldbus [Reference Manual](#).
- For configuration details using wireless, reference the Rosemount 3051S Wireless [Reference Manual](#).

Section 4 Operation and Maintenance

- For operation and maintenance details using HART, reference the Rosemount 3051S HART [Reference Manual](#).
- For operation and maintenance details using Fieldbus, reference the Rosemount 3051S FOUNDATION Fieldbus [Reference Manual](#).
- For operation and maintenance details using wireless, reference the Rosemount 3051S Wireless [Reference Manual](#).

Section 5 Troubleshooting

- For troubleshooting details using HART®, reference the Rosemount™ 3051S HART [Reference Manual](#).
- For troubleshooting details using Fieldbus, reference the Rosemount 3051S FOUNDATION™ Fieldbus [Reference Manual](#).
- For troubleshooting details using wireless, reference the Rosemount 3051S Wireless [Reference Manual](#).

5.1 Service support

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

Within the United States, call the Emerson 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 Instrument and Valves Response Center representatives will explain the additional information and procedures necessary to return goods exposed to hazardous substances.

Section 6 Safety Instrumented Systems

- For system details using HART®, reference the Rosemount™ 3051S HART [Reference Manual](#).
- For system details using Fieldbus, reference the Rosemount 3051S FOUNDATION™ Fieldbus [Reference Manual](#).
- For system details using wireless, reference the Rosemount 3051S Wireless [Reference Manual](#).

Section 7 Advanced HART Diagnostics

- For diagnostic details using HART, reference the Rosemount 3051S HART [Reference Manual](#).
- For diagnostic details using Fieldbus, reference the Rosemount 3051S FOUNDATION Fieldbus [Reference Manual](#).
- For diagnostic details using wireless, reference the Rosemount 3051S Wireless [Reference Manual](#).

Section 8 Specifications and Reference Data

8.1 Performance specifications

8.1.1 Rosemount™ 3051SHP

For zero-based spans, reference conditions, silicone oil fill, C-276 isolating diaphragm, coned and threaded process connections, digital trim values set to equal range points.

8.1.2 Conformance to specification ($\pm 3\sigma$ [sigma])

Technology leadership, advanced manufacturing techniques, and statistical process control ensure pressure measurement specification conformance to $\pm 3\sigma$ or better.

8.1.3 Reference accuracy

Stated reference accuracy equations include terminal based linearity, hysteresis, and repeatability. For FOUNDATION™ Fieldbus and wireless devices, use calibrated range in place of span.

| Differential pressure range | Reference accuracy ⁽¹⁾ |
|-----------------------------|--|
| Range 6 | $\pm 0.055\%$ of span; Spans less than 10:1, $\pm [0.005 + 0.01(\text{URL}/\text{Span})]\%$ of span |
| Range 7 | $\pm 0.055\%$ of span; Spans less than 10:1, $\pm [0.015 + 0.005(\text{URL}/\text{span})]\%$ of span |
| Range 8 | $\pm 0.055\%$ of span; Spans less than 5:1, $\pm [0.015 + 0.005(\text{URL}/\text{span})]\%$ of span |

1. For transmitters assembled to Rosemount 1199 remote seals, consult factory.

8.1.4 Process temperature RTD

± 0.67 °F (0.37 °C)

8.1.5 Long term stability

| Differential pressure range | Stability |
|-----------------------------|----------------------------------|
| Range 6–8 | $\pm 0.35\%$ of URL for 10 years |

8.1.6 Process temperature

The greater of ± 0.185 °F (0.103 °C) or 0.1% of reading per year (excludes RTD sensor stability)

8.1.7 Warranty⁽¹⁾

Classic models

- 1-year limited warranty is standard⁽²⁾
- Extended three-year and five-year limited warranties available if ordered⁽³⁾

Ultra models

- 15-year limited warranty⁽⁴⁾
 1. Warranty details can be found in Emerson™ Terms & Condition of Sale. Document 63445. Rev G (10/06).
 2. Goods are warranted for 12 months from the date of initial installation of 18 months from the date of shipment by seller, whichever period expires first.
 3. Three-year and five-year warranty apply to date of shipment by seller.
 4. Rosemount Ultra transmitters have a limited warranty of 15 years from date of shipment. All other provisions of Emerson standard limited warranty remain the same.

8.1.8 Dynamic performance

Total response time⁽¹⁾⁽²⁾ 100 ms

Dead time⁽³⁾ 45 ms

Sensor update rate⁽⁴⁾ 22 Hz

1. For transmitters assembled to Rosemount 1199 remote seals, consult factory.
2. For FOUNDATION™ Fieldbus (output code F), add 52 ms to stated values (not including segment macro-cycle). For option code DA2, add 45 ms (nominal) to stated values.
3. For option code DA2, dead time is 90 milliseconds (nominal).
4. Does not apply to Wireless (output code X). See “IEC 62591 (WirelessHART®)” on page 33 for wireless update rate.

8.1.9 Ambient temperature effect

| Differential pressure range | Ambient temperature effect ⁽¹⁾ |
|-----------------------------|--|
| Range 6 | ±0.035% URL + 0.0625% span from 1:1 to 5:1; ±0.070% + 0.125% span from >5:1 to 50:1 |
| Range 7 | ±0.0125% URL + 0.0625% span from 1:1 to 5:1; ±0.025% + 0.125% span from >5:1 to 100:1 |
| Range 8 | ±0.0125% URL + 0.0625% span from 1:1 to 5:1; ±0.025% + 0.125% span from >5:1 to 150:1 |

1. Temperature effect calculated per 50 °F (28 °C).

8.1.10 Process temperature RTD interface

Minimum span = 0.39 °F (0.216 °C) per 50 °F (28 °C)

8.1.11 Line pressure effect (DP measurement only)

| Differential pressure range | Zero error | Span error |
|-----------------------------|------------------------|-------------------------------------|
| Range 6 | ±0.1% URL per 1000 psi | ±0.3% of reading per 1000 psi |
| Range 7 | ±0.1% URL per 1000 psi | ±0.2% of reading per 1000 psi |
| Range 8 | ±0.1% URL per 1000 psi | -1.6% ±0.2% of reading per 1000 psi |

8.1.12 Mounting position effects

Zero shifts to ±1.25 in H₂O (6.22 mbar), which can be zeroed.

Span: No effect

8.1.13 Vibration effect

Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10–60 Hz 0.21 mm displacement peak amplitude/60–2000 Hz 3g).

For housing style codes 1J, 1K, 1L, 2J, and 2M: Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field with general application or pipeline with low vibration level (10–60 Hz 0.15 mm displacement peak amplitude/60–500 Hz 2g).

8.1.14 Power supply effect

Less than ±0.005% of calibrated span per volt change in voltage at the transmitter terminals

Electromagnetic compatibility (EMC)

Meets all industrial environment requirements of EN61326 and NAMUR NE-21⁽¹⁾⁽²⁾. Maximum deviation < 1% Span during EMC disturbance⁽³⁾⁽⁴⁾⁽⁵⁾.

1. NAMUR NE-21 is met on output type A if no external temperature sensor is attached.
2. NAMUR NE-21 does not apply to wireless output code X.
3. During surge event device may exceed maximum EMC deviation limit or reset; however, device will self-recover and return to normal operation within specified start-up time.
4. For devices with Junction Box housing or Remote Display (housing styles: 2A-2C, 2E-2G, 2J, 2M) testing performed with shielded cable.
5. Measurement Type 7 requires shielded cable for the process temperature connection.

Transient protection (option T1)

Tested in accordance with IEEE C62.41.2-2002, Location Category B

- 6 kV crest (0.5 μs – 100 kHz)
- 3 kA crest (8 x 20 microseconds)
- 6 kV crest (1.2 x 50 microseconds)

8.2 Functional specifications

8.2.1 Range and sensor limits

| Differential pressure range | LRL | URL |
|-----------------------------|-------------------------------------|-----------------------------------|
| Range 6 | -250 inH ₂ O (-623 mbar) | 250 inH ₂ O (623 mbar) |
| Range 7 | -700 inH ₂ O (-1,74 bar) | 700 inH ₂ O (1,74 bar) |
| Range 8 | -150 psi (-10,34 bar) | 150 psi (10,34 bar) |

8.2.2 Process temperature RTD interface

| LRL | URL |
|-------------------|------------------|
| -328 °F (-200 °C) | 1562 °F (850 °C) |

8.2.3 Minimum span limits

| Differential pressure range | Limit ⁽¹⁾ |
|-----------------------------|-----------------------------------|
| Range 6 | 5 inH ₂ O (12,44 mbar) |
| Range 7 | 7 inH ₂ O (17,42 mbar) |
| Range 8 | 1 psi (68,95 mbar) |

1. For transmitters assembled to Rosemount 1199 remote seals, consult factory.

8.2.4 Process temperature RTD interface

52 °F (11 °C)

8.2.5 Service

Rosemount 3051SHP (DP only)

Liquid, gas, and vapor applications

Rosemount 3051SHP (DP + Temperature)

Liquids, saturated steam

8.2.6 4–20 mA HART

Zero and span adjustment

Zero and span values can be set anywhere within the range.
Span must be greater than or equal to the minimum span.

Output

Two-wire 4–20 mA is user-selectable for linear or square root output. Digital process variable superimposed on 4–20 mA signal, available to any host that conforms to the HART protocol.

Power supply

External power supply required.

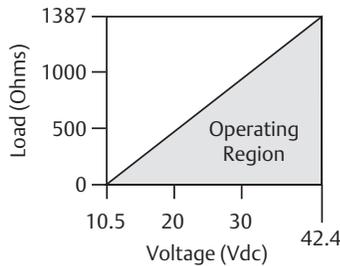
- Rosemount 3051SHP: 10.5 to 42.4 Vdc with no load
- Rosemount 3051SHP with Advanced HART Diagnostics Suite: 12 to 42.4 Vdc with no load

Load limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

Figure 1-16. Rosemount 3051SHP

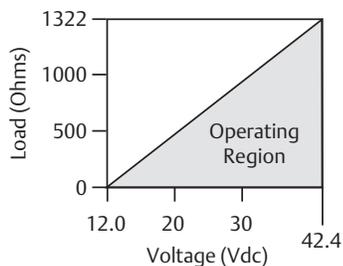
Maximum Loop Resistance = $43.5 \times (\text{Power Supply Voltage} - 10.5)$



The Field Communicator requires a minimum loop resistance of 250Ω for communication.

Figure 1-17. Rosemount 3051SHP, 3051SHP with HART Diagnostics (option code DA2), and 3051SHP with DP + T Measurement

Maximum Loop Resistance = $43.5 \times (\text{Power Supply Voltage} - 12.0)$



The Field Communicator requires a minimum loop resistance of 250Ω for communication.

Advanced HART diagnostics suite (option code DA2)

Statistical process monitoring (SPM) provides statistical data (standard deviation, mean, coefficient of variation) that can be used to detect process and process equipment anomalies, including plugged impulse lines, air entrainment, pump cavitation, furnace flame instability, distillation column flooding and more. This diagnostic allows you to take preventative measures before abnormal process situations result in unscheduled downtime or rework.

Power advisory diagnostic pro-actively detects and notifies you of degraded electrical loop integrity before it can affect your process operation. Example loop problems that can be detected include water in the terminal compartment, corrosion of terminals, improper grounding, and unstable power supplies.

The device dashboard presents the diagnostics in a graphical, task-based interface that provides single click access to critical process/device information and descriptive graphical troubleshooting.

Suite includes: SPM, power advisory, status log, variable log, advanced process alerts, service alerts, and time stamp capability.

8.2.7 FOUNDATION Fieldbus

Power supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter terminal voltage.

Current draw

17.5 mA for all configurations (including LCD display option)

Parameters

| | |
|--|-----------|
| Schedule entries | 14 (max.) |
| Links | 30 (max.) |
| Virtual communications relationships (VCR) | 20 (max.) |

Standard function blocks

Resource block

Contains hardware, electronics, and diagnostic information.

Transducer block

Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD display block

Configures the local display.

Two analog input blocks

Processes the measurements for input into other function blocks. The output value is in engineering or custom units and contains a status indicating measurement quality.

PID block with auto-tune

Contains all logic to perform PID control in the field including cascade and feed forward. Auto-tune capability allows for superior tuning for optimized control performance.

Backup link active scheduler (LAS)

The transmitter can function as a link active scheduler if the current link master device fails or is removed from the segment.

Software upgrade in the field

Software for the Rosemount 3051SHP with FOUNDATION Fieldbus is easy to upgrade in the field using the FOUNDATION Fieldbus “Common Device Software Download” procedure.

PlantWeb™ alerts

Enable the full power of the PlantWeb digital architecture by diagnosing instrumentation issues, communicating advisory, maintenance, and failure details, and recommending a solution.

Advanced control function block suite (option code A01)

Input selector block

Selects between inputs and generates an output using specific selection strategies such as minimum, maximum, midpoint, average, or first “good.”

Arithmetic block

Provides pre-defined application-based equations including flow with partial density compensation, electronic remote sensors, hydrostatic tank gauging, ratio control and others.

Signal characterizer block

Characterizes or approximates any function that defines an input/output relationship by configuring up to twenty X, Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates.

Integrator block

Compares the integrated or accumulated value from one or two variables to pre-trip and trip limits and generates discrete output signals when the limits are reached. This block is useful for calculating total flow, total mass, or volume over time.

Output splitter block

Splits the output of one PID or other control block so that the PID will control two valves or other actuators.

Control selector block

Selects one of up to three inputs (highest, middle, or lowest) that are normally connected to the outputs of PID or other control function blocks.

| Block | Execution time |
|----------------------|-----------------|
| Resource | N/A |
| Transducer | N/A |
| LCD Display Block | N/A |
| Analog Input 1, 2 | 20 milliseconds |
| PID with Auto-tune | 35 milliseconds |
| Input Selector | 20 milliseconds |
| Arithmetic | 20 milliseconds |
| Signal Characterizer | 20 milliseconds |

| Block | Execution time |
|------------------|-----------------|
| Integrator | 20 milliseconds |
| Output Splitter | 20 milliseconds |
| Control Selector | 20 milliseconds |

Fully compensated mass flow block (option code H01)

Calculates fully compensated mass flow based on differential pressure with external process pressure and temperature measurements over the Fieldbus segment. Configuration for the mass flow calculation is easily accomplished using the Rosemount Engineering Assistant 5.5.1 software.

FOUNDATION Fieldbus diagnostics suite (option code D01)

SPM provides statistical data (standard deviation and mean) that can be used to detect process and process equipment anomalies, including plugged impulse lines, air entrainment, pump cavitation, furnace flame instability, distillation column flooding, and more. This diagnostic allows you to take preventative measures before abnormal process situations result in unscheduled downtime or rework.

The device dashboard presents the diagnostics in a graphical, task-based interface that provides single click access to critical process/device information and descriptive graphical troubleshooting.

Suite includes: SPM and plugged impulse line detection (PIL).

8.2.8 IEC 62591 (*WirelessHART*[®])

Output

IEC 62591 (*WirelessHART*), 2.4 GHz DSSS

8.2.9 Radio frequency power output from antenna

- External antenna (WK option): Maximum of 10 mW (10 dBm) EIRP
- Extended range, external antenna (WM option): Maximum of 18 mW (12.5 dBm) EIRP
- Remote (WJ option) antenna: Maximum of 17 mW (12.3 dBm) EIRP
- High-gain, remote antenna (WN option): Maximum of 40 mW (16 dBm) EIRP

8.2.10 Local display

The optional seven-digit LCD display can display user-selectable information such as primary variable in engineering units, percent of range, sensor module temperature, and electronics temperature. The display updates based on the wireless update rate.

8.2.11 Update rate

User-selectable 1 second to 60 minutes

8.2.12 Power module

Field replaceable, keyed connection eliminates the risk of incorrect installation, Intrinsically Safe Lithium-thionyl chloride Power Module with polybutadine terephthalate (PBT) enclosure. Ten-year life at one minute update rate.⁽¹⁾

- Reference conditions are 70 °F (21 °C), and routing data for three additional network devices.
Note: Continuous exposure to ambient temperature limits of -40 °F or 185 °F (-40 °C or 85 °C) may reduce specified life by less than 20 percent.

8.2.13 Overpressure limits

| Pressure range | Overpressure limit |
|---------------------------|------------------------|
| Rosemount 3051SHP, Static | 22,500 psi (1,551 bar) |
| Rosemount 3051SHP, DP | 15,000 psi (1,034 bar) |

8.2.14 Maximum working pressure limits

Maximum working pressure is the maximum pressure allowed for normal transmitter operation. For a differential pressure transmitter, the maximum working pressure is the static line pressure under which the transmitter can safely operate. If one side of the transmitter is exposed to the full static line pressure due to mis-valving, the transmitter will experience an output shift and must be re-zeroed. For a gage or absolute pressure transmitter, the maximum working pressure is the same as the Upper Range Limit (URL). The maximum working pressure of transmitters with assemble-to options is limited by the lowest maximum pressure rating of the individual components.

The maximum working pressure of the Rosemount 3051SHP is specified in the model number of the product and is rated up to 15,000 psi (1,034 bar).

8.2.15 Static pressure limits

Operates within specifications between static line pressures of:
0,5 psia to 15,000 psig (0,03 to 1.034,21 bar) for transmitters with a maximum working pressure of 15,000 psig.

8.2.16 Burst pressure limits

37,500 psi (2,585 bar)

8.2.17 Temperature limits

Ambient

-40 to 185 °F (-40 to 85 °C)

With LCD display⁽¹⁾: -40 to 175 °F (-40 to 80 °C)

- LCD display may not be readable and LCD display updates will be slower at temperatures below -4 °F (-20 °C).

Storage

-50 to 185 °F (-46 to 85 °C)
With LCD display: -40 to 185 °F (-40 to 85 °C)
With wireless output: -40 to 185 °F (-40 to 85 °C)

Process temperature limits

At atmospheric pressures and above:

| Coplanar sensor module | |
|-------------------------------------|-------------------------------|
| Silicone fill sensor ⁽¹⁾ | -40 to 250 °F (-40 to 121 °C) |

1. Process temperatures above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio. For example, for process temperature of 195 °F (91 °C), new ambient temperature limit is equal to 170 °F (77 °C). This can be determined as follows: $(195\text{ °F} - 185\text{ °F}) \times 1.5 = 15\text{ °F}$, $185\text{ °F} - 15\text{ °F} = 170\text{ °F}$

8.2.18 Indication

Optional three-line LCD display

8.2.19 Zero and span adjustment requirements

Zero and span values can be set anywhere within the range limits stated in “Range and sensor limits” on page 29. Span must be greater than or equal to the minimum span stated in “Minimum span limits” on page 29.

8.2.20 Humidity limits

0–100% relative humidity

8.2.21 Turn-on time⁽¹⁾

When power is applied to the transmitter during startup, performance will be within specification per the time period described below:

Rosemount 3051SHP DP: 2 seconds

Rosemount 3051SHP DP + T: 5 seconds

1. Does not apply to Wireless option code X.

8.2.22 Volumetric displacement

Less than 0.0005 in³ (0,008 cm³)

8.2.23 Damping

Analog output response time to a step change is user-selectable from 0 to 60 seconds for one time constant. Software damping is in addition to sensor module response time.

For Rosemount 3051SHP DP + T, each variable can be individually adjusted.

8.2.24 Transmitter security

Activating the transmitter security function prevents changes to the transmitter configuration, including local zero and span adjustments. Security is activated by an internal switch.

8.2.25 Failure mode alarm

4–20 mA HART (output option code A)

If self-diagnostics detect a gross transmitter failure, the analog signal will be driven off-scale to alert the user. Rosemount standard (default), NAMUR, and custom alarm levels are available (see [Alarm configuration](#)).

High or low alarm signal is software-selectable or hardware-selectable via the optional switch (option D1).

8.2.26 Alarm configuration

| | High alarm | Low alarm |
|---------------------------------|--------------|------------|
| Default | ≥ 21.75 mA | ≤ 3.75 mA |
| NAMUR ⁽¹⁾ | ≥ 22.5 mA | ≤ 3.6 mA |
| Custom levels ⁽²⁾⁽³⁾ | 20.2–23.0 mA | 3.4–3.8 mA |

1. Analog output levels are compliant with NAMUR recommendation NE 43, see option codes C4 or C5.

2. Low alarm must be 0.1 mA less than low saturation and high alarm must be 0.1 mA greater than high saturation.

3. For option code DA2, low alarm custom values are 3.6–3.8 mA.

8.2.27 Safety-certified transmitter failure values⁽¹⁾

Device safety accuracy: ±2.0% of analog output span ⁽²⁾

Device safety response time: 1.5 seconds

1. Does not apply to wireless option code X.

2. Trip values in the DCS or safety logic solver should be derated by this device safety accuracy.

8.3 Physical specifications

8.3.1 Material selection

Emerson provides a variety of Rosemount product with various product options and configurations including materials of construction that can be expected to perform well in a wide range of applications. The Rosemount product information presented is intended as a guide for the purchaser to make an appropriate selection for the application. It is the purchaser's sole responsibility to make a careful analysis of all process parameters (such as all chemical components, temperature, pressure, flow rate, abrasives, contaminants, etc.), when specifying product, materials, options and components for the particular application. Emerson is not in a position to evaluate or guarantee the compatibility of the process fluid or other process parameters with the product, options, configuration or materials of construction selected.

8.3.2 Electrical connections

1/2–14 NPT, G¹/₂, and M20 x 1¹/₂ conduit. HART interface connections fixed to terminal block for output code A and X.

8.3.3 Process connections

Autoclave connection or seals

8.3.4 Process-wetted parts

Process isolating diaphragms

Coplanar sensor module

Alloy C-276 (UNS N10276)

8.3.5 Non-wetted parts

Electronics housing

Low-copper aluminum alloy or CF-8M (Cast 316 SST)

Enclosures meet NEMA[®] Type 4X, IP66, and IP68 [66 ft (20 m) for 168 hours] when properly installed.

Note

IP 68 is not available with wireless output.

Coplanar sensor module housing

C-276 module base, CF-3M (Cast 316L SST) upper module housing

8.3.6 Sensor module fill fluid

Silicone is standard.

8.3.7 Paint for aluminum housing

Polyurethane

8.3.8 Cover O-rings

Buna-N

8.3.9 Wireless antenna

External antenna (WK/WM)

PBT/PC integrated omni-directional antenna

Remote antenna (WN)

Fiberglass omni-directional antenna

8.3.10 Power module

Field replaceable, keyed connection eliminates the risk of incorrect installation, Intrinsically Safe Lithium-thionyl chloride power module with PBT enclosure

8.3.11 Shipping weights

Sensor module weights

4.49 lb (2,04 kg)

Transmitter weights⁽¹⁾

| Rosemount 3051SHP Transmitter with sensor module | |
|--|-------------------|
| Junction Box housing, direct process connection | 5.64 lb (2,56 kg) |
| PlantWeb housing, direct process connection | 6.04 lb (2,74 kg) |
| Wireless PlantWeb housing, direct process connection | 6.64 lb (3,01 kg) |

1. Fully functional transmitter with sensor module, housing, terminal block, and covers. Does not include LCD display.

Transmitter option weights

| Option code | Option | Add lb (kg) |
|-------------------|---|-------------|
| 1J, 1K, 1L | SST PlantWeb housing | 3.5 (1,6) |
| 2J | SST Junction Box housing | 3.4 (1,5) |
| 7J | SST Quick Connect | 0.4 (0,2) |
| 2A, 2B, 2C | Aluminum Junction Box housing | 1.1 (0,5) |
| 1A, 1B, 1C | Aluminum PlantWeb housing | 1.1 (0,5) |
| M5 ⁽¹⁾ | LCD display for Aluminum PlantWeb housing | 0.8 (0,4) |
| | LCD display for SST PlantWeb housing | 1.6 (0,7) |
| B4 | SST mounting bracket for coplanar flange | 1.2 (0,5) |

1. Includes LCD display and display cover.

Transmitter component weights

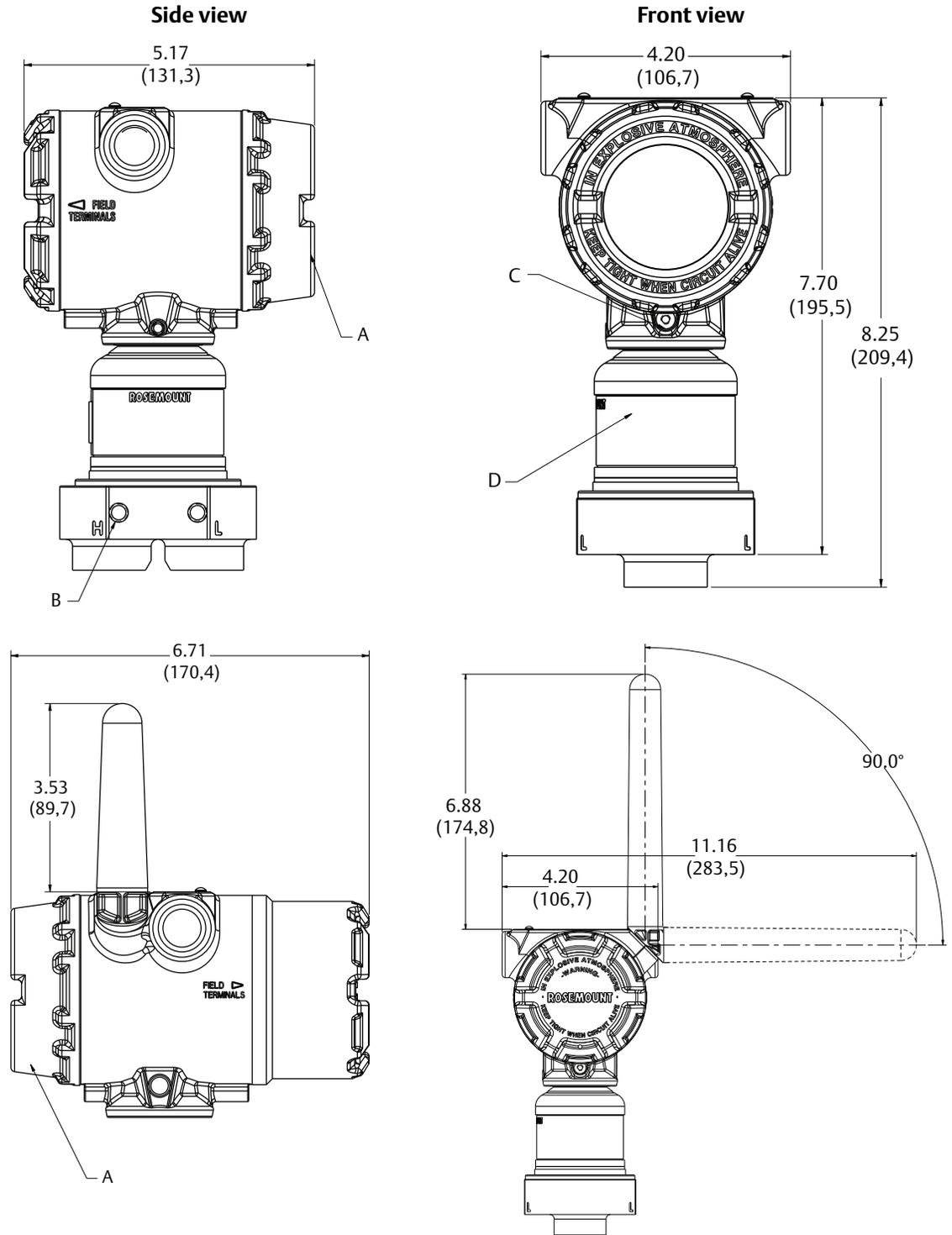
| Item | Weight in lb (kg) |
|-------------------------|-------------------|
| Aluminum standard cover | 0.4 (0,2) |
| SST standard cover | 1.3 (0,6) |
| Aluminum display cover | 0.7 (0,3) |
| SST display cover | 1.5 (0,7) |

| Item | Weight in lb (kg) |
|-----------------------------|-------------------|
| Wireless extended cover | 0.7 (0,3) |
| LCD display ⁽¹⁾ | 0.1 (0,04) |
| Junction box terminal block | 0.2 (0,1) |
| PlantWeb terminal block | 0.2 (0,1) |
| Power module | 0.5 (0,2) |

1. Display only.

8.4 Dimensional drawings

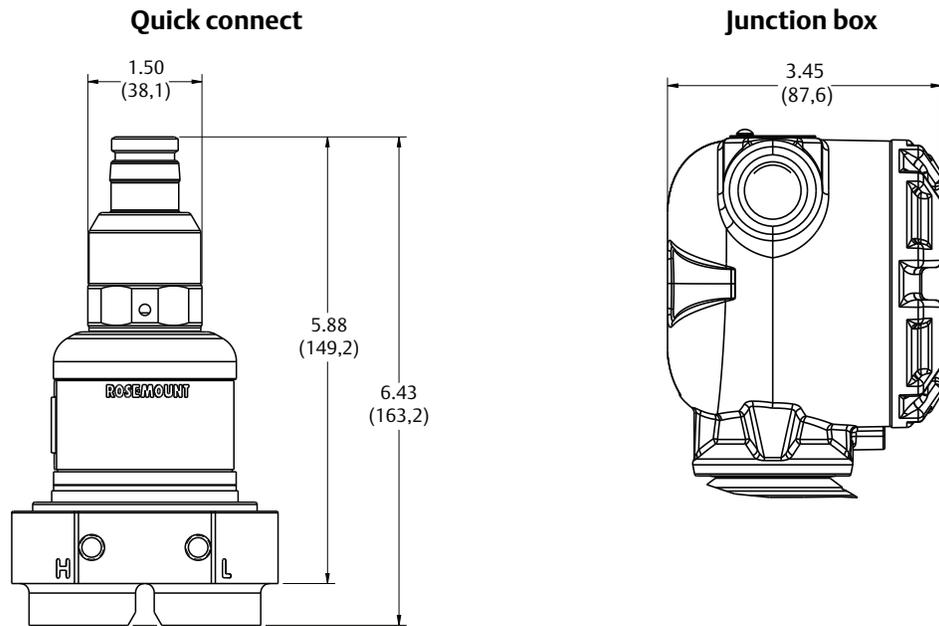
Figure 1-18. PlantWeb Housing



- A. Digital display cover
 - B. Bracket mounting holes (5/16–18 UNC, two places)
 - C. Housing rotation set screw
- Dimensions are in inches (millimeters).

- D. Nameplate
- E. Digital display cover

Figure 1-19. Other Housings



Dimensions are in inches (millimeters).

Figure 1-20. Remote Meter Option

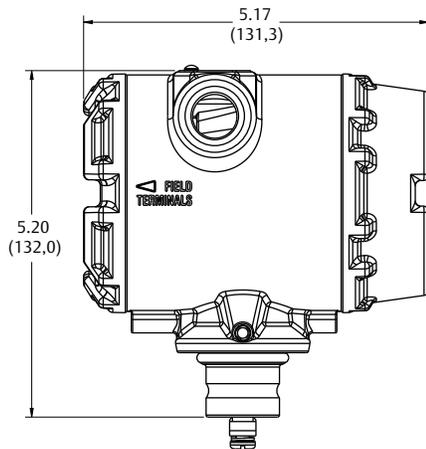
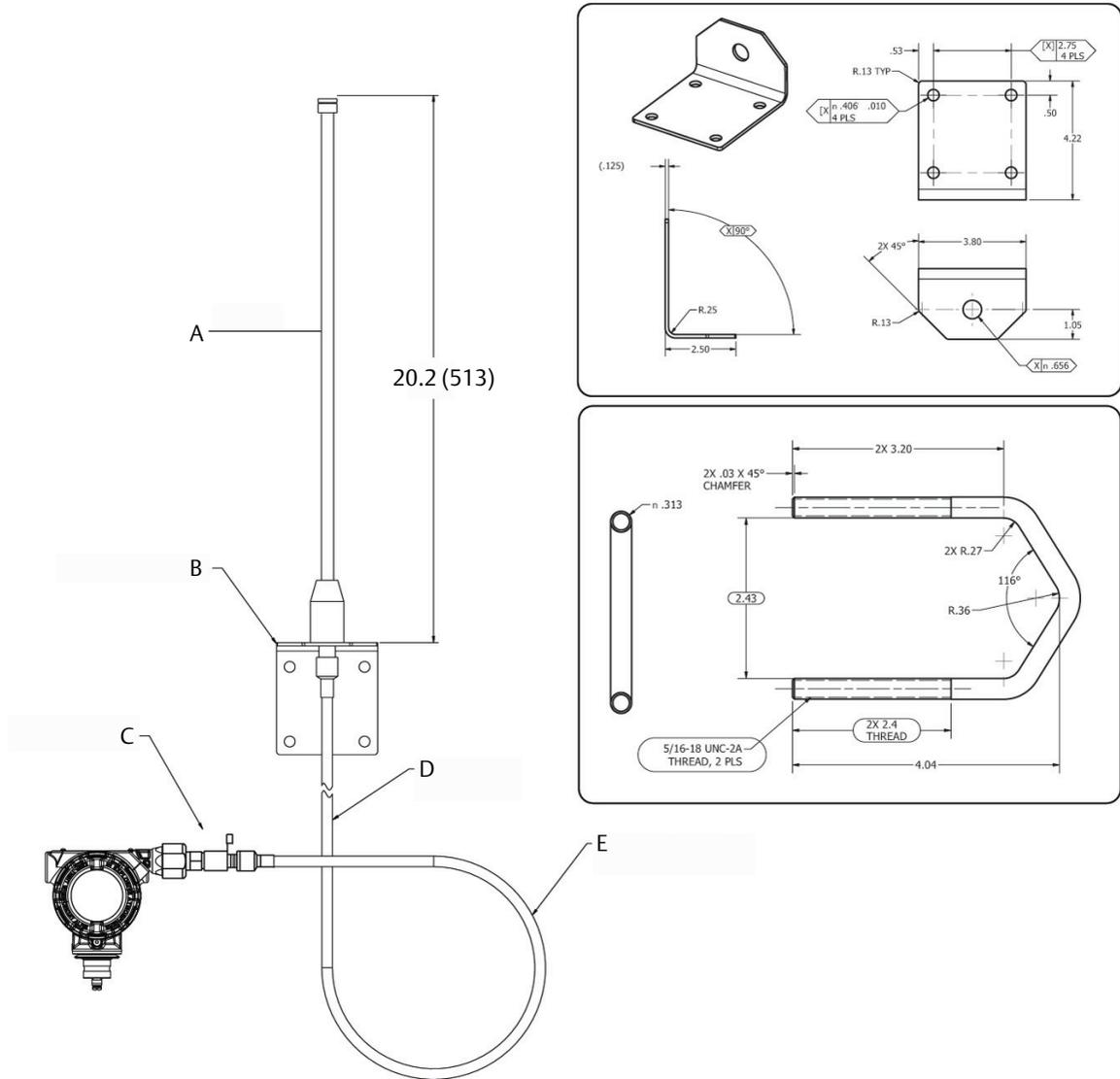


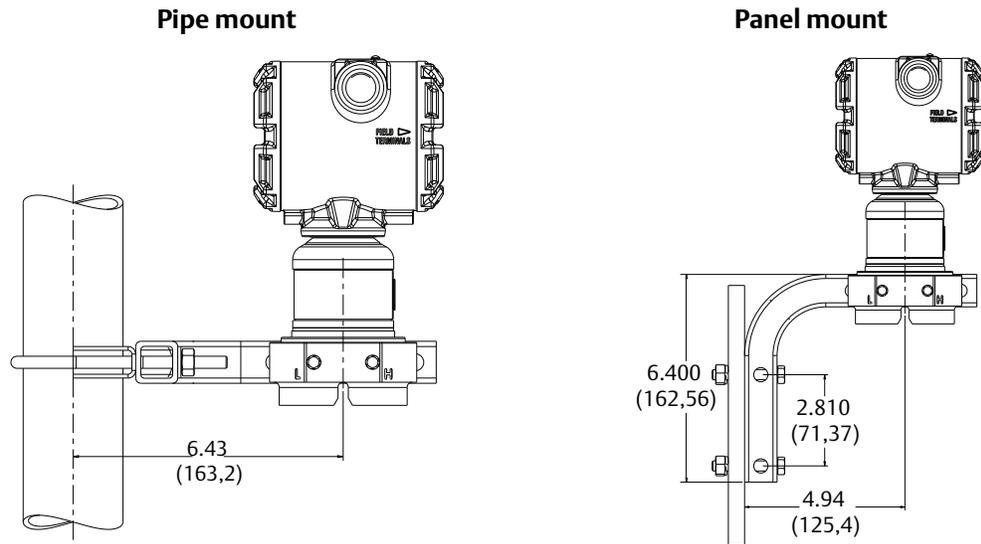
Figure 1-21. High Gain, Remote Mount Antenna (WN Option)



- A. Antenna
- B. Mounting bracket
- C. Lightning arrester
- D. 25 ft (7,6 m) cable
- E. Min drip loop Ø12-in. (0.3 m)

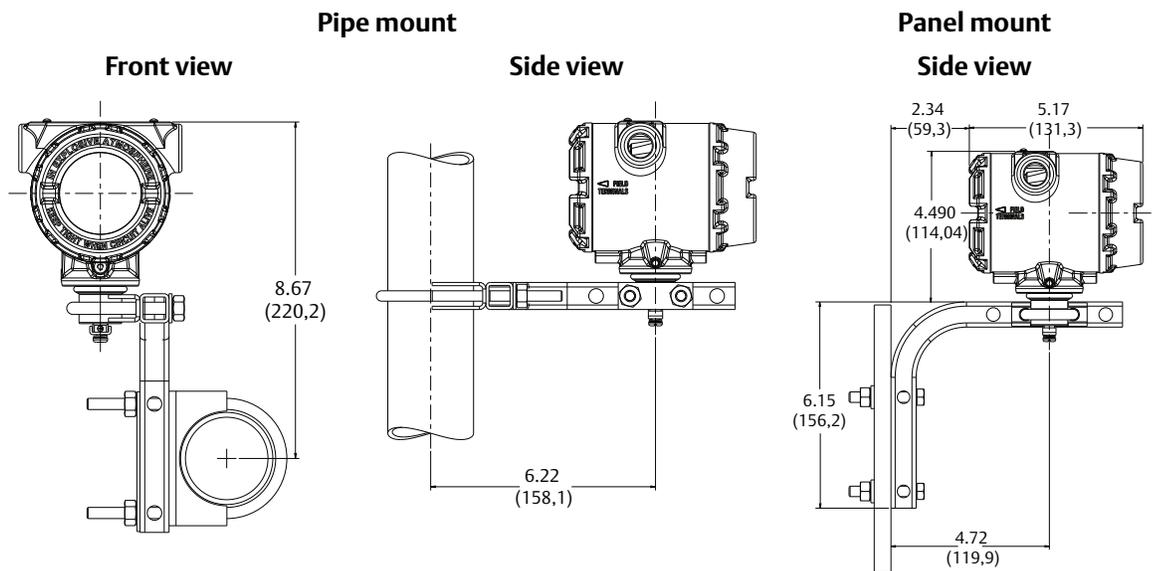
Dimensions are in inches (millimeters).

Figure 1-22. Traditional Mounting Configurations



Dimensions are in inches (millimeters).

Figure 1-23. Remote Display Mounting Configurations (B4 Bracket)



Dimensions are in inches (millimeters).

8.4.1 Options

Transmitter options

Standard configuration

Unless otherwise specified, transmitter is shipped as follows:

| Engineering units | |
|------------------------|---|
| Rosemount 3051SHP | inH ₂ O (Range 6 and 7) psi (Range 8) |
| 4 mA ⁽¹⁾ : | 0 (engineering units above) |
| 20 mA ⁽¹⁾ : | Upper range limit |
| Output | Linear |
| External buttons | None |
| Drain/vent | Specified model code option |
| LCD display | None |
| Alarm ⁽¹⁾ | High |
| Software tag | Blank |
| Damping | 0.4 seconds ⁽²⁾ |

1. Not applicable to FOUNDATION Fieldbus or wireless.
2. For fieldbus protocols, default damping is 1 second.

8.4.2 Custom configuration⁽¹⁾

If option code C1 is ordered, the customer may specify the following data in addition to the standard configuration parameters.

- Output information
- Transmitter information
- LCD display configuration
- Hardware selectable information
- Signal selection
- Wireless information
- Scaled variable
- and more

For Rosemount 3051SHP, refer to the Rosemount 3051SHP [Configuration Data Sheet](#).

1. Not applicable to FOUNDATION Fieldbus protocol.

8.4.3 Tagging (three options available)

- Standard SST hardware tag is wired to the transmitter. Tag character height is 0.125-in. (3,18 mm), 56 characters maximum.
- Tag may be permanently stamped on transmitter nameplate upon request, 56 characters maximum.
- Tag may be stored in transmitter memory. Character limit is dependent on protocol.
 - HART 4–20mA: 8 characters
 - WirelessHART: 32 characters
 - FOUNDATION Fieldbus: 32 characters

Commissioning tag⁽¹⁾

A temporary commissioning tag is attached to all transmitters. The tag indicates the device ID and allows an area for writing the location.

Output information

Output range points must be the same unit of measure. Available units of measure include:

| Pressure | | | |
|--------------------------|---------------------------|---|--|
| atm | inH ₂ O @4 °C | g/cm ² | psi |
| mbar | mmH ₂ O | kg/cm ² | torr |
| bar | mmHg | Pa | cmH ₂ O @4 °C ⁽¹⁾ |
| inH ₂ O | mmH ₂ O @4 °C | kPa | mH ₂ O @4 °C ⁽¹⁾ |
| inHg | ftH ₂ O | MPa | ftH ₂ O @60 °F ⁽¹⁾ |
| hPa ⁽¹⁾ | inH ₂ O @60 °F | kg/m ² ⁽¹⁾ | cmHg @0 °C ⁽¹⁾ |
| mHg @0 °C ⁽¹⁾ | psf ⁽¹⁾ | ftH ₂ O @4 °C ⁽¹⁾ | |

1. Field configurable only, not available for factory calibration or custom configuration (option code C1 "Software configuration").

Display and interface options

M5 Digital Display

- 3-line, 7-digit LCD display
- Direct reading of digital data for higher accuracy
- Displays user-defined flow, level, volume, or pressure units
- Displays diagnostic messages for local troubleshooting
- 90-degree rotation capability for easy viewing

Configuration buttons

Transmitter will ship with no buttons unless option D1 (hardware adjustments) or DA2 (Advanced HART Diagnostics Suite) are specified.

1. Only applicable to FOUNDATION Fieldbus.

The Rosemount Wireless Transmitter is available with a digital zero button installed with or without the LCD display digital display.

Transient protection (option code T1)

Tested in accordance with IEEE C62.41.2-2002, Location Category B

6 kV crest (0.5 μ s – 100 kHz)

3 kA crest (8 x 20 μ s)

6 kV crest (1.2 x 50 μ s)

Conduit plug

DO 316 SST Conduit Plug

Single 316 SST conduit plug replaces carbon steel plug

Bracket option

B4 Bracket for 2-in. pipe or panel mounting

- Bracket for mounting of transmitter on 2-in. pipe or panel
- 316 stainless steel construction with stainless steel bolts

Other publications

For additional information, go to Emerson.com.

8.5 Ordering information

Table 1-4. Rosemount 3051SHP Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

| Model | Transmitter type | |
|--|---|---|
| 3051SHP | High Static Differential Pressure Transmitter | |
| Performance class⁽¹⁾ | | |
| 1 | Ultra: 0.055% span accuracy, 15-yr limited warranty | ★ |
| 2 | Classic: 0.055% span accuracy | ★ |
| Connection type | | |
| C | Coplanar | ★ |
| Measurement type | | |
| D | Differential pressure | ★ |
| 7 | Differential pressure and temperature | ★ |
| Differential pressure range | | |
| 6 | -250 to 250 inH ₂ O (-623 to 623 mbar) | ★ |

Table 1-4. Rosemount 3051SHP Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

| | | | | |
|---|--|-----------------|---------------------------|---|
| 7 | -700 to 700 inH ₂ O (-1,74 to 1,74 bar) | | | ★ |
| 8 | -150 to 150 psi (-10,34 to 10,34 bar) | | | ★ |
| Static pressure range | | | | |
| A | None | | | ★ |
| Maximum static line pressure | | | | |
| 3 | 15,000 psi (1,034 bar) | | | ★ |
| Temperature input | | | | |
| N | None | | | ★ |
| R | RTD input (Type Pt 100, -328 to 1562 °F [-200 to 850 °C]) | | | |
| Isolating diaphragm⁽²⁾⁽³⁾ | | | | |
| 3 | Alloy C-276 | | | ★ |
| Process connection | | | | |
| B12 ⁽⁴⁾⁽⁵⁾ | Assemble to two Rosemount 1199 Seals | | | ★ |
| H11 | Coned and threaded, compatible with autoclave type F-250-C | | | |
| Transmitter output | | | | |
| A | 4–20 mA with digital signal based on HART protocol | | | ★ |
| F ⁽⁶⁾ | FOUNDATION Fieldbus protocol | | | ★ |
| X ⁽⁷⁾ | Wireless (requires wireless options and wireless PlantWeb housing) | | | ★ |
| Housing style | | Material | Conduit entry size | |
| 1A | PlantWeb housing | Aluminum | 1/2–14 NPT | ★ |
| 1B | PlantWeb housing | Aluminum | M20 x 1.5 | ★ |
| 1C | PlantWeb housing | Aluminum | G1/2 | |
| 1J | PlantWeb housing | SST | 1/2–14 NPT | ★ |
| 1K | PlantWeb housing | SST | M20 x 1.5 | ★ |
| 1L | PlantWeb housing | SST | G1/2 | |
| 2A | Junction Box housing | Aluminum | 1/2–14 NPT | ★ |
| 2B | Junction Box housing | Aluminum | M20 x 1.5 | ★ |
| 2C | Junction Box housing | Aluminum | G1/2 | |
| 2E | Junction Box housing with output for remote display and interface | Aluminum | 1/2–14 NPT | ★ |
| 2F | Junction Box housing with output for remote display and interface | Aluminum | M20 x 1.5 | ★ |
| 2G | Junction Box housing with output for remote display and interface | Aluminum | G1/2 | |
| 2J | Junction Box housing | SST | 1/2–14 NPT | ★ |
| 2M | Junction Box housing with output for remote display and interface | SST | 1/2–14 NPT | ★ |
| 5A ⁽⁸⁾ | Wireless PlantWeb housing | Aluminum | 1/2–14 NPT | ★ |

Table 1-4. Rosemount 3051SHP Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

| | | | | |
|-------------------|---|-----|------------|---|
| 5J ⁽⁸⁾ | Wireless PlantWeb housing | SST | 1/2–14 NPT | ★ |
| 7J ⁽⁸⁾ | Quick Connect (A size Mini, 4-pin male termination) | SST | N/A | ★ |

8.5.1 Wireless options (requires option code X and wireless PlantWeb housing)

| | | | | |
|--|--|--|--|---|
| Update rate | | | | |
| WA | User-configurable update rate | | | ★ |
| Operating frequency and protocol | | | | |
| 3 | 2.4 GHz DSSS, IEC 62591 (<i>WirelessHART</i>) | | | ★ |
| Omni-directional wireless antenna | | | | |
| WK | External antenna | | | ★ |
| WJ | Remote antenna | | | |
| WM | Extended range, external antenna | | | ★ |
| WN | High-gain, remote antenna | | | |
| SmartPower™⁽⁸⁾ | | | | |
| 1 | Adapter for black power module (I.S. power module sold separately) | | | ★ |

8.5.2 Other options (Include with selected model number)

| | | | | |
|--|---|--|--|---|
| Extended product warranty | | | | |
| WR3 | 3-year limited warranty | | | ★ |
| WR5 | 5-year limited warranty | | | ★ |
| PlantWeb control functionality ⁽⁹⁾ | | | | |
| A01 | FOUNDATION Fieldbus advanced control function block suite | | | ★ |
| PlantWeb Diagnostic Functionality | | | | |
| D01 ⁽⁹⁾ | FOUNDATION Fieldbus diagnostics suite | | | ★ |
| DAZ ⁽¹⁰⁾⁽¹¹⁾ | Advanced HART diagnostics suite | | | ★ |
| RTD cable (RTD sensor must be ordered separately) | | | | |
| C12 | RTD Input with 12 ft (3,66 m) of shielded cable | | | ★ |
| C13 | RTD Input with 24 ft (7,32 m) of shielded cable | | | ★ |
| C14 | RTD Input with 75 ft (22,86 m) of shielded cable | | | ★ |
| C22 | RTD Input with 12 ft (3,66 m) of armored shielded cable | | | ★ |
| C23 | RTD Input with 24 ft (7,32 m) of armored shielded cable | | | ★ |
| C24 | RTD Input with 75 ft (22,86 m) of armored shielded cable | | | ★ |
| C32 | RTD Input with 12 ft (3,66 m) of ATEX/IECEx flameproof cable | | | ★ |
| C33 | RTD Input with 24 ft (7,32 m) of ATEX/IECEx flameproof cable | | | ★ |
| C34 | RTD Input with 75 ft (22,86 m) of ATEX/IECEx flameproof cable | | | ★ |

Table 1-4. Rosemount 3051SHP Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

| | | |
|--|--|---|
| Mounting bracket | | |
| B4 | Coplanar flange bracket, all 316 SST, 2-in. pipe and panel/ bracket | ★ |
| Software configuration | | |
| C1 | Custom software configuration (requires Configuration Data Sheet) | ★ |
| Alarm level⁽¹¹⁾⁽¹²⁾ | | |
| C4 | NAMUR alarm and saturation levels, high alarm | ★ |
| C5 | NAMUR alarm and saturation levels, low alarm | ★ |
| C6 | Custom alarm and saturation signal levels, high alarm (requires C1 and Configuration Data Sheet) | ★ |
| C7 | Custom alarm and saturation signal levels, low alarm (requires C1 and Configuration Data Sheet) | ★ |
| C8 | Low alarm (standard Rosemount alarm and saturation levels) | ★ |
| Hardware adjustments⁽¹¹⁾⁽¹²⁾⁽¹³⁾ | | |
| D1 | Hardware adjustments (zero, span, alarm, security) | ★ |
| Ground screw⁽¹²⁾ | | |
| D4 | External ground screw assembly | ★ |
| Conduit plug⁽¹⁴⁾ | | |
| DO | 316 SST conduit plug | ★ |
| Customer specified bar code tag | | |
| D6 | Bar code tag | ★ |
| Product certifications⁽¹⁵⁾ | | |
| E1 | ATEX Flameproof | ★ |
| E5 | US Explosion-proof, Dust Ignition-proof | ★ |
| E6 ⁽¹⁶⁾ | Canada Explosion-proof, Dust Ignition-proof, Division 2 | ★ |
| E7 | IECEX Flameproof, Dust Ignition-proof | ★ |
| I1 | ATEX Intrinsic Safety | ★ |
| I5 | US Intrinsically Safe; Nonincendive | ★ |
| I6 | Canada Intrinsically Safe | ★ |
| I7 | IECEX Intrinsic Safety | ★ |
| IA | ATEX FISCO Intrinsic Safety (FOUNDATION Fieldbus protocol only) | ★ |
| IE | US FISCO Intrinsically Safe (FOUNDATION Fieldbus protocol only) | ★ |
| IF | Canada FISCO Intrinsically Safe (FOUNDATION Fieldbus protocol only) | ★ |
| IG | IECEX FISCO Intrinsic Safety (FOUNDATION Fieldbus protocol only) | ★ |
| K1 | ATEX Flameproof, Intrinsic Safety, Type n, Dust | ★ |
| K5 | US Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 | ★ |

Table 1-4. Rosemount 3051SHP Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

| | | |
|--|--|---|
| K6 ⁽¹⁷⁾ | Canada Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 | ★ |
| K7 | IECEX Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n | ★ |
| EM | Technical Regulations Customs Union (EAC) Flameproof | ★ |
| IM | Technical Regulations Customs Union (EAC) Intrinsic Safety | ★ |
| KM | Technical Regulations Customs Union (EAC) Flameproof, Intrinsic Safety | ★ |
| KA ⁽¹⁷⁾ | ATEX and Canada Flameproof, Intrinsically Safe, Division 2 | ★ |
| KB ⁽¹⁷⁾ | US and Canada Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 | ★ |
| KC | US and ATEX Explosion-proof, Intrinsically Safe, Division 2 | ★ |
| KD ⁽¹⁷⁾ | US, Canada, and ATEX Explosion-proof, Intrinsically Safe | ★ |
| KG | US, Canada, ATEX and IECEX FISCO Intrinsic Safety | ★ |
| N1 | ATEX Type n | ★ |
| N7 | IECEX Type n | ★ |
| ND | ATEX Dust | ★ |
| Display type⁽¹⁸⁾ | | |
| M5 | PlantWeb LCD display | ★ |
| M7 ⁽¹¹⁾⁽¹⁷⁾⁽¹⁹⁾ | Remote mount LCD display and interface, PlantWeb housing, no cable, SST bracket | ★ |
| M8 ⁽¹¹⁾⁽²⁰⁾ | Remote mount LCD display and interface, PlantWeb housing, 50 ft (15 m) cable, SST bracket | ★ |
| M9 ⁽¹¹⁾⁽²⁰⁾ | Remote mount LCD display and interface, PlantWeb housing, 100 ft (31 m) cable, SST bracket | ★ |
| Pressure testing | | |
| P1 | Hydrostatic testing with certificate | |
| Calibration certification | | |
| Q4 | Calibration certificate | ★ |
| Material traceability certification | | |
| Q8 | Material traceability certification per EN 10204 3.1B | ★ |
| Quality certification for safety | | |
| QS ⁽¹¹⁾⁽¹³⁾ | Prior-use certificate of FMEDA data | ★ |
| QT ⁽²¹⁾ | Safety-certified to IEC 61508 with certificate of FMEDA data | ★ |
| Transient protection⁽²⁰⁾⁽²²⁾ | | |
| T1 | Transient terminal block | ★ |
| Toolkit performance reports | | |
| QZ | Remote seal system performance calculation report | ★ |

Table 1-4. Rosemount 3051SHP Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

| | | |
|--|---|---|
| NACE certificate⁽²⁰⁾ | | |
| Q15 | Certificate of compliance to NACE MR0175/ISO 15156 for wetted materials | ★ |
| Q25 | Certificate of compliance to NACE MR0103 for wetted materials | ★ |
| Typical model number: 3051SHP 1CD6A3N3 H11A1A DA2 B4 M5 | | |

1. For detailed specifications see “[Specifications and Reference Data](#)” on page 26.
2. Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments. Order with Q15 or Q25 to receive a NACE certificate.
3. Isolator diaphragm selection will dictate materials of construction for wetted parts.
4. Consult factory for available Rosemount 1199 high pressure remote seal options.
5. “Assemble to” items are specified separately and require a completed model number.
6. Requires PlantWeb housing.
7. Only intrinsically safe approval codes apply.
8. Long-Life Power Module must be shipped separately, order Power Module 701PBKKF.
9. Only available with output code F.
10. Only available with output code A.
11. Requires PlantWeb housing and output code A. Includes Hardware Adjustments as standard.
12. This assembly is included with approval options EP, KP, E1, N1, K1, ND, E4, E7, N7, K7, E2, E3, KA, KC, KD, IA, IB, IE, IF, IG, KG, K2, N3, EM, and KM. It is also included with transient protection T1.
13. Not available with housing style codes 00, 01, 2E, 2F, 2G, 2M, 5A, 5J, or 7J.
14. Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug.
15. Valid when SuperModule platform and housing have equivalent approvals.
16. Not available with M20 or G 1/2 conduit entry size.
17. Not available with output code F, option code DA2, or option code QT.
18. Not available with Housing code 7J.
19. See the Rosemount 3051S [Reference Manual](#) for cable requirements. Contact an Emerson representative for additional information.
20. NACE compliant wetted materials are identified by [Footnote 2](#).
21. Not available with output code F or X. Not available with housing code 7J.
22. Not available with housing code 00, 5A, 5J, or 7J.

Section 9 Product Certifications

Rev 2.6

9.1 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).

9.2 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.

9.3 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.

9.4 USA

- E5** Explosionproof, Dust Ignition-proof
Certificate: 143113
Standards: FM Class 3600 - 2011, FM Class 3615 - 2006, FM Class 3810 - 2005, UL 1203 5th Ed., UL 50E 1st Ed., UL 61010-1 (3rd Edition)
Markings: XP CL I, DIV 1, GP B, C, D; T5; DIP CL II, DIV 1, GP E, F, G; CL III; T5(-50 °C ≤ T_a ≤ +85 °C); Seal Not Required; Type 4X
- I5** US Intrinsically Safe; Nonincendive
Certificate: 1143113
Standards: FM Class 3600 - 2011, FM Class 3610 - 2010, FM Class 3611 - 2004, FM Class 3810 - 2005, UL 50E 1st Ed., UL 61010-1 (3rd Edition)
Markings: IS CL I,II,III, DIV 1, GP A, B, C, D, E, F, G, T4; Class 1, Zone 0 AEx ia IIC T4(-50 °C ≤ T_a ≤ +70 °C) [HART]; T4(-50 °C ≤ T_a ≤ +60 °C) [Fieldbus]; NI CL 1, DIV 2, GP A, B, C, D, T5, T_a = 70 °C; Rosemount drawing 03251-1006; Type 4X
- IE** US FISCO Intrinsically Safe
Certificate: 1143113
Standards: FM Class 3600 - 2011, FM Class 3610 - 2010, FM Class 3810 - 2005, UL 50E 1st Ed., UL 61010-1 (3rd Edition)
Markings: IS CL I, DIV 1, GP A, B, C, D, T4(-50 °C ≤ T_a ≤ +60 °C); Class 1, Zone 0 AEx ia IIC T4; Rosemount drawing 03251-1006; Type 4X

9.5 Canada

- E6** Canada Explosion-proof, Dust Ignition-proof, Division 2
 Certificate: 1143113
 Standards: CAN/CSA C22.2 No. 0-10, CSA C22.2 No. 25-1966 (R2014), CSA C22.2 No. 30-M1986 (R2012), CSA C22.2 No. 94.2-07, CSA C22.2 No. 213-M1987 (R2013), CAN/CSA-C22.2 No. 61010-1-12, ANSI/ISA 12.27.01-2011
 Markings: Class I, Groups B, C, D, $-50\text{ °C} \leq T_a \leq +85\text{ °C}$; Class II, Groups E, F, G; Class III; suitable for Class I, Zone 1, Group IIB+H2, T5; Class I, Division 2, Groups A, B, C, D; suitable for Class I, Zone 2, Group IIC, T5; Seal Not Required; Dual Seal; Type 4X
- I6** Canada Intrinsically Safe
 Certificate: 1143113
 Standards: CAN/CSA C22.2 No. 0-10, AN/CSA-60079-0-11, CAN/CSA C22.2 No. 60079-11:14, CSA C22.2 No. 94.2-07, ANSI/ISA 12.27.01-2011
 Markings: Intrinsically Safe Class I, Division 1; Groups A, B, C, D; suitable for Class 1, Zone 0, IIC, T3C, $T_a = 70\text{ °C}$; Rosemount drawing 03251-1006; Dual Seal; Type 4X
- IF** Canada FISCO Intrinsically Safe
 Certificate: 1143113
 Standards: CAN/CSA C22.2 No. 0-10, AN/CSA-60079-0-11, CAN/CSA C22.2 No. 60079-11:14, CSA C22.2 No. 94.2-07, ANSI/ISA 12.27.01-2011
 Markings: Intrinsically Safe Class I, Division 1; Groups A, B, C, D; suitable for Class 1, Zone 0, IIC, T3C, $T_a = 70\text{ °C}$; Rosemount drawing 03251-1006; Dual Seal; Type 4X

9.6 Europe

- E1** ATEX Flameproof
 Certificate: DEKRA 15ATEX0108X
 Standards: EN 60079-0:2012 + A11:2013, EN60079-1:2014, EN60079-26:2015
 Markings: Ex II 1/2 G Ex db IIC T6...T4 Ga/Gb, $T6(-60\text{ °C} \leq T_a \leq +70\text{ °C})$, $T4/T5(-60\text{ °C} \leq T_a \leq +80\text{ °C})$; $V_{\text{max}} = 42.4\text{ VDC}$

| Temperature class | Process temperature | Ambient temperature |
|-------------------|---------------------|---------------------|
| T6 | -60 °C to +70 °C | -60 °C to +70 °C |
| T5 | -60 °C to +80 °C | -60 °C to +80 °C |
| T4 | -60 °C to +120 °C | -60 °C to +80 °C |

Special Conditions for Safe Use (X):

1. This device contains a thin wall diaphragm less than 1 mm thickness that forms a boundary between zone 0 (process connection) and zone 1 (all other parts of the equipment). The model code and data sheet are to be consulted for details of the diaphragm material. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. Flameproof joints are not intended for repair.

3. Non-standard paint options may cause risk from electrostatic discharge. Avoid installations that could cause electrostatic build-up on painted surfaces, and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.
4. Appropriate cable, glands and plugs need to be suitable for a temperature of 5 °C greater than maximum specified temperature for location where installed.

11 ATEX Intrinsic Safety

Certificate: BAS01ATEX1303X

Standards: EN 60079-0:2012, EN 60079-11:2012

Markings:  II 1 G Ex ia IIC T4 Ga, T4(-60 °C ≤ T_a ≤ +70 °C)

| Model | U _i | I _i | P _i | C _i | L _i |
|---|----------------|----------------|----------------|----------------|----------------|
| SuperModule™ | 30 V | 300 mA | 1.0 W | 30 nF | 0 |
| 3051S...A; 3051SF...A; 3051SAL...C; 3051SHP...D...A | 30 V | 300 mA | 1.0 W | 12 nF | 0 |
| 3051S...F; 3051SF...F; 3051SHP...D...F | 30 V | 300 mA | 1.3 W | 0 | 0 |
| 3051S...F...IA; 3051SF ...F...IA; 3051SHP...D...F...IA | 17.5 V | 380 mA | 5.32 W | 0 | 0 |
| 3051S ...A...M7, M8, or M9; 3051SF ...A...M7, M8, or M9; 3051SAL...C... M7, M8, or M9; 3051SHP...D... M7, M8, or M9 | 30 V | 300 mA | 1.0 W | 12 nF | 60 μH |
| 3051SAL; 3051SAM | 30 V | 300 mA | 1.0 W | 12 nF | 33 μH |
| 3051SAL...M7, M8, or M9 3051SAM...M7, M8, or M9 | 30 V | 300 mA | 1.0 W | 12 nF | 93 μH |
| RTD option for 3051SF | 5 V | 500 mA | 0.63 W | N/A | N/A |
| 3051SHP...7...A | 30 V | 300 mA | 1.0 W | 14.8 nF | 0 |
| RTD option for 3051SHP...7...A | 30 V | 2.31 mA | 17.32 mW | N/A | N/A |
| 3051SHP...7...F | 30 V | 300 mA | 1.3 W | 0 | 0 |
| 3051SHP...7...F...IA | 17.5 V | 380 mA | 5.32 W | 0 | 0 |
| RTD option for 3051SHP...7...F | 30 V | 18.24 mA | 137 mW | 0.8 nF | 1.33 mH |

Special Conditions for Safe Use (X):

1. The Rosemount 3051S Transmitters fitted with transient protection are not capable of withstanding the 500 V test as defined in Clause 6.3.13 of EN 60079-11:2012. This must be taken into account during installation.
2. The terminal pins of the Rosemount 3051S SuperModule must be provided with a degree of protection of at least IP20 in accordance with IEC/EN 60529.
3. The Rosemount 3051S 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 a zone 0 area.

IA ATEX FISCO

Certificate: BAS01ATEX1303X

Standards: EN 60079-0:2012, EN 60079-11:2012

Markings:  II 1 G Ex ia IIC T4 Ga, T4(-60 °C ≤ T_a ≤ +70 °C)

| Parameter | FISCO |
|----------------------------|--------|
| Voltage U _i | 17.5 V |
| Current I _i | 380 mA |
| Power P _i | 5.32 W |
| Capacitance C _i | 0 |
| Inductance L _i | 0 |

Special Conditions for Safe Use (X):

1. The Rosemount 3051S Transmitters fitted with transient protection are not capable of withstanding the 500 V test as defined in Clause 6.3.13 of EN 60079-11:2012. This must be taken into account during installation.
2. The terminal pins of the Rosemount 3051S SuperModule must be provided with a degree of protection of at least IP20 in accordance with IEC/EN 60529.
3. The Rosemount 3051S 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 a zone 0 area.

ND ATEX Dust

Certificate: BAS01ATEX1374X

Standards: EN 60079-0:2012, EN 60079-31:2009

Markings:  II 1 D Ex ta IIIC T105 °C T₅₀₀ 95 °C Da, (-20 °C ≤ T_a ≤ +85 °C), V_{max} = 42.4 V

Special Conditions for Safe Use (X):

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient temperature range of the apparatus and capable of withstanding a 7 J impact test.
4. The SuperModule(s) must be securely screwed in place to maintain the ingress protection of the enclosure(s).

N1 ATEX Type n

Certificate: BAS01ATEX3304X

Standards: EN 60079-0:2012, EN 60079-15:2010

Markings:  II 3 G Ex nA IIC T5 Gc, (-40 °C ≤ T_a ≤ +85 °C), V_{max} = 45 V

Special Condition for Safe Use (X):

1. The equipment is not capable of withstanding the 500 V insulation test required by clause 6.5 of EN 60079-15:2010. This must be taken into account when installing the equipment.

Note

RTD Assembly is not included with the Rosemount 3051SFx Type n Approval.

9.7 International

E7 IECEx Flameproof and Dust

Certificate: IECEx DEK 15.0072X, IECEx BAS 09.0014X

Standards: IEC 60079-0:2011, IEC 60079-1:2014, IEC 60079-26:2014, IEC 60079-31:2008

Markings: Ex db IIC T6...T4 Ga/Gb, T6 ($-60\text{ °C} \leq T_a \leq +70\text{ °C}$), T4/T5 ($-60\text{ °C} \leq T_a \leq +80\text{ °C}$); $V_{max} = 42.4\text{ VDC}$

Ex ta IIIC T105 °C T₅₀₀ 95 °C Da ($-20\text{ °C} \leq T_a \leq +85\text{ °C}$)

| Temperature class | Process temperature | Ambient temperature |
|-------------------|---------------------|---------------------|
| T6 | -60 °C to +70 °C | -60 °C to +70 °C |
| T5 | -60 °C to +80 °C | -60 °C to +80 °C |
| T4 | -60 °C to +120 °C | -60 °C to +80 °C |

Special Conditions for Safe Use (X):

1. This device contains a thin wall diaphragm less than 1 mm thickness that forms a boundary between zone 0 (process connection) and zone 1 (all other parts of the equipment). The model code and data sheet are to be consulted for details of the diaphragm material. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. Flameproof joints are not intended for repair.
3. Non-standard paint options may cause risk from electrostatic discharge. Avoid installations that could cause electrostatic build-up on painted surfaces, and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.
4. Appropriate cable, glands and plugs need to be suitable for a temperature of 5 °C greater than maximum specified temperature for location where installed.
5. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
6. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
7. Cable entries and blanking plugs must be suitable for the ambient temperature range of the apparatus and capable of withstanding a 7 J impact test.
8. The Rosemount 3051S SuperModule must be securely screwed in place to maintain the ingress protection of the enclosure.

I7 IECEx Intrinsic Safety

Certificate: IECEx BAS 04.0017X

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

Markings: Ex ia IIC T4 Ga, T4(-60 °C ≤ T_a ≤ +70 °C)

| Model | U _i | I _i | P _i | C _i | L _i |
|---|----------------|----------------|----------------|----------------|----------------|
| SuperModule | 30 V | 300 mA | 1.0 W | 30 nF | 0 |
| 3051S...A; 3051SF...A; 3051SAL...C; 3051SHP...D...A | 30 V | 300 mA | 1.0 W | 12 nF | 0 |
| 3051S...F; 3051SF...F; 3051SHP...D...F | 30 V | 300 mA | 1.3 W | 0 | 0 |
| 3051S...F...IA; 3051SF ...F...IA; 3051SHP...D...F...IA | 17.5 V | 380 mA | 5.32 W | 0 | 0 |
| 3051S ...A...M7, M8, or M9; 3051SF ...A...M7, M8, or M9; 3051SAL...C... M7, M8, or M9; 3051SHP...D... M7, M8, or M9 | 30 V | 300 mA | 1.0 W | 12 nF | 60 μH |
| 3051SAL; 3051SAM | 30 V | 300 mA | 1.0 W | 12 nF | 33 μH |
| 3051SAL...M7, M8, or M9 3051SAM...M7, M8, or M9 | 30 V | 300 mA | 1.0 W | 12 nF | 93 μH |
| RTD option for 3051SF | 5 V | 500 mA | 0.63 W | N/A | N/A |
| 3051SHP...7...A | 30 V | 300 mA | 1.0 W | 14.8 nF | 0 |
| RTD option for 3051SHP...7...A | 30 V | 2.31 mA | 17.32 mW | N/A | N/A |
| 3051SHP...7...F | 30 V | 300 mA | 1.3 W | 0 | 0 |
| 3051SHP...7...F...IA | 17.5 V | 380 mA | 5.32 W | 0 | 0 |
| RTD option for 3051SHP...7...F | 30 V | 18.24 mA | 137 mW | 0.8 nF | 1.33 mH |

Special Conditions for Safe Use (X):

1. The Rosemount 3051S Transmitters fitted with transient protection are not capable of withstanding the 500 V test as defined in Clause 6.3.13 of EN 60079-11:2012. This must be taken into account during installation.
2. The terminal pins of the Rosemount 3051S SuperModule must be provided with a degree of protection of at least IP20 in accordance with IEC/EN 60529.
3. The Rosemount 3051S 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 a zone 0 area.

IG IECEx FISCO

Certificate: IECEx BAS 04.0017X

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

Markings: Ex ia IIC T4 Ga, T4(-60 °C ≤ T_a ≤ +70 °C)

| Parameter | FISCO |
|----------------------------|--------|
| Voltage U _i | 17.5 V |
| Current I _i | 380 mA |
| Power P _i | 5.32 W |
| Capacitance C _i | 0 |
| Inductance L _i | 0 |

Special Conditions for Safe Use (X):

1. The Rosemount 3051S Transmitters fitted with transient protection are not capable of withstanding the 500 V test as defined in Clause 6.3.13 of EN 60079-11:2012. This must be taken into account during installation.
2. The terminal pins of the Rosemount 3051S SuperModule must be provided with a degree of protection of at least IP20 in accordance with IEC/EN 60529.
3. The Rosemount 3051S 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 a zone 0 area.

N7 IECEx Type n

Certificate: IECEx BAS 04.0018X

Standards: IEC 60079-0: 2011, IEC 60079-15: 2010

Markings: Ex nA IIC T5 Gc, ($-40\text{ °C} \leq T_a \leq +85\text{ °C}$)

Special Condition for Safe Use (X):

1. The equipment is not capable of withstanding the 500 V insulation test required by clause 6.5 of EN 60079-15:2010. This must be taken into account when installing the equipment.

9.8 Brazil

E2 Brazil Flameproof

Certificate: UL-BR 16.0855X

Standards: ABNT NBR IEC 60079-0:2008+Errata 1:2011, ABNT NBR IEC 60079-1:2009+Errata 1:2011, ABNT NBR IEC 60079-26:2008+Errata 1:2008

Markings: Ex db IIC T6...T4 Ga/Gb, T6 ($-60\text{ °C} \leq T_a \leq +70\text{ °C}$), T4/T5 ($-60\text{ °C} \leq T_a \leq +80\text{ °C}$)

Special Conditions for Safe Use (X):

1. This device contains a thin wall diaphragm less than 1 mm thickness that forms a boundary between zone 0 (process connection) and zone 1 (all other parts of the equipment). The model code and datasheet are to be consulted for details of the diaphragm material. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. Flameproof joints are not intended for repair.
3. Non-standard paint options may cause risk from electrostatic discharge. Avoid installations that could cause electrostatic build-up on painted surfaces, and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.

9.9 EAC – Belarus, Kazakhstan, Russia

- EM** Technical Regulation Customs Union (EAC) Flameproof and Dust
Certificate: RU C-US.AA87.B.00378
Markings: Ga/Gb Ex d IIC T6...T4 X
Ex tb IIIC T105°C T₅₀₀95°C Db X
Ex ta IIIC T105°C T₅₀₀95°C Da X
See Certificate for Special Conditions for safe use.
- IM** Technical Regulation Customs Union (EAC) Intrinsic Safety
Certificate: RU C-US.AA87.B.00378
Markings: 0Ex ia IIC T4 Ga X
See Certificate for Special Conditions for safe use.

9.10 Combinations

- K1** Combination of E1, I1, N1, and ND
K7 Combination of E7, I7, and N7
KC Combination of E1, E5, I1, and I5
KD Combination of E1, E5, E6, I1, I5, and I6
KG Combination of IA, IE, IF, and IG
KM Combination of EM and IM

Global Headquarters

Emerson Automation Solutions

6021 Innovation Blvd.

Shakopee, MN 55379, USA

 +1 800 999 9307 or +1 952 906 8888

 +1 952 949 7001

 RFQ.RMD-RCC@Emerson.com

North America Regional Office

Emerson Automation Solutions

8200 Market Blvd.

Chanhassen, MN 55317, USA

 +1 800 999 9307 or +1 952 906 8888

 +1 952 949 7001

 RMT-NA.RCCRFQ@Emerson.com

Latin America Regional Office

Emerson Automation Solutions

1300 Concord Terrace, Suite 400

Sunrise, FL 33323, USA

 +1 954 846 5030

 +1 954 846 5121

 RFQ.RMD-RCC@Emerson.com

Europe Regional Office

Emerson Automation Solutions Europe GmbH

Neuhofstrasse 19a P.O. Box 1046

CH 6340 Baar

Switzerland

 +41 (0) 41 768 6111

 +41 (0) 41 768 6300

 RFQ.RMD-RCC@Emerson.com

Asia Pacific Regional Office

Emerson Automation Solutions Asia Pacific Pte Ltd

1 Pandan Crescent

Singapore 128461

 +65 6777 8211

 +65 6777 0947

 Enquiries@AP.Emerson.com

Middle East and Africa Regional Office

Emerson Automation Solutions

Emerson FZE P.O. Box 17033

Jebel Ali Free Zone - South 2

Dubai, United Arab Emirates

 +971 4 8118100

 +971 4 8865465

 RFQ.RMTMEA@Emerson.com



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