

# Absolute, Gauge, and Differential Pressure: IAP05S, IGP05S, IDP05S

## Value Performance Pressure Transmitters

### Product Specification Sheet

PSS 2A-1S05 A

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# Introduction

The next generation family of pressure transmitters are intelligent, open-loop, two-wire measuring devices that convert process pressure to a proportional analog and/or digital signal. The versatility of the Value, Advanced, and Performance transmitter families allow you to select the transmitter best suited for your application in terms of features, performance, and price.



## Value Performance Transmitters

The competitively priced IAP05S, IGP05S, and IDP05S pressure transmitters provide a robust design without compromising quality. This transmitter family has been designed for applications requiring an accuracy of up to  $\pm 0.075\%$  of span, and HART transmitters are SIL 2 certified.

- Remote communication capabilities
- Stability:  $< \pm 0.05\%$  of URL/yr for 5 years
- Direct Connect AP/GP response time:  $< 100$  ms
- SIL 2 as standard (HART)
- Robust design: 2-year warranty (optional 5-year warranty)
- DP and Biplanar AP/GP response time:  $< 125$  ms
- High pressure measurement (direct connect GP) and low power options
- In-service time tracking (HART)
- High Turndown Capability<sup>1</sup> (up to 400:1)

## Advanced Performance Transmitters

Considered the one transmitter that can do it all, the IAP10S, IGP10S, and IDP10S pressure transmitters cover most of your application needs with a single range. These transmitters offer embedded FoxCal™ technology and multiple points of calibration, which allow you to benefit from wide rangeability and one of the best reference accuracy turndowns on the market. These transmitters have an accuracy of up to  $\pm 0.05\%$  of reading, and HART transmitters are SIL 2 certified.

- Remote communication capabilities
- Stability:  $< \pm 0.03\%$  of URL/yr for 10 years
- Direct Connect AP/GP response time:  $< 100$  ms<sup>2</sup>
- SIL 2 as standard (HART)
- Robust Design: 5-year warranty (optional 17-year warranty)
- DP and Biplanar AP/GP response time:  $< 125$  ms<sup>2</sup>
- FoxCal™ technology
- In-service time tracking
- High Turndown Capability<sup>3</sup> (up to 400:1)

## Premium Performance Transmitters

Transmitters with high accuracy are required for the most demanding applications, and with an accuracy of up to  $\pm 0.025\%$  of reading, the IAP50S, IGP50S, and IDP50S pressure transmitters fit the bill. These transmitters offer embedded FoxCal™ technology and multiple points of calibration, which allow you to benefit from wide rangeability and one of the best reference accuracy turndowns on the market. These transmitters also offer more exotic materials to accommodate severe environments, and HART transmitters are SIL 2 certified.

- Remote communication capabilities
- Stability:  $< \pm 0.015\%$  of URL/yr for 10 years
- Direct Connect AP/GP response time:  $< 100$  ms<sup>2</sup>
- SIL 2 as standard (HART)
- Robust Design: 5-year warranty (optional 17-year warranty)
- DP and Biplanar AP/GP response time:  $< 125$  ms<sup>2</sup>
- FoxCal™ technology
- In-service time tracking
- High Turndown Capability<sup>3</sup> (up to 400:1)

1. Turndown capability refers to Maximum span/Minimum span.

2. For FOUNDATION Fieldbus, this is the average time primary value is measured in the transducer block.

3. Turndown capability refers to Maximum span/Minimum span,

These pressure transmitters provide absolute pressure (AP), gauge pressure (GP), and differential pressure (DP) measurement.

- Absolute pressure transmitters measure pressure relative to vacuum. Gauge pressure transmitters measure pressure relative to ambient air pressure. Both absolute and gauge transmitters are used in a wide variety of oil, gas, water and industrial applications.
- Differential pressure transmitters measure the difference between *two* pressures applied to opposite sides of the sensor. The output signal is proportional to either the differential pressure or its square root.
  - Differential pressure transmitters are often used for measuring fluid flow rates across a primary device such as an orifice plate, but can also be used for other types of differential pressure measurements such as liquid level, interface level, or density measurements.

Transmitters can be connected in series to instruments such as recorders, controllers, and indicators.

## This Document

This document discusses the Value Performance family of pressure transmitters. This family provides Absolute Pressure (AP), Gauge Pressure (GP), and Differential Pressure (DP) transmitter options that operate with HART or low power communication.

# Key Features

The Value Performance pressure transmitters offer the following features:

- Absolute, Gauge, and Differential Pressure transmitters
- HART digital outputs, 4 to 20 mA outputs, low power analog outputs
- TÜV SIL 2 certification for HART transmitters
- 5-year proof test interval for pressure transmitters installed in SIL 2 Safety loops
- Accuracy up to  $\pm 0.075\%$  of span
- Response time of 100 ms for AP/GP transmitters and 125 ms for DP transmitters
- Time in Service meter features cumulative power-up time and time powered since last user reset for HART transmitters
- High Turndown Capabilities<sup>4</sup> (up to 400:1)
- Ability to locally configure the device with pushbuttons on the local display (optional with HART transmitters)
- Ability to remotely communicate with and configure the device using the device descriptor (DD), Device Type Manager (DTM), or the Field Device Integration (FDI) package
- Optional External Zero Adjustment (HART Only)
- Field-proven piezoresistive silicon microsensors help ensure excellent measurement performance
- Simple, elegant sensor design with very few parts achieves exceptional reliability
- Durable aluminum or 316 ss housing options are available; both meet NEMA Type 4X and IEC IP66/67 ratings
- Differential pressure (DP) transmitters are available with traditional and low profile or Coplanar™ structures
- Sensor diaphragm materials include 316L ss or nickel alloy<sup>5</sup>
- ½ NPT male, ½ NPT female, or M20 male process connections
- Numerous mounting bracket set options
- Process venting and bleeding options
- Special degreasing and cleaning options
- Low temperature and high pressure options
- Custody transfer lock and seal options
- Many configurations of direct connect or capillary connected seals
- Dual Seal certified by CSA to meet ANSI/ISA 12.27.01-2003 requirements
- Complies with electromagnetic compatibility requirements of European EMC Directive 2014/30/EU by conforming to following EN and IEC Standard: EN 61326-1:2013
- NACE MR0175 and MR0103 compliant process wetted parts and bolt material available
- Optional certification options allow transmitters to meet numerous requirements for hazardous and non-hazardous locations
- CE marked; meets the requirements of applicable EMC, ATEX, RoHS, and PED European Union Directives
- Multi-marking protection concepts available for ATEX, CSA, FM, IECEx, and INMETRO
- Standard 2-year warranty (optional 5-year warranty)

4. Turndown capability refers to Maximum span/Minimum span

5. Equivalent to Hastelloy® C-276. Hastelloy is a registered trademark of Haynes International, Inc.

## Transmitters Using HART Communication

Transmitters using HART communication provide the following features:

- Ability to remotely configure the device using a HART communicator or PC-based configurator
- Support for HART 7 communication protocol in single loop or multidrop mode
- Compliance with NAMUR NE 21 interference immunity requirement, and NAMUR NE 43 analog output overrange and underrange annunciations
- Interoperability tested and registered with the FieldComm Group

## Low Power Transmitters

When you want the flexibility and performance of a configurable, intelligent transmitter but you don't need a digital output signal, low power transmitters provide exceptional benefits at an affordable price. These transmitters are low power, voltage output transmitters that provide precise, reliable measurement of gauge, absolute, and differential pressure, draw no more than 3 mA, and transmit a 1 to 5 V dc output signal.

Low Power transmitters provide the following features:

- Used with processes that do not need a digital output
- 1 to 5 V dc output signal
- 9 V dc minimum voltage
- 3 mA maximum current
- Offered at an affordable price

## High Pressure Gauge Transmitters (Direct Connect GP Only)

High pressure, direct connect gauge transmitters provide the following features:

- Gauge pressure ranges to 105 or 210 MPa (15,000 or 30,000 psi)
- Digital output version available with HART, and analog output version can be either 4 to 20 mA or 1 to 5 V dc for low power installation
- Welded, stainless steel pressure capsule assembly with bonded strain gauge sensor provides an airtight and watertight seal as well as intrinsic overpressure protection

## Safety Integrity Level (SIL)

In addition to the traditional Explosion Proof certifications (ATEX or IECEx), Pressure Transmitters with HART communication offer standard SIL 2 certification. Absolute, gauge, and differential transmitters can now be deployed for either standard or safety applications. The transmitters' model codes allow you to customize your transmitter with a red or yellow cover to identify that the transmitter is part of a safety loop. SIL 2 certification is performed by TÜV, an independent third-party laboratory.

Pressure transmitters can be used in SIL 2 safety functions in 1oo1 single mode or in SIL 3 safety functions in 1oo2, dual mode.

**Figure 1 - Red or Yellow Covers to Indicate Safety Integrity Level**



## Acronyms and Definitions

Acronym	Definitions
FIT	Failures in Time (failures per 1E09 hours)
$\lambda$	Failure rate
$\lambda_{DD}$	Failure rate for Dangerous Detected
$\lambda_{DU}$	Failure rate for Dangerous Undetected
$\lambda_S$	Failure rate for Safe Detected + failure rate for Safe Undetected
$PFD_{AVG}$	Average Probability of Failure on Demand
PFH	Probability of Failure per Hour
SFF	Safe Failure Fraction
SIL	Safety Integrity Level

## Reliability Data

### Failure Data According to IEC 61508

$\lambda$	$\lambda_s$	$\lambda_{DD}$	$\lambda_{DU}$	SFF
1113 FIT	698 FIT	356 FIT	58 FIT	94.76%

The  $PFD_{AVG}$  value for a single pressure transmitter is 2.6E-4 per year.

## Certification Data

- SIL 2 certification is performed by TÜV, an independent laboratory.
- The Pressure Transmitter is classified as a Type B device according to IEC 61508, having a hardware fault tolerance of 0.
  - NOTE:** Type B component: “Complex” component (using microcontrollers or programmable logic); for details see section 7.4.4.1.3 of IEC 61508-2:2010.
- Based on internal diagnostics, the Pressure Transmitter has a Safe Failure Fraction of 94.76% (assuming that the logic solver is configured to detect over-scale and under-scale currents), and therefore may be used up to SIL 2 as a single device.
- The Pressure Transmitter has a proof test interval of up to five years in order to maintain a SIL 2 rating, allowing it to be used as a single device.
  - NOTE:** Per Table 3 of IEC 61508-2:2010 section 7.4.4.2.2, the preceding information allows the Pressure Transmitter, when used in a 1 of 2 system architecture, to be used as a SIL 3 application with an HFT of 1.

## Vacuum Service

### AP and Biplanar GP Transmitters:

A lower range limit of -100 kPa (-14.7 psi, -1 bar) means that vacuum measurements are easily handled with the versatile direct connect AP, biplanar AP, or biplanar GP transmitters.

### Direct Connect GP Transmitters:

A lower range limit of -100 kPa (-14.7 psi, -1 bar) allows vacuum limits for direct connect GP transmitters with Span Codes E, F, G, H, and J.

## Variety of Materials

With process connections of 316L ss and sensor diaphragms available in 316L ss or nickel alloy<sup>6</sup>, direct connect AP/GP transmitters are an excellent choice for the majority of process pressure measurements.

DP transmitters with traditional structures are offered with a choice of 316L ss or nickel alloy<sup>6</sup>.

For DP and biplanar AP/GP transmitters with low profile structures, 316L ss and nickel alloy<sup>6</sup> are offered as sensor materials. Refer to *Transmitter Structures for DP and Biplanar AP/GP Transmitters*, page 12 for a description and application of traditional and low profile (LP1 and LP2) structures.

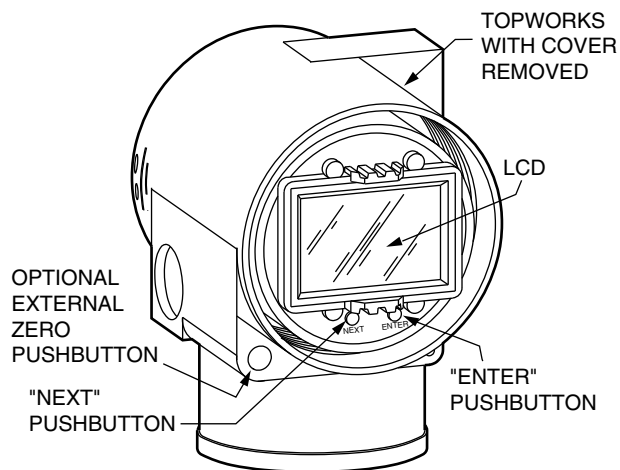
6. Equivalent to Hastelloy® C-276. Hastelloy is a registered trademark of Haynes International, Inc.

# Design Specifications

## Digital Liquid Crystal Display (LCD)

A two-line local digital display with on-board pushbuttons is provided by default with low power transmitters and as an option with HART transmitters. The display can be rotated into any one of four 90 degree positions and shows the current measurement configured with your choice of units. The pushbuttons allow you to locally configure and calibrate the device, for example, by adjusting the zero and span. Pushbutton pads are designed to help protect the transmitter from electrostatic discharge and moisture.

**Figure 2 - Digital LCD with On-Board Pushbuttons**



## Process Connectors for DP and Biplanar AP/GP Transmitters

Removable, gasketed process connectors allow a wide range of selections, including ¼ NPT, ½ NPT, Rc ¼, Rc ½, and weld neck connections.

## Ease of Installation

Pressure transmitters are lightweight and easy to install, and are offered with:

- **Rotatable Topworks** allows transmitter installation in tight places, allows the display to be positioned in the preferred direction, and eases field retrofit.
- **Two Conduit Entrances** offer a choice of entry positions for ease of installation and self-draining of condensation regardless of mounting position and topworks rotation.
- **Wiring Guides and Terminations** provide ease of wire entry and support, plenty of space to work and store excess wire, and large, rugged screw terminals for easy wire termination.
- **Two-Valve Manifolds**, which isolate and vent pressure from biplanar GP transmitters, can be easily mounted directly to transmitter.

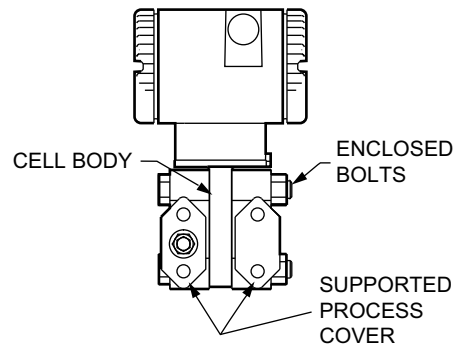
## Optional Mounting Bracket Sets for DP and Biplanar AP/GP Transmitters

Mounting bracket sets allow you to mount the transmitter to a surface, pipe, or manifold. In addition to the standard-style mounting bracket sets available, a unique universal style mounting bracket has been developed to allow wide flexibility in transmitter mounting configurations consistent with installation requirements. Refer to *Dimensions*, page 59.

## Unique Process Cover and Cell Body Design for DP and Biplanar AP/GP Transmitters

**Biplanar Construction** maintains the traditional horizontal process connections and vertical mounting by providing a cell body contained between two process covers, while still achieving light weight, small size, and high standard static pressure rating of 25 MPa (3626 psi). This design provides easy retrofit of any conventional differential pressure transmitter, and also allows the transmitter to be easily mounted in the horizontal position with vertical process connections.

**Figure 3 - Biplanar Construction Shown with Traditional Horizontal Process Connections**



- **Process Covers** are fully supported by the cell body over their entire height. This helps prevent bending and results in a firm seal. Also, this provides dimensional stability to the process covers, helping ensure they will mate properly with 3-valve bypass manifolds.
- **Process Cover Bolts** are enclosed to minimize corrosion and to minimize early elongation with rapid temperature increases. The design makes it less likely for the transmitter to release process liquid during a fire.
- **Process Cover Gaskets** are PTFE as standard; PTFE provides nearly universal corrosion resistance, so you do not need to select and stock various elastomers to provide process compatibility.
- **Light Weight** provides ease of handling, installation, and direct mounting without requiring costly pipe stands.

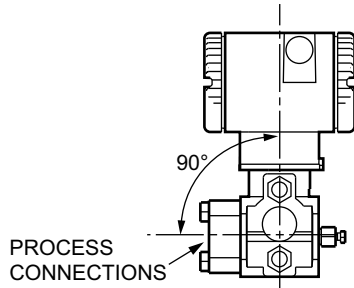
## Transmitter Structures for DP and Biplanar AP/GP Transmitters

For DP and biplanar AP and GP transmitters, traditional and low profile structures (LP1 and LP2) are offered to accommodate and to provide flexibility in transmitter installations.

## Traditional Structure for DP and Biplanar AP/GP Transmitters

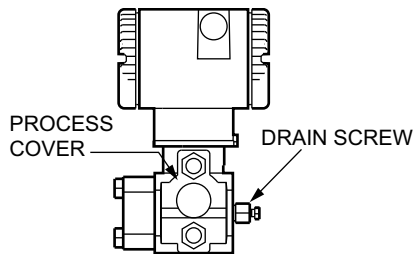
The traditional structure utilizes the right angle design common to most DP and biplanar AP/GP transmitters in use throughout the world. Process connections are oriented 90 degrees from the transmitter centerline. This traditional structure makes it easy to retrofit any transmitters of similar design.

**Figure 4 - Vertical Mounting Showing Process Connections at 90 Degrees**

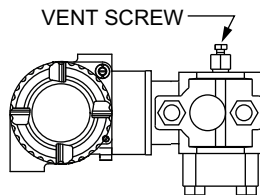


Sensor cavity venting and draining is provided for both vertical and horizontal transmitter installation, using innovative tangential connections to the sensor cavity. Optional side vents are offered for sensor cavity venting in the upright position.

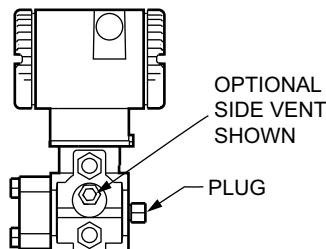
**Figure 5 - Vertical Mounting – Cavity Draining**



**Figure 6 - Horizontal Mounting – Cavity Venting, and Self-Draining into Process Line**



**Figure 7 - Vertical Mounting – Cavity Venting, and Self-Draining into Process Line**

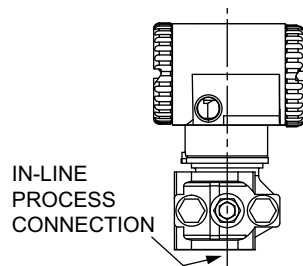


## Low Profile Structures for DP and Biplanar AP/GP Transmitters

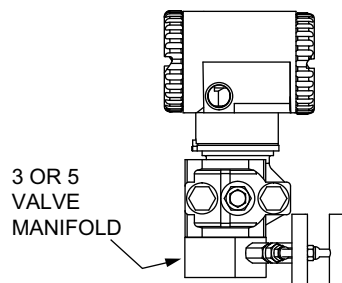
The low profile structures use an in-line design, meaning that the process connections are in line with the transmitter centerline. This allows you to mount the transmitter in the upright position with the process connections facing downward for connection to vertical process piping or for mounting directly to a three- or five-valve manifold.

For convenience, two types of low profile structures are offered, LP1 and LP2. The process covers and the external shape of the sensor cell body are the only transmitter parts that differ between LP1 and LP2.

**Figure 8 - Low Profile (LP1) Structure with In-Line Process Connections**



**Figure 9 - Low Profile (LP1) Structure Directly Mounted to Manifold**



The low profile structures provide a mounting style similar to that used by competitive Coplanar™ transmitters. This makes it easy to select these transmitters for both retrofit and new applications where this type of installation is desired.

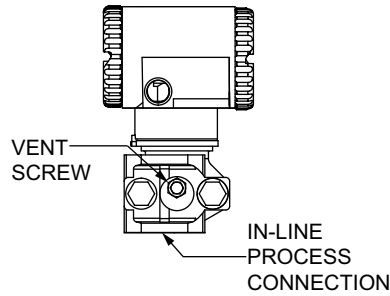
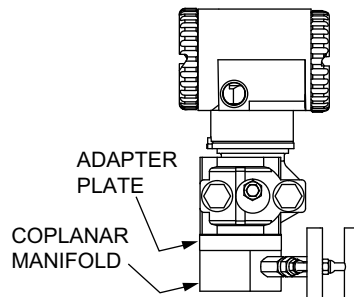
Transmitters with the low profile structure can be attached directly to existing, installed Coplanar manifolds, such as the Anderson Greenwood Models MB3, MB5G, and MB5P by using an optional adapter plate. See *Low Profile (LP1) Transmitter – Mounted to a Coplanar Manifold using an Optional Intermediate Adapter Plate*, page 14. Also, when assembled to the same process piping or manifold as a Coplanar transmitter, one of the electrical conduit connections is located within  $\pm 1$  inch of the similar conduit connection on the competitive transmitter, providing for ease of retrofit or conformance with installation design drawings.

### Low Profile Structure LP1 – Direct Mount

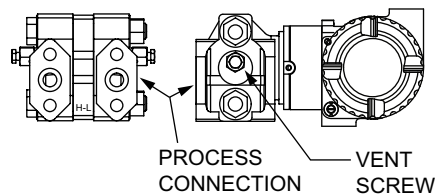
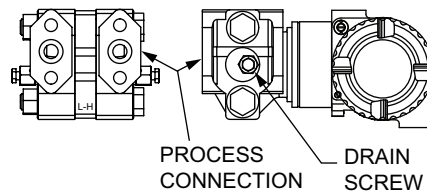
Low Profile Structure LP1 is a compact, inexpensive, lightweight design that you can mount directly to a separately mounted manifold or to process piping. These transmitters are not typically bracket-mounted.

By default, LP1 transmitters are supplied with a single vent/drain screw in the side of each process cover. In conjunction with the standard tangential venting and draining design, they are suitable for mounting either vertically or horizontally, and are suitable for most applications, including liquids, gases, and steam.

In the vertical, upright position, the LP1 transmitter is self-draining and is ideal for gas flow rate service when directly mounted to a manifold located above the horizontal pipeline. If desired, you can omit the vent screw for this or other applications.

**Figure 10 - Low Profile (LP1) Transmitter – Upright Mounting****Figure 11 - Low Profile (LP1) Transmitter – Mounted to a Coplanar Manifold using an Optional Intermediate Adapter Plate**

For horizontal installations, rotate the transmitter 180 degrees to orient the high and low pressure sides to the preferred locations. You do not need to unbolt process covers. You can also rotate the topworks housing as shown to orient the conduit connections in the desired position.

**Figure 12 - Low Profile (LP1) Transmitter – Horizontal Mounting with Vent Screw****Figure 13 - Low Profile (LP1) Transmitter – Horizontal Mounting with Drain Screw**

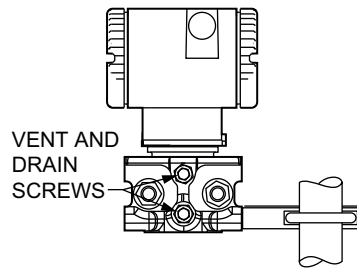
### Low Profile Structure LP2 – Bracket or Direct Mount

Low Profile Structure LP2 is a universal design for either bracket or direct mounting. Drilled and tapped mounting holes facilitate mounting to either new or existing Schneider Electric brackets (Options -M1, -M2, and -M3), as well as standard brackets supplied with existing Coplanar™ transmitters.

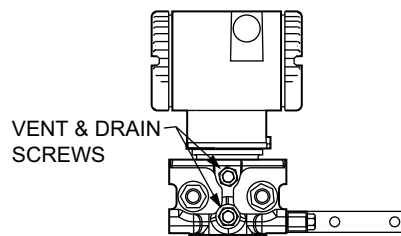
These transmitters can also be directly mounted to manifolds or process piping and are available with the same optional adapter used with low profile structure LP1 to fit existing Coplanar manifolds.

For extra convenience, they use a vent and drain design, with separate vent and drain screws positioned in each cover for venting or draining directly from the sensor cavity. They are normally recommended for upright, vertical installation.

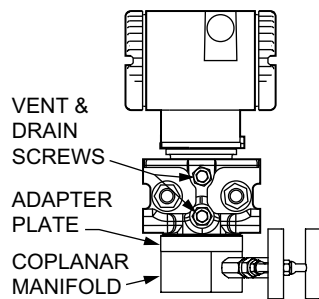
**Figure 14 - Low Profile (LP2) Transmitter – Mounted on the Schneider Electric Universal Bracket**



**Figure 15 - Low Profile (LP2) Transmitter – Shown on a Coplanar Bracket**



**Figure 16 - Low Profile (LP2) Transmitter – Mounted to an Existing Coplanar Manifold Using Adapter Plate**



## Factory Calibration

Prior to shipment, the factory performs a 2-point calibration on the transmitter based on the calibration range and units you require. A 2-point calibration is useful if your application requires zero-based ranges with greater than 30:1 turndown or when mandated by a specific requirement. Simply indicate the calibration range and units you require in the sales order. See *Units*, page 32.

**Table 1 - Example of Custom Factory Calibration for a Low Power Transmitter**

Parameter	Standard (Default) Configuration	Example of Custom Factory Calibration
<b>Calibrated Range</b>		
Pressure Engineering Units (EGUs)	per sales order <sup>7</sup>	inH <sub>2</sub> O
LRV	per sales order <sup>8</sup>	0
URV	per sales order <sup>9</sup>	100
<b>Measurement #1</b>		
Linear (pressure units)	Linear	Square Root
Pressure Engineering Units (EGUs)	per sales order <sup>7</sup>	gal/m
Range (DP)	per sales order <sup>9</sup>	0 to 500 gal/m
Output	4 to 20 mA	4 to 20 mA
<b>Measurement #2</b>		
Linear (pressure units)	Linear	Square Root
Pressure Engineering Units (EGUs)	per sales order <sup>10</sup>	gal/m
Range (DP)	per sales order <sup>9</sup>	0 to 500 gal/m

**Table 2 - Example of Custom Factory Calibration Option -C1 for a HART Transmitter**

Parameter	Standard (Default) Configuration	Example of Custom Factory Calibration (Option -C1)
<b>Calibrated Range</b>		
Pressure Engineering Units (EGUs)	per sales order <sup>7</sup>	inH <sub>2</sub> O
LRV	per sales order <sup>8</sup>	0
URV	per sales order <sup>9</sup>	100
<b>Measurement #1</b>		
Linear (pressure units, AP or GP) or Square Root (flow units, DP only)	Linear	Square Root
Pressure EGU (AP, GP, DP) or Flow EGU (DP only)	per sales order <sup>11</sup>	gal/m
Range (DP)	per sales order <sup>9</sup>	0 to 500 gal/m
Output	4 to 20 mA <sup>12</sup>	4 to 20 mA <sup>12</sup>
<b>Measurement #2</b>		
Linear (pressure units, AP or GP) or Square Root (flow units, DP only)	Linear	Square Root
Pressure EGU (AP, GP, DP) or Flow EGU (DP only)	per sales order <sup>11</sup>	gal/m
Range (DP)	per sales order <sup>9</sup>	0 to 500 gal/m

7. Pressure units from *Units*, page 32. If not specified, the factory default calibration is zero to maximum span and the default units vary by sensor code.

8. Within Span and Range Limits for selected sensor code.

9. Same as Calibrated Range.

10. Pressure or flow units from *Units*, page 32. If not specified, the factory default calibration is zero to maximum span and the default units vary by sensor code.

11. Pressure or flow units from *Units*, page 32. If not specified, the factory default calibration is zero to maximum span and the default units vary by sensor code.

12. Fixed current is used for multidrop applications.

## Optional Factory Configuration (Option -C2)

You also have the option to have the transmitter configured by the factory prior to shipment by selecting Model Code Option -C2. For the transmitter to be custom configured by the factory, you must fill out a data form. If this option is not selected, a standard (default) configuration is provided.

In addition to the example parameters listed in the table, the data form allows you to configure any of the transmitter’s user-configurable parameters.

**Table 3 - Example Parameters: Factory Configuration Option -C2 for a Low Power Transmitter**

Parameter	Standard (Default) Configuration	Example of Factory Configuration (Option -C2)
<b>Calibrated Range</b>		
Pressure Engineering Units (EGUs)	per sales order <sup>13</sup>	inH <sub>2</sub> O
LRV	per sales order <sup>14</sup>	0
URV	per sales order <sup>15</sup>	100
<b>Measurement #1</b>		
Linear (pressure units, AP or GP) or Square Root (flow units, DP only)	Linear	Square Root
Pressure EGU (AP, GP, DP) or Flow EGU (DP only)	per sales order <sup>16</sup>	gal/m
Range (DP)	per sales order <sup>15</sup>	0 to 500 gal/m
Output	4 to 20 mA <sup>17</sup>	4 to 20 mA <sup>17</sup>
<b>Measurement #2</b>		
Linear (pressure units, AP or GP) or Square Root (flow units, DP only)	Linear	Square Root
Pressure EGU (AP, GP, DP) or Flow EGU (DP only)	per sales order <sup>18</sup>	gal/m
Range (DP)	per sales order <sup>15</sup>	0 to 500 gal/m

**Table 4 - Example Parameters: Factory Configuration Option -C2 for a HART Transmitter**

Parameter	Standard (Default) Configuration	Example of Factory Configuration (Option -C2)
<b>Calibrated Range</b>		
Pressure Engineering Units (EGUs)	per sales order <sup>13</sup>	inH <sub>2</sub> O
LRV	per sales order <sup>14</sup>	0
URV	per sales order <sup>15</sup>	100
<b>Measurement #1</b>		
Linear (pressure units, AP or GP) or Square Root (flow units, DP only)	Linear	Square Root

13. Pressure units from *Units*, page 32. If not specified, the factory default calibration is zero to maximum span and the default units vary by sensor code.  
 14. Within Span and Range Limits for selected sensor code.  
 15. Same as Calibrated Range.  
 16. Pressure or flow units from *Units*, page 32. If not specified, the factory default calibration is zero to maximum span and the default units vary by sensor code.  
 17. Fixed current is used for multidrop applications.  
 18. Pressure or flow units from *Units*, page 32. If not specified, the factory default calibration is zero to maximum span and the default units vary by sensor code.

**Table 4 - Example Parameters: Factory Configuration Option -C2 for a HART Transmitter (Continued)**

Parameter	Standard (Default) Configuration	Example of Factory Configuration (Option -C2)
Pressure EGU (AP, GP, DP) or Flow EGU (DP only)	per sales order <sup>19</sup>	gal/m
Range (DP)	per sales order <sup>20</sup>	0 to 500 gal/m
Output	4 to 20 mA <sup>21</sup>	4 to 20 mA <sup>21</sup>
<b>Measurement #2</b>		
Linear (pressure units, AP or GP) or Square Root (flow units, DP only)	Linear	Square Root
Pressure EGU (AP, GP, DP) or Flow EGU (DP only)	per sales order <sup>19</sup>	gal/m
Range (DP)	per sales order <sup>20</sup>	0 to 500 gal/m

## Pressure Seals

Pressure seals are used when it is necessary to keep the transmitter isolated from the process. A sealed system is used for a process fluid that may be corrosive, viscous, subject to temperature extremes, toxic, sanitary, or that may tend to collect and solidify.

Pressure seals can be used with direct connect AP/GP transmitters as well as DP and biplanar AP/GP transmitters that have a traditional structure (see *Transmitter Structures for DP and Biplanar AP/GP Transmitters, page 12*).

**NOTE:** When used with pressure seals, the accuracy specifications for Value Performance transmitters do not apply.

The following table describes each pressure seal and indicates with which transmitter types the seal can be used. To order a transmitter with seals, select both a transmitter model code and a seal model code. See PSS 2A-1Z11 B for pressure seal model codes and specifications.

**Table 5 - Pressure Seals**

Model	Description	Process Connections	Used with Transmitters
<b>Direct Connect Pressure Seal Assemblies</b>			
PSFLT	Flanged, Direct Connect (Flanged Level), Flush or Extended Diaphragm	ANSI Class 150/300/600 flanges and IEC 61518 PN 10/40, 10/16, 25/40 flanges	Biplanar AP, Biplanar GP, DP
PSFAD	Flanged, Direct Connect, Recessed Diaphragm	ANSI Class 150/300/600/1500 flanges	Direct Connect AP, Direct Connect GP
PSFFD	Flanged, Direct Connect, Flush Diaphragm	ANSI Class 150/300/600 and PN 10/40	Direct Connect AP, Direct Connect GP
PSTAD	Threaded, Direct Connect, Recessed Diaphragm	¼, ½, ¾, 1, or 1½ NPT internal thread	Direct Connect AP, Direct Connect GP
PSISD	In-Line Saddle Weld, Direct Connect, Recessed Diaphragm	Lower housing of seal is in-line saddle welded to nominal 3- or 4-inch (or larger) pipe	Direct Connect AP, Direct Connect GP
PSSCT	Sanitary, Direct Connect (Level Seal), Flush Diaphragm	Process Connection to Sanitary Piping with 2- or 3-inch Tri-Clamp	Biplanar AP, Biplanar GP, DP

19. Pressure or flow units from *Units, page 32*. If not specified, the factory default calibration is zero to maximum span and the default units vary by sensor code.

20. Same as Calibrated Range.

21. Fixed current is used for multidrop applications.

**Table 5 - Pressure Seals (Continued)**

Model	Description	Process Connections	Used with Transmitters
PSSST	Sanitary, Direct Connect (Level Seal), Extended Diaphragm	Process Connection to 2-inch Mini Spud or 4-inch Standard Spud; Tri-Clamp	Biplanar AP, Biplanar GP, DP
<b>Remote Mount, Capillary-Connected Pressure Seal Assemblies</b>			
PSFPS	Flanged, Remote Mount, Flush Diaphragm	ANSI Class 150/300/600 flanges and IEC 61518 PN 10/40 flanges	Direct Connect AP, Direct Connect GP, Biplanar AP, Biplanar GP, DP
PSFES	Flanged, Remote Mount, Extended Diaphragm	ANSI Class 150/300/600 flanges and IEC 61518 PN 10/40, 10/16, 25/40 flanges	Direct Connect AP, Direct Connect GP, Biplanar AP, Biplanar GP, DP
PSFFR	Flanged, Remote Mount, Flush Diaphragm	ANSI Class 150/300/600 flanges and IEC 61518 PN 10/40	Direct Connect AP, Direct Connect GP, Biplanar AP, Biplanar GP
PSFAR	Flanged, Remote Mount, Recessed Diaphragm	ANSI Class 150/300/600/1500 flanges	Direct Connect AP, Direct Connect GP, Biplanar AP, Biplanar GP, DP
PSTAR	Threaded, Remote Mount, Recessed Diaphragm	¼, ½, ¾, 1, or 1½ NPT internal thread	Direct Connect AP, Direct Connect GP, Biplanar AP, Biplanar GP, DP
PSISR	In-Line Saddle Weld, Remote Mount, Recessed Diaphragm	Lower housing of seal is in-line saddle welded to nominal 3- or 4-inch (or larger) pipe	Direct Connect AP, Direct Connect GP, Biplanar AP, Biplanar GP, DP
PSSCR	Sanitary, Remote Mount, Flush Diaphragm	Process connection fastened to a 2- or 3-inch pipe with a Tri-Clamp	Direct Connect AP, Direct Connect GP, Biplanar AP, Biplanar GP, DP
PSSSR	Sanitary, Remote Mount, Extended Diaphragm	Process connection to 2-in mini spud or 4-in standard spud; Tri-Clamp	Direct Connect AP, Direct Connect GP, Biplanar AP, Biplanar GP, DP

**Figure 17 - Typical Pressure Seals**



# Physical Specifications

## Transmitter Materials and Construction

### Housing and Housing Cover Design

The housing has two compartments to separate the electronics from the field connections. The housing and covers are made from low copper (0.6% maximum) die-cast aluminum alloy with an epoxy finish, or from 316 ss.

O-ring seals are used to seal the threaded housing covers, housing neck, and terminal block.

### Process Wetted Materials

**Table 6 - Process Covers and Connections**

Transmitter Type	Materials
Direct Connect AP/GP	316L ss
Biplanar AP/GP	316 ss
DP	316 ss

**Table 7 - Process Cover Nuts and Bolts**

Transmitter Type	Materials
Biplanar AP/GP	ASTM A193, Grade B7 high strength alloy steel for bolts, and ASTM A194 Grade 2H high strength alloy steel for nuts are standard. Options include NACE Class B7M bolting, 17-4 ss bolting, and 316 ss bolting.
DP	

**Table 8 - Sensor Diaphragm**

Transmitter Type	Materials
Direct Connect AP/GP	316L ss or nickel alloy <sup>22</sup>
Biplanar AP/GP	316 ss or nickel alloy <sup>22</sup>
DP <sup>23</sup>	316L ss or nickel alloy <sup>22</sup>

**Table 9 - Gaskets**

Transmitter Type	Materials
Direct Connect AP/GP Biplanar AP/GP DP	Glass-filled PTFE

### Reference (Low) Pressure Side Materials (All Transmitters) and Reference (Atmospheric) Pressure Side Materials (GP Only)

Silicone, Pyrex, RTV silicone, or 316L ss

22. Equivalent to Hastelloy® C-276. Hastelloy is a registered trademark of Haynes International, Inc.

23. For exceptional value and corrosion resistance, 316L ss is the least expensive material.

## Sensor Fill Fluid

- Silicone fluid — dodecamethylpentasiloxane
- 3M™ Fluorinert™ Electronic Liquid FC-43 — perfluorotributylamine
- NEOBEE® M-20 — propylene glycol di(octanoate/decanoate)

## Environmental Protection

The transmitter's enclosure has the weatherproof, dust-tight, and water-tight rating of IP66/67 as defined by IEC 60529, and provides the environmental and corrosion resistant protection rating of NEMA Type 4X.

## Electronics Module

Printed wiring assemblies are potted or conformally coated for moisture and dust protection.

## Mounting Position

The transmitter can be mounted in any orientation. The housing can be rotated up to one full turn to any desired position for access to adjustments, display, or conduit connections.

The display can also be rotated at 90° increments within the housing.

**NOTE:**

- Mount the transmitter so that any moisture condensing or draining into the field wiring compartment can exit through one of the two threaded conduit connections.
- Use a suitable thread sealant on all connections.
- Position effect zero shift for all calibrated spans can be calibrated out by readjusting zero output after installation.

## Approximate Mass

Transmitter mass does not include pressure seals.

Transmitter and Option(s)	Approximate Mass
Direct Connect AP or GP, Aluminum Housing	1.4 kg (3.1 lb)
Biplanar or Traditional DP Structure, Aluminum, <u>without</u> Process Connectors	3.5 kg (7.8 lb)
Biplanar or Traditional DP Structure, Aluminum, <u>with</u> Process Connectors	4.2 kg (9.2 lb)
Optional Display	Add 0.2 kg (0.4 lb)
Substitute 316 ss Housing	Add 1.1 kg (2.4 lb)
Low Profile/Biplanar LP1 Structure	Add 0.1 kg (0.2 lb)
Low Profile/Biplanar LP2 Structure	Add 0.8 kg (1.8 lb)

# Functional Specifications

## Span and Range Limits

### Limits for AP/GP Direct Connect Transmitters

**Table 10 - Span Limits for Direct Connect Transmitters with HART Communication (Electronics Version -T)**

Code	Span Limits <sup>24</sup>
D	3.4 and 1380 kPa (0.5 and 200 psi)
E	0.034 and 13.8 MPa (5 and 2000 psi)
F	0.52 and 41.4 MPa (75 and 6000 psi) <sup>25</sup>
J	6.9 and 69 MPag (1000 and 10000 psig) <sup>25</sup>
G	34.5 and 104 MPag (5000 and 15000 psig) <sup>25</sup>
H	69 and 207 MPag (10000 and 30000 psig) <sup>25</sup>

**Table 11 - Span Limits for Direct Connect Transmitters with Low Power (Electronics Version -V)**

Code	Span Limits <sup>24</sup>
C	6.9 and 207 kPa (1 and 30 psi)
D	69 and 2070 kPa (10 and 300 psi)
E	0.69 and 20.7 MPa (100 and 3000 psi)
F	13.8 and 41.4 MPa (2000 and 6000 psi) <sup>25</sup>
J	6.9 and 69 MPag (1000 and 10000 psig) <sup>25</sup>
G	34.5 and 104 MPag (5000 and 15000 psig) <sup>25</sup>
H	69 and 207 MPag (10000 and 30000 psig) <sup>25</sup>

**Table 12 - Range Limits for Direct Connect Transmitters with HART Communication (Electronics Version -T)**

Code	Range Limits — AP	Range Limits — GP
D	0 and 1400 kPa <sup>a</sup> (0 and 200 psia)	0 and 1400 kPag (0 and 200 psig)
E	0 and 14 MPa <sup>a</sup> (0 and 2000 psia)	0 and 14 MPag (0 and 2000 psig)
F	n/a	0 and 42 MPag (0 and 6000 psig) <sup>26</sup>
J	n/a	0 to 69 MPag (0 to 10000 psig) <sup>27</sup>
G	n/a	0 and 104 MPag (0 and 15000 psig) <sup>27</sup>
H	n/a	0 and 207 MPag (0 and 30000 psig) <sup>27</sup>

24. Values listed are in absolute or gauge pressure units, as applicable.

25. Available for gauge pressure transmitters only.

26. Direct connect GP transmitters with this Span Code can tolerate vacuum down to -0.1 MPa (-14.7 psi). However, to measure vacuum accurately with a GP transmitter, a biplanar Structure Code is required.

27. Direct connect GP transmitters with Span Code G, H, or J can tolerate vacuum down to -0.1 MPa (-14.7 psi). However, they cannot measure vacuum accurately.

**Table 13 - Range Limits for Direct Connect Transmitters with Low Power (Electronics Version -V)**

Code	Range Limits — AP	Range Limits — GP
C	0 and 210 kPaa (0 and 30 psia)	0 and 210 kPag (0 and 30 psig)
D	0 and 2100 kPaa (0 and 300 psia)	0 and 2100 kPag (0 and 300 psig)
E	0 and 21 MPaa (0 and 3000 psia)	0 and 21 MPag (0 and 3000 psig) <sup>28</sup>
F	n/a	0 and 42 MPag (0 and 6000 psig) <sup>28</sup>
J	n/a	0 to 69 MPag (0 to 10000 psig) <sup>29</sup>
G	n/a	0 and 104 MPag (0 and 15000 psig) <sup>29</sup>
H	n/a	0 and 207 MPag (0 and 30000 psig) <sup>29</sup>

## Limits for AP/GP Biplanar Transmitters

**Table 14 - Span Limits for Biplanar Transmitters with HART Communication (Electronics Version -T)**

Code	Span Limits <sup>30</sup>
B	0.12 and 50 kPa (0.5 and 200 inH <sub>2</sub> O)
C	0.62 and 250 kPa (2.49 and 1000 inH <sub>2</sub> O)
D	26 and 2070 kPa (3.75 and 300 psi) <sup>31</sup>
E	0.26 and 20.7 MPa (37.5 and 3000 psi) <sup>31</sup>
F	1.1 and 34.5 MPa (165 and 5000 psi) <sup>32 31</sup>

**Table 15 - Span Limits for Biplanar Transmitters with Low Power (Electronics Version -V)**

Code	Span Limits <sup>30</sup>
A	0.12 and 7.5 kPa (0.5 and 30 inH <sub>2</sub> O) <sup>32</sup>
B	0.87 and 50 kPa (3.5 and 200 inH <sub>2</sub> O)
C	6.9 and 207 kPa (1 and 30 psi)
D	69 and 2070 kPa (10 and 300 psi) <sup>31</sup>
E	0.69 and 20.7 MPa (100 and 3000 psi) <sup>31</sup>
F	1.38 and 34.5 MPa (200 and 5000 psi) <sup>32 31</sup>

28. Direct connect GP transmitters with this Span Code can tolerate vacuum down to -0.1 MPa (-14.7 psi). However, to measure vacuum accurately with a GP transmitter, a biplanar Structure Code is required.

29. Direct connect GP transmitters with Span Code G, H, or J can tolerate vacuum down to -0.1 MPa (-14.7 psi). However, they cannot measure vacuum accurately.

30. Values listed are in absolute or gauge pressure units, as applicable.

31. Span limit, maximum working pressure, maximum overrange pressure, and maximum static pressure (d/p) are derated for optional IEC 61518 Construction and optional Bolting except for codes -D3, -D7, and -B2. Option -D1 is derated to 2320 psi. Options -D5 and -B1 are derated to 2175 psi. Options -D2, -D4, -D6, and -D8 are derated to 1500 psi. Option -B3 is derated to 2900 psi.

32. Available for gauge pressure transmitters only.

**Table 16 - Range Limits for Biplanar Transmitters with HART Communication (Electronics Version -T)**

Code	Range Limits — AP	Range Limits — GP
B	0 and 50 kPaa (0 and 200 inH <sub>2</sub> Oa)	-50 and +50 kPag (-200 and +200 inH <sub>2</sub> Og)
C	0 and 250 kPaa (0 and 1000 inH <sub>2</sub> Oa)	-100 and +250 kPag (-401 and +1000 inH <sub>2</sub> Og)
D	0 and 2070 kPaa (0 and 300 psia) <sup>33</sup>	-100 and +2100 kPag (-14.7 and +300 psig) <sup>33</sup>
E	0 and 20.7 MPaa (0 and 3000 psia) <sup>33</sup>	-0.1 and +21 MPag (-14.7 and +3000 psig) <sup>33</sup>
F	n/a	-0.1 and +35 MPag (-14.7 and +5000 psig) <sup>33</sup>

**Table 17 - Range Limits for Biplanar Transmitters with Low Power (Electronics Version -V)**

Code	Range Limits — AP	Range Limits — GP
A	n/a	-7.5 and +7.5 kPag (-30 and +30 inH <sub>2</sub> Og)
B	0 and 50 kPaa (0 and 200 inH <sub>2</sub> Oa)	-50 and +50 kPag (-200 and +200 inH <sub>2</sub> Og)
C	0 and 207 kPaa (0 and 831 inH <sub>2</sub> Oa)	-100 and +210 kPag (-401 and +844 inH <sub>2</sub> Og)
D	0 and 2070 kPaa (0 and 300 psia) <sup>33</sup>	-100 and +2100 kPag (-14.7 and +300 psig) <sup>33</sup>
E	0 and 20.7 MPaa (0 and 3000 psia) <sup>33</sup>	-0.1 and +21 MPag (-14.7 and +3000 psig) <sup>33</sup>
F	n/a	-0.1 and +35 MPag (-14.7 and +5000 psig) <sup>33</sup>

## Limits for DP Transmitters

**Table 18 - Span Limits for DP Transmitters with HART Communication (Electronics Version -T)**

Code	Span Limits
B	0.12 and 50 kPa; 0.5 and 200 inH <sub>2</sub> O; 1.2 and 500 mbar
C	0.62 and 250 kPa; 2.5 and 1000 inH <sub>2</sub> O; 6.2 and 2500 mbar
D	0.026 and 2.07 MPa; 3.75 and 300 psi; 0.26 and 20.7 bar
E	0.26 and 20.7 MPa; 37.5 and 3000 psi; 2.6 and 207 bar

**Table 19 - Span Limits for DP Transmitters with Low Power (Electronics Version -V)**

Code	Span Limits
A	0.12 and 7.5 kPa; 0.5 and 30 inH <sub>2</sub> O; 1.2 and 75 mbar
B	0.87 and 50 kPa; 3.5 and 200 inH <sub>2</sub> O; 8.7 and 500 mbar
C	7 and 210 kPa; 28 and 840 inH <sub>2</sub> O; 70 and 2100 mbar
D	0.069 and 2.07 MPa; 10 and 300 psi; 0.69 and 20.7 bar
E	0.69 and 20.7 MPa; 100 and 3000 psi; 6.9 and 207 bar

33. Span limit, maximum working pressure, maximum overrange pressure, and maximum static pressure (d/p) are derated for optional IEC 61518 Construction and optional Bolting except for codes -D3, -D7, and -B2. Option -D1 is derated to 2320 psi. Options -D5 and -B1 are derated to 2175 psi. Options -D2, -D4, -D6, and -D8 are derated to 1500 psi. Option -B3 is derated to 2900 psi.

**Table 20 - Range Limits for DP Transmitters with HART Communication (Electronics Version -T)**

Code	Range Limits
B	-50 and +50 kPa (-200 and +200 inH <sub>2</sub> O)
C	-250 and +250 kPa (-1000 and +1000 inH <sub>2</sub> O)
D	-0.10 and +2.07 MPa (-14.7 and +300 psi)
E	0 and 21 MPa (0 and 3000 psi)

**Table 21 - Range Limits for DP Transmitters with Low Power (Electronics Version -V)**

Code	Range Limits
A	-7.5 and +7.5 kPa (-30 and +30 inH <sub>2</sub> O)
B	-50 and +50 kPa (-200 and +200 inH <sub>2</sub> O)
C	-210 and +210 kPa (-840 and +840 inH <sub>2</sub> O)
D	-0.10 and +2.07 MPa (-14.7 and +300 psi)
E	0 and 21 MPa (0 and 3000 psi)

## Maximum Static, Overrange, and Proof Pressure Ratings

**⚠ DANGER**

**HAZARD OF EXPLOSION**

Exceeding the proof pressure can cause the sensor to rupture forcefully. Avoid exposing the transmitter to the proof pressure limit.

**Failure to follow these instructions will result in death or serious injury.**

**NOTICE**

**POTENTIAL EQUIPMENT DAMAGE**

Exceeding the overrange pressure limit for the transmitter can cause damage to the transmitter, degrading its performance. The transmitter could become nonfunctional after exceeding the overrange pressure. Avoid exposure to the overrange pressure limit.

**Failure to follow these instructions can result in equipment damage.**

## Ratings for Direct Connect AP and GP Transmitters

**Table 22 - HART Communication (Electronics Version -T)**

Span Limit Code	Maximum Overrange Pressure	Maximum Proof Pressure <sup>34</sup>
D	2.1 MPa (300 psi)	5.51 MPa (800 psi)
E	20.7 MPa (3,000 psi)	55.1 MPa (8,000 psi)

34. Meets ANSI/ISA Standard S82.03-1988.

**Table 22 - HART Communication (Electronics Version -T) (Continued)**

Span Limit Code	Maximum Overrange Pressure	Maximum Proof Pressure <sup>35</sup>
F <sup>36</sup>	59.1 MPa (8,580 psig)	165 MPa (24,000 psig)
J <sup>36</sup>	99 MPa (14,300 psig)	180 MPa (26,015 psig)
G <sup>36</sup>	137 MPa (19,500 psig)	310 MPa (45,000 psig)
H <sup>36</sup>	231 MPa (33,000 psig)	567 MPa (81,000 psig)

**Table 23 - Low Power (Electronics Version -V)**

Span Limit Code	Maximum Overrange Pressure	Maximum Proof Pressure <sup>35</sup>
C	0.31 MPa (45 psi)	0.827 MPa (120 psi)
D	3.1 MPa (450 psi)	8.27 MPa (1,200 psi)
E	31 MPa (4,500 psi)	79.3 MPa (11,500 psi)
F <sup>36</sup>	59.1 MPa (8,580 psig)	152 MPa (22,000 psig)
J <sup>36</sup>	99 MPa (14,300 psig)	180 MPa (26,015 psig)
G <sup>36</sup>	137 MPa (19,500 psig)	310 MPa (45,000 psig)
H <sup>36</sup>	231 MPa (33,000 psig)	567 MPa (81,000 psig)

## Ratings for DP Transmitters and Biplanar AP and GP Transmitters

For DP transmitters and for AP and GP transmitters with biplanar structures, pressure ratings may be affected by bolting options and other model code selections.

**Table 24 - HART Communication (Electronics Version -T)**

Transmitter Configuration <sup>37</sup>	Maximum Static <sup>38</sup> and Overrange Pressure <sup>39</sup>	Maximum Proof Pressure <sup>35</sup>
Standard (B7 steel) with Span Codes A to E, or with Option -B2 (17-4 PH ss), -D3, -D7, -P3, or -P7	25 MPa (3,626 psi)	100 MPa (14,500 psi)
Standard with Span Code F <sup>36</sup>	40 MPa (5,800 psi)	100 MPa (14,500 psi)
Option -B3 (B7M), -P4, or -P8	20 MPa (2,900 psi)	70 MPa (11,150 psi)
With Option -D1	16 MPa (2,320 psi)	64 MPa (9,280 psi)
Option -B1 (316 ss), -D5, -P2, or -P6	15 MPa (2,175 psi)	60 MPa (8,700 psi)
With Option -D2, -D4, -D6, or -D8 <sup>40</sup>	10 MPa (1,500 psi)	40 MPa (6,000 psi)
Option -D9 (17-4 PH ss) or -Y <sup>41</sup>	40 MPa (5,800 psi)	100 MPa (14,500 psi)

35. Meets ANSI/ISA Standard S82.03-1988.

36. Available for gauge pressure transmitters only.

37. Refer to the model code for option descriptions, and for applications and restrictions related to the items listed in the table.

38. Static pressure is relevant only for differential pressure transmitters.

39. Either side can be at higher pressure during overrange.

40. Limited to operating temperatures ranging from -10 to +80°C (14 to 176°F).

41. Differential pressure transmitters only.

**Table 25 - Low Power (Electronics Version -V)**

Transmitter Configuration <sup>42</sup>	Maximum Static <sup>43</sup> and Overrange Pressure <sup>44</sup>	Maximum Proof Pressure <sup>45</sup>
Standard (B7 steel) with Span Codes A to E, or with Option -B2 (17-4 PH ss), -D3, -D7, -P3, or -P7	25 MPa (3,626 psi)	100 MPa (14,500 psi)
Standard with Span Code F <sup>46</sup>	40 MPa (5,800 psi)	100 MPa (14,500 psi)
Option -B3 (B7M), -P4, or -P8	20 MPa (2,900 psi)	70 MPa (11,150 psi)
With Option -D1	16 MPa (2,320 psi)	64 MPa (9,280 psi)
Option -B1 (316 ss), -D5, -P2, or -P6	15 MPa (2,175 psi)	60 MPa (8,700 psi)
With Option -D2, -D4, -D6, or -D8 <sup>47</sup>	10 MPa (1,500 psi)	40 MPa (6,000 psi)
Option -D9 (17-4 PH ss) or -Y <sup>48</sup>	40 MPa (5,800 psi)	100 MPa (14,500 psi)

## Elevated Zero and Suppressed Zero

For applications requiring an elevated or suppressed zero, do not exceed the maximum span and the upper and lower range limits of the transmitter.

## Output Signal

For HART transmitters, 4 to 20 mA dc square root (for DP only) or 4 to 20 mA dc linear with digital HART communication. The output is software-selectable and remotely configurable from the HART Communicator, and locally configurable with the pushbuttons on the optional display. HART 7 allows the mA signal to be fixed or live when multidrop is enabled.

For low power transmitters, 1 to 5 V dc square root (for DP only) or 1 to 5 V dc linear; software-selectable. The output is locally configurable with the pushbuttons on the display.

## Minimum Allowable Absolute Pressure vs Process Temperature

- With silicone fill fluid: up to 121°C (250°F) at full vacuum
- With inert fill fluid: refer to the graph

42. Refer to the model code for option descriptions, and for applications and restrictions related to the items listed in the table.

43. Static pressure is relevant only for differential pressure transmitters.

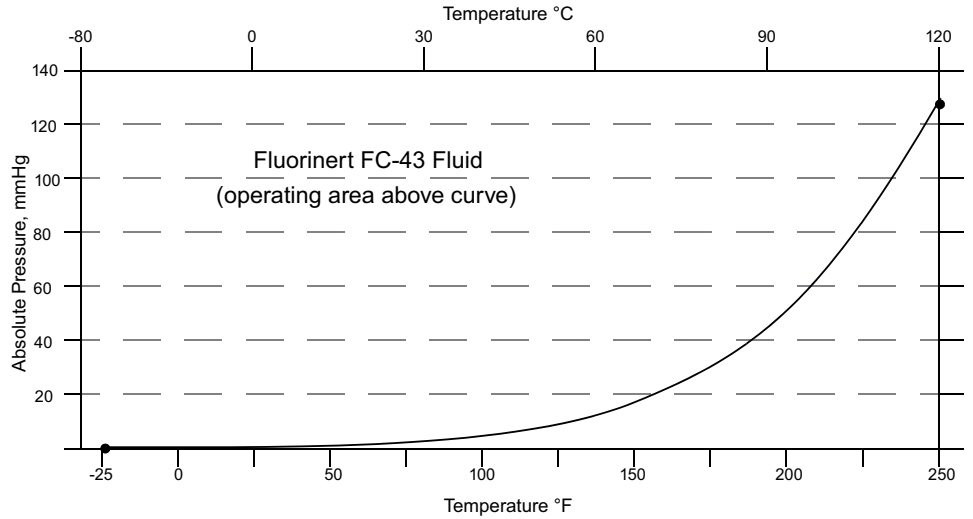
44. Either side can be at higher pressure during overrange.

45. Meets ANSI/ISA Standard S82.03-1988.

46. Available for gauge pressure transmitters only.

47. Limited to operating temperatures ranging from -10 to +80°C (14 to 176°F).

48. Differential pressure transmitters only.



## Supply Voltage

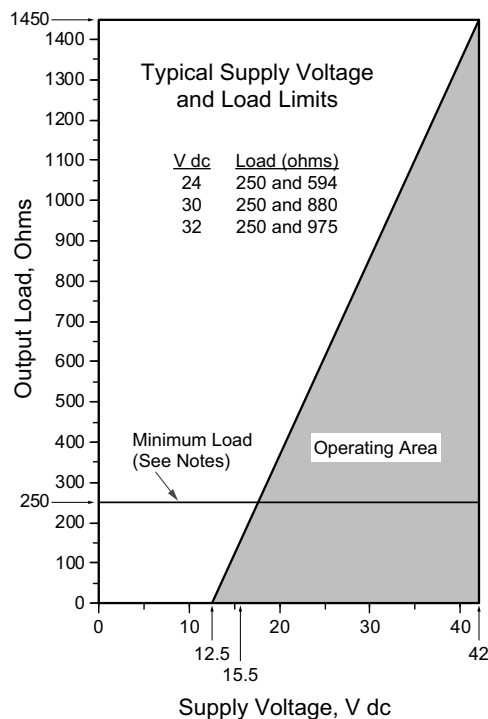
### HART Transmitters

The power supply must be capable of providing 22 mA when the transmitter is configured for 4 to 20 mA output. Ripple of up to 2 V pp (50/60/100/120 Hz) is tolerable, but instantaneous voltage must remain within the specified range.

The supply voltage and loop load must be within specified limits. Nominal minimum supply voltage is 12.5 V dc. The supply output load vs. voltage relationship, shown in the following graph, is  $R_{max} = 47.5 (V - 12.5 \text{ V dc})$ .

You can use any combination of supply voltage and loop load resistance in the shaded area shown in the graph below. To determine the loop load resistance (transmitter output load), add the series resistance of each component in the loop, excluding the transmitter.

**Figure 18 - 4 to 20 mA Output Supply Voltage vs Output Load**



**NOTES:**

1. The minimum voltage for HART communication is 15.5 V dc.
2. The minimum load for the HART Communicator is 250 ohms.
3. The transmitter can function with an output load less than the minimum, but using a remote configurator while operating in this area will result in output and/or communication disturbances.

	HART Communication	No HART Communication
Minimum Resistance	250 $\Omega$	0 $\Omega$
Minimum Supply Voltage	15.5 V dc	12.5 V dc
Maximum Supply Voltage	42 V dc	

## Low Power Transmitters

The power supply must be capable of providing at least 3 mA current under all conditions.

Minimum Supply Voltage	9 V dc
Maximum Supply Voltage	30 V dc
Minimum Impedance	0 $\Omega$
Maximum Impedance	2,160 $\Omega$

## Square Root Low Flow Cutoff for DP Transmitters

The square root low flow cutoff is configurable using a field communicator, PC-based configurator, or the local display. The square root low flow cutoff can be set to:

- Cutoff to zero at any flow rate between 0 and 20% of maximum flow
- Cutoff to zero at flows <10% of maximum flow (1% of maximum differential pressure)
- Active point-to-point line between zero and 20% of maximum flow (4% of maximum differential pressure)

## Current Outputs for Low and High Alarms, Underrange, Overrange, Offline, and Other Conditions (HART Only)

Output for Low Alarm	$\leq$ 3.60 mA
Output for High Alarm	$\geq$ 21.00 mA
Output when underrange	3.8 mA
Output when overrange	20.50 mA
Output if the sensor is potentially bad	Configurable to either the high value or low value
Output when offline	Configurable to a constant value between 3.6 mA and 21.0 mA

## Adjustable Damping

### HART (-T) Transmitters:

Damping is user-selectable to values of 0, 0.25, 0.5, 1, 2, 4, 8, 16, or 32 seconds. Selecting a value of **DAMP 0** in the Damping menu provides the fastest response.

### Low Power (-V) Transmitters:

Damping is user-selectable to values of 0, 2, 4, or 8 seconds.

## Field Wiring Reversal (HART Transmitters Only)

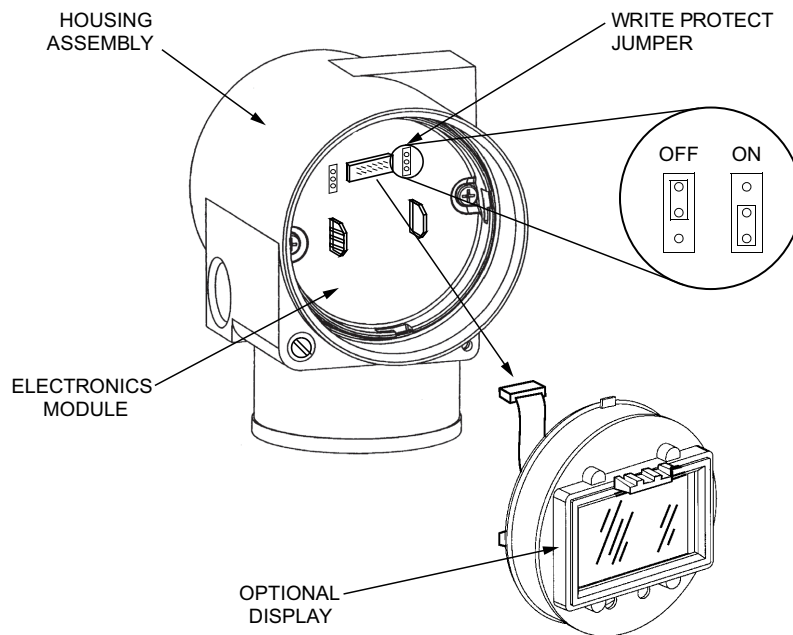
Reversal of field wiring does not damage the transmitter, provided the current is limited to 1 A or less by active current limiting or loop resistance. However, the transmitter is polarity-sensitive.

**NOTE:** Sustained currents of 1 A do not damage the electronics module or sensor, but can damage the terminal block assembly and external instruments in the loop.

## Write Protect Jumper

The transmitter has a write protect jumper that can be positioned to lock out configurators from making transmitter database changes.

**Figure 19 - Write Protect Jumper**



## Zeroing For Nonzero-Based Ranges

You can zero the transmitter when it is open to atmosphere, even when there is a nonzero-based range. This greatly simplifies position effect zeroing on many pressure and level applications. To zero the transmitter, you can use the local display, a PC-based configurator, or the optional External Zero Adjustment button.<sup>49</sup>

## Calibrated Range

The calibrated range of the transmitter is defined as the input range within span and range limits. The transmitter's calibrated range can be expressed in pressure units or flow units, depending on the communication protocol and whether the transmitter is in linear mode or square root mode.

49. The External Zero Adjustment button is not available with low power transmitters.

## Measurement Values

### Output Measurement #1 – Digital Primary Variable and 4 to 20 mA

Mode: Linear or Square Root

Pressure units for AP, GP, and DP transmitters in linear mode and flow units for DP transmitters<sup>50</sup> in square root mode are provided in *Units, page 32*.

### Output Measurement #2 – Digital Secondary Variable

Mode: Linear or Square Root

Pressure units for AP, GP, and DP transmitters in linear mode and flow units for DP transmitters in square root mode, independent of Measurement #1, are provided in *Units, page 32*.

## Units

**Table 26 - Allowable Units for Transmitters in Linear and Square Root Mode**

Communication Protocol and Transmitter Mode	Units <sup>51</sup>
Pressure Units for HART Transmitters in Linear Mode	inH2O, ftH2O, mmH2O, inHg, mmHg, cmHg, mHg, psi, psf, mbar, bar, g/cm2, kg/cm2, kg/m2, Pa, hPa, kPa, MPa, torr, inWC60, ftWC60, inWC4, ftWC4, mmWC4, cmWC4, mWC4, atm, dy/cm2
Flow Units for HART Transmitters in Square Root Mode	gal/s, gal/m, gal/h, gal/d, Mgal/d, ft3/s, ft3/m, ft3/h, ft3/d, lgal/s, lgal/m, lgal/h, lgal/d, l/s, l/m, l/h, Ml/d, m3/s, m3/m, m3/h, m3/d, Nl/h, Nm3/h, Sm3/h, Am3/h, Sft3/m, MSCFD, MMSCFD, bbl/s, bbl/m, bbl/h, bbl/d, g/s, g/m, g/h, kg/s, kg/m, kg/h, kg/d, lb/s, lb/m, lb/h, lb/d, t/m, t/h, t/d, STon/m, STon/h, STon/d, LTon/h, LTon/d, %flow
Pressure Units for Low Power (-V) Transmitters in Linear Mode	inH2O, inHg, ftH2O, mmH2O, mmHg, psi, bar, mbar, g/cm2, kg/cm2, Pa, kPa, MPa, torr, atm
Flow Units for Low Power (-V) Transmitters in Square Root Mode	Any custom unit, up to seven characters long

## Optional External Zero Adjustment

An optional external zero pushbutton (see *Digital Liquid Crystal Display (LCD), page 11*) is isolated from the electronics compartment and magnetically activates an internal switch through the housing. This helps eliminate a potential leak path for moisture or contaminants to get into the electronics compartment. This zero adjustment can be disabled by a configuration selection.

**NOTE:** Low Power transmitters do not have an External Zero Adjustment pushbutton.

50. With HART (-T) Communication only

51. For AP transmitters, 'a' is typically added to the EGU name on the display (for example, psia or mmHga). However, if the EGU name is six characters long, the 'a' is not added.

# Performance Specifications

## Accuracy (Includes Linearity, Hysteresis, and Repeatability)

### HART (-T) Transmitters

Accuracy specifications are described below for Value Performance Transmitters using HART (-T) Communication, with zero-based calibrations, and under reference operating conditions unless otherwise specified.

URL = Upper Range Limit

**Table 27 - IGP05S Direct Connect Accuracy – HART (-T) Transmitters with Linear Output<sup>52</sup>**

Span Code	Reference Accuracy (% of Span)
D	±0.075% of span
E	For turndowns greater than 10:1, accuracy = ±[0.0075 (URL/Span)]%
F	±0.075% of span For turndowns greater than 5:1, accuracy = ±[0.0015 (URL/Span)]%
J	±0.075% of span For turndowns greater than 3:1, accuracy = ±[0.025 (URL/Span)]%
G	±0.200% of span
H	Turndown Limits of 3:1

**Table 28 - IGP05S Biplanar Accuracy – HART (-T) Transmitters with Linear Output<sup>52</sup>**

Span Code	Reference Accuracy (% of Span)
B	±0.075% of span
C	For turndowns greater than 5:1, accuracy = ±[0.015 (URL/Span)]%
D	±0.075% of span For turndowns greater than 10:1, accuracy = ±[0.0075 (URL/Span)]%
E	±0.075% of span
F	For turndowns greater than 5:1, accuracy = ±[0.015 (URL/Span)]%

**Table 29 - IAP05S Direct Connect Accuracy – HART (-T) Transmitters with Linear Output<sup>52</sup>**

Span Code	Reference Accuracy (% of Span)
D	±0.075% of span
E	For turndowns greater than 10:1, accuracy = ±[0.0075 (URL/Span)]%

**Table 30 - IAP05S Biplanar Accuracy – HART (-T) Transmitters with Linear Output<sup>52</sup>**

Span Code	Reference Accuracy (% of Span)
B	±0.075% of span
C	For turndowns greater than 5:1, accuracy = ±[0.015 (URL/Span)]%
D	±0.075% of span For turndowns greater than 10:1, accuracy = ±[0.0075 (URL/Span)]%
E	±0.075% of span For turndowns greater than 5:1, accuracy = ±[0.015 (URL/Span)]%

<sup>52</sup>. This table is for digital accuracy; add 0.01% span for analog accuracy.

**Table 31 - IDP05S Accuracy – HART (-T) Transmitters with Linear Output<sup>53</sup>**

Span Code	Reference Accuracy (% of Span)
B	±0.075% of span
C	For turndowns greater than 5:1, accuracy = ±[0.015 (URL/Span)]%
D	±0.075% of span
E	For turndowns greater than 10:1, accuracy = ±[0.0075 (URL/Span)]%

## Low Power (-V) Transmitters

Accuracy specifications are described below for low power (-V) Value Performance Transmitters with linear output. Accuracy specification for Low Power is based on a four-wire connection.

URL = Upper Range Limit

Span = Calibrated span

**Table 32 - IGP05S Direct Connect Accuracy – Low Power (-V) Transmitters with Linear Output**

Span Code	Reference Accuracy (% of Span)
C	
D	±0.100% of span
E	For turndowns greater than 15:1, accuracy = ±[0.0067 (URL/Span)]%
F	
J	±0.10% of span For turndowns greater than 3:1, accuracy = ±[0.033 (URL/Span)]%
G	±0.200% of span
H	Turndown Limits of 3:1

**Table 33 - IGP05S Biplanar Accuracy – Low Power (-V) Transmitters with Linear Output**

Span Code	Reference Accuracy (% of Span)
A	±0.100% of span For turndowns greater than 15:1, accuracy = ±[0.0067 (URL/Span)]%
B	±0.100% of span For turndowns greater than 20:1, accuracy = ±[0.005 (URL/Span)]%
C	
D	±0.100% of span
E	For turndowns greater than 15:1, accuracy = ±[0.0067 (URL/Span)]%
F	

**Table 34 - IAP05S Direct Connect Accuracy – Low Power (-V) Transmitters with Linear Output**

Span Code	Reference Accuracy (% of Span)
C	
D	±0.100% of span
E	For turndowns greater than 15:1, accuracy = ±[0.0067 (URL/Span)]%

53. This table is for digital accuracy; add 0.01% span for analog accuracy.

**Table 35 - IAP05S Biplanar Accuracy – Low Power (-V) Transmitters with Linear Output**

Span Code	Reference Accuracy (% of Span)
B	±0.100% of span For turndowns greater than 20:1, accuracy = ±[0.005 (URL/Span)]%
C	±0.100% of span For turndowns greater than 15:1, accuracy = ±[0.0067 (URL/Span)]%
D	
E	

**Table 36 - IDP05S Accuracy – Low Power (-V) Transmitters with Linear Output**

Span Code	Reference Accuracy (% of Span)
A	±0.100% of span For turndowns greater than 15:1, accuracy = ±[0.0067 (URL/Span)]%
B	±0.100% of span For turndowns greater than 20:1, accuracy = ±[0.005 (URL/Span)]%
C	±0.100% of span For turndowns greater than 15:1, accuracy = ±[0.0067 (URL/Span)]%
D	
E	

## Stability

Long term drift for Value Performance pressure transmitters is < ±0.05% of URL/yr for 5 years.

## Turndown Capabilities

The turndown capability of a pressure transmitter, also known as the “turndown ratio”, “rangeability”, or simply “turndown”, is the ratio between the highest and lowest span settings for a transmitter:

$$\text{Turndown} = \frac{\text{Maximum Span}}{\text{Minimum Span}}$$

Our pressure transmitters have high turndown capabilities of up to 400:1.

## Supply Voltage Effect

The output changes less than 0.005% of span for each 1 V change within the specified supply voltage requirements.

## Position Effect

You can mount the transmitter in any position. Any zero effect caused by the mounting position can be removed by rezeroing. There is no span effect.

## Ambient Temperature Effect

For direct connect AP/GP transmitters with Span Code C, D, E, or F, the total effect for a 28°C (50°F) change within normal operating conditions is  $\pm(0.03\% \text{ URL} + 0.06\% \text{ Span})$ .

For direct connect GP transmitters with Span Code G, H, or J, the total effect for a 28°C (50°F) change within normal operating conditions is  $\pm(0.08\% \text{ URL} + 0.025\% \text{ Span})$ .

For biplanar AP/GP transmitters with Span Code B, C, or D, the total effect for a 28°C (50°F) change within normal operating conditions is  $\pm(0.04\% \text{ URL} + 0.050\% \text{ Span})$ .

For biplanar AP/GP transmitters with Span Code E or F, the total effect for a 28°C (50°F) change within normal operating conditions is  $\pm(0.08\% \text{ URL} + 0.025\% \text{ Span})$ .

For DP transmitters (all Span Codes), the total effect for a 28°C (50°F) change within normal operating conditions is  $\pm(0.04\% \text{ URL} + 0.050\% \text{ Span})$ .

**NOTE:** For -V electronics, add an additional 0.025% of span.

## Vibration Effect

With aluminum housing, per IEC 61298-3, Section 7, Table 2 for “field with high vibration level or pipeline with high vibration level”: 0.42 mm peak to peak displacement from 10 to 60 Hz, 3 “g” constant acceleration input over a frequency range of 60 to 1000 Hz. Total effect is less than 0.1% of URL/sensor range per “g”.

With stainless steel housing, per IEC 61298-3, Section 7, Table 2 for “field with general application or pipeline with low vibration level”: 0.30 mm peak to peak displacement from 10 to 60 Hz, 2 “g” constant acceleration input over a frequency range of 60 to 1000 Hz. Total effect is less than 0.1% of URL/sensor range per “g”.

## RFI Effect

For AP and GP transmitters, the output error is less than 0.1% of calibrated span for radio frequencies in the range of 30 to 1000 MHz and field intensity of 30 V/m when the transmitter is properly installed with shielded conduit and grounding, and housing covers are in place (per IEC Std. 61000-4-3).

For DP transmitters, the output error is less than 0.1% of span within standard accuracy turndown limits, for radio frequencies from 27 to 1000 MHz and field intensity of 30 V/m when the transmitter is properly installed with shielded conduit and grounding, and housing covers are in place (per IEC Std. 61000-4-3).

## Switching and Indirect Lightning Transients

The transmitter can withstand a transient surge up to 2000 V (common mode) or 1000 V (normal mode) without permanent damage. The output shift is less than 1.0%. (Per ANSI/IEEE C62.41-1980 and IEC Std. 61000-4-5.)

## Re-zero Calibration Frequency

The re-zero calibration frequency is five years. The five years is derived using the values of allowable error (% span), TPE (% span), performance margin (% span), and stability (% span/month); where:

$$\text{Calibration Frequency} = \frac{\text{Performance Margin}}{\text{Stability}} = \text{Months}$$

## Static Pressure Effect for DP Transmitters

The zero and span shift for a 1,000 psi (7 MPa) change in static pressure is described below.

### Zero Shift

Zero shift can be calibrated out by zeroing at nominal line pressure.

Span Code	Zero Shift Static Pressure Effect
B	±0.07% of URL
C	±0.02% of URL
D and E	±0.50% URL <sup>54</sup>

### Span Shift

Span Shift is ±0.15% of reading.

54. Per 3.5 MPa (500 psi) for Span Code D

# Communication

## HART Communication Protocol

Transmitters using HART communication transmit a 4 to 20 mA output signal with a superimposed HART digital signal for remote configuration and monitoring. This allows direct analog connection to common receivers while still providing digital communications using a HART communicator, PC-based configurator, or the local display.

Transmitter communication is configurable for either analog or multidrop (fixed current) mode. Digital communication is provided in both modes based upon the FSK (Frequency Shift Keying) technique which alternately superimposes one of two different frequencies on the uninterrupted current carried by the two signal/power wires. See *HART Communication Configured for Analog Mode (4 to 20 mA Output)*, page 38 and *Multidrop Communications (Fixed Current)*, page 39.

### HART Communication Configured for Analog Mode (4 to 20 mA Output)

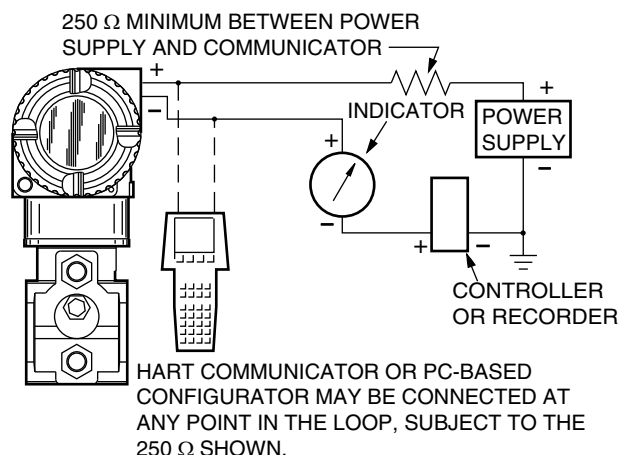
Measurements and diagnostics are available from the HART communicator connected to the two-wire loop carrying the 4 to 20 mA measurement signal by using a bidirectional digital signal superimposed on the 4 to 20 mA current signal.

Multiple measurements are transmitted digitally, including not only the pressure measurement but also the electronics temperature and sensor temperature, which can be used to monitor external heat tracing equipment. For AP and GP transmitters, the primary measurement is expressed in pressure units, and for DP transmitters, the primary measurement can be expressed in either pressure or flow units. Transmitter diagnostics are also communicated.

The 4 to 20 mA output signal is updated multiple times per second. Digital communications between the transmitter and HART communicator or PC-based configurator is rated for distances up to 3,050 m (10,000 ft). The communications rate is 1200 baud and requires a minimum loop load of 250 ohms.

Configuration and reranging can be accomplished with a HART communicator, PC-based configurator, or the pushbuttons on the optional local display.

**Figure 20 - 4 to 20 mA Output Functional Block Diagram, Point-to-Point Communications**

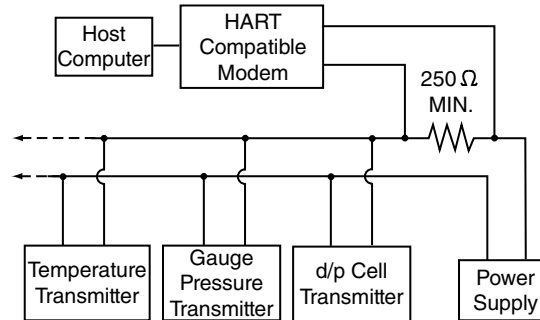


## Multidrop Communications (Fixed Current)

Multidrop communication is the connection of several transmitters to a single communications line. Communication between the host computer and transmitters takes place digitally with the analog output of the transmitter fixed.

This mode supports communication with up to 64 transmitters on a single pair of signal/power wires. The output signal is updated 4 times per second and carries not only the pressure measurement, but also the sensor and electronics temperatures. Communication between the transmitter and system, or between the transmitter and communicator or configurator, is rated for distances up to 1525 m (5000 ft). The communications rate is 1200 baud and requires a minimum loop load of 250 ohms.

**Figure 21 - Typical Multidrop Functional Block Diagram**



# Operating Conditions

Description	Reference Operating Conditions	Normal Operating Conditions <sup>55</sup>	Operative Limits <sup>55</sup>
Sensor Body Temperature <sup>56</sup>			
Silicone	24 ± 2°C (75 ± 3°F)	-29 to +82°C (-20 to +180°F) <sup>57</sup>	-46 and +121°C (-50 and +250°F) <sup>58 59</sup>
Fluorinert	24 ± 2°C (75 ± 3°F)	-29 to +82°C (-20 to +180°F) <sup>60</sup>	-29 and +121°C (-20 and +250°F) <sup>60</sup>
NEOBEE®	24 ± 2°C (75 ± 3°F)	-18 to +82°C (0 to +180°F)	-18 and +121°C (0 and 250°F)
Electronics Temperature			
Without display	24 ± 2°C (75 ± 3°F)	-29 to +82°C (-20 to +180°F) <sup>61</sup>	-40 and +85°C (-40 and +185°F) <sup>62 63</sup>
With display	24 ± 2°C (75 ± 3°F) <sup>64</sup>	-20 to 82°C (-4 to +180°F) <sup>65</sup> <sub>66 64</sub>	-40 and +85°C (-40 and +185°F) <sup>62 63 67 64</sup>
Relative Humidity	50 ± 10% <sup>68</sup>	0 to 100% <sup>68</sup>	0 and 100% <sup>68</sup>
Ambient Pressure (DP HART)	860 to 1060 mbar	Atmospheric	Atmospheric
Supply Voltage, dc (HART) <sup>69</sup>	30 ± 0.5 V dc	15.5 to 42 V dc	12.5 V dc and 42 V dc
Supply Voltage, dc (Low Power)	15.5 ± 0.5 V dc	9 to 15.5 V dc	9 V dc and 30 V dc
Output Load (HART)	650 Ω	0 to 1,450 Ω <sup>70</sup>	0 and 1,450 Ω <sup>70</sup>
Output Load (Low Power)	10 MΩ	1 to 10 MΩ	1 and Open Circuit
Mounting Position			
AP and GP	Upright	Upright	No limit
DP	Upright or Horizontal <sup>71</sup>	Upright or Horizontal <sup>71</sup>	
Vibration			
Aluminum Housing	1 m/s <sup>2</sup> (0.1 "g")	Per IEC 60770 for "field with high vibration level or pipeline with high vibration level": 0.42 mm peak-to-peak displacement from 10 to 60 Hz, 3 "g" constant acceleration input over a frequency range of 60 to 1000 Hz	
SS Housing	1 m/s <sup>2</sup> (0.1 "g")	Per IEC 60770 for "field with general application or pipeline with low vibration level": 0.3 mm peak-to-peak displacement from 10 to 60 Hz, 2 "g" constant acceleration input over a frequency range of 60 to 1000 Hz	

55. Normal Operating Conditions and Operative Limits are defined per ANSI/ISA 51.1-1979 (R1993)

56. When Traditional Structure Codes 78/79 (PVDF inserts in Hi- and Lo-side process covers) are used, temperature limits are -7 and +82°C (+20 and 180°F).

57. -29 to +50°C (-20 to +122°F) for biplanar AP transmitters

58. Selection of Option -J extends the low temperature operative limit of transmitters with silicone filled sensors down to -50°C (-58°F).

Performance is not assured below -29°C. Sensor damage may occur if process is frozen. Contact Global Customer Support for availability of this option.

59. -46 and +50°C (-50 and +122°F) for biplanar AP transmitters.

60. -18°C (0°F) for J range (IGP05S transmitters only).

61. -29 to +50°C (-20 to +122°F) for biplanar AP transmitters.

62. -40 and +75°C (-40 and +167°F) for transmitters with ATEX flameproof classification.

63. -40 and +50°C (-40 and +122°F) for biplanar AP transmitters.

64. Although the LCD will not be damaged by any temperature within the storage and transportation limits, updates will be slowed and readability decreased at temperatures outside the normal operating conditions.

65. -20 to +50°C (-20 to +122°F) for biplanar AP transmitters.

66. Refer to *Electrical Certifications, page 42* for a restriction in ambient temperature limits with certain electrical approvals/certifications.

67. Display updates are slowed and readability is decreased at temperatures less than -20°C (-4°F).

68. Relative humidity refers to transmitters with housing covers installed and conduit entrances sealed. To maintain IEC IP66/IP67 and NEMA Type 4X protection, plug the unused conduit opening with the metal plug provided. Use a suitable thread sealant on both conduit connections. In addition, the threaded housing covers must be installed. Turn covers to seat the o-ring into the housing, then continue to hand-tighten until the cover contacts the housing metal-to-metal.

69. Refer to *Supply Voltage, page 29*.

70. 250 Ω minimum load is required for communication with a HART communicator.

71. Sensor process wetted diaphragms in a vertical plane.

## Storage and Transportation Conditions

Description	Storage and Transportation Limits
Sensor Body Temperature	-29 to +82°C (-20 to +180°F) <sup>72</sup>
Electronics Temperature	-20 to +82°C (-4 to +180°F) <sup>73 74 72</sup>
Relative Humidity	0 to 100% Noncondensing <sup>75</sup>
Ambient Pressure (DP HART)	Atmospheric

72. -29 to +50°C (-20 to +122°F) for biplanar AP transmitters.

73. -20 to +50°C (-4 to +122°F) for biplanar AP transmitters.

74. Refer to *Electrical Certifications, page 42* for a restriction in ambient temperature limits with certain electrical approvals/certifications.

75. Relative humidity refers to transmitters with housing covers installed and conduit entrances sealed. To maintain IEC IP66/IP67 and NEMA Type 4X protection, plug the unused conduit opening with the metal plug provided. Use a suitable thread sealant on both conduit connections. In addition, the threaded housing covers must be installed. Turn covers to seat the o-ring into the housing, then continue to hand-tighten until the cover contacts the housing metal-to-metal.

## Electrical Certifications

These transmitters have been designed to meet the electrical safety descriptions listed in the following table. For detailed information or status of testing laboratory approvals/certifications, contact Global Customer Support.

Refer to *Model Codes, page 44* for the availability of electrical safety design codes with specific transmitter structures.

**Table 37 - Electrical Certifications**

Agency Certification, Types of Protection, and Area Classification	Application Conditions <sup>76</sup>	Model Code Option
ATEX intrinsically safe, Ex ia IIC <sup>77</sup>	Temperature Class T4, Ta= -40°C to +80°C	AA
ATEX flameproof, Ex d IIC	Temperature Class T6, T85°C, Ta= -40°C to +75°C	AD
ATEX multiple certifications (includes ATEX Codes AA and AN) <sup>77</sup>	Applies to Codes AA and AN	AM <sup>78</sup>
ATEX protection type n, Ex ic IIC, or Ex nA <sup>77</sup>	Temperature Class T4, Ta= -40°C to +80°C	AN
ATEX multiple certifications (includes ATEX Codes AA, AD and AN) <sup>77</sup>	Applies to Codes AA, AN, and AD	AP <sup>78</sup>
INMETRO intrinsically safe, Ex ia IIC <sup>77</sup>	Temperature Class T4, Ta= -40°C to +80°C	BA
INMETRO flameproof, Ex d IIC	Temperature Class T6, T85°C, Ta= -40°C to +75°C	BD
INMETRO multiple certifications (includes INMETRO Codes BA and BD) <sup>77</sup>	Applies to codes BA and BD	BP <sup>78</sup>
CSA intrinsically safe, Zone certified Ex ia	Temperature Class T4A at 40°C and T3C at 85°C maximum ambient	CA
CSA zone certified flameproof Ex d IIC; also explosion proof, dust ignition-proof	T6, Maximum Ambient Temperature 75°C	CD
CSA multiple certifications (includes CSA Codes CA and CN)	Applies to codes CA and CN	CM <sup>78</sup>
CSA non-incendive, Zone certified Ex nA IIC	Temperature Class T4A at 40°C and T3C at 85°C maximum ambient	CN
CSA multiple certifications (includes CSA Codes CA, CD and CN)	Applies to codes CA, CD, and CN	CP <sup>78</sup>
Multi-marked ATEX and IECEx intrinsically safe, Ex ia IIC <sup>77</sup>	Temperature Class T4, Ta = -40°C to +80°C	DA
Multi-marked ATEX and IECEx flameproof, Ex d IIC	Temperature Class T6, T85°C, Ta = -40°C to +75°C	DD
Multi-marked ATEX and IECEx multiple certifications, ia, ic <sup>77</sup>	Applies to codes DA and DN	DM <sup>78</sup>
Multi-marked ATEX and IECEx protection type n, Ex ic IIC <sup>77</sup>	Temperature Class T4, Ta = -40°C to +80°C	DN
Multi-marked ATEX and IECEx multiple certifications, ia, ic, and d <sup>77</sup>	Applies to codes DA, DD, and DN	DP <sup>78</sup>
IECEX intrinsically safe, Ex ia IIC <sup>77</sup>	Temperature Class T4, Ta= -40°C to +80°C	EA
IECEX flameproof, Ex d IIC	Temperature Class T6, T85°C, Ta = -40°C to +75°C	ED
IECEX multiple certifications, ia, ic, nA <sup>77</sup>	Applies to Codes EA and EN	EM <sup>78</sup>
IECEX protection type n, Ex ic IIC, or Ex nA <sup>77</sup>	Temperature Class T4, Ta= -40°C to +80°C	EN
IECEX multiple certifications, ia, ic, nA, and d <sup>77</sup>	Applies to Codes EA, EN, and ED	EP <sup>78</sup>
FM Classes I, II and III Division 1 intrinsically safe, AEx ia IIC	Temperature Class T4, Ta= -40°C to +80°C	FA
FM Classes I, II and III Division 1 explosion proof, dust-ignition proof, Zone approved AEx d IIC	Temperature Class T6 at 75°C and T5 at 85°C maximum ambient	FD

76. Selection of Option -J extends the low temperature operative limit of transmitters with silicone filled sensors down to -50°C (-58°F).

77. Not available with Electronics Version -V.

78. When selecting an Electrical Safety Design Code that ends in "M" or "P," you must permanently mark (check off in the rectangular block on the data plate) one type of protection only (ia, d, n, IS, NL, or XP). Do not change this mark once it has been applied.

**Table 37 - Electrical Certifications (Continued)**

Agency Certification, Types of Protection, and Area Classification	Application Conditions <sup>79</sup>	Model Code Option
FM multiple certifications (includes FM Codes FA or FN)	Applies to codes FA or FN	FM <sup>80</sup>
Classes I, II and III FM Division 2 non-incendive, Zone approved AEx nA IIC	Temperature Class T4, Ta= -40°C to +80°C	FN
FM multiple certifications (includes FM Codes FA, FD or FN)	Applies to codes FA, FD, or FN	FP <sup>80</sup>
KOSHA Ex d	Temperature Class T6, T85°C, Ta = -40°C to +75°C	KD
EAC intrinsically safe, Ex ia <sup>81</sup>	Temperature Class T4, Ta= -40°C to +80°C	RA
EAC flameproof, Ex d <sup>81</sup>	Temperature Class T4, Ta= -40°C to +75°C	RD
EAC protection type n, Ex ic IIC or Ex nA <sup>81</sup>	Temperature Class T4, Ta= -40°C to +80°C	RN
No certification	n/a	ZZ

79. Selection of Option -J extends the low temperature operative limit of transmitters with silicone filled sensors down to -50°C (-58°F).

80. When selecting an Electrical Safety Design Code that ends in "M" or "P," you must permanently mark (check off in the rectangular block on the data plate) one type of protection only (ia, d, n, IS, NL, or XP). Do not change this mark once it has been applied.

81. Not available with Electronics Version -V.

## Model Codes

These tables list the available options for the Absolute, Gauge, and Differential Pressure Transmitters described in this document.

### Absolute and Gauge Pressure Transmitters

**Table 38 - Absolute and Gauge Pressure Transmitters**

Code	Description
<b>Model<sup>82</sup></b>	
IAP05S	Absolute Pressure Transmitter, Value Tier
IGP05S	Gauge Pressure Transmitter, Value Tier
<b>Electronics Versions/Output Signals</b>	
-T	HART and 4 to 20 mA with SIL 2
-V	Low Power Electronics, 1 to 5 Volts
<b>Structure Codes</b>	
<b>Structure — Direct Connect<sup>83</sup></b>	
22	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
23	316L ss Process Sensor; 316L ss Diaphragm; Inert Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
30	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
31	316L ss Process Sensor; C276 Diaphragm; Inert Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
32	C276 Process Sensor; C276 Diaphragm; Silicone Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
33	C276 Process Sensor; C276 Diaphragm; Inert Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
36	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; 1/2 NPT Internal Conn. Only <sup>84 85</sup>
37	316L ss Process Sensor; 316L ss Diaphragm; Inert Fill; 1/2 NPT Internal Conn. Only <sup>84 85</sup>
38	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; 1/2 NPT Internal Conn. Only <sup>84 85</sup>
39	316L ss Process Sensor; C276 Diaphragm; Inert Fill; 1/2 NPT Internal Conn. Only <sup>84 85</sup>
E2	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; M20 External Conn. Only <sup>84 85</sup>
E3	316L ss Process Sensor; 316L ss Diaphragm; Inert Fill; M20 External Conn. Only <sup>84 85</sup>
E4	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; M20 External Conn. Only <sup>84 85</sup>
E5	316L ss Process Sensor; C276 Diaphragm; Inert Fill; M20 External Conn. Only <sup>84</sup>
E6	C276 Process Sensor; C276 Diaphragm; Silicone Fill; M20 External Conn. Only <sup>84 86</sup>
E7	C276 Process Sensor; C276 Diaphragm; Inert Fill; M20 External Conn. Only <sup>84 86</sup>

82. Refer to *Accuracy (Includes Linearity, Hysteresis, and Repeatability)*, page 33 for accuracy specifications.

83. Not available with Electrical Certification codes that end in D or P.

84. Not available with option codes -V1, -V2, -V3, and -V4.

85. Not available with Electronics Version -V.

86. Not available for 10K PSI (Span Code J).

**Table 38 - Absolute and Gauge Pressure Transmitters (Continued)**

Code	Description
<b>Structure — Direct Connect Flameproof</b>	
52	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
53	316L ss Process Sensor; 316L ss Diaphragm; Inert Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
60	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
61	316L ss Process Sensor; C276 Diaphragm; Inert Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
62	C276 Process Sensor; C276 Diaphragm; Silicone Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
63	C276 Process Sensor; C276 Diaphragm; Inert Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
90	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; 1/2 NPT Internal Conn. Only <sup>87 88</sup>
91	316L ss Process Sensor; 316L ss Diaphragm; Inert Fill; 1/2 NPT Internal Conn. Only <sup>87 88</sup>
92	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; 1/2 NPT Internal Conn. Only <sup>87 88</sup>
93	316L ss Process Sensor; C276 Diaphragm; Inert Fill; 1/2 NPT Internal Conn. Only <sup>87 88</sup>
F2	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; M20 External Conn. Only <sup>87 88</sup>
F3	316L ss Process Sensor; 316L ss Diaphragm; Inert Fill; M20 External Conn. Only <sup>87 88</sup>
F4	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; M20 External Conn. Only <sup>87 88</sup>
F5	316L ss Process Sensor; C276 Diaphragm; Inert Fill; M20 External Conn. Only <sup>87 88</sup>
F6	C276 Process Sensor; C276 Diaphragm; Silicone Fill; M20 External Conn. Only <sup>87 89</sup>
F7	C276 Process Sensor; C276 Diaphragm; Inert Fill; M20 External Conn. Only <sup>87 89</sup>
<b>Structure — Biplanar (Vented Low Side Process Cover and Diaphragm)</b>	
B2	316 ss Cover; 316L ss Diaphragm; Silicone Fill
B3	316 ss Cover; 316L ss Diaphragm; Inert Fill
B6	316 ss Cover; C276 Diaphragm; Silicone Fill
B7	316 ss Cover; C276 Diaphragm; Inert Fill
<b>Structure — LP1 Biplanar (Not Available with Pressure Seals)<sup>88</sup></b>	
LL	316 ss Cover; 316L ss Diaphragm; Silicone Fill
LM	316 ss Cover; 316L ss Diaphragm; Inert Fill
LC	316 ss Cover; C276 Diaphragm; Silicone Fill
LD	316 ss Cover; C276 Diaphragm; Inert Fill
<b>Structure — LP2 Biplanar (Not Available with Pressure Seals)<sup>88</sup></b>	
L2	316 ss Cover; 316L ss Process Sensor and Diaphragm; Silicone Fill
L3	316 ss Cover; 316L ss Process Sensor and Diaphragm; Inert Fill
L6	316 ss Cover; 316L ss Process Sensor; C276 Diaphragm; Silicone Fill
L7	316 ss Cover; 316L ss Process Sensor; C276 Diaphragm; Inert Fill

87. Not available with option codes -V1, -V2, -V3, and -V4.

88. Not available with Electronics Version -V.

89. Not available for 10K PSI (Span Code J).

**Table 38 - Absolute and Gauge Pressure Transmitters (Continued)**

Code	Description
<b>Structure — Direct Connect, Prepared for Schneider Electric Model Coded Pressure Seals<sup>90</sup></b>	
D1	316L ss Process Sensor and Diaphragm; Silicone Fill; Prepared for Direct Connect Seal <sup>91</sup>
D2	316L ss Process Sensor and Diaphragm; Inert Fill; Prepared for Direct Connect Seal <sup>91</sup>
S3	316L ss Process Sensor and Diaphragm; Silicone Fill; Prepared for Remote Mount Seal <sup>92</sup>
S4	316L ss Process Sensor and Diaphragm; Inert Fill; Prepared for Remote Mount Seal <sup>92</sup>
<b>Structure — Direct Connect, Prepared for Non-Schneider Electric Model Coded Pressure Seals<sup>90 93</sup></b>	
SC	316L ss Process Sensor and Diaphragm; Silicone Fill; Prepared for Remote Mount Seal
SD	316L ss Process Sensor and Diaphragm; Inert Fill; Prepared for Remote Mount Seal
<b>Structure — Biplanar, Prepared for Schneider Electric Model Coded Pressure Seals<sup>94 95</sup></b>	
P1	316 ss Cover; 316L ss Process Sensor and Diaphragm; Silicone Fill; Prepared for Direct Connect Seal <sup>96</sup>
P2	316 ss Cover; 316L ss Process Sensor and Diaphragm; Inert Fill; Prepared for Direct Connect Seal <sup>96</sup>
P3	316 ss Cover; 316L ss Process Sensor and Diaphragm; Silicone Fill; Prepared for Remote Mount Seal <sup>92</sup>
P4	316 ss Cover; 316L ss Process Sensor and Diaphragm; Inert Fill; Prepared for Remote Mount Seal <sup>92</sup>
<b>Structure — Biplanar, Prepared for Non-Schneider Electric Model Coded Pressure Seals<sup>93 95</sup></b>	
P5	316 ss Cover; 316L ss Process Sensor and Diaphragm; Silicone Fill; Prepared for Remote Mount Seal
P6	316 ss Cover; 316L ss Process Sensor and Diaphragm; Inert Fill; Prepared for Remote Mount Seal
<b>Structure — Direct Connect Flameproof, Prepared for Schneider Electric Model Coded Pressure Seals</b>	
D5	316L ss Process Sensor and Diaphragm; Silicone Fill; Prepared for Direct Connect Seal <sup>91</sup>
D6	316L ss Process Sensor and Diaphragm; Inert Fill; Prepared for Direct Connect Seal <sup>91</sup>
S5	316L ss Process Sensor and Diaphragm; Silicone Fill; Prepared for Remote Mount Seal <sup>92</sup>
S6	316L ss Process Sensor and Diaphragm; Inert Fill; Prepared for Remote Mount Seal <sup>92</sup>
<b>Structure — Direct Connect Flameproof, Prepared for Non-Schneider Electric Model Coded Pressure Seals<sup>93</sup></b>	
SH	316L ss Process Sensor and Diaphragm; Silicone Fill; Prepared for Remote Mount Seal
SJ	316L ss Process Sensor and Diaphragm; Inert Fill; Prepared for Remote Mount Seal

90. Not available with Electrical Certification codes that end in D or P.

91. Specify direct connect seal PSFFD, PSFAD, PSISD, or PSTAD.

92. Specify remote mount seal PSFFR, PSFAR, PSFES, PSFPS, PSISR, PSSCR, PSSSR, or PSTAR.

93. These structures are prepared for attachment of pressure seals by others. Do not specify a Schneider Electric seal model code.

94. Not available with optional Biplanar Process Connector (codes -F1 through -F6).

95. Not available with options -X1, -X2, or -X3.

96. Specify biplanar, direct connect seal PSFLT, PSSST, or PSSCT.

**Table 38 - Absolute and Gauge Pressure Transmitters (Continued)**

Code	Description
<b>Structure — Direct Connect, Prepared for Sanitary or Pulp and Paper Seals<sup>97 98</sup></b>	
TA	316L ss Process Sensor; 316L ss Diaphragm; Neobee Fill; 1.5" Tri-Clamp Sanitary Connection
T2	316L ss Process Sensor; 316L ss Diaphragm; Neobee Fill; 2.0" Tri-Clamp Sanitary Connection
T3	316L ss Process Sensor; 316L ss Diaphragm; Neobee Fill; 3.0" Tri-Clamp Sanitary Connection
TB	316L ss Process Sensor; C276 Diaphragm; Neobee Fill; 1.5" Tri-Clamp Sanitary Connection
T4	316L ss Process Sensor; C276 Diaphragm; Neobee Fill; 2.0" Tri-Clamp Sanitary Connection
T5	316L ss Process Sensor; C276 Diaphragm; Neobee Fill; 3.0" Tri-Clamp Sanitary Connection
M1	316L ss Process Sensor; 316L ss Diaphragm; Neobee Fill; Mini Tank Spud Seal, 1.5" Ext.
M6	316L ss Process Sensor; 316L ss Diaphragm; Neobee Fill; Mini Tank Spud Seal, 6" Ext.
M9	316L ss Process Sensor; 316L ss Diaphragm; Neobee Fill; Mini Tank Spud Seal, 9" Ext.
PA	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; Sleeve Type 1" (nominal)
PB	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; Threaded Type 1" (nominal)
PC	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; Sleeve Type 1.5" (nominal)
PD	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; Threaded Type 1.5" (nominal)
PE	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; Sleeve Type 1" (nominal)
PF	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; Threaded Type 1" (nominal)
PG	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; Sleeve Type 1.5" (nominal)
PH	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; Threaded Type 1.5" (nominal)
PJ	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; Threaded Type 1.5" (fits Ametek spud)
<b>Structure — Direct Connect, High Pressure (Gauge Pressure Only)</b>	
24	15-5 ss Process Sensor and Diaphragm; 1/4 NPT Internal Connection <sup>99</sup>
26	Inconel X-750 Process Sensor and Diaphragm; 1/4 NPT Internal Connection <sup>99</sup>
28	13-8 Moly ss Process Sensor and Diaphragm; Autoclave F-250-C Connection <sup>100</sup>

97. Not available with Electrical Certification codes that end in D or P.

98. Available with Span Limit codes C and D only.

99. Available with Span Limit code G only.

100. Available with Span Limit code H only.

**Table 38 - Absolute and Gauge Pressure Transmitters (Continued)**

Code	Description	
<b>Span Limits</b>		
Code	Transmitters with Direct Connect Structures	Transmitters with Biplanar Structures
A	n/a	With -T Electronics: n/a With -V Electronics: 0.12 and 7.5 kPa (0.5 and 30 inH <sub>2</sub> O) <sup>101</sup>
B	n/a	With -T Electronics: 0.12 and 50 kPa (0.5 and 200 inH <sub>2</sub> O) With -V Electronics: 0.87 and 50 kPa (3.5 and 200 inH <sub>2</sub> O)
C	With -T Electronics: n/a With -V Electronics: 6.9 and 207 kPa (1 and 30 psi)	With -T Electronics: 0.62 and 250 kPa (2.49 and 1000 inH <sub>2</sub> O) With -V Electronics: 6.9 and 207 kPa (1 and 30 psi)
D	With -T Electronics: 3.4 and 1380 kPa (0.5 and 200 psi) With -V Electronics: 69 and 2070 kPa (10 and 300 psi)	With -T Electronics: 26 and 2070 kPa (3.75 and 300 psi) <sup>102</sup> With -V Electronics: 69 and 2070 kPa (10 and 300 psi) <sup>102</sup>
E	With -T Electronics: 0.034 and 13.8 MPa (5 and 2000 psi) With -V Electronics: 0.69 and 20.7 MPa (100 and 3000 psi)	With -T Electronics: 0.26 and 20.7 MPa (37.5 and 3000 psi) <sup>102</sup> With -V Electronics: 0.69 and 20.7 MPa (100 and 3000 psi) <sup>102</sup>
F	With -T Electronics: 0.52 and 41.4 MPa (75 and 6000 psi) <sup>101</sup> With -V Electronics: 13.8 and 41.4 MPa (2000 and 6000 psi) <sup>101</sup>	With -T Electronics: 1.1 and 34.5 MPa (165 and 5000 psi) <sup>101 102</sup> With -V Electronics: 1.38 and 34.5 MPa (200 and 5000 psi) <sup>101 102</sup>
J	With -T Electronics: 6.9 and 69 MPag (1000 and 10000 psig) <sup>101 103</sup> With -V Electronics: 6.9 and 69 MPag (1000 and 10000 psig) <sup>101 103</sup>	n/a
G	With -T Electronics: 34.5 and 104 MPag (5000 and 15000 psig) <sup>101 104</sup> With -V Electronics: 34.5 and 104 MPag (5000 and 15000 psig) <sup>101 104</sup>	n/a
H	With -T Electronics: 69 and 207 MPag (10000 and 30000 psig) <sup>101 105</sup> With -V Electronics: 69 and 207 MPag (10000 and 30000 psig) <sup>101 105</sup>	n/a
<b>Conduit Connection and Housing Material</b>		
1	1/2 NPT Conduit Connection, Both Sides, Aluminum Housing	
3	1/2 NPT Conduit Connection, Both Sides, 316 ss Housing	
5	M20 Conduit Connection, Both Sides, Aluminum Housing	
6	M20 Conduit Connection, Both Sides, 316 ss Housing	

101. Available for gauge pressure transmitters only.

102. Span limit, maximum working pressure, maximum overrange pressure, and maximum static pressure (d/p) are derated for optional IEC 61518 Construction and optional Bolting except for codes -D3, -D7, and -B2. Option -D1 is derated to 2320 psi. Options -D5 and -B1 are derated to 2175 psi. Options -D2, -D4, -D6, and -D8 are derated to 1500 psi. Option -B3 is derated to 2900 psi.

103. Available for Model IGP05S only and structure codes 22, 23, 30, 31, 32, 33, 52, 53, 60, 61, 62, and 63.

104. Available with Structure codes 24 and 26 only.

105. Available with Structure code 28 only.

**Table 38 - Absolute and Gauge Pressure Transmitters (Continued)**

Code	Description
<b>Electrical Certifications</b>	
AA	ATEX intrinsically safe, Ex ia IIC <sup>106</sup>
AD	ATEX flameproof, Ex d IIC <sup>107</sup>
AM	ATEX multiple certifications (includes ATEX Codes AA and AN) <sup>106</sup>
AN	ATEX protection type n, Ex ic IIC, or Ex nA <sup>106</sup>
AP	ATEX multiple certifications (includes ATEX Codes AA, AD and AN) <sup>106 107</sup>
BA	INMETRO intrinsically safe, Ex ia IIC <sup>106</sup>
BD	INMETRO flameproof, Ex d IIC <sup>107</sup>
BP	INMETRO multiple certifications (includes INMETRO Codes BA and BD) <sup>106 107</sup>
CA	CSA intrinsically safe, Zone certified Ex ia
CD	CSA zone certified flameproof Ex d IIC; also explosion proof, dust ignition-proof <sup>107</sup>
CM	CSA multiple certifications (includes CSA Codes CA and CN)
CN	CSA non-incendive, Zone certified Ex nA IIC
CP	CSA multiple certifications (includes CSA Codes CA, CD and CN) <sup>107</sup>
DA	Multi-marked ATEX and IECEx intrinsically safe, Ex ia IIC <sup>106</sup>
DD	Multi-marked ATEX and IECEx flameproof, Ex d IIC <sup>107</sup>
DM	Multi-marked ATEX and IECEx multiple certifications, ia, ic <sup>106</sup>
DN	Multi-marked ATEX and IECEx protection type n, Ex ic IIC <sup>106</sup>
DP	Multi-marked ATEX and IECEx multiple certifications, ia, ic, and d <sup>106 107</sup>
EA	IECEx intrinsically safe, Ex ia IIC <sup>106</sup>
ED	IECEx flameproof, Ex d IIC <sup>107</sup>
EM	IECEx multiple certifications, ia, ic, nA <sup>106</sup>
EN	IECEx protection type n, Ex ic IIC, or Ex nA <sup>106</sup>
EP	IECEx multiple certifications, ia, ic, nA, and d <sup>106 107</sup>
FA	FM Classes I, II and III Division 1 intrinsically safe, AEx ia IIC
FD	FM Classes I, II and III Division 1 explosion proof, dust-ignition proof, Zone approved AEx d IIC <sup>107</sup>
FM	FM multiple certifications (includes FM Codes FA or FN)
FN	Classes I, II and III FM Division 2 non-incendive, Zone approved AEx nA IIC
FP	FM multiple certifications (includes FM Codes FA, FD or FN) <sup>107</sup>
KD	KOSHA Ex d <sup>108</sup>
RA	EAC intrinsically safe, Ex ia <sup>106</sup>
RD	EAC flameproof, Ex d <sup>106 107</sup>
RN	EAC protection type n, Ex ic IIC or Ex nA <sup>106</sup>
ZZ	No certification

106. Not available with Electronics Version -V.

107. Available with all biplanar structures and only the following Direct Connect Structure codes: 52, 53, 60, 61, 90, 91, 92, 93, F2, F3, F4, F5, D5, D6, S5, S6, SH, SJ, 24, 26, and 28.

108. Available only with Structure codes 52, 53, 60, 61, B2, B3, B6, B7, P1, P2, P3, P4, P5, P6, D5, D6, S5, S6, SH, SJ, 24, 26, and 28.

**Table 38 - Absolute and Gauge Pressure Transmitters (Continued)**

Code	Description
<b>Optional Mounting Bracket Sets</b>	
-M1	Painted Steel Bracket, Plated Steel Bolts, 1/2 NPT, Direct Connect Only <sup>109 110 111</sup>
-M2	Stainless Steel Bracket, Stainless Steel Bolts, 1/2 NPT, Direct Connect Only <sup>109 110 111</sup>
-M3	Universal Stainless Steel Mounting Bracket Set, Stainless Steel Hardware, Biplanar Only
-M5	Painted Steel Bracket, Plated Steel Bolts, M20, Direct Connect Only <sup>109 110 112</sup>
-M6	Stainless Steel Bracket, Stainless Steel Bolts, M20, Direct Connect Only <sup>109 110 112</sup>
-M7	Stainless Steel Bracket for Flameproof Direct Connect Sensor Structures <sup>113</sup>
-M8	Painted Steel Bracket for Flameproof Direct Connect Sensor Structures <sup>113</sup>
-M9	Painted Steel Bracket, Plated Steel Bolts, Biplanar Only
-M0	Stainless Steel Bracket, Stainless Steel Bolts, Biplanar Only
<b>Optional Vent Screw and Block and Bleed Valve</b>	
-V1	316 ss Vent Screw in Process Connection <sup>109 114 115</sup>
-V2	Block and Bleed Valve, Carbon Steel <sup>109 114 116</sup>
-V3	Block and Bleed Valve, 316 ss <sup>109 114 116</sup>
-V4	Block and Bleed Valve, 316 ss w/ Monel Trim, NACE Approved <sup>109 114 116</sup>
-V5	Vent Screw in Side of Process Cover <sup>117 118 119</sup>
-V6	Omit Vent Screw <sup>120</sup>
<b>Optional Biplanar Process Connector Type (same material as Process Cover)<sup>117</sup></b>	
-F1	1/4 NPT <sup>121</sup>
-F2	1/2 NPT
-F3	RC 1/4 <sup>121</sup>
-F4	RC 1/2
-F6	1/2 Schedule 80 Weld Neck <sup>121</sup>
<b>Options for Digital Indicator with Pushbuttons</b>	
-L1	Digital Display, Pushbuttons and Window Cover <sup>122</sup>
-L2	Substitute Solid Cover over Digital Display <sup>123</sup>

109. Not available with biplanar structures.

110. Not available with Electrical Certification codes that end in D or P.

111. Available with Conduit Connection and Housing Material codes 1 and 3 only.

112. Available with Conduit Connection and Housing Material codes 5 and 6 only.

113. Available only with flameproof Direct Connect Structure codes, excluding D5 and D6.

114. Not available with option -G.

115. Available only with 1/2 NPT 316L ss Structure codes 22, 23, 30, 31, 52, 53, 60, and 61.

116. Available only with structures that have 1/2 NPT external connections.

117. Available with biplanar structures only.

118. Not available with Structure codes LL, LM, LC, LD, L2, L3, L6, or L7. A vent screw in the side of the process cover is standard with these structures.

119. Not available with optional IEC 61518 Construction codes -D1 through -D9.

120. Available only for transmitters with biplanar LP1 or LP2 structures.

121. Not available with biplanar C276 structures.

122. Not available with Electronics Version -V.

123. Available only with Electronics Version -V.

**Table 38 - Absolute and Gauge Pressure Transmitters (Continued)**

Code	Description
<b>Optional IEC 61518 Construction<sup>124 125</sup></b>	
-D1	Single-Ended Process Cover with B7 Steel Bolt; No Connector Screw; MWP=2320 psi <sup>126</sup>
-D2	Double-Ended Process Cover <sup>127</sup> with B7 Steel Bolt; Size M10 Steel Connector Screw; MWP=1500 psi <sup>128 129 130</sup>
-D3	Single-Ended Process Cover with B7 Steel Bolt; No Connector Screw; MWP=3626 psi <sup>126</sup>
-D4	Double-Ended Process Cover <sup>127</sup> with B7 Steel Bolt; Size 7/16 Steel Connector Screw; MWP=1500 psi <sup>128 129 130</sup>
-D5	Single-Ended Process Cover with 316 ss Bolt; No Connector Screw; MWP=2175 psi <sup>126</sup>
-D6	Double-Ended Process Cover <sup>127</sup> with 316 ss Bolt; Size 7/16 316 ss Connector Screw; MWP=1500 psi <sup>128 129 130</sup>
-D7	Single-Ended Process Cover with 17-4 PH Bolt; No Connector Screw; MWP=3626 psi <sup>126</sup>
-D8	Double-Ended Process Cover <sup>127</sup> with 17-4 PH Bolt; Size 7/16 17-4 PH Connector Screw; MWP=1500 psi <sup>128 129 130</sup>
-D9	Single-Ended Process Cover with 17-4 PH Bolt; No Connector Screw; MWP=5800 psi <sup>126</sup>
<b>Optional Cleaning and Preparation<sup>131</sup></b>	
-X1	Unit Degreased – for Silicone Fill Sensors Only <sup>132</sup>
-X2	Cleaned and Prepared for Oxygen Service – for Inert Fill Sensors Only <sup>133 134</sup>
-X3	Cleaned and Prepared for Chlorine Service <sup>133 135</sup>
<b>Optional Bolting (Process Covers and Process Connectors)<sup>124 136 137</sup></b>	
-B1	316 ss Bolts and Nuts (high corrosion protection; MWP derated to 2175 psi) <sup>138</sup>
-B2	17-4 PH ss Bolts and Nuts (bright acid tin coated corrosion protection with no pressure derating)
-B3	B7M Bolts and 2HM Nuts (conforms to NACE MR0175/MR0103, Class II; MWP derated to 2900 psi) <sup>138</sup>
<b>Optional Conduit Thread Adapters<sup>139 140</sup></b>	
-A1	Hawke-Type 1/2 NPT Brass Cable Gland
-A3	M20 Connector
<b>Optional Custom Factory Configuration</b>	
-C2	Custom Factory Configuration (requires Configuration Form to be filled out)

124. Span limit, maximum working pressure, maximum overrange pressure, and maximum static pressure (d/p) are derated for optional IEC 61518 Construction and optional Bolting except for codes -D3, -D7, and -B2. Option -D1 is derated to 2320 psi. Options -D5 and -B1 are derated to 2175 psi. Options -D2, -D4, -D6, and -D8 are derated to 1500 psi. Option -B3 is derated to 2900 psi.

125. Not available with optional Biplanar Process Connector (codes -F1 through -F6).

126. Available with Biplanar Structure codes B2, B3, B6, B7, LL, LM, LC, and LD.

127. Blind connector supplied.

128. Temperature limits are derated to -10 and +80°C (14 and 176°F) for optional IEC 61518 Construction codes -D2, -D4, -D6, and -D8 only.

129. Available only with Structure codes B2, B3, B6, and B7.

130. Not available with optional Mounting Bracket Sets -M3, -M9, and -M0.

131. Not available with Span codes G and H.

132. Available only with structures that have silicone fill and are not prepared for seals.

133. Available only with structures that have inert fill and are not prepared for seals.

134. After units are cleaned and reassembled for oxygen service, they are not rechecked for accuracy. This may affect performance for DP and biplanar GP transmitters.

135. For -X3, standard bolting is replaced with 17-4 ph ss bolts and nuts. Therefore, Bolting codes -B1, -B2, and -B3 are not available with -X3.

136. Not available with optional IEC 61518 Construction codes -D1 through -D9.

137. Available with biplanar structures only.

138. See *Maximum Static, Overage, and Proof Pressure Ratings*, page 26 for pressure deratings when certain IEC 61518 options and Bolting Options -B1 or -B3 are specified.

139. Not available with Electrical Certification codes that end in D or P.

140. Available with Conduit Connection and Housing Material codes 1 and 3 only.

**Table 38 - Absolute and Gauge Pressure Transmitters (Continued)**

Code	Description
<b>Optional Electronics Housing Features</b>	
-Z1	External Zero Adjustment <sup>141 142</sup>
-Z2	Custody Transfer Lock and Seal <sup>143</sup>
-Z3	External Zero Adjustment and Custody Transfer Lock/Seal <sup>141 142 143</sup>
<b>Optional Ermeto Connectors</b>	
-E3	316 ss for Connecting 6 mm Tubing to 1/4 NPT Process Connector <sup>144</sup>
-E4	316 ss for Connecting 12 mm Tubing to 1/2 NPT Process Connector <sup>145</sup>
<b>Optional Manifold Configurations</b>	
-H1	Manifold Mounted to Transmitter and Pressure Tested (1.5 times transmitter range or 1.5 times manifold rating, whichever is less)
-H2	Manifold Mounted to Transmitter and Pressure Tested (Certificate)
<b>Optional SIL 2 Selections<sup>146</sup></b>	
-S1	Yellow Cover for SIL2 on Electronics/Indicator Side of Housing
-S2	Red Cover for SIL2 on Electronics/Indicator Side of Housing
<b>Miscellaneous Optional Selections</b>	
-F	Autoclave F-250-C (GP transmitters only) <sup>147</sup>
-G	G 1/2 B Manometer Process Connection <sup>147 148</sup>
-G1	Metal O-Ring for Pressure Seals in Vacuum Service <sup>149</sup>
-H	1/2 NPT External Thread (GP transmitters only) <sup>147</sup>
-J	Low Temperature Operative Limit -50°C (-58°F) <sup>141 150 151</sup>
-K2	FoxDoc DVD-ROM (instead of "Getting Started" Guide)
-R	R 1/2 Process Connection (1/2 NPT to R 1/2 Adapter) <sup>152</sup>
-T	Supplemental Customer Tag (Stainless Steel Tag Wired onto Transmitter)

141. Not available with Electronics Version -V.

142. Not available for structures with sanitary or pulp and paper seals.

143. For flameproof models, the -Z2 and -Z3 options provide the seals in addition to the cover locks that are already included in the standard offering for these models.

144. Available only with Biplanar Structure codes B2, B3, B6, and B7, and Optional Biplanar Process Connector Type code -F1.

145. Available only with Biplanar Structure codes B2, B3, B6, and B7, and Optional Biplanar Process Connector Type code -F2.

146. Available only with Electronics Version -T.

147. Available with Structure codes 24 and 26 only.

148. Available with non-gold-plated 316L ss direct connect structures with 1/2 NPT external connections.

149. Available only with Structure codes P1, P2, P3, P4, P5, and P6.

150. Not available with Optional IEC 61518 Construction codes -D2, -D4, -D6, and -D8.

151. Not available with Direct Connect Structure codes 23, 31, 37, 39, E3, E5, 53, 61, 91, 93, F3, F5; Biplanar Structure codes B3, B7, LM, LD, L3, L7; and all Sanitary/Pulp and Paper structures.

152. Available with 316L ss direct connect structures with 1/2 NPT external connections.

## Differential Pressure Transmitters

**Table 39 - Differential Pressure Transmitters**

Code	Description
<b>Model<sup>153</sup></b>	
IDP05S	Differential Pressure Transmitter, Value Tier
<b>Electronics Versions/Output Signals</b>	
-T	HART and 4 to 20 mA with SIL 2
-V	Low Power Electronics, 1 to 5 Volts
<b>Structure Codes</b>	
<b>Structure — Traditional<sup>154</sup></b>	
22	316 ss Cover; 316L ss Diaphragm; Silicone Fill; Max Static Pressure=25 MPa (3626 psi)
23	316 ss Cover; 316L ss Diaphragm; Inert Fill; Max Static Pressure=25 MPa (3626 psi)
26	316 ss Cover; C276 Diaphragm; Silicone Fill; Max Static Pressure=25 MPa (3626 psi)
27	316 ss Cover; C276 Diaphragm; Inert Fill; Max Static Pressure=25 MPa (3626 psi)
<b>Structure — LP1 Direct Mount (Not Available with Pressure Seals); Maximum Static Pressure=25 MPa (3626 psi)<sup>154</sup></b>	
LL	316 ss Cover; 316L ss Diaphragm; Silicone Fill
LM	316 ss Cover; 316L ss Diaphragm; Inert Fill
LC	316 ss Cover; C276 Diaphragm; Silicone Fill
LD	316 ss Cover; C276 Diaphragm; Inert Fill
<b>Structure — LP2 Bracket Mount or Direct Mount (Not Available with Pressure Seals); Maximum Static Pressure=25 MPa (3626 psi)<sup>154</sup></b>	
52	316 ss Cover; 316L ss Diaphragm; Silicone Fill
53	316 ss Cover; 316L ss Diaphragm; Inert Fill
56	316 ss Cover; C276 Diaphragm; Silicone Fill
57	316 ss Cover; C276 Diaphragm; Inert Fill
<b>Structure — Prepared for Schneider Electric Model Coded Pressure Seals (Static Pressure Rating Limited by Seal)<sup>155 156</sup></b>	
S1	316 ss Cover; 316L ss Diaphragm; Silicone Fill; Remote Mount Seals, Both Sides <sup>157</sup>
S2	316 ss Cover; 316L ss Diaphragm; Inert Fill; Remote Mount Seals, Both Sides <sup>157</sup>
S3	316 ss, 1/2 NPT Cover; 316L ss Diaphragm; Silicone Fill; Remote Mount Seal, High Side <sup>157</sup>
S4	316 ss, 1/2 NPT Cover; 316L ss Diaphragm; Inert Fill; Remote Mount Seal, High Side <sup>157</sup>
S5	316 ss, 1/2 NPT Cover; 316L ss Diaphragm; Silicone Fill; Remote Mount Seal, Low Side <sup>157</sup>
S6	316 ss, 1/2 NPT Cover; 316L ss Diaphragm; Inert Fill; Remote Mount Seal, Low Side <sup>157</sup>
F1	316 ss, 1/2 NPT Cover; 316L ss Diaphragm; Silicone Fill; Direct Connect Seal, High Side
F2	316 ss, 1/2 NPT Cover; 316L ss Diaphragm; Inert Fill; Direct Connect Seal, High Side
F3	316 ss Cover; 316L ss Diaphragm; Silicone Fill; Direct Connect Seal, High Side and Remote Mount Seal, Low Side
F4	316 ss Cover; 316L ss Diaphragm; Inert Fill; Direct Connect Seal, High Side and Remote Mount Seal, Low Side

153. Refer to *Accuracy (Includes Linearity, Hysteresis, and Repeatability)*, page 33 for accuracy specifications.

154. Maximum static pressure can be derated by optional selections.

155. Not available with options -X1, -X2, or -X3.

156. Both transmitter and pressure seal model numbers are required. See PSS 2A-1Z11 B for pressure seal model codes.

157. Remote seal models that may be specified are PSFPS, PSFES, PSFAR, PSTAR, PSISR, PSSCR, and PSSSR.

**Table 39 - Differential Pressure Transmitters (Continued)**

Code	Description
<b>Structure — Prepared for Non-Schneider Electric Model Coded Pressure Seals (Static Pressure Rating Limited by Seal)<sup>158</sup></b>	
SA	316 ss Cover; 316L ss Diaphragm; Silicone Fill; Remote Mount Seals, Both Sides
SB	316 ss Cover; 316L ss Diaphragm; Inert Fill; Remote Mount Seals, Both Sides
SC	316 ss, 1/2 NPT Cover; 316L ss Diaphragm; Silicone Fill; Remote Mount Seal, High Side
SD	316 ss, 1/2 NPT Cover; 316L ss Diaphragm; Inert Fill; Remote Mount Seal, High Side
SE	316 ss, 1/2 NPT Cover; 316L ss Diaphragm; Silicone Fill; Remote Mount Seal, Low Side
SF	316 ss, 1/2 NPT Cover; 316L ss Diaphragm; Inert Fill; Remote Mount Seal, Low Side
<b>Span Limits</b>	
A <sup>159</sup>	With -T Electronics: n/a With -V Electronics: 0.12 and 7.5 kPa; 0.5 and 30 inH <sub>2</sub> O; 1.2 and 75 mbar
B	With -T Electronics: 0.12 and 50 kPa; 0.5 and 200 inH <sub>2</sub> O; 1.2 and 500 mbar With -V Electronics: 0.87 and 50 kPa; 3.5 and 200 inH <sub>2</sub> O; 8.7 and 500 mbar
C	With -T Electronics: 0.62 and 250 kPa; 2.5 and 1000 inH <sub>2</sub> O; 6.2 and 2500 mbar With -V Electronics: 7 and 210 kPa; 28 and 840 inH <sub>2</sub> O; 70 and 2100 mbar
D	With -T Electronics: 0.026 and 2.07 MPa; 3.75 and 300 psi; 0.26 and 20.7 bar With -V Electronics: 0.069 and 2.07 MPa; 10 and 300 psi; 0.69 and 20.7 bar
E	With -T Electronics: 0.26 and 20.7 MPa; 37.5 and 3000 psi; 2.6 and 207 bar With -V Electronics: 0.69 and 20.7 MPa; 100 and 3000 psi; 6.9 and 207 bar
<b>Process Connector Type (Same Material as the Process Cover)</b>	
0	None
1	1/4 NPT <sup>160 161</sup>
2	1/2 NPT <sup>160</sup>
3	RC 1/4 <sup>160 161</sup>
4	RC 1/2 <sup>160</sup>
6	1/2 Schedule 80 Weld Neck <sup>160 161</sup>
<b>Conduit Connection and Housing Material</b>	
1	1/2 NPT Conduit Connection, Both Sides, Aluminum Housing
3	1/2 NPT Conduit Connection, Both Sides, 316 ss Housing
5	M20 Conduit Connection, Both Sides, Aluminum Housing
6	M20 Conduit Connection, Both Sides, 316 ss Housing

158. Not available with options -X1, -X2, or -X3.

159. Span limit code A is not available with pressure seals, except for sanitary spud seal models PSSSR-\*4 and PSSST-\*4.

160. Not available with structures that have seals on both sides.

161. Not available with structures that have C276 process covers.

**Table 39 - Differential Pressure Transmitters (Continued)**

Code	Description
<b>Electrical Certifications</b>	
AA	ATEX intrinsically safe, Ex ia IIC <sup>162</sup>
AD	ATEX flameproof, Ex d IIC
AM	ATEX multiple certifications (includes ATEX Codes AA and AN) <sup>162</sup>
AN	ATEX protection type n, Ex ic IIC, or Ex nA <sup>162</sup>
AP	ATEX multiple certifications (includes ATEX Codes AA, AD and AN) <sup>162</sup>
BA	INMETRO intrinsically safe, Ex ia IIC <sup>162</sup>
BD	INMETRO flameproof, Ex d IIC
BP	INMETRO multiple certifications (includes INMETRO Codes BA and BD) <sup>162</sup>
CA	CSA intrinsically safe, Zone certified Ex ia
CD	CSA zone certified flameproof Ex d IIC; also explosion proof, dust ignition-proof
CM	CSA multiple certifications (includes CSA Codes CA and CN)
CN	CSA non-incendive, Zone certified Ex nA IIC
CP	CSA multiple certifications (includes CSA Codes CA, CD and CN)
DA	Multi-marked ATEX and IECEx intrinsically safe, Ex ia IIC <sup>162</sup>
DD	Multi-marked ATEX and IECEx flameproof, Ex d IIC
DM	Multi-marked ATEX and IECEx multiple certifications, ia, ic <sup>162</sup>
DN	Multi-marked ATEX and IECEx protection type n, Ex ic IIC <sup>162</sup>
DP	Multi-marked ATEX and IECEx multiple certifications, ia, ic, and d <sup>162</sup>
EA	IECEx intrinsically safe, Ex ia IIC <sup>162</sup>
ED	IECEx flameproof, Ex d IIC
EM	IECEx multiple certifications, ia, ic, nA <sup>162</sup>
EN	IECEx protection type n, Ex ic IIC, or Ex nA <sup>162</sup>
EP	IECEx multiple certifications, ia, ic, nA, and d <sup>162</sup>
FA	FM Classes I, II and III Division 1 intrinsically safe, AEx ia IIC
FD	FM Classes I, II and III Division 1 explosion proof, dust-ignition proof, Zone approved AEx d IIC
FM	FM multiple certifications (includes FM Codes FA or FN)
FN	Classes I, II and III FM Division 2 non-incendive, Zone approved AEx nA IIC
FP	FM multiple certifications (includes FM Codes FA, FD or FN)
KD	KOSHA Ex d
RA	EAC intrinsically safe, Ex ia <sup>162</sup>
RD	EAC flameproof, Ex d <sup>162</sup>
RN	EAC protection type n, Ex ic IIC or Ex nA <sup>162</sup>
ZZ	No certification

162. Not available with Electronics Version -V.

**Table 39 - Differential Pressure Transmitters (Continued)**

Code	Description
<b>Optional Mounting Bracket Sets<sup>163 164</sup></b>	
-M1	Standard Style Painted Steel Bracket with Plated Steel Bolts
-M2	Standard Style Stainless Steel Bracket with Stainless Steel Bolts
-M3	Universal Style Stainless Steel Bracket with Stainless Steel Bolts
<b>Optional Adapter Plates<sup>165 166 167</sup></b>	
-P1	Adapter Set for MC Coplanar Manifolds, B7 Bolts <sup>168</sup>
-P2	Adapter Set for MC Coplanar Manifolds, 316 ss Bolts <sup>169</sup>
-P3	Adapter Set for MC Coplanar Manifolds, 17-4 ss Bolts <sup>170</sup>
-P4	Adapter Set for MC Coplanar Manifolds, B7M Bolts <sup>171</sup>
-P5	Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, B7 Bolts <sup>168</sup>
-P6	Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, 316 ss Bolts <sup>169</sup>
-P7	Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, 17-4 ss Bolts <sup>170</sup>
-P8	Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, B7M Bolts <sup>171</sup>
<b>Options for Digital Indicator with Pushbuttons</b>	
-L1	Digital Display, Pushbuttons and Window Cover <sup>172</sup>
-L2	Substitute Solid Cover over Digital Display <sup>173</sup>
<b>Optional IEC 61518 Construction<sup>167 174 175</sup></b>	
-D1	Single-Ended Process Cover with B7 Steel Bolt; No Connector Screw; MWP=2320 psi
-D2	Double-Ended Process Cover <sup>176</sup> with B7 Steel Bolt; Size M10 Steel Connector Screw; MWP=1500 psi <sup>177 178</sup>
-D3	Single-Ended Process Cover with B7 Steel Bolt; No Connector Screw; MWP=3626 psi
-D4	Double-Ended Process Cover <sup>176</sup> with B7 Steel Bolt; Size 7/16 Steel Connector Screw; MWP=1500 psi <sup>177 178</sup>
-D5	Single-Ended Process Cover with 316 ss Bolt; No Connector Screw; MWP=2175 psi
-D6	Double-Ended Process Cover <sup>176</sup> with 316 ss Bolt; Size 7/16 316 ss Connector Screw; MWP=1500 psi <sup>177 178</sup>
-D7	Single-Ended Process Cover with 17-4 PH Bolt; No Connector Screw; MWP=3626 psi
-D8	Double-Ended Process Cover <sup>176</sup> with 17-4 PH Bolt; Size 7/16 17-4 PH Connector Screw; MWP=1500 psi <sup>177 178</sup>
-D9	Single-Ended Process Cover with 17-4 PH Bolt; No Connector Screw; MWP=5800 psi

163. Not available with Structure codes F1, F2, F3, and F4 (direct connect seal).

164. Not available with Low Profile (LP1 and LP2) structures.

165. Not available with optional IEC 61518 Construction codes -D1 through -D9.

166. Not available with structures prepared for pressure seals.

167. Available only with Process Connector Type code 0.

168. Not available with Bolting Options -B1, -B2, or -B3.

169. Available only with option -B1.

170. Available only with option -B2.

171. Available only with option -B3.

172. Not available with Electronics Version -V.

173. Available only with Electronics Version -V.

174. See *Maximum Static, Overrange, and Proof Pressure Ratings, page 26* for pressure deratings when certain IEC 61518 options and Bolting Options -B1 or -B3 are specified.

175. Available only with Structure codes 22 through 27. Not available with options -V and -V1.

176. Blind connector supplied.

177. Not available with Mounting Bracket Set options -M1, -M2, and -M3.

178. Temperature limits are derated to -10 and +80°C (14 and 176°F) for optional IEC 61518 Construction codes -D2, -D4, -D6, and -D8 only.

**Table 39 - Differential Pressure Transmitters (Continued)**

Code	Description
<b>Optional Cleaning and Preparation</b>	
-X1	Unit Degreased – for Silicone Fill Sensors Only <sup>179</sup>
-X2	Cleaned and Prepared for Oxygen Service – for Inert Fill Sensors Only <sup>180 181</sup>
-X3	Cleaned and Prepared for Chlorine Service <sup>180 182</sup>
<b>Optional Bolting (Process Covers and Process Connectors)<sup>183 184</sup></b>	
-B1	316 ss Bolts and Nuts (high corrosion protection; MWP derated to 2175 psi) <sup>185</sup>
-B2	17-4 PH ss Bolts and Nuts (bright acid tin coated corrosion protection with no pressure derating)
-B3	B7M Bolts and 2HM Nuts (conforms to NACE MR0175/MR0103, Class II; MWP derated to 2900 psi) <sup>185</sup>
<b>Optional Conduit Thread Adapters<sup>186 187</sup></b>	
-A1	Hawke-Type 1/2 NPT Brass Cable Gland
-A3	M20 Connector
<b>Optional Custom Factory Configuration</b>	
-C2	Custom Factory Configuration (requires Configuration Form to be filled out)
<b>Optional Electronics Housing Features</b>	
-Z1	External Zero Adjustment <sup>188</sup>
-Z2	Custody Transfer Lock and Seal <sup>189</sup>
-Z3	External Zero Adjustment and Custody Transfer Lock/Seal <sup>188 189</sup>
<b>Optional Ermeto Connectors</b>	
-E3	316 ss for Connecting 6 mm Tubing to 1/4 NPT Process Connector <sup>190</sup>
-E4	316 ss for Connecting 12 mm Tubing to 1/2 NPT Process Connector <sup>191</sup>
<b>Optional Manifold Configurations</b>	
-H1	Manifold Mounted to Transmitter and Pressure Tested (1.5 times transmitter range or 1.5 times manifold rating, whichever is less)
-H2	Manifold Mounted to Transmitter and Pressure Tested (Certificate)
<b>Optional SIL 2 Selections<sup>192</sup></b>	
-S1	Yellow Cover for SIL2 on Electronics/Indicator Side of Housing
-S2	Red Cover for SIL2 on Electronics/Indicator Side of Housing

179. Available only with structures that have silicone fill and are not prepared for seals.

180. Available only with structures that have inert fill and are not prepared for seals.

181. After units are cleaned and reassembled for oxygen service, they are not rechecked for accuracy. This may affect performance for DP and biplanar GP transmitters.

182. For -X3, standard bolting is replaced with 17-4 ph ss bolts and nuts. Therefore, Bolting codes -B1, -B2, and -B3 are not available with -X3.

183. Not available with optional IEC 61518 Construction codes -D1 through -D9.

184. For stainless steel bolts with IEC 61518 construction, specify -D5 to -D9, as required, instead of -B1 or -B2.

185. See *Maximum Static, Overrange, and Proof Pressure Ratings, page 26* for pressure deratings when certain IEC 61518 options and Bolting Options -B1 or -B3 are specified.

186. Not available with Electrical Certification codes that end in D or P.

187. Available with Conduit Connection and Housing Material codes 1 and 3 only.

188. Not available with Electronics Version -V.

189. Cover locks are provided as standard with Electrical Certification codes that end in D or P (flameproof).

190. Available only with Structure codes 22, 23, 26, and 27, and Process Connector codes 0 and 1.

191. Available only with Structure codes 22, 23, 26, and 27, and Process Connector code 2.

192. Available only with Electronics Version -T.

**Table 39 - Differential Pressure Transmitters (Continued)**

Code	Description
<b>Miscellaneous Optional Selections</b>	
-G1	Metal O-Ring for Pressure Seals in Vacuum Service <sup>193 194</sup>
-J	Low Temperature Operative Limit -50°C (-58°F) <sup>195 196 197</sup>
-K2	FoxDoc DVD-ROM (instead of "Getting Started" Guide)
-T	Supplemental Customer Tag (Stainless Steel Tag Wired onto Transmitter)
-V	Supply Vent Screw in Side of Each Process Cover <sup>198</sup>
-V1	Omit Vent Screw in Side of Each Process Cover <sup>199</sup>
-Y	Static Pressure Rating to 40 MPa (5800 psi) and 17-4 ss Bolts and Nuts <sup>200 201</sup>

193. When the pressure seal is used in vacuum applications, -G1 is required. This selection substitutes a vacuum service metal gasket for the standard PTFE process cover gasket.

194. Available only with structure codes for pressure seals.

195. Not available with Electronics Version -V.

196. Not available with Optional IEC 61518 Construction codes -D2, -D4, -D6, and -D8.

197. Not available with Traditional, LP1, or LP2 structures with inert fill fluid.

198. Available only with Traditional Structure codes.

199. Available only with LP1 Direct Mount structures with 316 ss process covers.

200. Not available with structures prepared for pressure seals.

201. Not available with Bolting Options -B1, -B2, or -B3.

# Dimensions

For dimensional information specific to your sales order, contact your sales representative to order a Certified Dimensional Print (CDP).

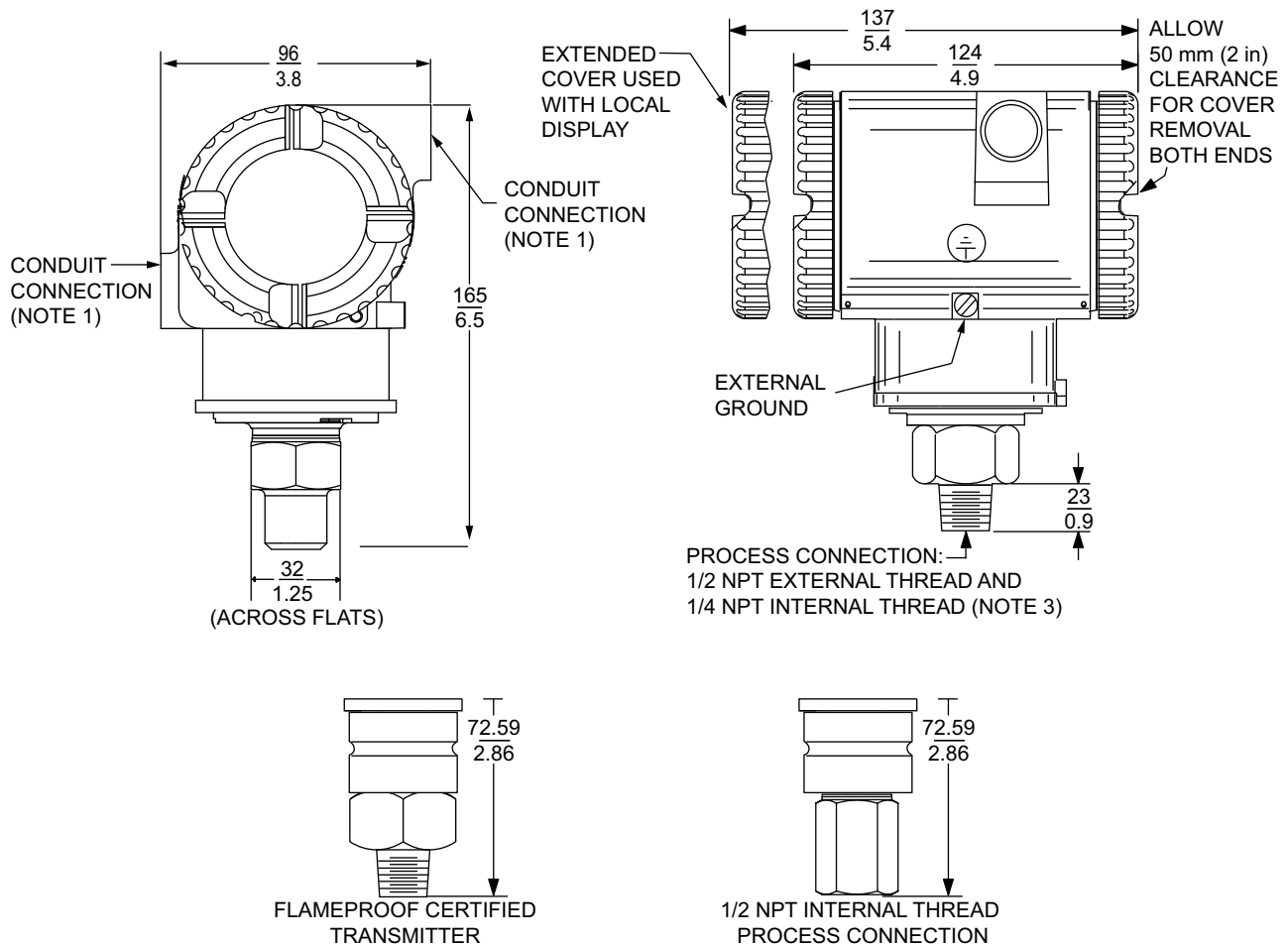
All dimensions in diagrams are shown in millimeters over inches ( $\frac{mm}{in}$ ).

**NOTE:** For information on pulp and paper connection and sanitary pressure transmitters, see:

- DP 020-217, *Gauge and Absolute Pressure Transmitters With Pulp and Paper Process Connections*
- DP 020-218, *Sanitary Pressure Transmitters with 1½-, 2-, and 3-inch Tri-Clamp Process Connection*
- DP 020-219, *Sanitary Gauge or Absolute Pressure Transmitters with Mini Tank Spud Seal*

## Direct Connect AP and Direct Connect GP Transmitters

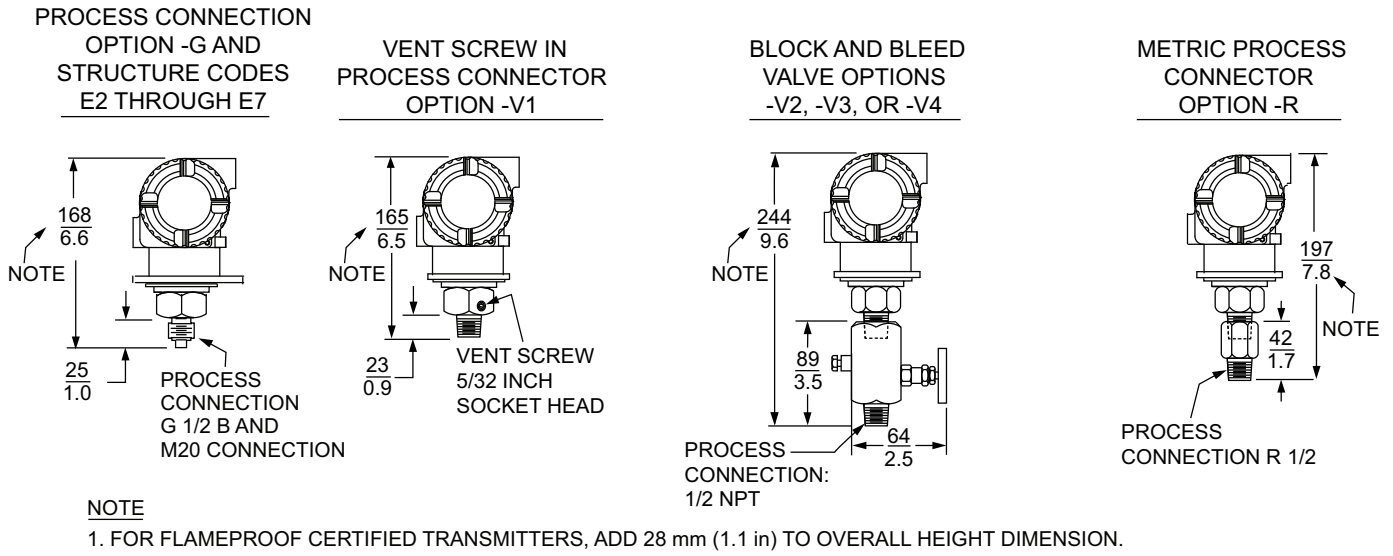
Figure 22 - Direct Connect AP/GP Transmitters



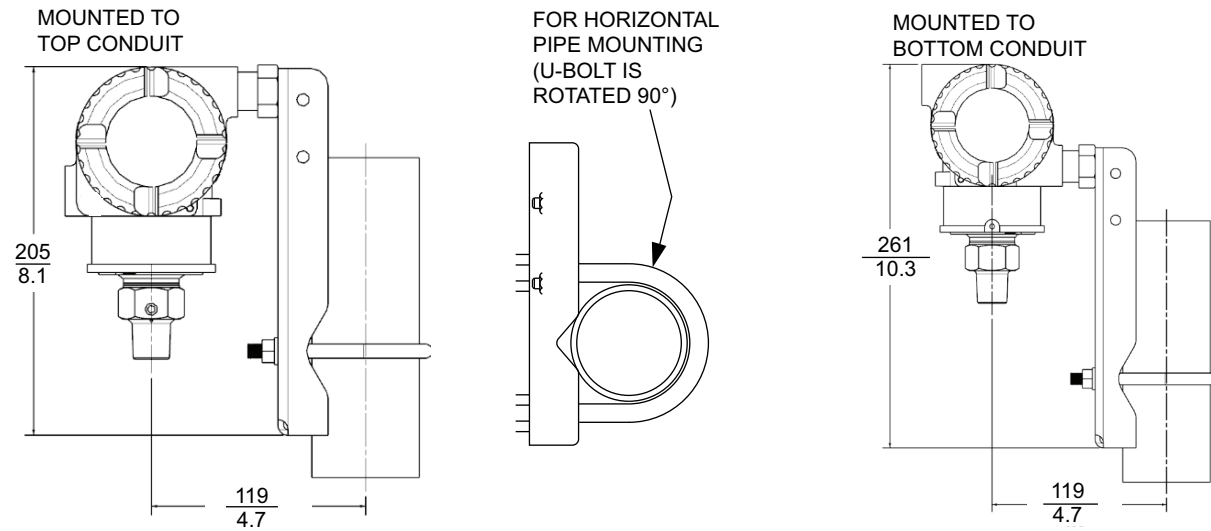
**NOTES:**

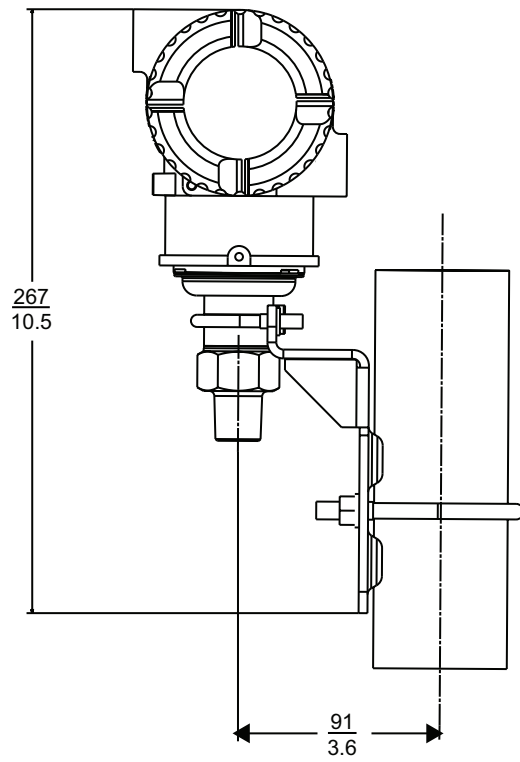
1. CONDUIT CONNECTION 1/2 NPT OR M20, BOTH SIDES: PLUG UNUSED CONNECTION WITH SUPPLIED METAL PLUG.
2. TOPWORKS ROTATABLE TO ANY POSITION WITHIN ONE TURN COUNTERCLOCKWISE OF FULLY TIGHTENED POSITION.
3. DO NOT USE THE 1/4 NPT INTERNAL THREAD TO DIRECTLY CONNECT THE TRANSMITTER.

**Figure 23 - Direct Connect AP/GP Transmitters with Options -G, -V1, -V2, -V3, -V4, and -R**

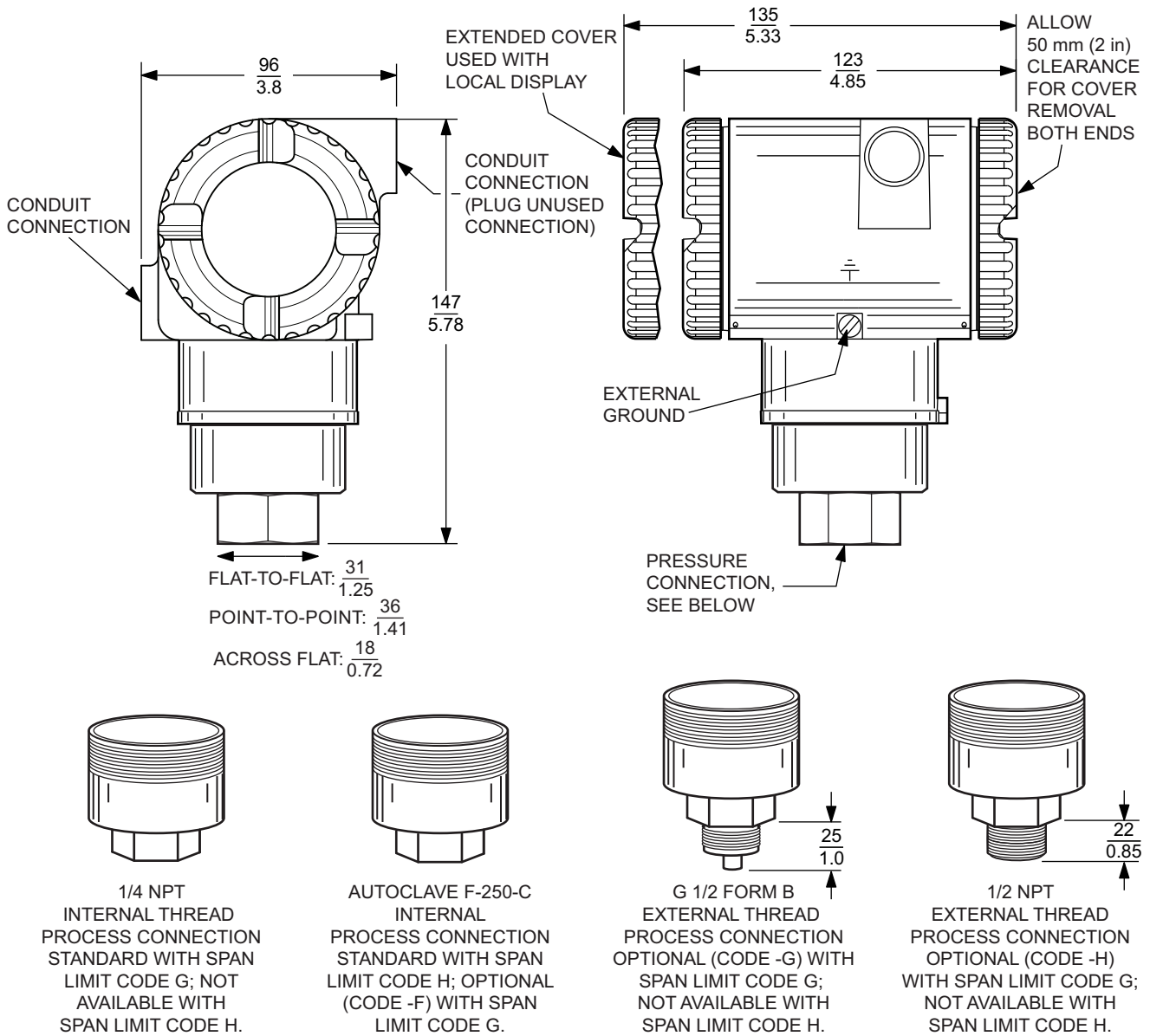


**Figure 24 - Direct Connect AP/GP Transmitters with Options -M1, -M2, -M5, and -M6**



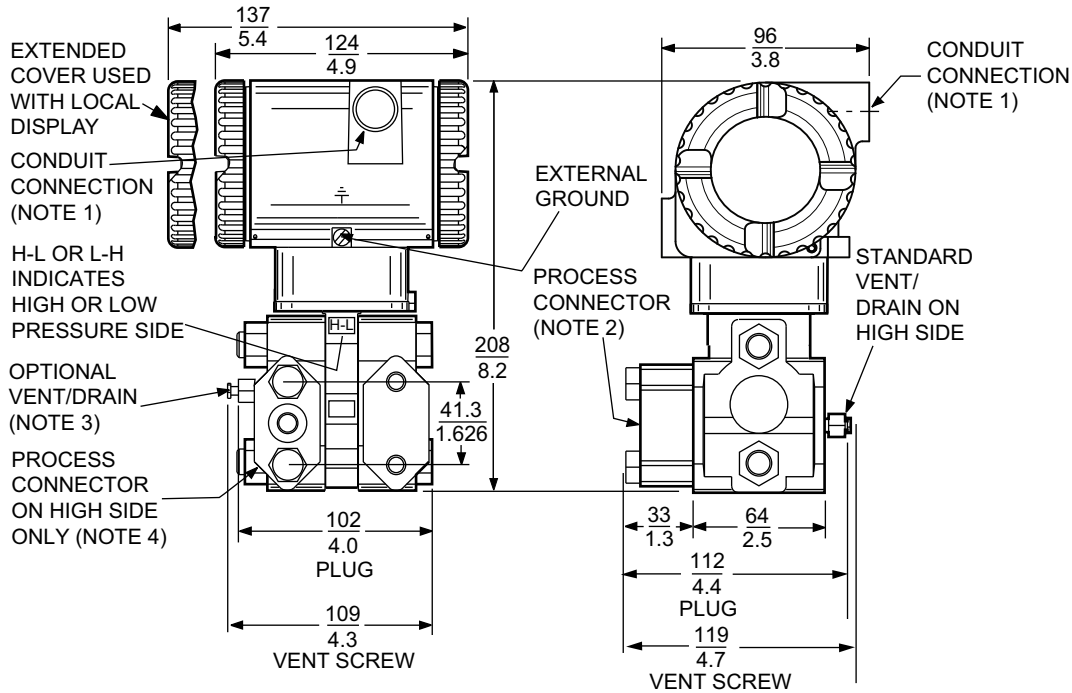
**Figure 25 - Flameproof Direct Connect AP/GP Transmitters with Options -M7 and -M8**

**Figure 26 - Direct Connect GP Transmitters for High Gauge Pressure Measurement**



## Biplanar AP and Biplanar GP Transmitters

**Figure 27 - Biplanar AP/GP Transmitters**



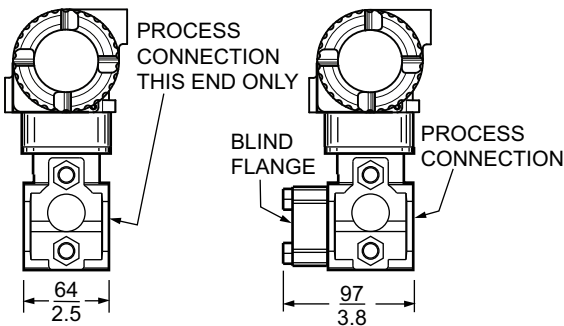
**NOTES**

1. CONDUIT CONNECTION 1/2 NPT OR M20, BOTH SIDES: PLUG UNUSED CONNECTION WITH SUPPLIED METAL PLUG.
2. PROCESS CONNECTOR CAN BE REMOVED AND CONNECTION MADE DIRECTLY TO PROCESS COVER USING 1/4 NPT INTERNAL THREAD IN PROCESS COVER. NOTE THAT WITH PROCESS CONNECTION CODE "0", THERE IS NO CONNECTOR.
3. PROCESS COVER CAN BE INVERTED MAKING OPTIONAL SIDE VENT A SIDE DRAIN.
4. FOR USERS WHO DESIRE THE PROCESS CONNECTOR ON THE RIGHT SIDE, ROTATE TRANSMITTER 180° AND RELOCATE PROCESS CONNECTOR (AND VENT SCREW, IF APPLICABLE).
5. DO NOT USE THE 1/4 NPT INTERNAL THREAD TO DIRECT-CONNECT THE TRANSMITTER WITHOUT A MOUNTING BRACKET.

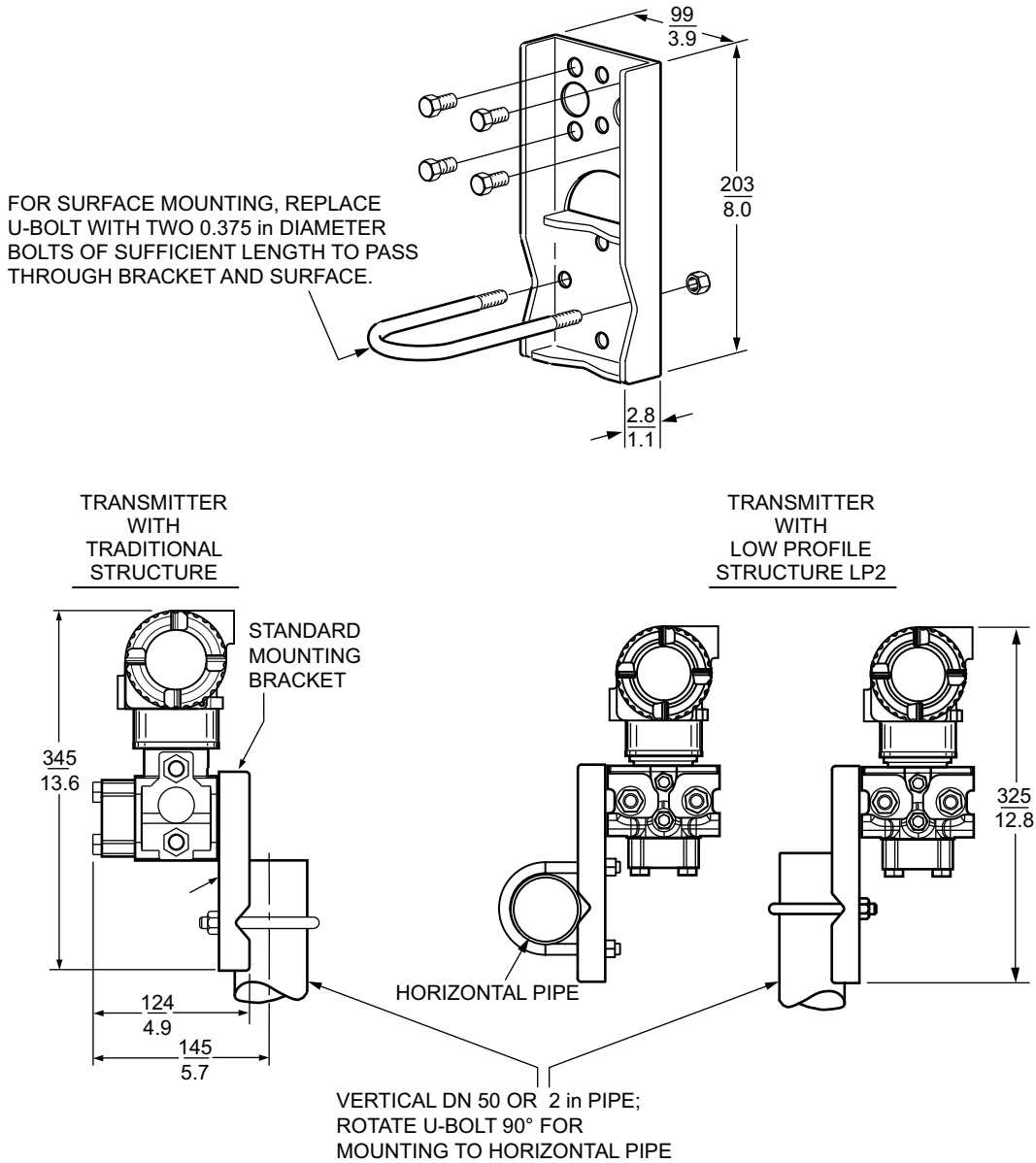
**Figure 28 - Biplanar AP/GP Transmitters with Options -D1, -D2, -D3, -D4, -D5, -D6, -D7, -D8, and -D9**

**IEC 61518 CONSTRUCTION OPTIONS**

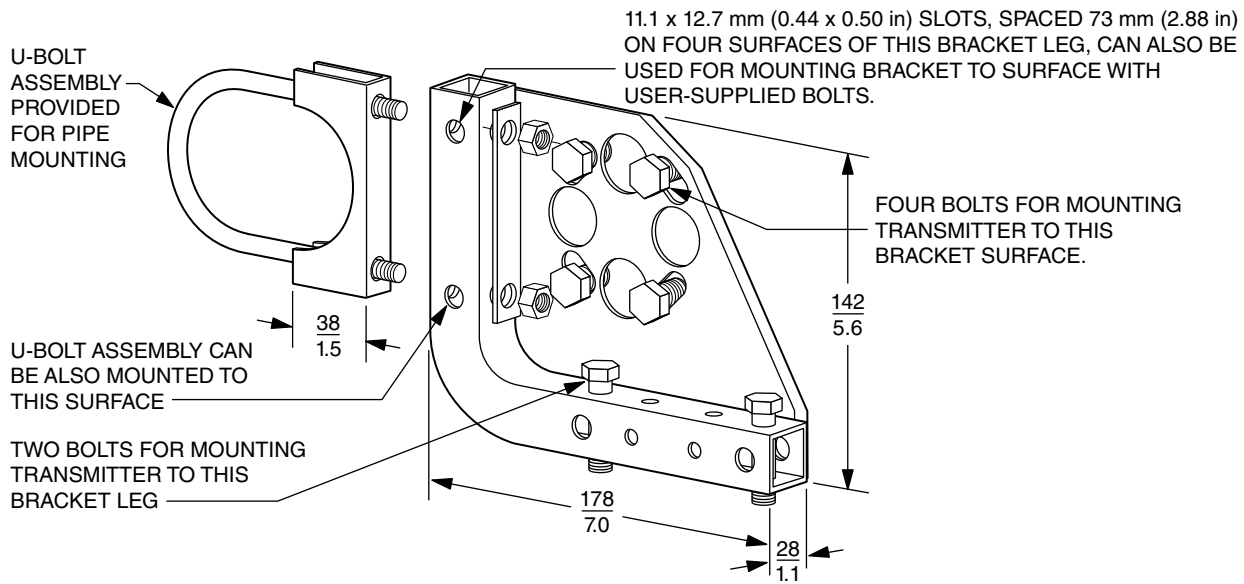
SINGLE ENDED PROCESS COVER OPTIONS	DOUBLE ENDED PROCESS COVER OPTIONS
-D1, -D3, -D5, -D7, -D9	-D2, -D4, -D6, -D8



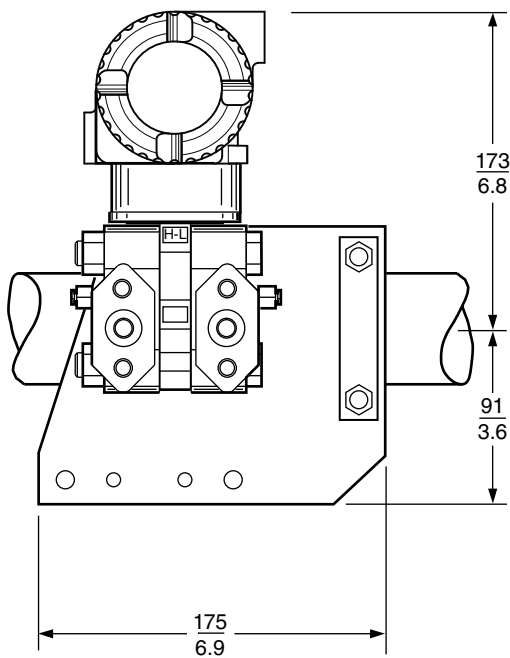
**Figure 29 - Biplanar AP/GP Transmitters with Options -M0 and -M9 (Standard Stainless Steel or Painted Steel Bracket)**



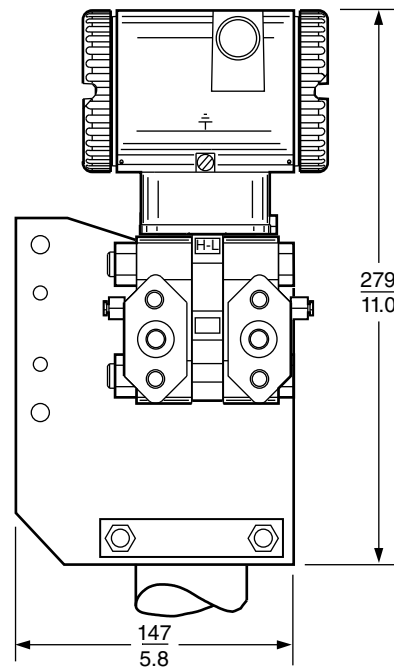
**Figure 30 - Biplanar AP/GP Transmitters with Option -M3 (Universal Bracket)**



HORIZONTAL PIPE MOUNTING

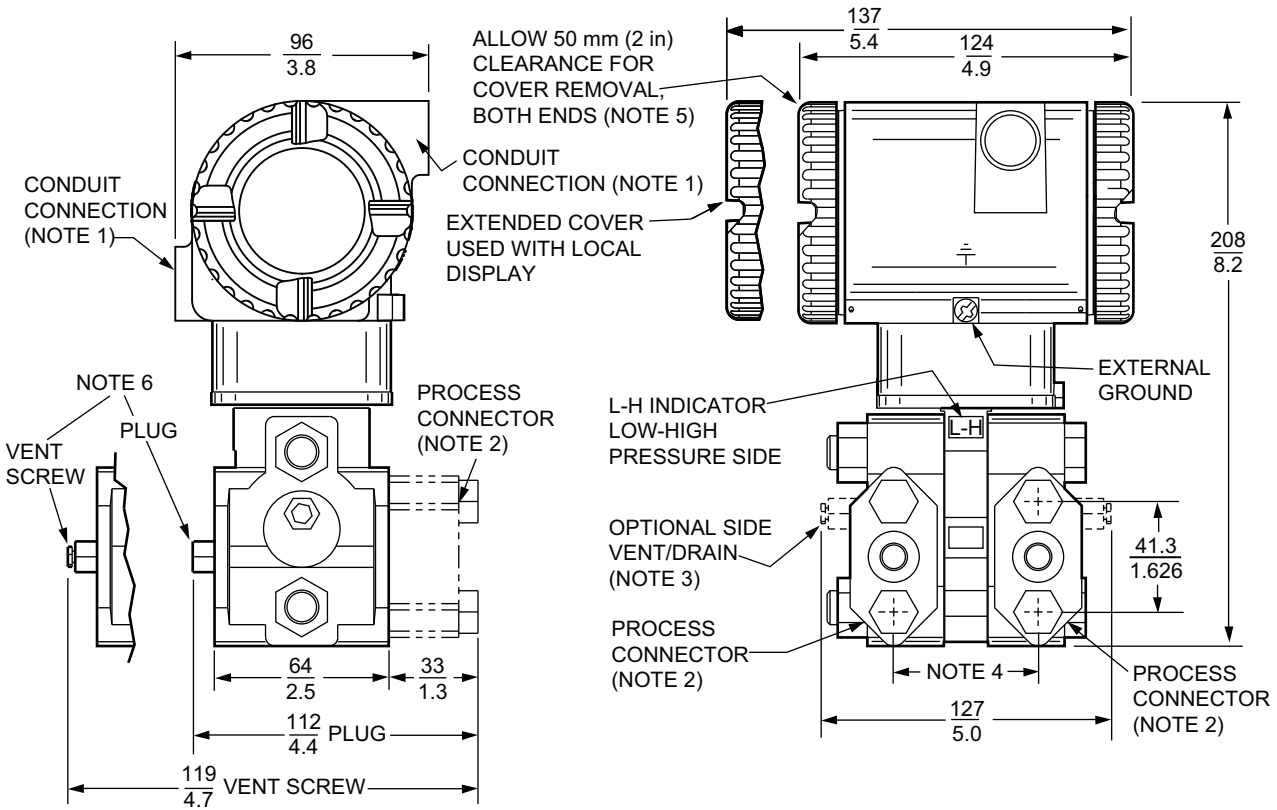


VERTICAL PIPE MOUNTING



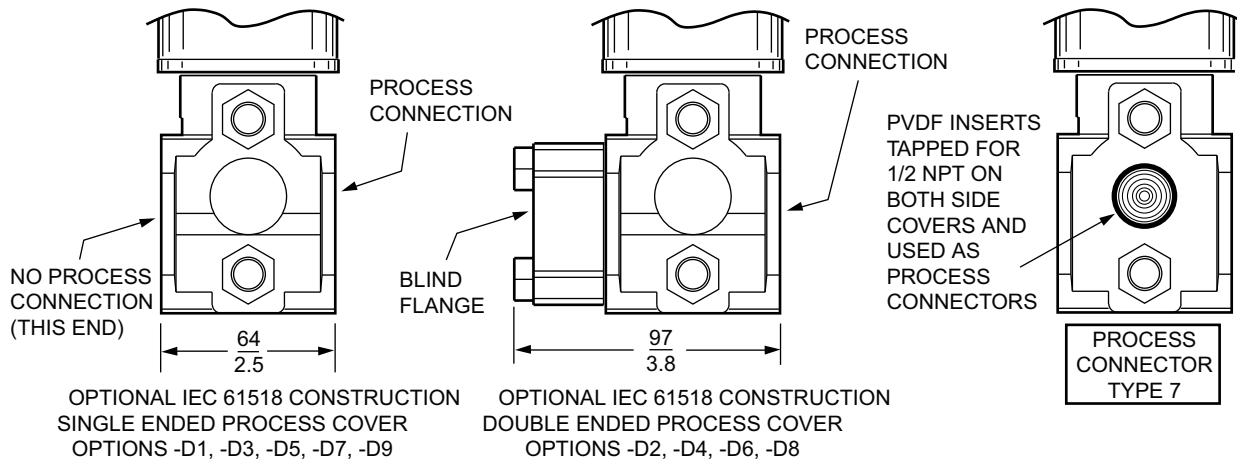
# DP Transmitters

Figure 31 - DP Transmitters with Traditional Structure

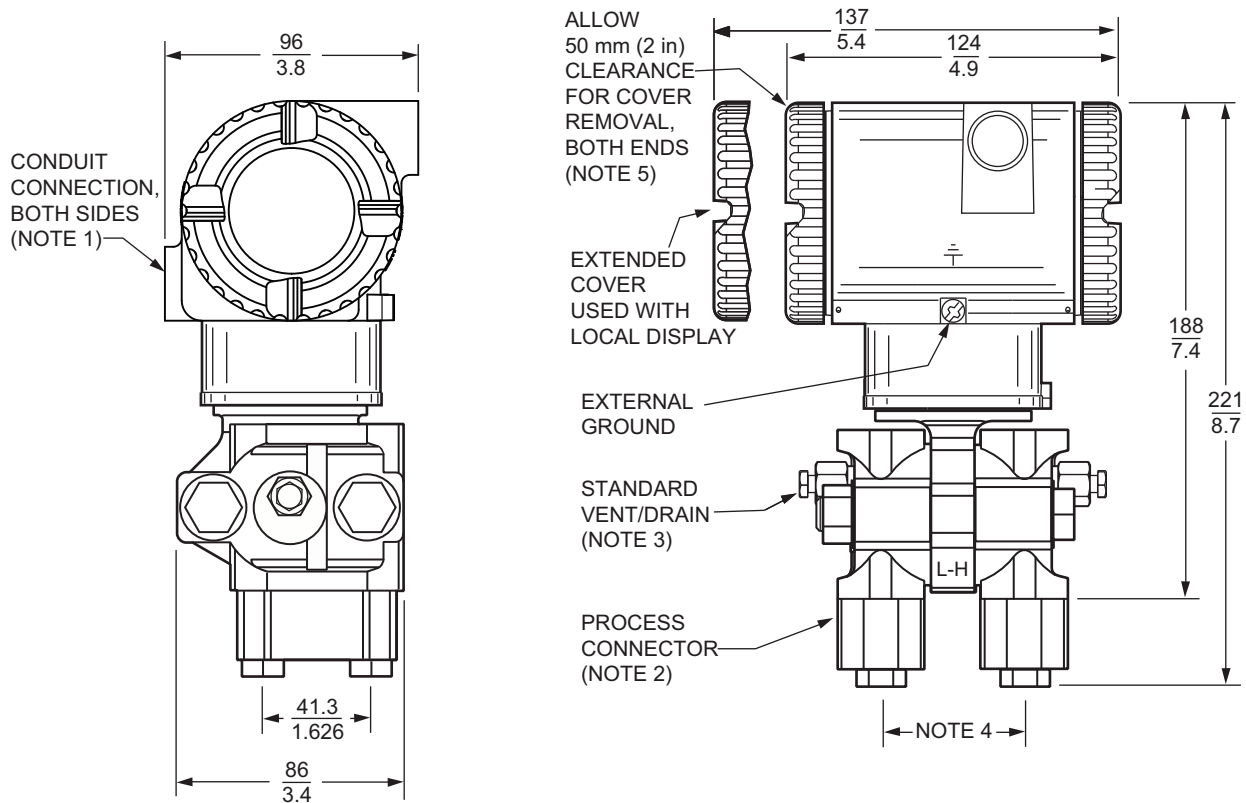


**NOTES:**

1. CONDUIT CONNECTION 1/2 NPT, BOTH SIDES: PLUG UNUSED CONNECTION WITH SUPPLIED METAL PLUG.
2. PROCESS CONNECTORS MAY BE REMOVED AND TRANSMITTER MOUNTED DIRECTLY ON A MANIFOLD, OR CONNECTIONS MADE DIRECTLY TO PROCESS COVER USING 1/4 NPT INTERNAL THREAD IN PROCESS COVER.
3. PROCESS COVER CAN BE INVERTED MAKING OPTIONAL SIDE VENTS OR SIDE DRAINS.
4. PROCESS CONNECTORS CAN BE INVERTED TO GIVE EITHER 51, 54, OR 57 mm (2.0, 2.125, OR 2.25 in) CENTER-TO-CENTER DISTANCE BETWEEN HIGH AND LOW PRESSURE CONNECTIONS.
5. TOPWORKS CAN BE ROTATED TO ANY POSITION WITHIN ONE TURN COUNTERCLOCKWISE OF THE FULLY TIGHTENED POSITION.
6. PROCESS COVER END PLUGS ARE SUBSTITUTED FOR VENT SCREWS WHEN OPTIONAL SIDE VENTS (NOTE 3) ARE SPECIFIED.



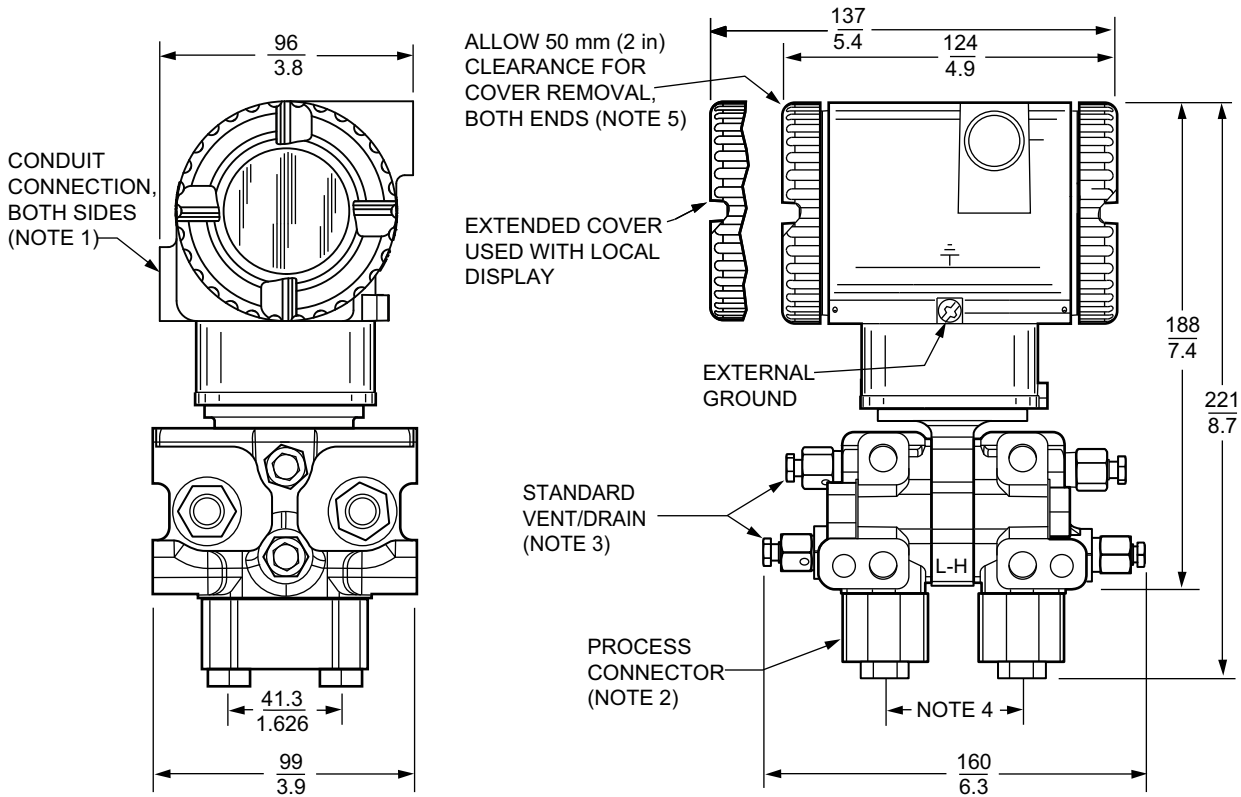
**Figure 32 - DP Transmitters with Low Profile 1 (LP1) Structure**



**NOTES:**

1. CONDUIT CONNECTION 1/2 NPT OR M20, BOTH SIDES: PLUG UNUSED CONNECTION WITH SUPPLIED METAL PLUG.
2. PROCESS CONNECTORS MAY BE REMOVED AND TRANSMITTER MOUNTED DIRECTLY ON A MANIFOLD, OR CONNECTIONS MADE DIRECTLY TO PROCESS COVER USING 1/4 NPT INTERNAL THREAD IN PROCESS COVER.
3. THE TRANSMITTER'S LOW PROFILE STRUCTURE LP1 IS SHOWN IN THE VERTICALLY UPRIGHT POSITION. NOTE THE LOCATION OF THE STANDARD VENT/DRAIN SCREW. IN THIS CONFIGURATION, THE TRANSMITTER CAN BE VENTED OR IS SELF-DRAINING. ALSO RECOMMENDED IS A HORIZONTAL INSTALLATION WHERE THE INSTALLED ORIENTATION CAN BE SET TO ALLOW FOR VENTING OR DRAINING.
4. PROCESS CONNECTORS CAN BE INVERTED TO GIVE EITHER 51, 54, OR 57 mm (2.0, 2.125, OR 2.25 in) CENTER-TO-CENTER DISTANCE BETWEEN HIGH AND LOW PRESSURE CONNECTIONS.
5. TOPWORKS CAN BE ROTATED TO ANY POSITION WITHIN ONE TURN COUNTERCLOCKWISE OF THE FULLY TIGHTENED POSITION.

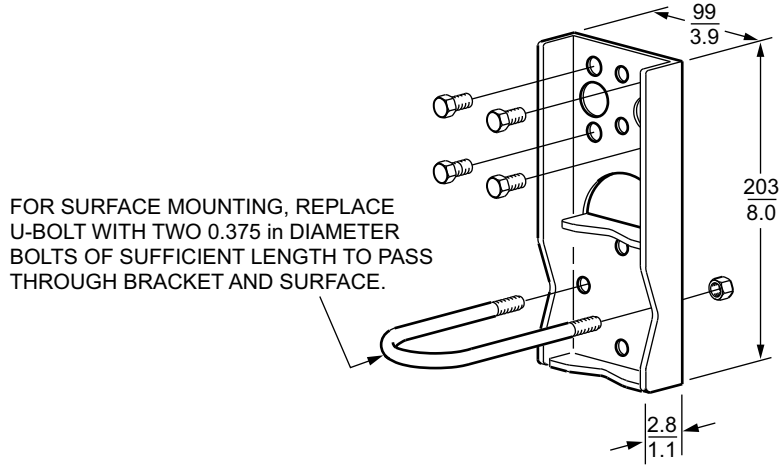
**Figure 33 - DP Transmitters with Low Profile 2 (LP2) Structure**



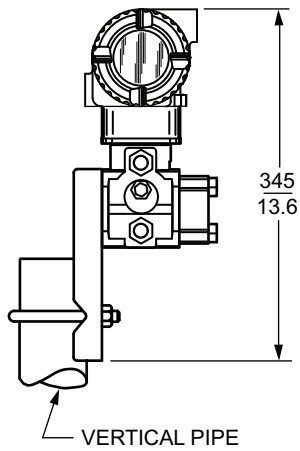
**NOTES:**

1. CONDUIT CONNECTION 1/2 NPT OR M20, BOTH SIDES: PLUG UNUSED CONNECTION WITH SUPPLIED METAL PLUG.
2. PROCESS CONNECTORS MAY BE REMOVED AND TRANSMITTER MOUNTED DIRECTLY ON A MANIFOLD, OR CONNECTIONS MADE DIRECTLY TO PROCESS COVER USING 1/4 NPT INTERNAL THREAD IN PROCESS COVER.
3. THE TRANSMITTER'S LOW PROFILE STRUCTURE LP2 IS SHOWN IN THE RECOMMENDED VERTICAL UPRIGHT POSITION. NOTE THE STANDARD VENT OR DRAIN SCREWS. HORIZONTAL INSTALLATIONS ARE NOT RECOMMENDED.
4. PROCESS CONNECTORS CAN BE INVERTED TO GIVE EITHER 51, 54, OR 57 mm (2.0, 2.125, OR 2.25 in) CENTER-TO-CENTER DISTANCE BETWEEN HIGH AND LOW PRESSURE CONNECTIONS.
5. TOPWORKS CAN BE ROTATED TO ANY POSITION WITHIN ONE TURN COUNTERCLOCKWISE OF THE FULLY TIGHTENED POSITION.

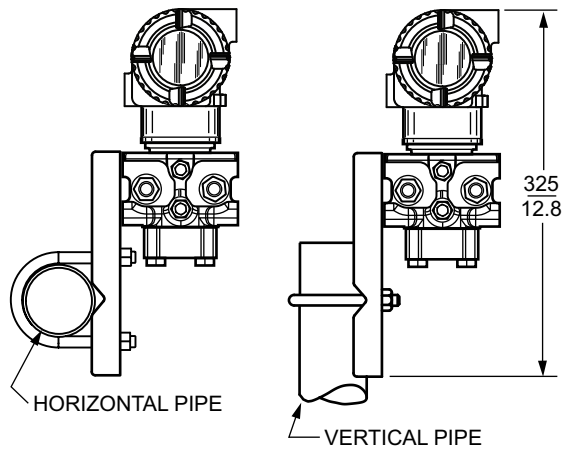
**Figure 34 - DP Transmitters with Traditional or LP2 Structure and Options -M1 and -M2 (Standard Style Mounting Bracket)**



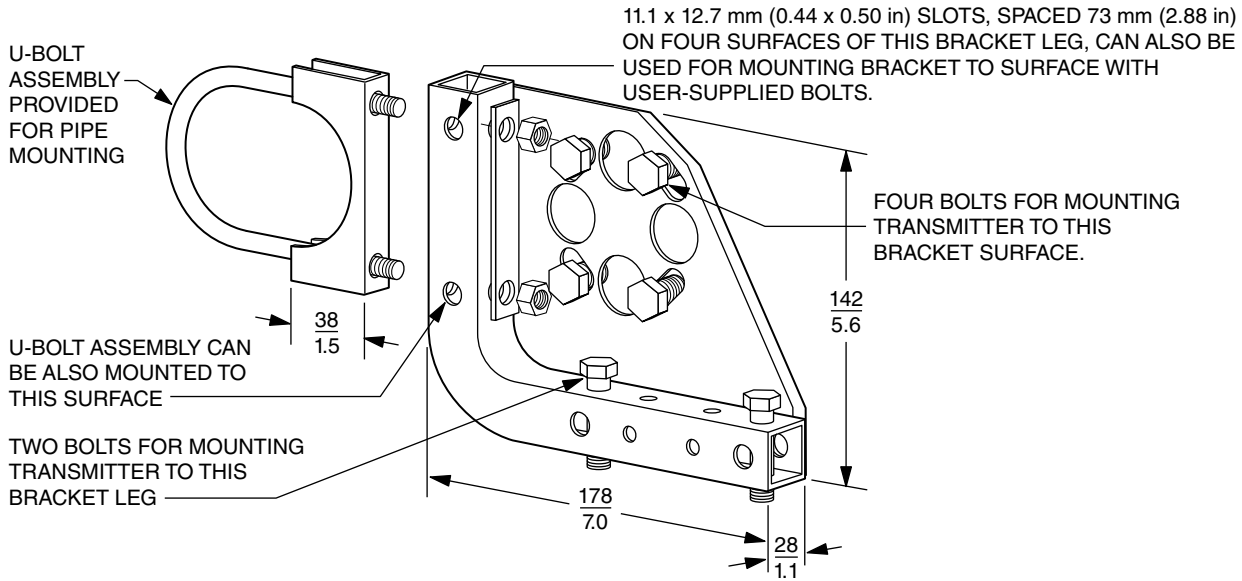
**TRANSMITTER WITH TRADITIONAL STRUCTURE**



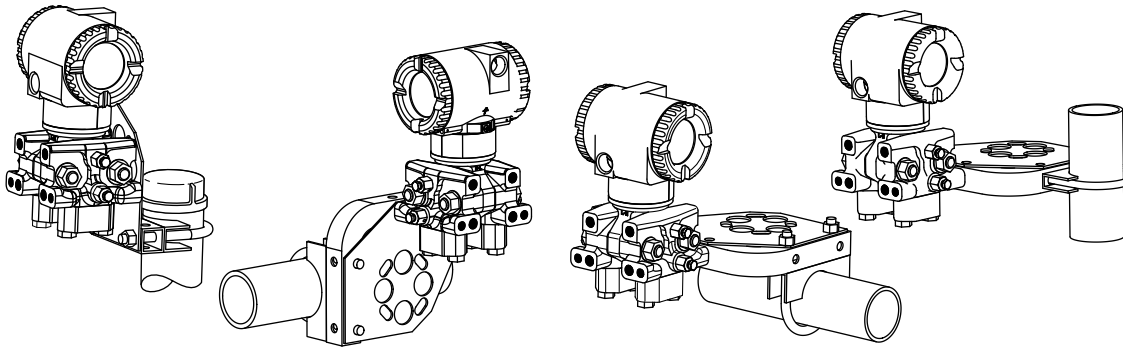
**TRANSMITTER WITH LOW PROFILE STRUCTURE LP2**



**Figure 35 - DP Transmitters with Option -M3 (Universal Style Mounting Bracket Kit)**

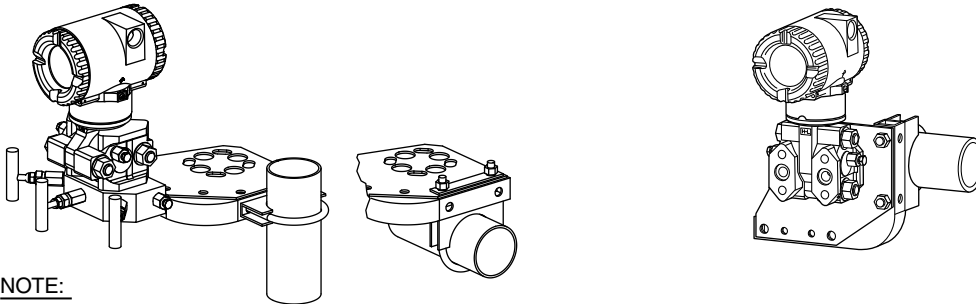


TYPICAL PIPE MOUNTING WITH LOW PROFILE STRUCTURE LP2



TYPICAL PIPE MOUNTING  
LOW PROFILE STRUCTURE LP1

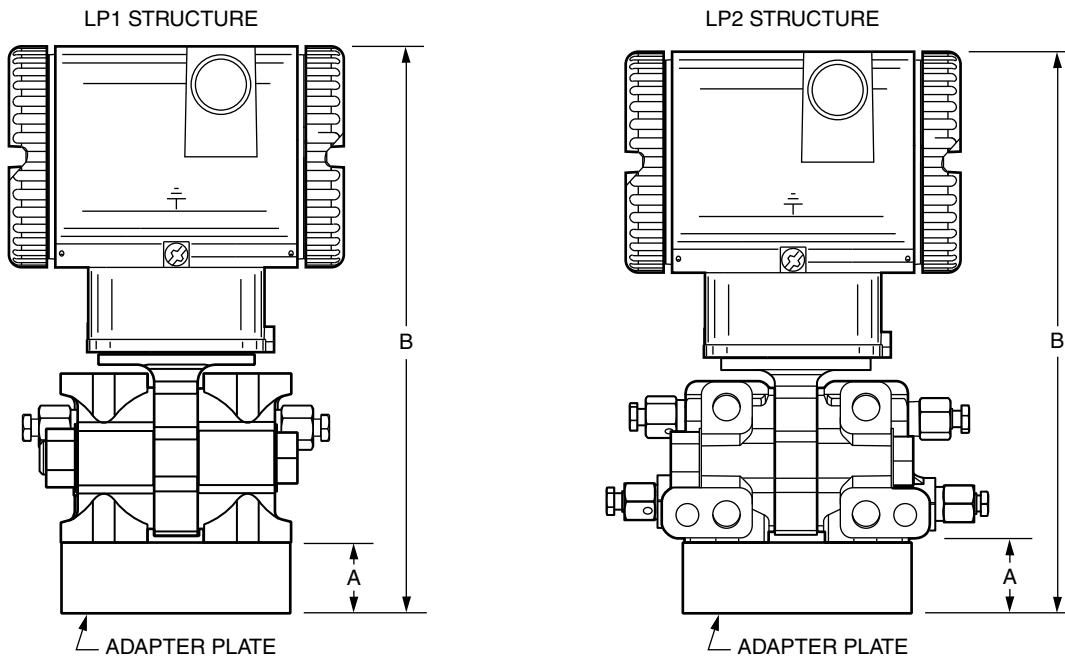
TYPICAL PIPE MOUNTING  
WITH TRADITIONAL STRUCTURE



**NOTE:**

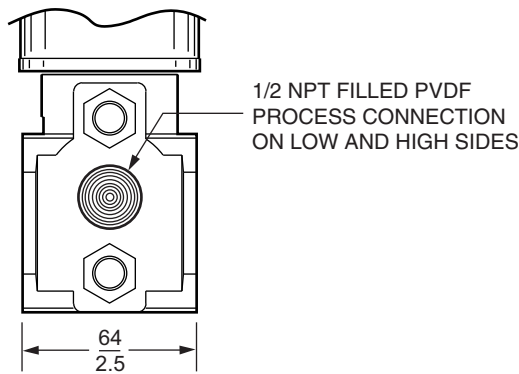
FOR SURFACE MOUNTING CONFIGURATIONS, USE THE U-BOLT MOUNTING HOLES FOR ATTACHING THE BRACKET TO A SURFACE RATHER THAN TO THE U-BOLT ASSEMBLY. SURFACE MOUNTING BOLTS FOR ATTACHING THE BRACKET TO A SURFACE ARE USER SUPPLIED.

**Figure 36 - DP Transmitters with LP1 or LP2 Structure Mounted on a Coplanar™ Manifold**

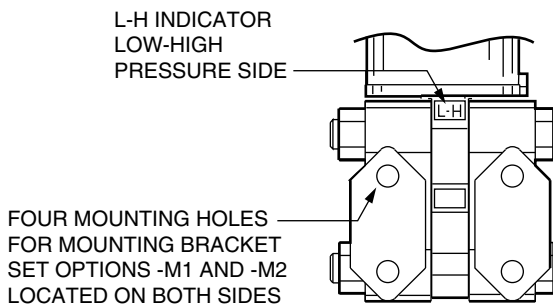


Manifold	Dimension A	Dimension B
MC	11 mm (0.5 in)	199 mm (7.9 in)
MT3	22 mm (0.9 in)	210 mm (8.3 in)

**Figure 37 - DP Transmitters with Traditional Structure and Structure Codes -78 and -79 (Filled PVDF Connection)**



**Figure 38 - DP Transmitters with Traditional Structure and Options -D1 to -D9**



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please ask for confirmation of the information given in this publication.

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