Reference Manual
00809-0100-4235, Rev BA
April 2007

Rosemount 1152 Alphaline®

Nuclear Pressure Transmitter

Product Discontinued

CE

ROSEMOUNT Nuclear

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EMERSON Process Management

IMPORTANT NOTICE -- ERRATA

Model 1152 Product Manual 00809-0100-4235 Rev BA (April 2007)

No.	Affected Pages	Description of Change	Effect. Date
1	6-6	Mounting Bracket – Carbon steel, AISI 1010 or *JIS G3131 SPHC P/O* with *polyurethane* paint; or 316L SST.	3/13/09 1/24/11
2	6-6	Process Flange –*CF3M* (Cast version of *316L* SST) Drain/Vent Valves –*316L* SST	10/21/09
3	6-6	Electronics Housing – Low-copper aluminum with *polyurethane* paint; or austenitic stainless steel	1/24/11

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Rosemount 1152 Alphaline® Nuclear Pressure Transmitter

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

For equipment service needs outside the United States, contact the nearest Rosemount representative.

Within the United States, the North American Response Center is at your service 24 hours a day, and is a single-point contact for all Rosemount equipment service needs. If at any time you are not sure what to do, you have a question about using the product, or you have a service or support request, call the center toll free at 1-800-654-RSMT (7768). This contact is your fastest link to quick and complete answers about any Rosemount Group product or service.

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Cover Photo: 1152-001AB

CE *Rosemount Nuclear Instruments, Inc. satisfies all obligations coming from legislation to harmonize product requirements in the European Union.*

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Rosemount Nuclear Instruments, Inc. Warranty and Limitations of Remedy

NOTICE

Authorization for return is required from Rosemount Nuclear Instruments, Inc. prior to shipment. Contact the Nuclear Instruments Group

(952-949-5210) for details on obtaining Return Material Authorization (RMA). Rosemount Nuclear Instruments will not accept any returned material without a Returned Material Authorization. Material returned without authorization is subject to return to customer.

Material returned for repair, whether in or out of warranty, should be shipped prepaid to:

Rosemount Nuclear Instruments, Inc.
8200 Market Blvd
Chanhassen, MN 55317
USA

NOTICE

The Rosemount 1152 Pressure Transmitter is designed for nuclear use, has been tested to IEEE 323-1971 and IEEE 344-1975 per Rosemount Reports 38019, 58225, and 117415 and IEEE 344-1975 per Report D8800058, and is manufactured to the requirements of NQA-1; 10CFR50, Appendix B quality assurance programs; and 10CFR Part 21. To ensure compliance with 10CFR Part 21, the transmitter must comply with the requirements herein throughout its installation, operation, and maintenance. It is incumbent upon the user to ensure that the Rosemount Nuclear Instruments, Inc.'s component traceability program is continued throughout the life of the transmitter.

Where the manual uses the terms requirements, mandatory, must, or required, the instructions so referenced must be carefully followed. Rosemount Nuclear Instruments, Inc. expressly disclaims all responsibility and liability for transmitters for which the foregoing has not been complied with by the user.

The warranty and limitations of remedy applicable to this Rosemount equipment are as stated on the reverse of the current Rosemount quotation and customer acknowledgment forms.

Revision Status

Changes From June 1999 to April 2007

Page (Old)	Page (New)	Changes
Cover	Cover	Document revision date change from June 1999 to April 2007, rev from AA to BA
i, ii, 5-10 & back cover	ii & back cover	Include errata sheet information on address and phone number
6-7	6-8	Include errata sheet information on circuit board number changes: Replaced amplifier circuit card, P/N 01152-0125-0001 with 01152-0125-0002.
Throughout	Throughout	References to Fisher-Rosemount were changed to Emerson Process Management
i, back cover	Cover, i & back cover	Web address changed from www.rosemount.com to www.emersonprocess.com/rosemount/nuclear
i	Cover, i, back page	Added reference to European Union product requirement (CE)
2-1,3-1,4-1,5-1,6-1	2-1,3-1,4-1,5-1,6-1	Added table of contents to each section
2-1	2-2	Statement added noting it is the user's responsibility for qualifying ¼ - 18 NPT connection interfaces.
2-5	2-6	Rearranged wording on shielded cable, removed reference to Model 353C.
2-3 & 2-4	2-4 & 2-5	Added 'nominal' to Notes in drawings Changed significant digits to conform to standard,
5-7 & 6-7	5-7 & 6-8	Changed reference to thread sealant from Loctite 571 (P/N 01152-0121-0001) to Loctite 580-PST (P/N 01153-0329-0001). Add sealant cure step to Connecting electrical housing to sensor module section.
5-8 & 6-8	5-8 & 6-9	Inserted information on the spare parts kit for bolts and nuts for process flange
6-1	6-1	Changed ISO 9001 to ISO 9001:2000
3-10, 6-3	3-10, 6-4	Added 'nominal' to response time specification
6-7, 6-8	6-8 & 6-9	Added to spare parts list the following: P/N 01153-0175-0002 process flange with welded vent/drain valve. P/N 01153-0277-0001 valve stem. Note on current standard transmitter configuration of process flange.
-	Back cover	Added trademark & registration information

NOTE
The above Revision Status list summarizes the changes made. Please refer to both manuals for complete comparison details.

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Section 1 Introduction

Overview . . . . . page 1-1
About This Transmitter . . . . . page 1-1

OVERVIEW

This manual is designed to assist in installing, operating, and maintaining the Rosemount 1152 Pressure Transmitter. The manual is organized into the following sections:

Section 2: Installation

Provides general, mechanical, and electrical installation considerations to guide you through a safe and effective transmitter installation.

Section 3: Calibration

Provides transmitter calibration procedures.

Section 4: Operation

Provides descriptions of how the transmitter operates.

Section 5: Maintenance and Troubleshooting

Provides basic hardware troubleshooting considerations including sensing module checkout, disassembly and reassembly procedures, and post-assembly tests.

Section 6: Specifications and Reference Data

Provides nuclear, performance, functional, and physical transmitter specifications; also includes ordering information, and a list of spare parts.

ABOUT THIS TRANSMITTER

Rosemount 1152 Pressure Transmitters are designed for precision pressure measurements in nuclear applications requiring reliable performance and safety over an extended service life. The Rosemount 1152 transmitter is available with 4–20 or 10–50 mA output. The 4–20 mA output has been tested to IEEE Std 323-1971 and IEEE Std 344-1975 per Rosemount Reports 38019, 58225, and 117415. The 10–50 mA output has been seismic tested to IEEE Std 344-1975 per Rosemount Report D8800058. Stringent quality control during the manufacturing process includes traceability of pressure-retaining parts, special nuclear cleaning, and hydrostatic testing.

Rosemount 1152 Transmitters are similar in construction and performance to the Rosemount 1151 Series that have become a standard of reliable service. Units are available in absolute (A), gage (G), differential (D), and high-line differential (H) configurations, with a variety of pressure range options (See Table 6-1 on page 6-7). Figure 2-1 on page 2-4 shows transmitter dimensional drawings.

Section 2 Installation

Overview . . . . . **page 2-1**
General Considerations . . . . . **page 2-1**
Mechanical Considerations . . . . . **page 2-1**
Electrical Considerations . . . . . **page 2-6**
Installation Procedures . . . . . **page 2-8**

OVERVIEW

This section contains information and instructions regarding the following installation-related information:

- General Considerations
- Mechanical Considerations
  Process Connections
  Conduit
- Electrical Considerations
- Installation Procedures
  Mechanical
  Electrical

GENERAL CONSIDERATIONS

The quality and accuracy of flow, level, or pressure measurement depends largely on the proper installation of the transmitter and its associated impulse piping and valves. For flow measurement, proper installation of the primary measuring element is also critical to the accuracy of the measurement. Transmitter installation should minimize the effects of temperature gradients and fluctuations, and avoid vibration and shock during normal operation. Take care when designing the measurement to minimize the error caused by incorrect installation.

MECHANICAL CONSIDERATIONS

This section contains information you should consider when preparing to mount the transmitter. Read this section carefully before proceeding to the mechanical installation procedure.

Rosemount 1152 Transmitters must be mounted with an optional mounting bracket or directly mounted to a rigid support. Proper installation is mandatory to assure seismic qualification per IEEE Std 344-1975.

Two mounting bracket options are available with the transmitter: a panel mount or a 2-inch pipe mount. Figure 2-2 on page 2-5 shows the qualified mounting configuration for both the panel and pipe mount options.

Orientation with respect to gravity is not critical. For maximum accuracy, however, if the transmitter is mounted so the flanges are horizontal, rezero the transmitter calibration to cancel the liquid head effect caused by the difference in height of the process connections.

Process Connections

Process tubing installation must prevent any added mechanical stress on the transmitter under seismic disturbances. This may be done by using stress-relief loops in the process tubing or by separately supporting the process tubing close to the transmitter.

Process connections on the transmitter flanges are ¼–18 NPT. Use thread sealant when making connections. Valve seats or plugs should also be sealed with thread sealant. Torque to 200 in-lbs (22.4 N-m).

The user assumes responsibility for qualifying 1/4 - 18 NPT connection interfaces.

If the drain/vent valves must be opened to bleed the process lines, torque to 7.5 ft-lb (10.2 N-m) when closing.

Proper location of the transmitter with respect to the process tubing depends on process parameters. Consider the following in determining the best location:

- Keep hot or corrosive process fluids from contacting the transmitter.
- Prevent sediment from depositing in the impulse tubing.
- Keep impulse tubing as short as possible.
- Ambient temperature gradients and fluctuations can result in erroneous transmitter readings.
- For differential transmitters, balance the liquid head on both legs of the impulse tubing.
- For liquid flow or pressure measurements, make taps to the side of the line to avoid sediment deposits, and mount the transmitter beside or below the taps so that gases vent into the process line (see Figure 2-3 on page 2-6).
- For gas flow or pressure measurements, make the taps on the top or side of the line and mount the transmitter beside or above the taps so that liquid drains into the process line (see Figure 2-3 on page 2-6).
- For steam flow or pressure measurements, make taps to the side of the line, and mount the transmitter below the taps so the impulse tubing stays filled with condensate (see Figure 2-3 on page 2-6).
- For steam service, fill lines with water to prevent steam from contacting the transmitter. Condensate chambers are not necessary since the volumetric displacement of the transmitter is negligible.

The piping between the process and the transmitter must transfer the pressure measured at the process taps to the transmitter. Possible sources of error in this pressure transfer are:

- Leaks
- Friction loss (particularly if purging is used)
- Trapped gas in a liquid line or trapped liquid in a gas line (head error)
- Temperature-induced density variation between legs (head error), for differential transmitters

To minimize the possibility of errors, take the following precautions:

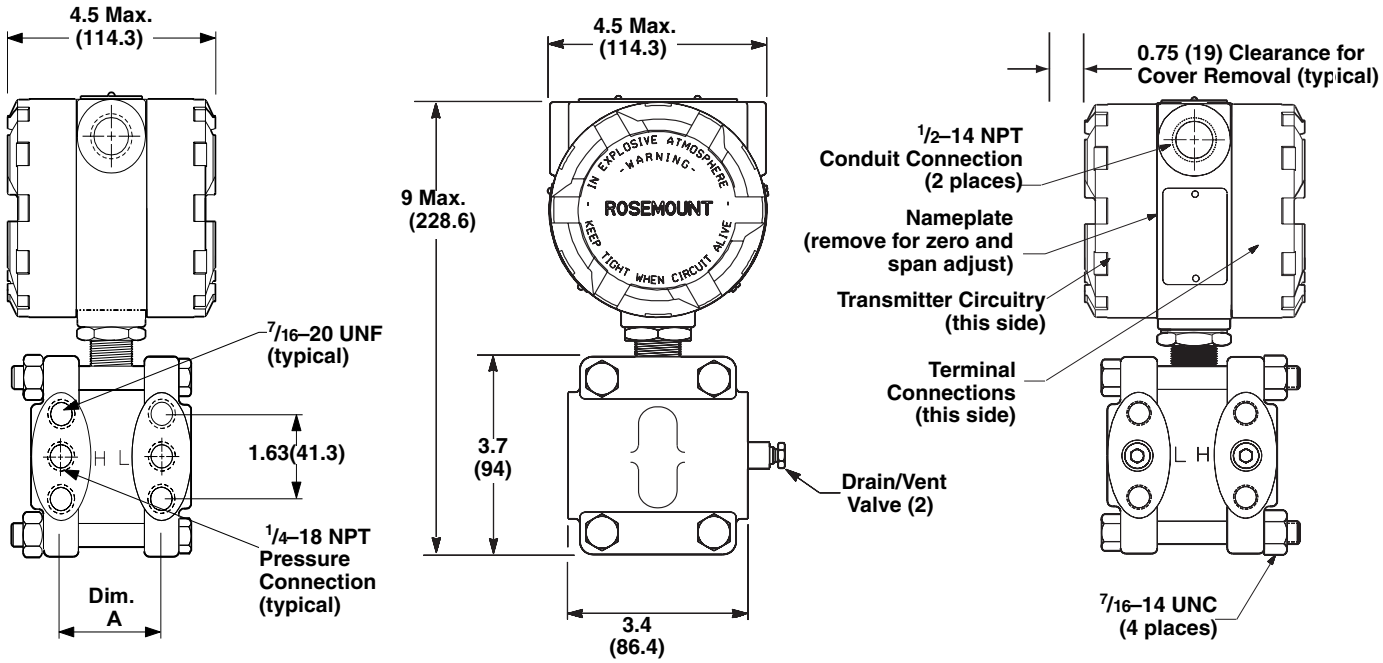
- Make impulse tubing as short as possible.
- Slope tubing at least one inch per foot up toward the process connections for liquid and steam.
- Slope tubing at least one inch per foot down toward the process connections for gas.
- Avoid high points in liquid lines and low points in gas lines.
- Use impulse tubing of sufficient diameter to avoid friction effects.
- Ensure that all gas is vented from liquid tubing legs.
- Ensure that the impulse tubing is of adequate strength to be compatible with anticipated pressure.

For differential transmitters, consider the following:

- Keep both impulse legs at the same temperature.
- When sealing fluid is used, fill both piping legs to the same level.
- When purging is used, make the purge connection close to the process taps and purge through equal lengths of the same size tubing. Avoid purging through the transmitter.

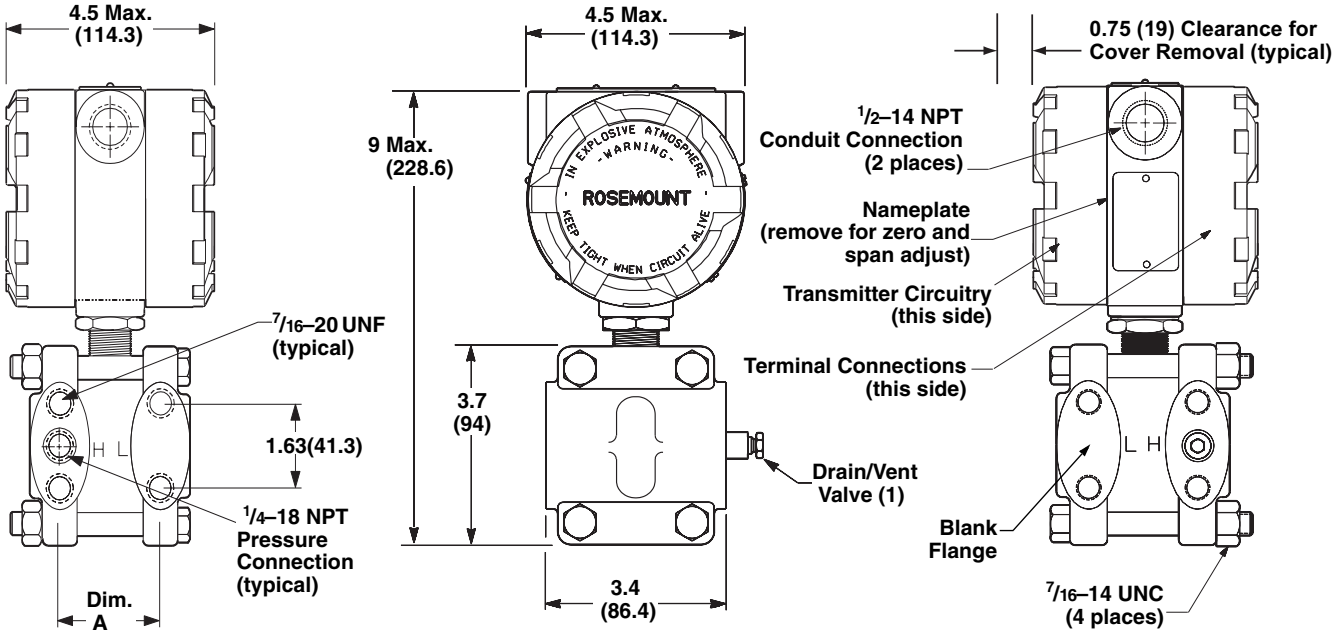
Figure 2-1. Rosemount 1152 Dimensional Drawings.

ROSEMOUNT 1152 DP AND HP



Pressure Range Code	Dimension A
3, 4, 5	2.13 (54)
6, 7	2.19 (55.6)
8	2.25 (57.2)
9	2.28 (57.9)
0	2.33 (59.1)

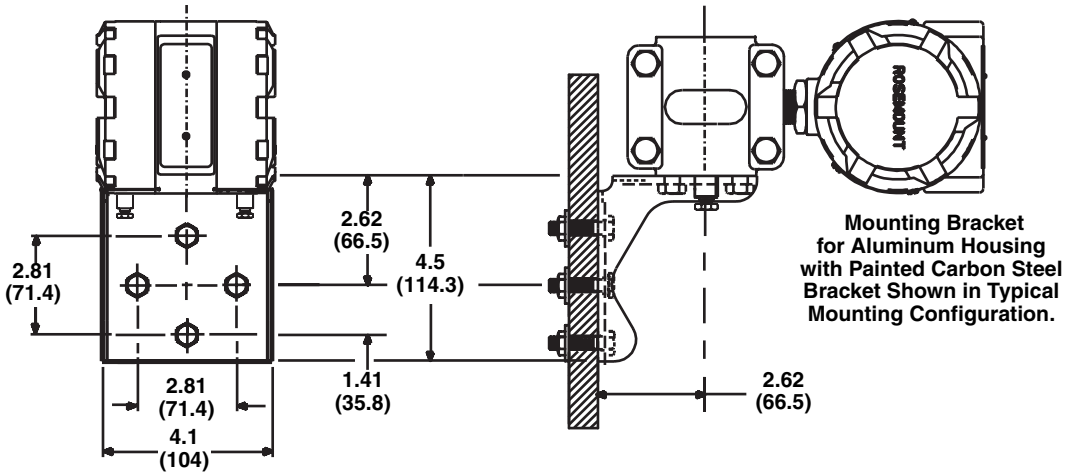
ROSEMOUNT 1152 AP AND GP



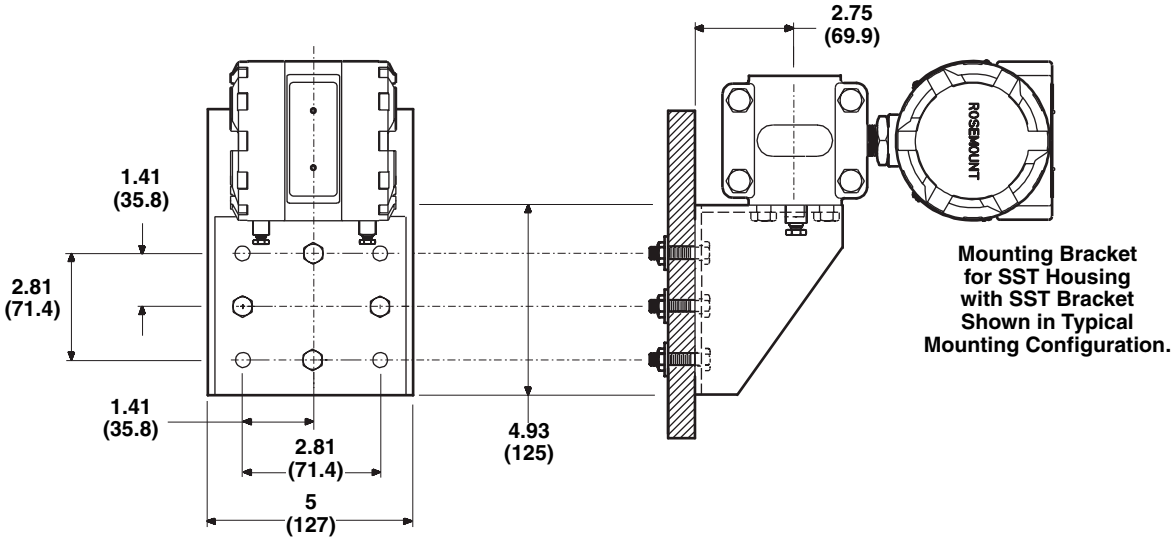
NOTE
Dimensions are nominal in inches (millimeters).

1152-1152A05C, B05B, C05A, A05D B05B, F05A

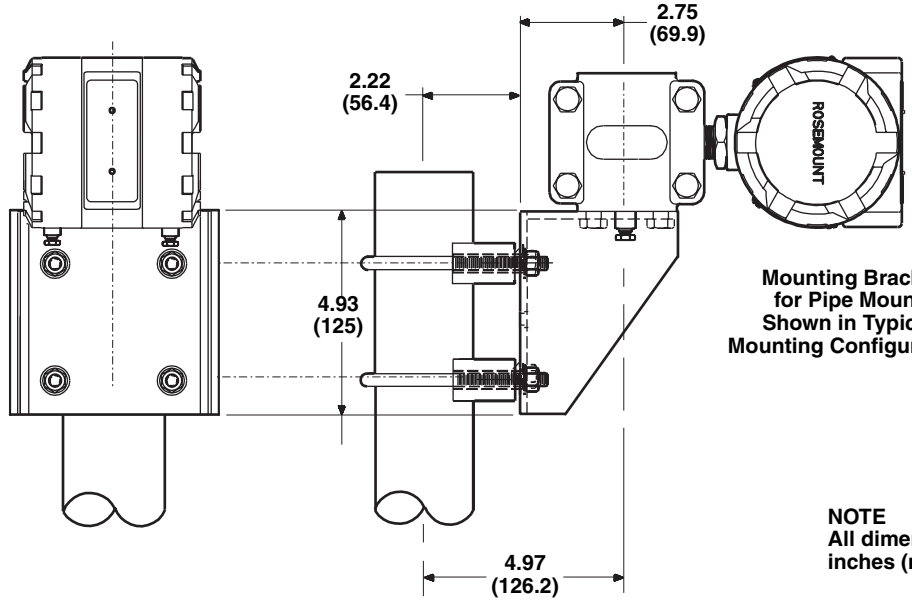
Figure 2-2. Rosemount 1152 Typical Mounting Configuration.



PANEL MOUNTING HOLE PATTERN



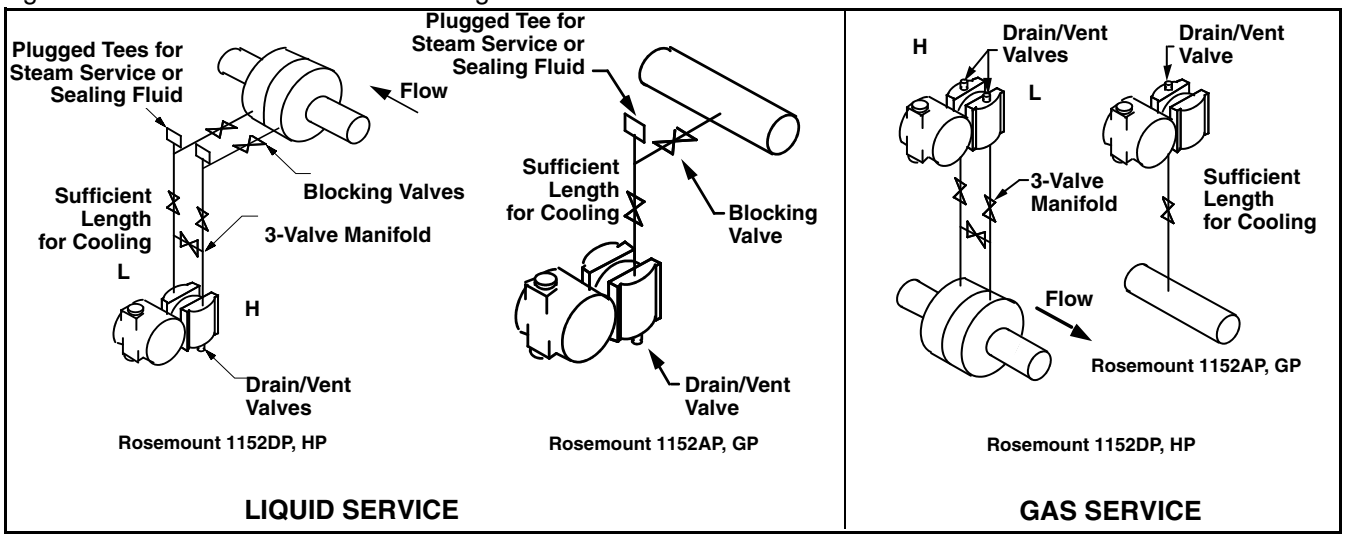
PANEL MOUNTING HOLE PATTERN



NOTE
All dimensions are nominal in inches (millimeters).

PIPE MOUNTING HOLE PATTERN

Figure 2-3. Transmitter Installation Configurations.



Conduit

The conduit connections to the transmitter are ½–14 NPT. Two hubs are available on the transmitter for convenient installation. Close off the unused hub with a stainless steel ½–14 NPT pipe plug; all threads must be sealed with a pipe-thread sealant. Use a qualified conduit seal at the conduit entry to prevent moisture from accumulating in the terminal side of the housing during accident conditions. To prevent the conduit from adding mechanical stress to the transmitter during seismic disturbances, use flexible conduit or support the conduit near the transmitter. Install the conduit seal in accordance with the manufacturer's instructions or use the procedure on page 2-8.

ELECTRICAL CONSIDERATIONS

This section contains information that you should consider when preparing to make electrical connections to the transmitter. Read this section carefully before proceeding to the electrical installation.

The Rosemount 1152 Pressure Transmitter provides a 4–20 or 10–50 mA signal when connected to a suitable dc power source. Figure 2-4 on page 2-7 shows a typical signal loop consisting of a transmitter, a power supply, and various receivers (controller, indicator, computer, etc.). With 4–20 mA output electronics, the power supply must supply at least
12 volts to the transmitter terminals at 30 mA (overscale) signal, or the maximum output current required for proper system operation. With 10–50 mA output electronics, the power supply must provide 30 volts minimum to the transmitter terminals at 90 mA (overscale) signal, or the maximum output current required for proper system operation. Any power supply ripple appears in the output load. The supply voltage versus load limitation relationship is shown in Figure 2-5 on page 2-7. The load is the sum of the resistance of the signal leads and the load resistance of the receivers.

Signal wiring need not be shielded, but twisted pairs yield the best results. In electrically noisy environments, shielded cable should be used for best results. Do not run signal wiring in conduit or open trays with power wiring, or near heavy electrical equipment. Signal wiring may be ungrounded (floating) or grounded at any place in the signal loop. The transmitter case may be grounded or ungrounded.

Figure 2-4. Transmitter Wiring Connections.

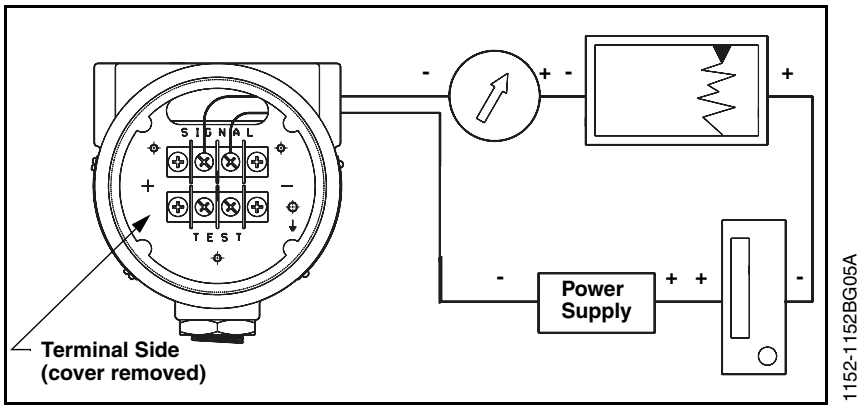
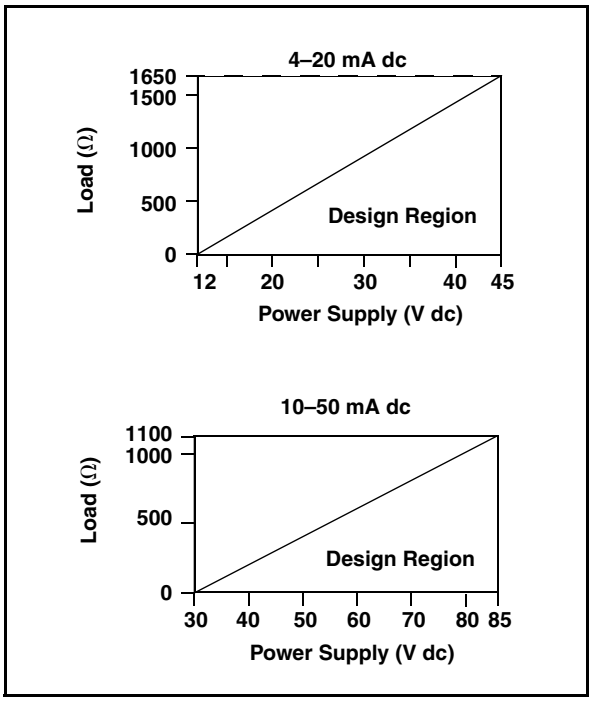


Figure 2-5. Supply Voltage vs. Load Relationship.



The capacitance sensing element uses alternating current to generate a capacitance signal. This alternating current is developed in an oscillator circuit with a frequency of 32,000 ± 10,000 Hz. This 32,000 Hz signal is capacitor-coupled to the transmitter case ground through the sensing element. Because of this coupling, a voltage may be imposed across the load, depending on choice of grounding.

This impressed voltage, which is seen as high frequency noise, has no effect on most instruments. Computers with short sampling times in a circuit where the negative transmitter terminal is grounded detect a significant noise signal. Filter this signal out by using a large capacitor (1 μf) or a 32,000 Hz LC filter across the load. Signal loops grounded at any other point are negligibly affected by this noise and do not need filtering.

INSTALLATION PROCEDURES

Installation consists of mounting the transmitter and conduit and making electrical connections. Following are procedures for each operation.

Mechanical

Transmitter

⚠CAUTION

Be careful not to break the neck seal between the sensor module and the electronics housing.

The threaded interface between the sensor module and the electronics housing is hermetically sealed before shipment. The integrity of this seal is necessary for the safe operation of the transmitter during accident conditions. If the seal is broken, reseal it according to Connecting Electrical Housing to Sensor Module on page 5-7.

1. Mount the bracket to a panel or other flat surface (see Figure 2-2 on page 2-5). Use four 5/16 in. diameter bolts (not supplied with unit). SAE grade 2 bolts were used during qualification. Torque each bolt to 19 ft-lb (26 N-m).
   For the pipe mounting option, assemble the bracket kit to a 2 in. pipe (see Figure 2-2 on page 2-5). Torque each bolt to 19 ft-lb (26 N-m).
2. Attach the transmitter to the mounting bracket (see Figure 2-2 on page 2-5). Use the four 7/16–20 × ¾ bolts with washers supplied with the unit. Torque each bolt to 21 ft-lb (29 N–m).

Conduit

1. Seal the conduit threads with thread sealant (such as Grafoil™ tape). Conduit threads mate with a standard ½–14 NPT male fitting.
2. Starting at zero thread engagement, install the conduit into the transmitter between 4 and 7 turns, or a minimum of 150 in-lb (16.9 N-m). Hold the electronics housing securely to avoid damaging the threaded neck seal between the sensor module and the electronics housing during conduit installation.
3. Provide separate support for the conduit if necessary.

Electrical

1. Remove the cover from the terminal side of the transmitter (see Figure 2-1 on page 2-4).
2. Connect the power leads to the “SIGNAL” terminals on the transmitter terminal block (see Figure 2-4 on page 2-7). Torque the terminal screws to 5 in-lb (0.6 N-m) or hand tight.

⚠CAUTION

Do not connect signal leads to the “TEST” terminals.

3. Recheck connections for proper polarity.
4. Check cover O-ring grooves for cleanliness. If chips or dirt are present, clean the seat and mating portion of the cover with alcohol. Lubricate replacement O-ring with O-ring grease (RMT P/N 01153-0248-0001 or P/N 01153-0053-0001).The transmitter was qualified using Dow Corning® 55 Silicone O-ring Grease.
5. Spray the inside threads of the electronics covers with cover lubricant (RMT P/N 01153-0333-0001) if necessary. If covers are already sufficiently lubricated, do not spray.
6. Carefully replace the cover and tighten to 16.5 ft-lb (22.4 N-m).

Section 3 Calibration

Overview . . . . . page 3-1
Calibration (A and D Output) . . . . . page 3-1
Calibration (E, N, and L Output) . . . . . page 3-4
Correction For High Line Pressure (All Output Codes) . page 3-11

OVERVIEW

Each transmitter is factory calibrated to the range specified by the customer.

This section contains the following transmitter calibration information:

- Calibration—A and D Output
  - Span Adjustment (A and D Output)
  - Zero Adjustment (A and D Output)
  - Calibration Procedure—Zero and Span Adjustment (A and D Output)
  - Linearity Adjustment (A and D Output)
  - Damping Adjustment (D Output Only)
- Calibration—E, N, and L Output
  - Span Adjustment (E, N, and L Output)
  - Zero Adjustment (E, N, and L Output)
  - Calibration Procedure—Zero and Span Adjustment (E, N, and L Output)
  - Linearity Adjustment (E, N, and L Output)
  - Damping Adjustment (E, N, and L Output)
- Correction for High Line Pressure—All Output Codes
  - Span
  - Zero

CALIBRATION (A AND D OUTPUT)

(See Nuclear Regulatory Commission IE Bulletin No. 80-16, June 27, 1980.)

The Rosemount 1152DP, HP, GP, and AP Transmitters are factory calibrated to the range shown on the nameplate. This range may be changed within the limits of the transmitter. Zero may also be adjusted to elevate (for all models except Rosemount 1152AP) or suppress (for all models). The span and zero adjustments are external and located under the nameplate.

Span Adjustment (A and D Output)

The span on any Rosemount 1152 Transmitter is continuously adjustable to allow calibration anywhere between maximum span and 1/6 of maximum span. For example, the span on a Range Code 4 transmitter can be continuously adjusted between 0–25 and 0–150 inH_2O.

Zero Adjustment (A and D Output)

Zero adjustments are limited as follows:

Rosemount 1152DP, Ranges 3, 4, and 5: 150 percent of calibrated span suppression or elevation.

Rosemount 1152DP, Ranges 6, 7, and 8: 50 percent of calibrated span suppression or elevation.

Rosemount 1152HP, Ranges 4 and 5: 150 percent of calibrated span suppression or elevation.

Rosemount 1152HP, Ranges 6 and 7: 50 percent of calibrated span suppression or elevation.

Rosemount 1152GP, all ranges: 100 percent of calibrated span suppression; to 0.5 psia elevation for compound ranges.

Rosemount 1152AP, all ranges: 100 percent of calibrated span suppression.

The transmitter may be calibrated to cross zero (e.g., –25 to 25 inH_2O), but this may result in a slight loss of linearity. A further limitation on zero adjustment is that the top of the span may not exceed the upper range limit.

Calibration Procedure—Zero and Span Adjustment (A and D Output)

NOTE
The Rosemount 1152 Pressure Transmitter contains electronic circuit boards which may be static sensitive.

NOTE
Covers need not be removed for zero and span adjustment.

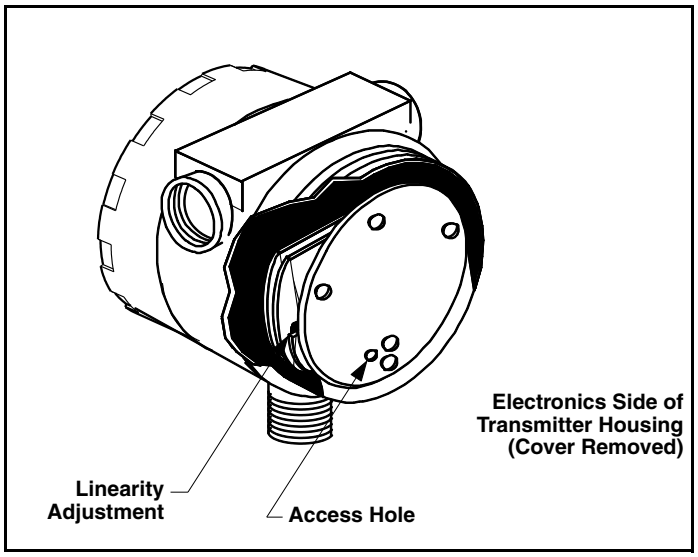
The zero adjustment has very little effect on the span. Span adjustment may have a slight effect on zero and has a noticeable effect when zero is elevated or suppressed because the span is rotated about a point on the zero differential. The following example for a Rosemount 1152DP, Range 4, shows the proper sequence for changing a 25 to 125 inH_2O range (suppressed zero of 25 inH_2O, span of 100 inH_2O) to a range of –75 to –25 inH_2O (elevated zero of 75 inH_2O, span of 50 inH_2O).

1. Turn the zero adjustment to bring the range from 25–125 inH_2O to 0–100 inH_2O.
2. Turn the span adjustment to bring the range from 0–100 inH_2O to 0–50 inH_2O.
3. Turn the zero adjustment to bring the range from 0–50 inH_2O to –75 to –25 inH_2O.
4. Recheck full scale and zero and adjust if necessary.

NOTE
There is some mechanical backlash in the zero and span adjustments, so there will be a dead band when direction of adjustment is changed. The simplest correction, if the desired setting is overshot, is purposely overshooting a larger amount before reversing the direction of adjustment.

NOTE
On Range Codes 6, 7, 8, 9, and 10, the span adjustment has a significant effect on zero. This effect becomes increasingly more pronounced as span is decreased. The span effect on zero is great enough in some instances to cause a decrease in full-scale output with an increase in span.

Figure 3-1. Linearity Adjustment, A or D Output.



Linearity Adjustment (A and D Output)

In addition to the span and zero adjustments, there is a linearity adjustment located inside the transmitter, accessible through the amplifier board. Linearity is factory adjusted for optimum performance over the calibrated range of the instrument and is not normally adjusted in the field. To maximize linearity over some particular range, use the linearity adjustment. It is necessary to readjust span after adjusting linearity. Figure 3-1 on page 3-3 and Figure 3-2 on page 3-4 show the location of the linearity adjustment.

Damping Adjustment (D Output Only)

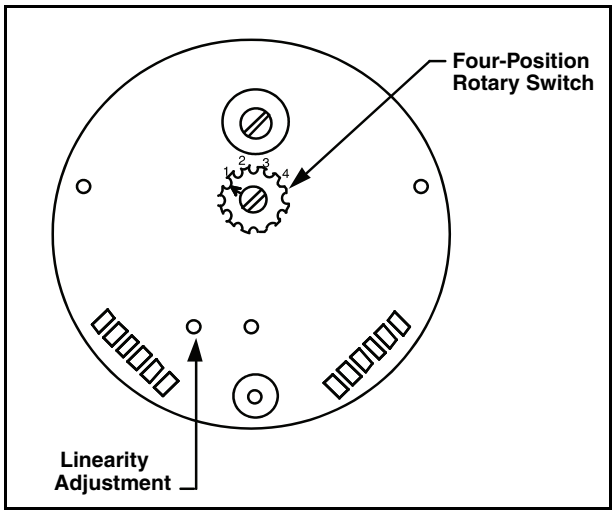
The stepped variable time-constant amplifier board is designed to permit dampening out of rapid pulsations in the pressure source by selecting one of four time constant settings. The available settings provide time-constant values (63.2 percent of total response) between 0.2 seconds(1) and 2.0 seconds. These time-constants are selected by manually setting a four-position rotary switch located on the amplifier board. The switch positions are labeled 1, 2, 3, and 4 which correspond to time-constant values of 0.2, 0.5, 1.0, and 2.0 seconds, respectively. The tolerance of these values is ±20 percent. Figure 3-2 on page 3-4 shows the four-position rotary switch.

Select the shortest possible time constant setting. For example, if the 0.5 second time constant is sufficient to dampen out the undesired pulsations, then do not use a longer time constant.

Since transmitter accuracy is not influenced by the time constant setting, the transmitter can be calibrated with the switch in any one of the four positions. However, position 1 gives the fastest time response during calibration. The switch can be reset later to any other position without further adjustments.

(1) The actual minimum time constant (at 100 °F) is range dependent as follows: 0.3 seconds nominal (Range Code 3); 0.2 seconds nominal (Range Codes 4 and 5); 0.1 seconds nominal (Range Codes 6, 7, 8, 9, and 10).

Figure 3-2. Adjustable Damping, D Output.



NOTE
If you remove either cover during the above procedures, replace the O-ring and torque the cover per the instructions provided in Section 5: Maintenance and Troubleshooting. Spare cover O-rings are supplied with each transmitter.

CALIBRATION (E, N, AND L OUTPUT)

Rosemount 1152DP, HP, GP, and AP Transmitters are factory calibrated to the range shown on the nameplate. This range may be changed within the limits of the transmitter. Zero may also be adjusted to elevate (for all models except Rosemount 1152AP) or suppress (for all models). The span and zero adjustments are external and located under the nameplate.

Span Adjustment (E, N, and L Output)

The span on any Rosemount 1152 Transmitter is continuously adjustable to allow calibration anywhere between maximum span and 1/6 of maximum span. For example, the span on a Range Code 4 transmitter can be continuously adjusted between 0–25 inH_2O and 0–150 inH_2O.

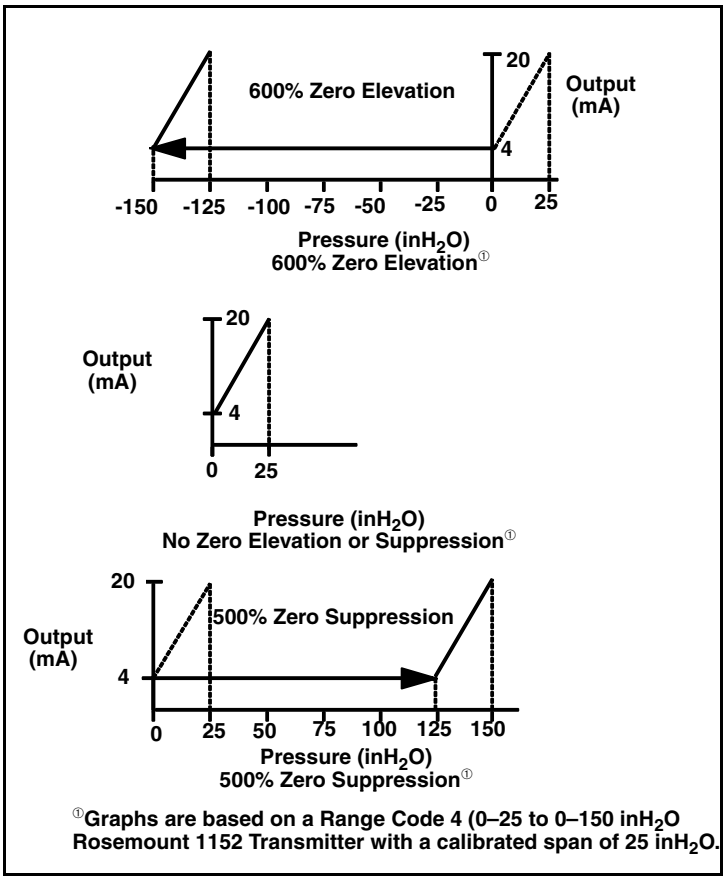
Zero Adjustment (E, N, and L Output)

The zero on a Rosemount 1152 Transmitter with the E, N, or L output can be adjusted for up to 500 percent of span suppression or 600 percent of span elevation (see Figure 3-3 on page 3-5 for E or N output).

The zero may be elevated or suppressed to these extremes with the limitation that no applied pressure within the calibrated range exceeds the full-range pressure limit. For example, a Range Code 4 transmitter cannot be calibrated for 150 to 200 inH_2O (only 300 percent zero suppression) because the 200 inH_2O exceeds the 150 inH_2O full-range pressure limit of Range Code 4.

The transmitter may be calibrated to cross zero (e.g., –75 to 75 inH_2O) but this may result in a slight loss of linearity.

Figure 3-3. Zero Adjustment, E or N Output.



To achieve large amounts of elevation or suppression, the E output electronics have a switch and N output electronics have either a switch or three turrets on the component side of the amplifier board (refer to Electrical Housing Disassembly on page 5-4 and to Figure 5-2 on page 5-6 to locate the amplifier board). The slide switch, shown in Figure 3-4 on page 3-6, has three positions. The middle position allows moderate amounts of elevation or suppression. To achieve large elevations or suppressions, move this switch to the “elevate zero” or “suppress zero” position. If the amplifier board has three turrets, shown in Figure 3-5 on page 3-6, large elevations or suppressions are achieved by connecting a jumper wire between the middle terminal and the terminal marked “EZ” (elevation) or “SZ” (suppression).

To make large elevation or suppression adjustments using the L output electronics (10–50 mA), it is necessary to move a jumper pin assembly on the component side of the amplifier board. The jumper pin has three positions, as shown in Figure 3-4 on page 3-6. The middle position allows normal levels of elevation or suppression. To make larger adjustments, move the jumper to the Elevate Zero or Suppress Zero position (marked EZ and SZ accordingly).

Figure 3-4.
Elevation/Suppression Setting,
E, N, or L Output.

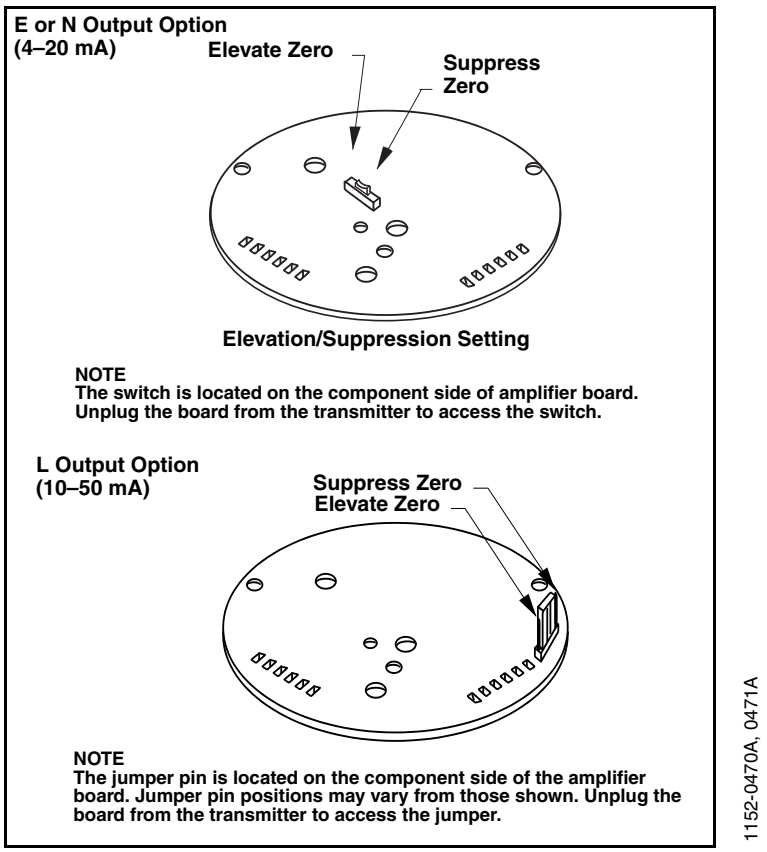
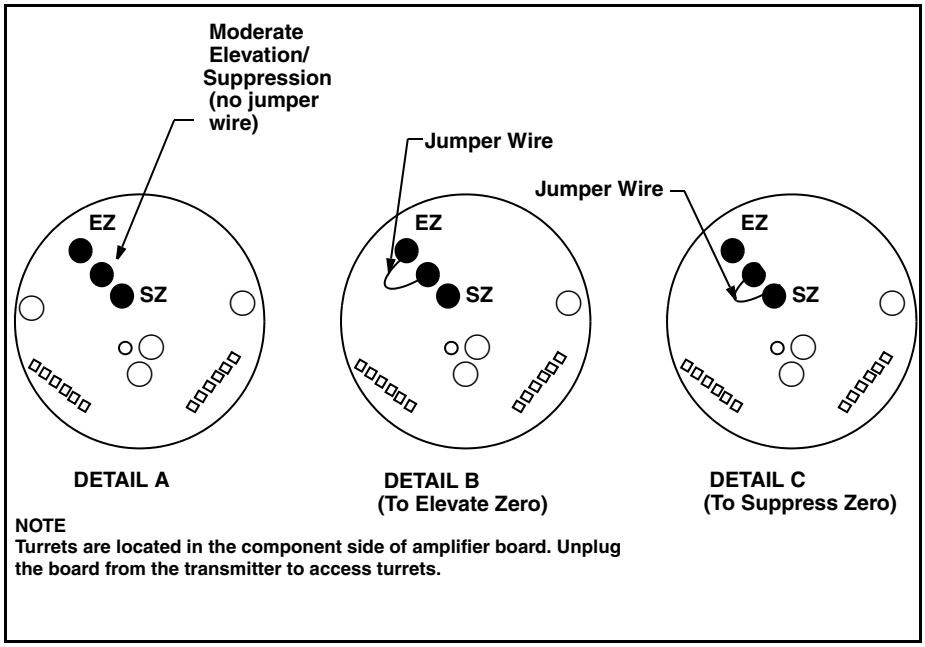


Figure 3-5.
Elevation/Suppression Turrets,
N Output.



NOTE
Always make sure that the jumper is fully seated on its pins. If the jumper has not been placed in any of the three positions, the amplifier board provides normal levels of elevation or suppression. Also, a slide switch replaces the jumper pin on some versions of the amplifier board.

Calibration Procedure—Zero and Span Adjustment (E, N, and L Output)

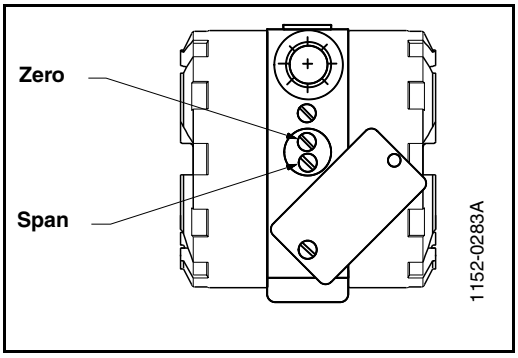
NOTE
The Rosemount 1152 Pressure Transmitter contains electronic circuit boards which may be static sensitive.

NOTE
Covers need not be removed for zero and span adjustment.

The zero and span adjustment screws are accessible externally and are located behind the nameplate on the side of the electronics housing (see Figure 3-6). The transmitter output increases with clockwise rotation of the adjustment screws.

The zero adjustment has very little effect on the span. The span adjustment, however, does affect the zero. The effect of interaction is more apparent with suppression or elevation. The span adjustment changes the zero output and the full-scale output by approximately the same percentage. Therefore, it is best to calibrate the transmitter from zero to the desired span and finish the calibration by adjusting the zero screw to achieve the desired elevation or suppression.

Figure 3-6. Zero and Span Adjustment.



EXAMPLE (For Range Code 4—E and N Output)

Initial transmitter calibration: 25 to 125 inH_2O
(100 inH_2O span with zero suppressed 25 inH_2O).

Desired transmitter calibration: –75 to –25 inH_2O
(50 inH_2O span with zero elevated 75 inH_2O).

1. Adjust the zero to eliminate any existing zero elevation or suppression. With 0 inH_2O pressure applied to the transmitter, turn the zero adjustment until the output reads 4 mA. The unit is now calibrated for 0 to 100 inH_2O.
2. Adjust the span to the desired new span. To reduce the span, turn the span screw until the output, with 0 inH_2O pressure input, equals 8 mA.

$$4\,\text{mA} \times \left(\frac{\text{Existing Span}}{\text{Desired Span}}\right) = 4\,\text{mA} \times \left(\frac{100\ \text{in}H_2O}{50\ \text{in}H_2O}\right) = 8\,\text{mA}$$

3. Adjust the zero screw to bring the output, with 0 inH_2O input, back to 4 mA. The transmitter calibration should now be very close to 0 to 50 inH_2O.
4. Check full-span output and fine tune the span and zero adjustment, if required. Remember that zero adjustments do not affect span, but span adjustments do affect zero. Adjusting the span screw affects the zero 1/5 as much as it affects the span. To compensate for this effect, simply overadjust by 25 percent. For example, if, after completing step 3, the transmitter output reads 19.900 mA at 50 inH_2O, turn the span potentiometer until the output (at 50 inH_2O) reads 20.025 mA.

   19.900 + (20.000 – 19.900) × 1.25 =
   19.900 + 0.125 = 20.025.

   Since the span adjustment affects zero 1/5 as much as the span, the 0.125 mA increase in span causes a 0.025 mA increase in zero. Therefore, turn the zero adjustment (at 50 inH_2O) until the output reads 20.000 mA. The unit should now be calibrated for 0 to 50 inH_2O.
5. Zero elevation/suppression: Elevate the zero. Turn the zero screw until the output reads 4 mA with –75 inH_2O applied to the high side of the transmitter (applying 75 inH_2O to the low side of the transmitter will give the same result). The output may stop changing before the desired 4 mA reading is obtained. If this occurs, turn power to the unit off and unplug the amplifier board (refer to Electrical Housing Disassembly on page 5-4 and Figure 5-2 on page 5-6 to locate the amplifier board).

   To elevate or suppress zero a large amount, follow either procedure A or B, depending on whether the amplifier board has a switch (see Figure 3-4 on page 3-6) or three turrets (see Figure 3-5 on page 3-6).

   A. Amplifier Board with Switch

   Method:
   Locate the three-position slide switch on the component side of the amplifier board (see Figure 3-4). Move the switch position to “elevate zero,” plug the amplifier board back in, and complete the zero adjustment. To suppress zero, follow the same procedures except move the switch position to “suppress zero” (see Figure 3-4).

B. Amplifier Board with Turrets

Material:

- Wire: 22-gauge tinned solid copper— Fed. Spec. QQ-W-343; ASTM B33.
- Solder: 60% tin, 40% lead (60/40)— Fed. Spec. QQ-S-571.
- Flux: MIL-F-14256, Type A; Fed. Spec. QQ-S-571 Type RA.

Method:

a. Locate the three turret terminals on the component side of the amplifier board. Remove any jumper wires between them (see Figure 3-5 on page 3-6).

b. To elevate zero, connect a jumper wire between the middle terminal and the terminal marked “EZ” (see Figure 3-5 on page 3-6, Detail B).

c. Wrap the jumper wire once around each terminal and cut off any excess.

d. Solder the jumper wire to the terminals using proper electronics soldering techniques. Clean solder joints thoroughly with isopropyl alcohol.

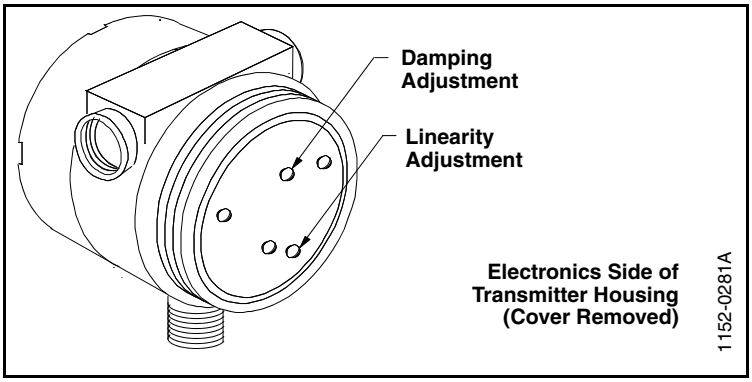
e. Plug the amplifier board back in and complete the zero adjustment.

To suppress zero, follow the same procedure, except connect the jumper wire between the middle terminal and the terminal marked “SZ” (see Figure 3-5 on page 3-6, Detail C).

6. Recheck full scale and zero, and fine tune if necessary.

NOTE
There is some mechanical backlash in the zero and span adjustments, so there will be a dead band when you change direction of adjustment. Because of the backlash, the simplest procedure, if the desired setting is overshot, is to intentionally overshoot a larger amount before reversing the direction of the adjustment.

Figure 3-7. Linearity and Damping Adjustment, E, N, or L Output.



Linearity Adjustment (E, N, and L Output)

In addition to the span and zero adjustments, there is a linearity adjustment located on the solder side of the amplifier board (see Figure 3-7). Linearity is factory calibrated for optimum performance over the calibrated range of the instrument and is not normally adjusted in the field. If it is desired to maximize linearity over some particular range, use the following procedure:

1. Apply mid-range pressure and note the error between theoretical and actual output signals.
2. Apply full-scale pressure. Multiply the error noted in step 1 by six and by the range down factor.

$$\text{Range Down Factor} = \frac{\text{Maximum Allowable Span}}{\text{Calibrated Span}}$$

3. Add the result to the full-scale output for negative errors, or subtract the result from the full-scale output for positive errors, by adjusting the linearity trimmer (see Figure 3-7). Example: At 4-to-1 range down, the midscale point is low by 0.05 mA. Therefore, adjust the “Linearity” trimmer until full-scale output increases by (0.05 mA $\times$ 6 $\times$ 4) = 1.2 mA.
4. Readjust zero and span.

NOTE
If you remove either cover during the above procedures, replace the O-ring and torque the cover per the instructions provided in Section 5: Maintenance and Troubleshooting. Spare cover O-rings are supplied with each transmitter.

Damping Adjustment (E, N, and L Output)

The E, N, and L output amplifier boards are designed to permit damping of rapid pulsations in the pressure source by adjusting the trimmer marked “damping” located on the solder side of the amplifier board. The settings available provide time-constant values up to 1.67 seconds nominal. The instrument is calibrated and shipped with this adjustment set at the counterclockwise stop (fastest setting). It is best to set the damping to the shortest possible time-constant setting. Since transmitter calibration is not affected by the damping setting, you may adjust the damping with the transmitter installed on the process. Turn the damping adjustment clockwise until the desired damping is obtained. Figure 3-7 on page 3-9 shows the location of the damping adjustment.

⚠CAUTION

The damping potentiometer has positive stops at both ends. Forcing the potentiometer beyond the stops may cause permanent damage.

NOTE
If you remove either cover during the above procedures, replace the O-ring and torque the cover per the instructions provided in Section 5: Maintenance and Troubleshooting. Spare cover O-rings are supplied with each transmitter.

CORRECTION FOR HIGH LINE PRESSURE (ALL OUTPUT CODES)

(Rosemount 1152DP and 1152HP Only)

Span

If a differential transmitter is calibrated with the low side at ambient pressure, but will be used at high line pressure, correct the span adjustment to compensate for the effect of static pressure on the unit. If zero is elevated or suppressed, also correct the zero adjustment. Correction factors, expressed in percent of differential pressure input at end points per 1,000 psi static pressure, are:

Range	% input per 1,000 psi
3	1.75
4	0.87
5	0.81
6	1.45
7	1.05
8	0.55

The correction procedure below uses the following example: Range 5 with a 4–20 mA output, calibrated for –100 to 300 in H_2O to be operated at 1,200 psi line pressure. Note that steps 3–6 are omitted for ranges based at zero differential pressure.

1. Calibrate the unit per preceding section to output = 4 mA at –100 inH_2O and 20 mA at 300 inH_2O.
2. Calculate correction factor:

$$\frac{0.81\%}{1,000\ \text{psi}} \times 1,200\ \text{psi} = 0.97\%\ \text{differential input}$$

3. Calculate zero adjustment correction in terms of pressure:

$$0.97\% \times -100\ \text{in}H_2O = -0.97\ \text{in}H_2O$$

4. Convert pressure correction to percent of input span:

$$\frac{-0.97\ \text{in}H_2O}{400\ \text{in}H_2O\ \text{input span}} = -0.24\%\ \text{span}$$

5. Calculate correction in terms of output span (mA):

$$-0.24\% \times 16\ \text{mA span} = -0.038\ \text{mA}$$

6. Add the mA correction to the ideal zero output (4 mA). This is the corrected ideal zero output.

$$4.00\ \text{mA} - 0.038\ \text{mA} = 3.962\ \text{mA}$$

7. Calculate the full-scale adjustment correction in terms of pressure:

$$0.97\% \times 300\ inH_2O = 2.91\ inH_2O$$

8. Repeat step 4 with the results of step 7:

$$\frac{2.91\ inH_2O}{400\ inH_2O\ input\ span} = 0.73\%\ span$$

9. Repeat step 5 with the result of step 8:

$$0.73\% \times 16\ mA = 0.117\ mA$$

10. Add the mA correction to the ideal full-scale output (20 mA). This is the corrected ideal full-scale output.

$$20.00\ mA + 0.117\ mA = 20.117\ mA$$

11. Readjust the zero and span adjustments for corrected output.

There is an uncertainty of ±0.25 percent of input reading per 1,000 psi (±0.5% input reading per 1,000 psi for Range Code 3) associated with the span correction.

Zero

Zero shift with static pressure is not systematic. However, if the calibrated range includes zero differential pressure, the effect can be trimmed out after installation and with the unit at operating pressure.

Equalize pressure to both process connections and turn the zero adjustment until the ideal output at zero differential input is observed. Do not readjust the span potentiometer.

If, however, the transmitter does not include zero differential pressure within its calibrated span, the zero effect or zero correction can be determined before the unit is suppressed or elevated to eliminate the zero effect after correcting for the span effect.

The following procedure illustrates how to eliminate the zero effect for a non-zero differential pressure-based calibration. The example uses a Range Code 5 with a 4–20 mA output calibrated from 100 to 500 inH2O with 1,200 psi static line pressure.

1. Using standard calibration procedures, calibrate the unit to the required span, with the 4 mA or zero point corresponding to zero differential pressure:

   4 mA at 0 inH2O and 20 mA at 400 inH2O
2. Apply static pressure to both high and low process connections with zero differential pressure across the transmitter, and note the zero correction (zero shift). For example, if the output reads 4.006 mA, the zero correction is calculated as:

   4.00 mA – 4.006 mA = –0.006 mA
   Note the sign associated with this correction, as this result will be added when determining the final, ideal transmitter output.
3. Remove static pressure and correct for the span effect as outlined in the span correction procedure. Calibrate the unit to the calculated output values. If, for example, the span correction procedure yielded 4.029 mA and 20.144 mA, calibrate the unit for:

   4.029 mA at 100 inH2O
   20.144 mA at 500 inH2O
4. Add the zero correction found in step 2 (–0.006 mA) to the ideal zero point value calculated in step 3.

   4.029 mA + (–0.006 mA) = 4.023 mA
5. To eliminate the zero effect, readjust the zero potentiometer so that the output reads the ideal zero point calculated in step 4 (do not readjust the span potentiometer). Note that all the calibration points shift the same amount toward the correct reading. The example output is now 4.023 mA at 100 inH2O.

The transmitter output will now be 4–20 mA over its calibrated span when the unit is operated at 1,200 psi static line pressure.

Section 4 Operation

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Transmitter Operation . . . . . **page 4-1**
Demodulator . . . . . **page 4-4**
Voltage Regulator . . . . . **page 4-5**
Zero and Span Adjustments . . . . . **page 4-5**
Current Controls . . . . . **page 4-5**
Current Limit . . . . . **page 4-5**
Reverse Polarity Protection . . . . . **page 4-5**

OVERVIEW

This section provides brief descriptions of basic transmitter operations in the following order:

- Transmitter Operation
- The δ-Cell™ Sensor
- Demodulator
- Linearity Adjustment
- Oscillator
- Voltage Regulator
- Zero and Span Adjustments
- Current Control
- Current Limit
- Reverse Polarity Protection

TRANSMITTER OPERATION

.

The block diagram in Figure 4-1 on page 4-3 illustrates the operation of the transmitter.

Rosemount 1152 Alphaline Pressure Transmitters have a variable capacitance sensing element, the δ-Cell (see Figure 4-2 on page 4-4). Differential capacitance between the sensing diaphragm and the capacitor plates is converted electronically to a 2-wire, 4–20 or 10–50 mA dc signal.

$$P = K_1\left(\frac{C_2 - C_1}{C_1 + C_2}\right)$$

Where:

P is the process pressure.

K_1 is a constant.

C_1 is the capacitance between the high pressure side and the sensing diaphragm.

C_2 is the capacitance between the low pressure side and the sensing diaphragm.

$$fV_{p-p} = \frac{I_{ref}}{C_1 + C_2}$$

Where:

I_{ref} is the current source.

V_{p-p} is the peak-to-peak oscillation voltage.

f is the oscillation frequency.

$$I_{diff} = fV_{p-p}(C_2 - C_1)$$

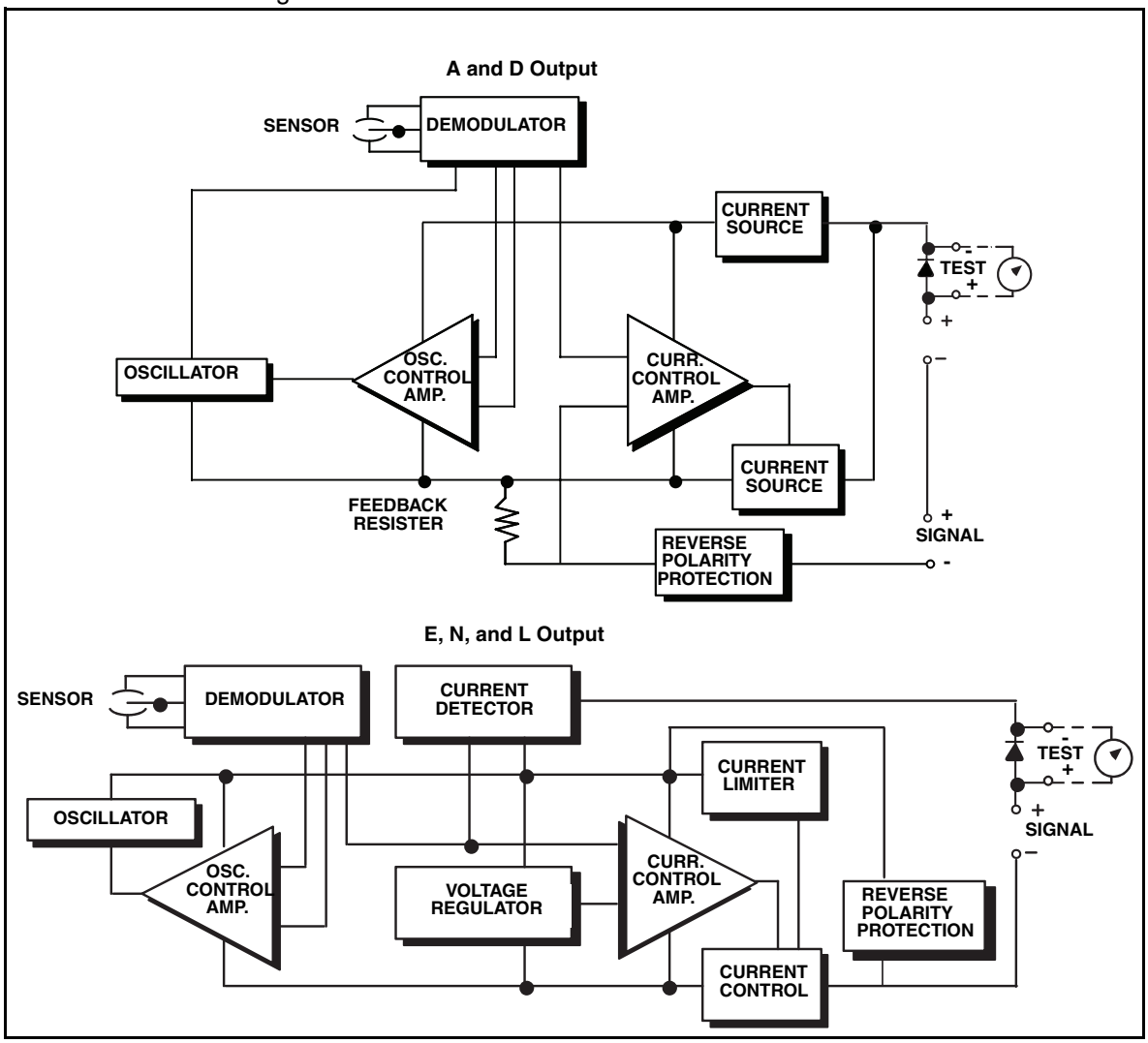
Where:

I_{diff} is the difference in current between C_1 and C_2.

Therefore:

$$P = \text{Constant} \times I_{diff} = I_{ref}\left(\frac{C_2 - C_1}{C_2 + C_1}\right)$$

Figure 4-1. Electrical Block Diagram.

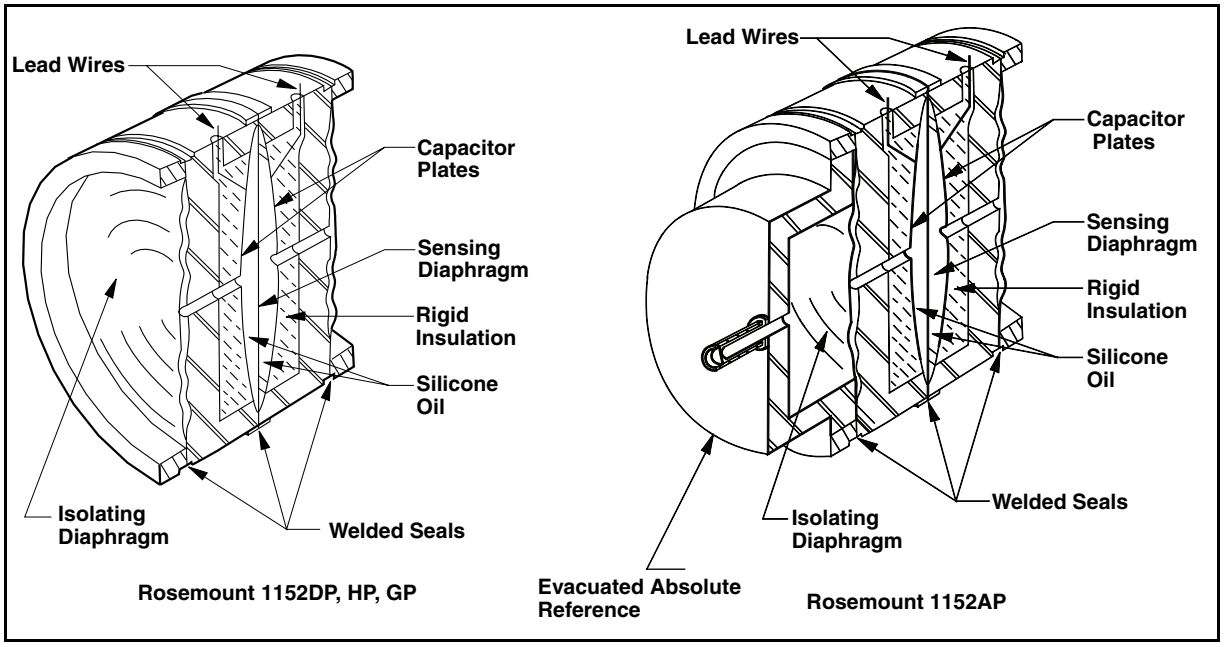


The δ-Cell Sensor

Process pressure is transmitted through an isolating diaphragm and silicone oil fill fluid to a sensing diaphragm in the center of the δ-cell. The reference pressure is transmitted in like manner to the other side of the sensing diaphragm.

The position of the sensing diaphragm is detected by the capacitance plates on both sides of the sensing diaphragm. The capacitance between the sensing diaphragm and either capacitor plate is approximately 150 pf. The sensor is driven through transformer windings by an oscillator at roughly 32 kHz and 30 $V_{p-p.}$

Figure 4-2. The δ-Cell.



DEMODULATOR

The demodulator consists of a diode bridge that rectifies the ac signal from the sensor cell to a dc signal.

The oscillator driving current, I_{ref} (the sum of the dc currents through two transformer windings) is kept a constant by an integrated circuit amplifier.

The dc current through a third transformer winding is a current directly proportional to pressure; i.e.,

$$I_{diff} = fV_{p-p}(C_2 - C_1)$$

The diode bridge and span temperature compensating thermistor are located inside the sensor module. The effect of the thermistor is controlled by resistors located in the electronics housing.

LINEARITY ADJUSTMENT

Linearity is adjusted by a variable-resistance network, capacitor, and diodes. The currents generated through this part of the circuit are summed into the inputs of the oscillator control circuit. This provides a programmed correction that raises the oscillator peak-to-peak voltage to compensate for first-order nonlinearity of capacitance as a function of pressure.

OSCILLATOR

The oscillator frequency is determined by the capacitance of the sensing element and the inductance of the transformer windings.

The sensing element capacitance is variable. Therefore, the frequency is variable about a nominal value of 32 kHz.

An integrated circuit amplifier acts as a feedback control circuit and controls the oscillator drive voltage such that:

$$fV_{p-p} = \frac{I_{ref}}{C_1 + C_2}$$

VOLTAGE REGULATOR

The transmitter uses a zener diode, transistor, and several resistors to provide a constant voltage of 6.4 V dc for the reference and 7 V dc for the oscillator.

ZERO AND SPAN ADJUSTMENTS

Zero adjustment components consist of a potentiometer and resistor that develop a separate adjustable current sum with the sensor current. The coarse zero switch switches resistors into the circuit as needed.

Span adjustment is performed with a potentiometer that determines the amount of loop current that is sensed and fed back to the current control amplifier.

CURRENT CONTROLS

The current control amplifier consists of an integrated circuit, two transistors, and associated components. The integrated circuit reference voltage is established at the junction of a resistor network. The current control amplifier drives the current control to a level such that the current detector feeds back a signal equal to the sum of the zero current and the variable sensor current.

CURRENT LIMIT

The current limiter prevents excessively high output currents in case of overpressure. Maximum output with the 4–20 mA output is limited to 30 mA. Maximum output with the 10–50 mA output is limited to 90 mA.

REVERSE POLARITY PROTECTION

A zener diode provides reverse polarity protection.

Section 5 Maintenance and Troubleshooting

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Safety Messages . . . . . **page 5-1**
Test Terminals . . . . . **page 5-2**
Board Checkout . . . . . **page 5-2**
Sensing Module Checkout . . . . . **page 5-2**
Disassembly Procedure . . . . . **page 5-3**
Reassembly Procedure . . . . . **page 5-5**
Post Assembly Tests . . . . . **page 5-9**

OVERVIEW

This section outlines a technique for checking out the components, a method for disassembly and reassembly, and a troubleshooting guide.

NOTE
Maintenance of traceability of any replacement parts is the responsibility of the user (see the “Important Notice” on page 6-10 and the **Important Notice** at the beginning of this manual, preceding the **Table of Contents**).

The Rosemount 1152 has no moving parts and requires a minimum of scheduled maintenance. Calibration procedures for range adjustment are outlined in Section 3: Calibration. A calibration check should be conducted after inadvertent exposure to overpressure, unless your plant considers this factor separately in the plant error analysis.

Test terminals are available for in-process checks. For further checks, the transmitter can be separated into three active physical components: the sensing module, the amplifier board, and the calibration board.

An exploded view drawing is provided in Figure 5-2 on page 5-6. In the following procedures, numbers in parentheses refer to item numbers in the exploded view.

SAFETY MESSAGES

Instructions and procedures in this section may require special precautions to ensure the safety of the people performing the operations. Information that raises potential safety issues is indicated by a warning message. The following warning messages appear in this section.

⚠WARNING

Use only the procedures and new parts specifically referenced in this manual to ensure specification performance and certification compliance. Unauthorized procedures or parts can render the instrument dangerous to life, limb, or property.

⚠WARNING

Process O-rings may retain some process fluid after disassembly of process flanges. If this fluid is determined to be contaminated, take appropriate safety measures.

TEST TERMINALS

The test terminals are connected across a diode through which the loop signal current passes. The indicating meter or test equipment shunts the diode when connected to the test terminals. As long as the voltage across the terminals is kept below the diode threshold voltage, no current passes through the diode. To ensure that there is no current leakage through the diode when making a test reading or when connecting an indicating meter, the resistance of the test connection or meter should not exceed 10 Ω for the 4–20 mA output or 4 Ω for the 10–50 mA output.

BOARD CHECKOUT

NOTE
Numbers in parentheses refer to item numbers in Figure 5-2 on page 5-6.

NOTE
The Rosemount 1152 Pressure Transmitter contains electronic circuit boards, which may be static sensitive.

You can easily check the printed circuit boards (11 and 13) for a malfunction by substituting spare boards into the circuit. If this procedure turns up a malfunctioning board, return the defective board to Rosemount Nuclear Instruments, Inc. for replacement. Because of parts traceability, qualification becomes the responsibility of the customer in the event of unauthorized board repairs.

NOTE
When replacing either the A or D output amplifier or calibration board, both boards must be replaced with N output amplifier and calibration boards. When replacing the E output amplifier or calibration board, the boards must be replaced with an N output amplifier or calibration board. Both boards do not need to be replaced on the E output.

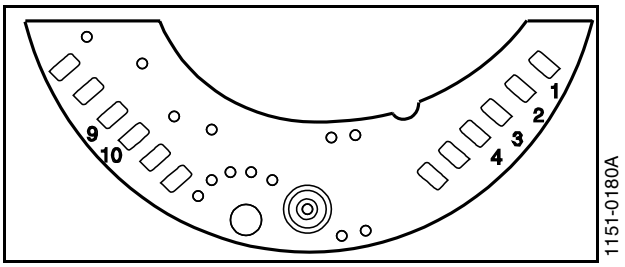
SENSING MODULE CHECKOUT

NOTE
Numbers in parentheses refer to item numbers in Figure 5-2 on page 5-6.

The sensing module (24) is not field-repairable and must be replaced if defective. If no defect such as a punctured isolating diaphragm or loss of fill fluid is observed, check the sensing module in the following manner:

1. Disengage the header assembly board (10) as described in “Electrical Housing Disassembly” on page 5-4. You need not remove the sensing module from the electrical housing for checkout.
2. Jump connections 1 and 2 on the header assembly board (see Figure 5-1).

Figure 5-1. Header Board Connections.



3. Using a low-voltage ohmmeter, check the resistance between the jumper wire and the sensing module housing. This resistance should be greater than 10 MΩ. Remove the jumper wire.
4. Jump connections 3 and 4 on the header assembly board and repeat step 3 (see Figure 5-1).

NOTE
The above procedure does not completely test the sensing module. If circuit board replacement does not correct the abnormal condition and no other problems are obvious, replace the sensing module.

DISASSEMBLY PROCEDURE

Process Flange Removal

NOTE
Numbers in parentheses refer to item numbers in Figure 5-2 on page 5-6.

NOTE
The Rosemount 1152 Pressure Transmitter contains electronic circuit boards, which may be static sensitive.

NOTE
Read “Process Flange Reassembly” on page 5-7 before attempting disassembly. Special testing and traceability are required.

⚠WARNING

Process O-rings may retain some process fluid after disassembly of process flanges. If this fluid is determined to be contaminated, take appropriate safety measures.

1. Remove the transmitter from service before disassembling flanges.
2. Detach process flanges (25, 27) by removing the four large bolts (26). **Be careful not to scratch or puncture the isolating diaphragms**. Identify high and low (“H” and “L”) flanges for reassembly.

NOTE
Carefully remove the O-rings (23) from the cell if they do not come off when the flange is removed. Do not pry the O-ring from its seat as damage to the isolating diaphragm may occur.

3. Clean isolating diaphragms with a soft cloth and a mild cleaning solution. **Do not use any chlorine or acid solutions to clean the diaphragms.** Rinse the diaphragms with distilled water.

Electrical Housing Disassembly

1. The signal terminals and the test terminals are accessible by unscrewing the cover (1) on the terminal side. This compartment is identified as “Terminal Side” on the nameplate. The terminals are permanently attached to the housing and must not be removed.
2. Circuit boards are located in a separate compartment identified as “Circuit Side” on the nameplate. Remove power from the transmitter before removing the circuit cover. Unscrew the cover (1) on the circuit side to access the circuit boards. A special cover wrench (RMT P/N 01153-0382-0001) is available from Rosemount to remove and replace the housing covers.
3. E, N, and L Output: Unplug the amplifier board (13) after removing the three holding screws (14). The L output board has an additional captive screw that should be removed last.
4. The header assembly board (10) is permanently attached to the sensor module (24) and contains the temperature-compensating resistors. Carefully pull this board off the bayonet pins. Rotate the board 180° about the axis formed by the connecting leads. This allows access to the calibration board (11).
5. Disconnect the calibration board (11) by removing the three standoffs (12) and aligning the zero and span adjust screws so that their slots are perpendicular to the board. Remove the board by grasping the interface pin and pulling outward.

   A and D Output: Unplug the amplifier board (13) after removing 3 holding screws (14) and loosening the heat sink screw, which is captive to the board. Remove the board by inserting a #6-32 screw in the rivnut on the board. The header assembly board (10) is permanently attached to the sensor module (24) and contains the temperature compensating resistors. Carefully pull this board off the bayonet pins by inserting a #6-32 screw into the rivnut on the board. Rotate the board 180° about the axis formed by the connecting leads. This allows access to the calibration board (11). Disconnect the calibration board by removing the three standoffs (12) and aligning the zero and span adjust screws so that their slots are perpendicular to the board. Remove the board by inserting a #6-32 screw in the rivnut on the board.
6. If replacement of the zero and span adjustment screws (4) is necessary, remove the nameplate (8) and detach the snap rings (6) inside the housing.

Removing Sensor Module from Electrical Housing

1. Remove flanges per “Process Flange Removal” on page 5-3.
2. Remove amplifier board and calibration board as described in “Electrical Housing Disassembly” on page 5-4.
3. Loosen the lock nut (17).
4. Unscrew the sensor module (24) from the electronics housing, simultaneously turning the header board and leads to prevent them from being twisted or damaged. The threaded connection has a sealing compound on it and must be broken loose. **Be careful not to damage the isolating diaphragms when unscrewing the sensor module.** Then carefully pull the header assembly board (10) through the hole.
5. The sensor module (24) is a welded assembly and cannot be further disassembled.

REASSEMBLY PROCEDURE

NOTE
Numbers in parentheses refer to item numbers in Figure 5-2 on page 5-6.

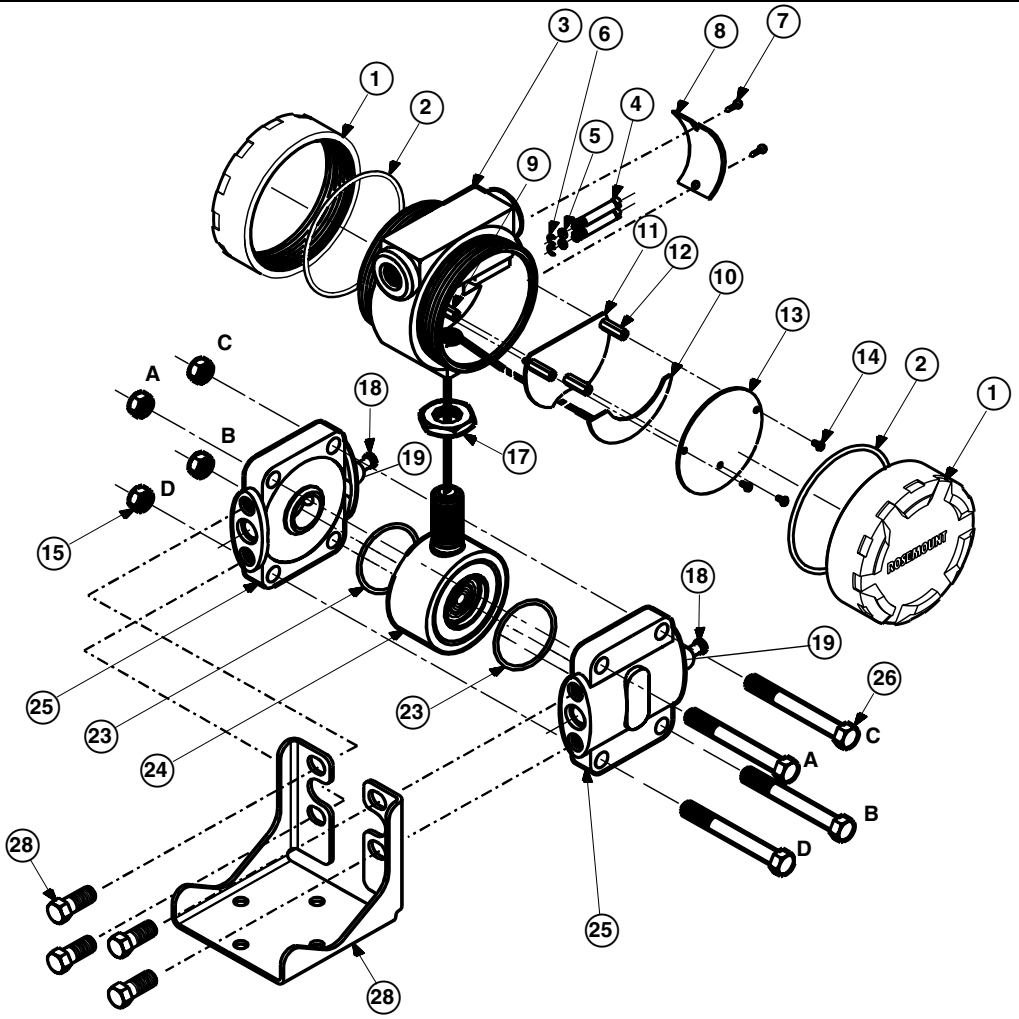
NOTE
The Rosemount 1152 Pressure Transmitter contains electronic circuit boards which may be static sensitive.

Preliminary

1. Replace the cover O-rings (2) whenever you remove a cover. Clean the sealing areas with isopropyl alcohol, if necessary, and lightly grease the O-ring with Dow Corning® 55 Silicone O-ring Grease (RMT P/N 01153-0248-0001 or P/N 01153-0053-0001). Spray the inside threads of the electronics covers with cover lubricant (RMT P/N 01153-0333-0001 or equivalent) if necessary. If covers are already sufficiently lubricated, do not spray.
2. Verify that the circuit boards are clean.
3. Verify that the bayonet pins on the connection board are clean.
4. If you remove the sensor module, clean the thread sealant from the sensor threads, lock nut, and electronics housing threads with a wire brush.

NOTE
Spare Range Codes 8, 9, and 10 sensor modules are no longer compatible with the A output.

Figure 5-2. Parts Drawing, Exploded View.



1. Electronics Cover
2. O-ring for Electronics Cover
3. Electronics Housing
4. Adjustment Screw
5. O-ring for Adjustment Screw
6. Retaining Ring
7. Screw
8. Nameplate
9. Standoff
10. Header Board
11. Calibration Circuit Board
12. Standoff
13. Amplifier Circuit Board
14. Screw
15. Nuts for the Process Flange
16. Not Specified
17. Locknut
18. Valve Stem
19. Valve Seat
20. Not Specified
21. Not Specified
22. Not Specified
23. O-ring for Process Flange
24. Sensor Module
25. Process Flange
26. Bolts for the Process Flange
27. Blank Flange (Not Shown—GP and AP only)
28. Panel Mounting Bracket with Bolts

1152-1152A02B

Connecting Electrical Housing to Sensor Module

1. Run the lock nut down to the base of the sensor module threads.
2. Apply a heavy, continuous bead (about 3/8 in. wide) of Loctite® 580-PST sealant (RMT P/N 01153-0329-0001) around the top sensor module threads.
3. Insert the header assembly board (10) through the hole in the bottom of the electronics housing.
4. Screw the sensor module (24) into the electrical housing (3), ensuring that five full threads are engaged. Be careful not to damage or twist the sensor module leads. Turn the header board to avoid twisting wires.
5. Align the sensor module with the high and low pressure sides oriented per Figure 2-1 on page 2-4, as applicable. Alternately, tighten the module one-half turn further to reverse the orientation of the module about the electronics housing.
6. Tighten the lock nut (17) to 35 ft-lb (47.5 N-m) torque.
7. Wipe off excess sealant.
8. Place the assembled unit in an oven at 200 ± 5 °F (93 ± 3 °C) for 12 hours to cure the sealant.

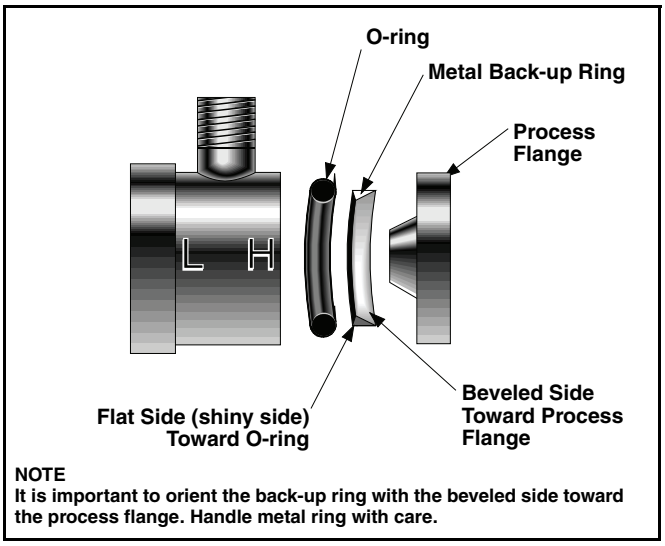
Electrical Housing Assembly

1. Replace the zero and span adjustment screw O-rings (5) whenever you remove the zero or span adjustment screws (4). Lightly grease the O-rings with Dow Corning 55 Silicone O-ring Grease (RMT P/N 01153-0248-0001 or P/N 01153-0053-0001). Reinstall the adjustment screws and secure with snap rings (6).
2. Align the zero and span adjustment screws with the potentiometer stems on the calibration board (11) and push the calibration board onto the bayonet pins.
3. Secure the calibration board with the three standoffs (12). The upper-right-hand standoff grounds the electronics to the case and must be firmly in place.
4. Slide the header assembly board (10) onto the bayonet pins with the component side toward the pins. Slide excess wire behind the calibration board, taking care to avoid kinks.
5. Push the amplifier board (13) onto the bayonet pins. Connect the heat sink screw (A, D, and L outputs only) and secure the amplifier board with the three holding screws (14).
6. Carefully replace the cover (1) and tighten to 16.5 ft-lb (22.4 N-m) (see “Preliminary” on page 5-5).
7. Replace the nameplate (8) and attach with two nameplate screws (7).

Process Flange Reassembly

1. Replace the flange O-rings with new O-rings if the flanges were removed. Lightly grease new flange O-rings with Dow Corning® 111 Silicone Grease (RMT P/N 01153-0334-0001).
2. Carefully place an O-ring (23) in the isolator well of the high side (“H”) of the sensing module. On Range Code 10 transmitters, add a backup ring over the O-ring as shown in Figure 5-3 on page 5-8.

Figure 5-3. Process O-Ring and Back-Up Ring Installation for Rosemount 1152 Range Code 10.



3. Carefully place the flange (25 or 27) as shown in the exploded view. Take care not to disturb the O-rings or damage the diaphragms.
4. On differential units, repeat steps 2 and 3 for the low side (“L”) of the sensor module. For gage units, repeat step 3 for the low side (“L”) of the sensor module.
5. Keeping the flanges parallel to each other and to the module faces, insert the four bolts (26) (and washers on Range Codes 9 and 10) and finger-tighten the nuts (15).
   Each spare parts kit contains the correct number of nuts, bolts, and washers for the specific transmitter range code it is designated for. Due to recent consolidation of parts kits, the bolt length and quantity of washers required may differ from existing transmitter assemblies and/or parts kits. Verify by part number that the appropriate spare parts kit is used for the transmitter range code being re-assembled. Contact Rosemount Nuclear Instruments, Inc. if there are any questions.
6. Evenly seat the flanges on the sensor housing, using a hand torque wrench. See Figure 5-2 on page 5-6 to identify the bolts.
7. Alternately tighten bolts A and B to 10 ft-lb (14 N-m) torque.
8. Alternately tighten bolts C and D to 10 ft-lb (14 N-m) torque.
9. Check torque on A and B.
10. Check torque on C and D.
11. Repeat steps 7–10 at 15 ft-lb (20 N-m) torque, at 20 ft-lb (27 N-m) torque, and at 25 ft-lb (34 N-m) torque until all bolts are torqued to 25 ft-lb (34 N-m).
12. Expose Range Code 3 transmitters to two temperature cycles over the expected operating temperature range before calibration.

Table 5-1. Torque References.

Item(s)	Torque	Tolerance
Bracket to Mounting Panel Bolts	19 ft-lb (26 N-m)	±1 ft-lb (1 N-m)
Transmitter to Bracket Bolts	21 ft-lb (29 N-m)	±1 ft-lb (1 N-m)
Pipe Mount U-bolts	19 ft-lb (26 N-m)	±1 ft-lb (1 N-m)
Drain/Vent Valves	7.5 ft-lb (10 N-m)	±0.5 ft-lb (0.7 N-m)
Covers	16.5 ft-lb (22.4 N-m)	±1 ft-lb (1 N-m)
Module Neck Lock Nut	35 ft-lb (48 N-m)	±1 ft-lb (1 N-m)
Flange Bolts	See PROCESS FLANGE REASSEMBLY	—
Terminal Block Screws	5 in-lb (0.6 N-m) or hand tight	±1 in-lb (0.1 N-m)
Amplifier Board Screws	Nominal 10 in-lb (1.1 N-m)	—

POST ASSEMBLY TESTS

1. Conduct hydrostatic testing to 150 percent of maximum working pressure or 2,000 psi, whichever is greater.
2. Calibrate the transmitter per the calibration section of this manual.
3. Conduct nuclear cleaning to 1 ppm chloride content of transmitter “wetted parts.”

Table 5-2. Troubleshooting

Symptom	Potential Source	Corrective Action
High Output	Primary Element	Check for restrictions at primary element, improper installation, or poor condition. Note any changes in process fluid properties that may affect output.
	Impulse Piping	Check for leaks or blockage. Ensure that blocking valves are fully open. Check for entrapped gas in liquid lines and for liquid in dry lines. Ensure that density of fluid in impulse lines is unchanged. Check for sediment in the transmitter process flanges.
	Transmitter Electronics	Make sure that post connectors and the sensor connections are clean. If the electronics are still suspect, substitute new electronics.
	Transmitter Electronics Failure	Determine faulty circuit board by trying spare boards. Replace faulty circuit board.
	Sensing Module	**NOTE: See Sensing Module Checkout section.** The sensing element is not field repairable and must be replaced if found to be defective. See "Disassembly procedure" for instructions on disassembly. Check for obvious defects, such as punctured isolating diaphragm or fill fluid loss, and contact Rosemount Nuclear Instruments, Inc. at (952) 949-5210.
	Power Supply	Check the power supply output voltage at the transmitter.
Low Output or No Output	Primary Element	Check for restrictions at primary element, improper installation, or poor condition. Note any changes in process fluid properties that may affect output.
	Loop Wiring	**⚠CAUTION** Do not use over 100 volts to check the loop, or damage to the transmitter electronics may result. Check for adequate voltage to the transmitter. Check the milliamp rating of the power supply against the total current being drawn for all transmitters being powered. Check for shorts and multiple grounds. Check for proper polarity at the signal terminal. Check loop impedance. Check wire insulation to detect possible shorts to ground.
	Impulse Piping	Ensure that the pressure connection is correct. Check for leaks or blockage. Check for entrapped gas in liquid lines. Check for sediment in the transmitter process flange. Ensure that blocking valves are fully open and that bypass valves are tightly closed. Ensure that density of the fluid or other fluid properties in the impulse piping are unchanged.
	Transmitter Electronics Connections	Ensure that calibration adjustments are in allowable range. Check for shorts in sensor leads. Make sure post connectors are clean, and check the sensor connections. If the electronics are still suspect, substitute new electronics.
	Test Diode Failure	Replace electronics housing.
	Transmitter Electronics Failure	Determine faulty circuit board by trying spare boards. Replace faulty circuit board.
	Sensing Module	**NOTE: See Sensing Module Checkout section.** The sensing element is not field repairable and must be replaced if found to be defective. See "Disassembly procedure" for instructions on disassembly. Check for obvious defects, such as punctured isolating diaphragm or fill fluid loss, and contact Rosemount Nuclear Instruments, Inc. at (952) 949-5210.
	Power Supply	Check the power supply output voltage at transmitter.
Erratic Output	Loop Wiring	**⚠CAUTION** Do not use over 100 volts to check the loop, or damage to the transmitter electronics may result. Check for adequate voltage to the transmitter. Check for intermittent shorts, open circuits and multiple grounds.

Symptom	Potential Source	Corrective Action
	Impulse Piping and Process Connections	Check for entrapped gas in liquid lines and for liquid in dry lines.
	Transmitter Electronics	Check for intermittent shorts or open circuits. Make sure that post connectors and the sensor connections are clean and properly installed.
	Transmitter Electronics Failure	Determine faulty board by trying spare boards. Replace faulty circuit board.
	Power Supply	Check power supply output voltage.

Section 6 Specifications and Reference Data

Nuclear Specifications . . . . . **page 6-1**
Performance Specifications . . . . . **page 6-2**
Functional Specifications . . . . . **page 6-3**
Physical Specifications . . . . . **page 6-6**

NUCLEAR SPECIFICATIONS

Qualified to IEEE Std 323-1971 and IEEE Std 344-1975 as stated in Rosemount Reports 38019, 58225, and 117415; Rosemount 1152 with Output Code L (10–50 mA) seismic qualification only, to IEEE Std 344-1975 per Rosemount Report D8800058

Radiation (4–20 mA only)

Accuracy within ±8.0% of upper range limit during and after exposure to 5×10^6 rads, total integrated dosage of gamma radiation at 0.4 Mrad/hr dose rate

Seismic

Accuracy within ±0.25% of upper range limit during and after seismic disturbance to 3 g over a range of 5–100 Hz in 3 major axes

Steam Pressure/Chemical Spray (4–20 mA only)

Accuracy within ±0.75% of upper range limit after sequential exposure to steam at the following temperatures and pressures:
316 °F (157.8 °C), 70 psig (482.6 kPa) for 1 hour
303 °F (150.5 °C), 55.4 psig (381.9 kPa) for 7 hours
230°F (110°C), 6 psig (41.4 kPa) for 42 hours

For SST housing option, accuracy within ±0.75% of upper range limit after chemical spray concurrent with the above system pressure cycle

Quality Assurance Program

In accordance with NQA-1, 10CFR50 Appendix B, ISO 9001:2000 and CSA Z299.1

Nuclear Cleaning

To 1 ppm chloride content

Hydrostatic Testing

To 150% of rated line pressure or 2,000 psi (13.8 MPA), whichever is greater (Range Code 0 tested to 7,500 psi)

Traceability

In accordance with NQA-1 and 10CFR50 Appendix B; chemical and physical material certification of pressure retaining parts

PERFORMANCE SPECIFICATIONS

Based on zero-based ranges under reference conditions

Accuracy

±0.25% of calibrated span; includes combined effects of linearity, hysteresis, and repeatability

Dead Band

None

Drift

±0.2% of upper range limit for 30 months

Temperature Effect

Range Codes 4–9 and 0: ±(0.5% upper range limit +0.5% span) per ambient temperature change of 100 °F (55.6 °C)

Range Code 3: ±(1.0% upper range limit +1.0% span) per ambient temperature change of 100 °F (55.6 °C)

Overpressure Effect

Rosemount 1152DP:
Maximum zero shift after 2,000 psig (13.8 MPa) overpressure:

Range Code	Overpressure Effect
3, 4	±0.25% of upper range limit
5	±1.0% of upper range limit
6, 7	±3.0% of upper range limit
8	±6.0% of upper range limit

Rosemount 1152HP:
Maximum zero shift after 4,500 psig (31.0 MPa) overpressure:

Range Code	Overpressure Effect
4	±1.0% of upper range limit
5	±2.0% of upper range limit
6, 7	±5.0% of upper range limit

Rosemount 1152AP and 1152GP:

Range Code	Overpressure Effect
3, 4	2,000 psig (13.8 MPa) will cause a zero shift of less than ±0.25% of upper range limit.
5–8	2,000 psig (13.8 MPa) will cause a zero shift of less than ±1.0% of upper range limit.
9	4,500 psi (31.0 MPa) will cause a zero shift of less than ±0.5% of upper range limit.
0	7,500 psi (51.7 MPa) will cause a zero shift of less than ±1.0% of upper range limit.

Static Pressure Zero Effect

Rosemount 1152DP
Per 2,000 psi (13.8 MPa)

Range Code	Static Pressure Zero Effect
4, 5	±0.25% of upper range limit
3, 6–8	±0.5% of upper range limit

Rosemount 1152HP:
Per 4,500 psi (31.0 MPa)

Range Code	Static Pressure Zero Effect
all	±2.0% of upper range limit

Static Pressure Span Effect

Effect is systematic and can be calibrated out for a particular pressure before installation. Correction uncertainty is ±0.25% of input reading/1,000 psi (6.89 MPa) (±0.5% of input reading/1,000 psi for Range Code 3).

Power Supply Effect

Less than 0.005% of output span/volt

Load Effect

No load effect other than the change in voltage supplied to the transmitter

Mounting Position Effect

No span effect; zero shift of up to 1 inH_2O, which can be calibrated out

FUNCTIONAL SPECIFICATIONS

Service

Liquid, gas, or vapor

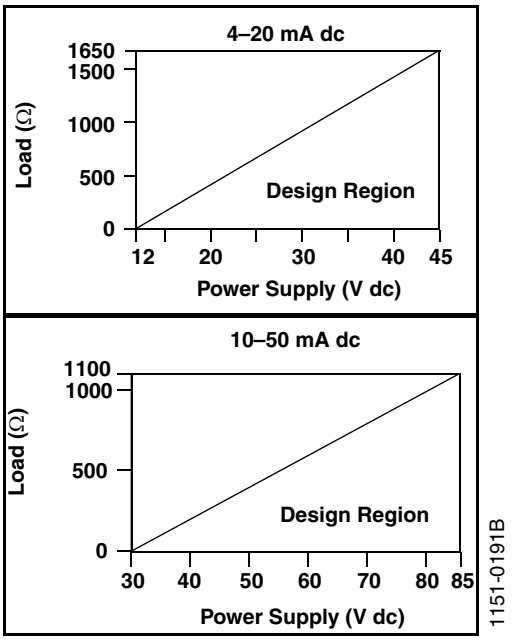
Output

4–20 mA dc or 10–50 mA dc (seismic qualification only)

Power Supply

Design limits as shown in Figure 6-1 for 4–20 mA dc and 10–50 mA dc

Figure 6-1. Transmitter Load Limitations.



Span and Zero

Continuously adjustable externally

Zero Elevation and Suppression

Maximum zero elevation: 600% of calibrated span (DP, GP, and HP only)

Maximum zero suppression: 500% of calibrated span

Zero elevation and suppression must be such that neither the span nor the upper or lower range value exceeds 100% of the upper range limit

Temperature Limits

Amplifier operating: –20 to +200 °F (–28.9 to +93.3 °C)
Sensing element operating: –20 to +220 °F (–28.9 to +104.4 °C)
Storage: –60 to +250 °F (–51.1 to +121.1 °C)

Humidity Limits

0 to 100% relative humidity (NEMA 4X)

Volumetric Displacement

Less than 0.01 in^3 (0.16 cm^3)

Turn-On Time

Two seconds maximum; no warm-up required

Response Time

Time constant at 100 °F (37.8 °C) continuously adjustable from 0.2 seconds or less (0.4 seconds or less for Range Code 3) up to 1.67 seconds, nominal.

Pressure Ranges

Rosemount 1152DP and Rosemount 1152HP:

Range Code	Pressure Range
3	0–5 to 0–30 inH_2O (0–1.24 to 0–7.46 kPa) (DP units only)
4	0–25 to 0–150 inH_2O (0–6.22 to 0–37.3 kPa)
5	0–125 to 0–750 inH_2O (0–31.08 to 0–186.4 kPa)
6	0–17 to 0–100 psi (0–0.12 to 0–0.69 MPa)
7	0–50 to 0–300 psi (0–0.34 to 0–2.07 MPa)
8	0–170 to 0–1,000 psi (0–1.17 to 0–6.89 MPa) (DP units only)

Rosemount 1152AP and Rosemount 1152GP:

Range Code	Pressure Range
3	0–5 to 0–30 inH_2O (0–1.24 to 0–7.46 kPa) (GP units only)
4	0–25 to 0–150 inH_2O (0–6.22 to 0–37.3 kPa) (GP units only)
5	0–125 to 0–750 inH_2O (0–31.08 to 0–186.4 kPa)
6	0–17 to 0–100 psi/psia (0–0.12 to 0–0.69 MPa)
7	0–50 to 0–300 psi/psia (0–0.34 to 0–2.07 MPa)
8	0–170 to 0–1,000 psi/psia (0–1.17 to 0–6.89 MPa)
9	0–500 to 0–3,000 psi (0–3.45 to 0–20.68 MPa) (GP units only)
0	0–1,000 to 0–6,000 psi (0–6.89 to 0–41.37 MPa) (GP units only)

Maximum Working Pressure

Rosemount 1152DP and 1152HP:
Static pressure limit

Rosemount 1152AP and 1152GP:
Upper range limit

Static Pressure and Overpressure Limits

Rosemount 1152DP:
0.5 psia to 2,000 psig (3.4 kPa abs to 13.8 MPa) maximum rated static pressure for operation within specifications; overpressure limit is 2,000 psig (13.8 MPa) on either side without damage to the transmitter

Rosemount 1152HP:
0.5 psia to 4,500 psig (3.4 kPa abs to 31.0 MPa) maximum rated static pressure for operation within specifications; overpressure limit is 4,500 psig (31.0 MPa) on either side without damage to the transmitter

Overpressure Limits

Rosemount 1152AP and 1152GP:
Operates within specification from 0.5 psia (3.4 kPa abs) to upper range limit; overpressure limit is 2,000 psig (13.8 MPa) without damage to the transmitter for all range codes, except Range Code 9, which has a limit of 4,500 psig (31.0 MPa) and Range Code 0, which has a limit of 7,500 psig (51.7 MPa)

PHYSICAL SPECIFICATIONS

Materials of Construction

Isolating Diaphragms:
316L SST

Drain/Vent Valves:
316 SST

Process Flanges:
CF-8M (Cast version of 316 SST)

O-rings:
Ethylene Propylene

Fill Fluid:
Silicone Oil

Flange Bolts and Nuts:
Plated alloy steel, per ASTM A-540

Electronics Housing:
Low-copper aluminum with epoxy-polyester paint, or authentic stainless steel

Mounting Bracket:
Carbon steel, AISI 1010 or 1020, with epoxy-polyester paint or 316L SST

Mounting Bolts (Bracket to Transmitter):
SAE J429 carbon steel, Grade 2 or Grade 5

Process Connections

1/4–18 NPT

Electrical Connections

1/2–14 NPT conduit with screw terminals

Weight

12 lb. (5.4 kg) with aluminum housing; 16 lb. (7.3 kg) with stainless steel housing (excluding bracket)

Table 6-1. Ordering Information

Model	Description			
1152	*Alphaline* Pressure Transmitters for Nuclear Applications			
Code	**Pressure Measurement**			
DP	Differential Pressure, 2,000 psig (13.8 MPa) Static Pressure Rating			
HP	Differential Pressure, 4,500 psig (31.0 MPa) Static Pressure Rating			
AP	Absolute Pressure			
GP	Gage Pressure			
	PRESSURE RANGES at 68 °F			
Code	**Rosemount 1152DP (Differential)**	**Rosemount 1152HP (Differential)**	**Rosemount 1152AP (Absolute)**	**Rosemount 1152GP (Gage)**
3	0–5 to 0–30 inH_2O (0–1.24 to 0–7.46 kPa)	—	—	0–5 to 0–30 inH_2O (0–1.24 to 0–7.46 kPa)
4	0–25 to 0–150 inH_2O (0–6.22 to 0–37.3 kPa)	0–25 to 0–150 inH_2O (0–6.22 to 0–37.3 kPa)	—	0–25 to 0–150 inH_2O (0–6.22 to 0–37.3 kPa)
5	0–125 to 0–750 inH_2O (0–31.08 to 0–186.4 kPa)	0–125 to 0–750 inH_2O (0–31.08 to 0–186.4 kPa)	0–125 to 0–750 inH_2O (0–31.08 to 0–186.4 kPa)	0–125 to 0–750 inH_2O (0–31.08 to 0–186.4 kPa)
6	0–17 to 0–100 psi (0–0.12 to 0–0.69 MPa)	0–17 to 0–100 psi (0–0.12 to 0–0.69 MPa)	0–17 to 0–100 psia (0–0.12 to 0–0.69 MPa)	0–17 to 0–100 psi (0–0.12 to 0–0.69 MPa)
7	0–50 to 0–300 psi (0–0.34 to 0–2.07 MPa)	0–50 to 0–300 psi (0–0.34 to 0–2.07 MPa)	0–50 to 0–300 psia (0–0.34 to 0–2.07 MPa)	0–50 to 0–300 psi (0–0.34 to 0–2.07 MPa)
8	0–170 to 0–1,000 psi (0–1.17 to 0–6.89 MPa)	—	0–170 to 0–1,000 psia (0–1.17 to 0–6.89 MPa)	0–170 to 0–1,000 psi (0–1.17 to 0–6.89 MPa)
9	—	—	—	0–500 to 0–3,000 psi (0–3.45 to 0–20.68 MPa)
0	—	—	—	0–1,000 to 0–6,000 psi (0–6.89 to 0–41.37 MPa)
Code	**Output**			
N(1)	4–20 mA dc with Adjustable Damping			
	MATERIALS OF CONSTRUCTION			
Code	**Flanges**	**Drain/Vent Valves**	**Isolating Diaphragms**	**Electronics Housing/Covers**
22	316 SST	316 SST	316 SST	Aluminum
92	316 SST	316 SST	316 SST	Austenitic SST
Code	**Options**			
PB	Panel Mounting Bracket			
PM	2-in. Pipe Mounting Bracket			
Typical Model Number: 1152DP 4 N 22 PB				

*(1) For 10–50 mA output, the "N" is replaced with "L," and "T1805" is incorporated into the model number, unless another "T" option is required. For example: 1152DP5L22**T1805**PB. Transmitters with Output Code L have seismic qualification only.*

Table 6-2. **Rosemount 1152 Spare Parts.**

Spare Parts Category[1] / Traceable Part / Quantity Required / Item Number / Part Description					Rosemount 1152DP Order No.	Rosemount 1152HP Order No.	Rosemount 1152GP Order No.	Rosemount 1152AP Order No.
Amplifier Cir. Board, Output Code N	13	1		A	01152-0086-0005	01152-0086-0005	01152-0086-0005	01152-0086-0005
Calib. Cir. Board, Output Code N	11	1		A	01152-0047-0001	01152-0047-0001	01152-0047-0001	01152-0047-0001
Amplifier Cir. Board, Output Code L	13	1		A	01152-0125-0002	01152-0125-0002	01152-0125-0002	01152-0125-0002
Calib. Cir. Board, Output Code L	11	1		A	01152-0123-0001	01152-0123-0001	01152-0123-0001	01152-0123-0001
Sensor Module, 316SST	24	1						
0–5/30 inH_2O			X	B	01152-0300-0732	—	01152-0300-0732	—
0–25/150 inH_2O			X	B	01152-0300-0742	01152-0300-0942	01152-0300-0742	—
0–125/750 inH_2O			X	B	01152-0300-0752	01152-0300-0952	01152-0300-0752	01152-0300-0852
0–17/100 psi **Note: Kit includes two O-rings.**			X	B	01152-0300-0762	01152-0300-0962	01152-0300-0762	01152-0300-0862
0–50/300 psi			X	B	01152-0300-0772	01152-0300-0972	01152-0300-0772	01152-0300-0872
0–170/1,000 psi			X	B	01152-0300-0782	—	01152-0300-0782	01152-0300-0882
0–500/3,000 psi					—	—	01152-0300-0792	—
0–1,000/6,000 psi					—	—	01152-0300-0702	—
Electronics Housing, Aluminum	3	1			01152-0041-0001	01152-0041-0001	01152-0041-0001	01152-0041-0001
Electronics Cover, Aluminum, Beveled Edge Style	1	2			01153-0381-0001	01153-0381-0001	01153-0381-0001	01153-0381-0001
Electronics Housing, Austenitic SST					01152-0041-0002	01152-0041-0002	01152-0041-0002	01152-0041-0002
Electronics Cover, Austenitic SST	3	1			01152-0118-0001	01152-0118-0001	01152-0118-0001	01152-0118-0001
Cover Wrench	1	2			01153-0382-0001	01153-0382-0001	01153-0382-0001	01153-0382-0001
Conduit Plug, 316SST		1			01153-0335-0001	01153-0335-0001	01153-0335-0001	01153-0335-0001
Hollow Terminal Block Screw Kit					01153-0041-0001	01153-0041-0001	01153-0041-0001	01153-0041-0001
Solid Terminal Block Screw Kit (Kit Contains 20 each)					01153-0330-0001	01153-0330-0001	01153-0330-0001	01153-0330-0001
Process Flange[2] 316SST $^1/_4$ - 18 NPT welded V/D Valve Seat	25		X		01153-0175-0002	01153-0175-0002	01153-0175-0002	01153-0175-0002
Process Flange, 316SST, $^1/_4$ - 18 NPT x $^1/_4$ - 18 NPT	25	1	X		01153-0291-0001	01153-0291-0001	01153-0291-0001	01153-0291-0001
Blank Flange, 316 SST	27	1	X		—	—	01153-0272-0001	01153-0272-0001
Valve Stem, 316SST[2]	18	1	X	A	01153-0277-0001	01153-0277-0001	01153-0277-0001	01153-0277-0001
Valve Stem and Seat Kit, 316SST			X		01153-0038-0001	01153-0038-0001	01153-0038-0001	01153-0038-0001
Adjustment Screw	4	2			01152-0064-0001	01152-0064-0001	01152-0064-0001	01152-0064-0001
Retaining Ring	6	2						
O-ring for Adjustment Screw	5	2						
O-ring for Adjustment Screw	5	2		B				
(Pkg. of 12)	2	2		C	01152-0065-0001	01152-0065-0001	01152-0065-0001	01152-0065-0001
O-ring for Electronics Cover	2	2		C				
(Pkg. of 12)					01152-0066-0001	01152-0066-0001	01152-0066-0001	01152-0066-0001
O-ring for Electronics Cover (Pkg. of 1)					01153-0039-0003	01153-0039-0003	01153-0039-0003	01153-0039-0003
O-ring for Process Flange	23	2	X	B				
Range Code 3–8 (Pkg. of 12)					01152-0067-0001	01152-0067-0002	01152-0067-0001	01152-0067-0001
Range Code 9–0 (Pkg. of 12)							01152-0067-0002	—
Range Code 0 (Pkg. of 12 back-up O-rings)					—	—	01152-0067-0003	—
D.C. 55 O-ring Lubricant (0.25 oz)					01153-0053-0001	01153-0053-0001	01153-0053-0001	01153-0053-0001
D.C. 55 O-ring Lubricant (5.3 oz)					01153-0248-0001	01153-0248-0001	01153-0248-0001	01153-0248-0001
D.C. 111 O-ring Lubricant					01153-0334-0001	01153-0334-0001	01153-0334-0001	01153-0334-0001
Loctite 580-PST Thread Sealant (50 ml)					01153-0329-0001	01153-0329-0001	01153-0329-0001	01153-0329-0001
Lubri-Bond® A Cover Lubricant (12 oz)					01153-0333-0001	01153-0333-0001	01153-0333-0001	01153-0333-0001

Continued on Next Page

Part Description	Item Number	Quantity Required	Traceable Part	Spare Parts Category	Rosemount 1152DP Order No.	Rosemount 1152HP Order No.	Rosemount 1152GP Order No.	Rosemount 1152AP Order No.
Electronics Assembly Hardware		1			01152-0069-0001	01152-0069-0001	01152-0069-0001	01152-0069-0001
Standoff	9							
Standoff	12							
Screw	7							
Screw	14							
Locknut	17							
Jumper Wire Kit (36 in.)					01153-0055-0001	01153-0055-0001	01153-0055-0001	01153-0055-0001
Bolts and Nuts for Process Flange[3]								
Range Codes 3–8	26	4	X		01152-0070-0001	01152-0070-0001	01152-0070-0001	01152-0070-0001
Range Codes 9–0	15	4	X		—	—	01152-0070-0002	—
Panel Mounting Bracket with Bolts	28	1			01152-0071-0001	01152-0071-0001	01152-0071-0001	01152-0071-0001
Universal Mounting Bracket with Bolts					01153-0013-0003	01153-0013-0003	01153-0013-0003	01153-0013-0003
Bolts & Washers for Bracket (Pkg of 4)					01153-0321-0001	01153-0321-0001	01153-0321-0001	01153-0321-0001
Pipe Mount Bracket Kit (Adapters)					01154-0044-0001	01154-0044-0001	01154-0044-0001	01154-0044-0001
Pipe Mount Bracket Kit (Bracket and Adapters)					01154-0038-0002	01154-0038-0002	01154-0038-0002	01154-0038-0002

(1) Rosemount recommends one spare part or kit for every 25 transmitters in Category "A", one spare part or kit for every 50 transmitters in Category "B", and one spare part or kit for every 5 transmitters in Category "C".
(2) Current standard configuration on transmitters assembled at factory.
(3) Each spare parts kit contains the correct number of nuts, bolts, and washers for the specific transmitter range code it is designated for. Due to recent consolidation of parts kits, the bolt length and quantity of washers required may differ from the existing transmitter assemblies and/or parts kits. Verify by part number that the appropriate spare parts kit is used for the transmitter range code being re-assembled. Contact Rosemount Nuclear Instruments, Inc. if there are any questions.
NOTE: Rosemount 1152 spare parts not hydrostatic tested or nuclear cleaned.

SPARE PARTS SHELF LIFE

Store all spare transmitters and spare component parts in accordance with ANSI N45.2.2 level B.

Lubricants and sealants: The data of the end of shelf life (use by date) is provided with the lubricants and/or sealant at the time of shipment. The product has a minimum of six months shelf life at the time of shipment.

All other parts: Shelf life is not applicable.

IMPORTANT NOTICE

There are factors to consider concerning maintenance of qualification and traceability during on-site instrument repair because of the nuclear use intended for these parts. Rosemount Nuclear Instruments, Inc. rigidly controlled the original assembly of the instrument to ensure that the specifications were met. Since we are not installing the replacement parts in the instruments, Rosemount Nuclear Instruments, Inc. is unable to ensure that the specifications are being satisfied. This responsibility is shifted to the user. The integrity of the instrument as originally assembled is broken. **Replacing parts has ramifications under 10CFR21, for which the user is responsible.** These same regulations additionally mandate a component traceability program, which the user must undertake for the replacement parts. In view of this, and in order to maintain the qualification of the product, the user must ensure that all replacement parts are installed in accordance with the Rosemount Nuclear Instruments, Inc. approved installation and recalibration procedures herein.

Notes

1. Rosemount 1152 spare parts are not hydrostatic tested or nuclear cleaned.
2. Part numbers shown may differ from those currently supplied. The part numbers shown are current at the time of printing of this manual, but may be revised in the future. Parts provided are compatible and interchangeable with those listed on your order as to the form, fit, and function of the part required. Please adjust your needs accordingly.

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