

Model IDP10
I/A Series[®] Electronic Differential Pressure Transmitters
with FoxCom[™] Communication Protocol



The Foxboro[®] brand Model IDP10 is an Intelligent, two-wire d/p Cell[®] Transmitter that provides precise, reliable, measurement of differential pressure, and transmits a 4 to 20 mA or a digital output signal using FoxCom Communication Protocol, software selectable, for remote configuration and monitoring. Contact Global Customer Support for other Intelligent IDP10 Transmitters with remote communications, or microprocessor-based IDP10 Transmitters with an analog output and local configuration.

FEATURES

- ▶ Silicon strain gauge sensors successfully field-proven in many thousands of installations.
- ▶ Simple, elegant sensor packaging, with very few parts, achieves exceptionally high reliability.
- ▶ Transmitter available with traditional or low profile structures (see photos above).
- ▶ Remote configuration with FoxCom Protocol; or locally via the optional LCD indicator.
- ▶ Can be provided as a sealed measurement system with numerous configurations of direct connect or capillary connected seals available.
- ▶ Aluminum housing has durable, corrosion-resistant epoxy finish; 316 ss housing also available; both meet NEMA 4X and IEC IP66.
- ▶ Industry standard 316L ss, Co-Ni-Cr, Nickel alloy⁽¹⁾, Monel, or Tantalum sensor, depending on transmitter structure selected.
- ▶ Dual Seal certified to meet ANSI/ISA 12.27.01-2003 requirements.
- ▶ Complies with NAMUR 21 Interference Immunity Requirement.

1. Equivalent to Hastelloy[®] C. Hastelloy is a registered trademark of Haynes International, Inc.

- ▶ Analog output complies with NAMUR 43 overrange and underrange annunciations.
- ▶ CE marked; complies with applicable EMC, ATEX, and PED European Directives.
- ▶ Complies with Electromagnetic Compatibility Requirements of European EMC Directive 2004/108/EC by conforming to the following EN and IEC Standards: EN 61326-1, and IEC 61000-4-2 through 61000-4-6.
- ▶ Designed for hazardous area installations. Versions available to meet Agency flameproof and zone requirements.
- ▶ Optional mounting bracket sets allow pipe, surface, or manifold mounting of transmitter.
- ▶ Standard 5-year warranty.

I/A SERIES PRESSURE TRANSMITTER FAMILY

The I/A Series Electronic Pressure Transmitters are a complete family of d/p Cell[®], gauge, absolute, multirange, multivariable, and premium performance transmitters, as well as transmitters with remote or direct connect seals, all using field-proven silicon strain gauge sensors and common topworks.

Select the electronic module you need to provide just the right level of intelligence for your application and budget. If your needs change, the modular design allows easy migration to other protocols – including HART, FOUNDATION fieldbus, and analog 4 to 20 mA or 1 to 5 V dc versions.

SELECT THE LEVEL OF TRANSMITTER INTELLIGENCE YOU NEED

These transmitters are configurable, thus allowing you to select the degree of transmitter intelligence you need for your application - FoxCom Digital or 4 to 20 mA outputs.

FoxCom Digital Output

Provides Measurement Integration with I/A Series systems, transmission of multiple measurements, and workstation configuration and diagnostics. Also provides digital communications with a PC-based Configurator or optional LCD Indicator with on-board pushbuttons for local configuration and calibration.

FoxCom 4 to 20 mA Output

Allows direct analog connection to common receivers while still providing full Intelligent Transmitter Digital Communications with a PC-based Configurator, applicable I/A Series system FBMs, or optional LCD Indicator with on-board pushbuttons for configuration and calibration.

Intelligent Module Configured for Digital Output

All communications between I/A Series system and transmitter are digital, providing true Measurement Integration and eliminating need to use PC-based configurators and personal computers. You can do all of your configuration and transmitter communications directly from the workstation in the control room.

Measurement from sensor lower range value to upper range value is automatically accomplished independent of the calibrated range, eliminating the need to rerange the transmitter when process conditions change. Since the measurements are digital, they are more accurate because the inaccuracies of the analog input circuit, and the analog-to-digital converter, are eliminated.

Multiple measurements are transmitted digitally, including not only the primary measurement available in both pressure units and plant engineering units, but also the sensor temperature which can be used to monitor, control, or alarm external heat tracing equipment. Complete transmitter diagnostics are also available at the workstation.

Upload and download capability is provided to send transmitter configuration changes from system to transmitter, and from transmitter to system. Also, transmitter databases can be easily uploaded to the system for viewing, verification, comparison, modification, and saving.

INTELLIGENT MODULE CONFIGURED FOR 4 to 20 mA OUTPUT

When 4 to 20 mA output is selected, the following items are accessible from a personal computer running configuration software (PC-based Configurator), applicable I/A Series system FBMs, or the on-board pushbuttons which are part of the LCD Indicator option:

- ▶ Measurements
- ▶ Diagnostics
- ▶ Configuration
- ▶ Calibration, including Reranging without Pressure

The PC-based Configurator may be connected to the two-wire loop, uses a bidirectional digital signal superimposed on the 4 to 20 mA analog signal, and does not interrupt the 4 to 20 mA output.

WIDE MEASUREMENT RANGE WITH A MINIMUM OF SENSORS

Five d/p Cell range sensors are provided to cover measurement spans from 0.12 to 21 000 kPa (0.018 to 3000 psi). The high turndown capability of the transmitter means that nearly all d/p applications can be satisfied with only these five ranges, greatly simplifying your spare transmitter and spare parts requirements.

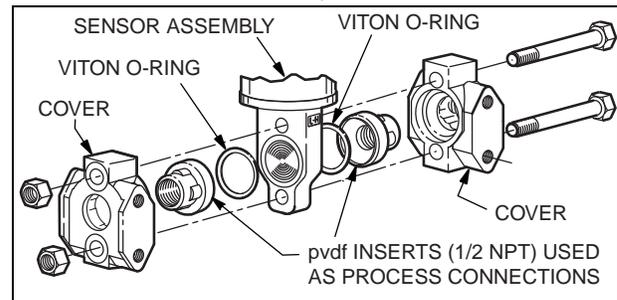
HIGH PERFORMANCE

Transmitters are accurate to $\pm 0.05\%$ of calibrated span in the digital linear mode, and $\pm 0.075\%$ of calibrated span in the 4 to 20 mA linear mode, as well as microprocessor-based correction to achieve excellent ambient temperature compensation.

PROCESS CONNECTORS

Removable, gasketed process connectors allow a wide range of selections, including 1/4 NPT, 1/2 NPT, Rc 1/4, Rc 1/2, and weld neck connections. For highly corrosive chemical processes when a traditional structure is used (see transmitter structures further in document), two 1/2 NPT pvdf inserts (Figure 1) are installed in both 316 ss covers and are used as the process connectors. In these applications, tantalum is used as the sensor diaphragm material.

Figure 1. Bottomworks Shown with pvdf Inserts in HI-/LO-Side Covers; Traditional Structure



SENSOR CORROSION PROTECTION

For traditional structure, choice of 316L ss, Co-Ni-Cr, Nickel alloy⁽²⁾, Monel, Gold-Plated 316L ss, and Tantalum materials. High corrosion resistance of Co-Ni-Cr (TI 037-078) means long service life in many difficult applications without the extra cost for exotic materials. See TI 037-75b for process applicability with Co-Ni-Cr and other process wetted materials.

For low profile structures LP1 and LP2, 316L ss and Nickel alloy⁽²⁾ are offered as sensor materials.

Refer to Transmitter Structures section that follows for description and application of traditional and low profile (LP1 and LP2) structures.

OPTIONAL LCD DIGITAL INDICATOR

A two-line digital indicator (Figure 20) with on-board pushbuttons is available to display the measurement with a choice of units. The pushbuttons allow zero and span adjustments, as well as local configuration without the need for a PC-based configurator.

2. Equivalent to Hastelloy® C.

EASE OF INSTALLATION

Rotatable Topworks allows transmitter installation in tight places, allows indicator to be positioned in 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.

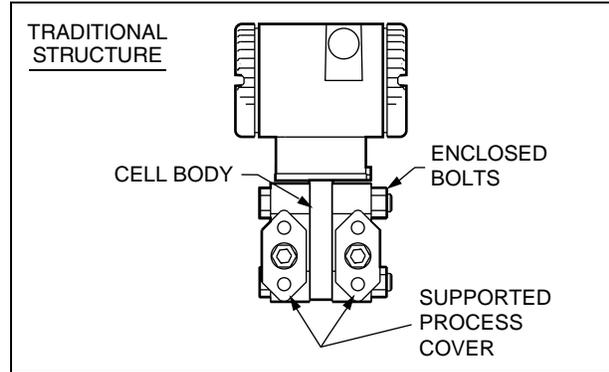
OPTIONAL MOUNTING BRACKET SETS

In addition to the standard style mounting bracket sets optionally offered with these transmitters, a unique universal style mounting bracket has been developed to allow wide flexibility in transmitter mounting configurations consistent with installation requirements. All mounting bracket sets allow mounting to a surface, pipe, or manifold. Refer to “Dimensions - Nominal” on page 28.

UNIQUE PROCESS COVER/CELL BODY DESIGN

Biplanar Construction (Figure 2) 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 provides easy retrofit of any conventional DP transmitter, and also is easily mounted in the horizontal position with vertical process connections, when required.

Figure 2. Biplanar Construction Shown with Traditional Horizontal Process Connections



Process Covers (Figure 2) are fully supported by the cell body over their entire height. This prevents bending and results in a highly reliable seal. Also, this provides dimensional stability to the process covers, ensuring that they will always mate properly with 3-valve bypass manifolds.

Process Cover Bolts (Figure 2) 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 ptfе as standard; ptfе provides nearly universal corrosion resistance, and eliminates the need to select and stock various elastomers to assure process compatibility.

Light Weight provides ease of handling, installation, and direct mounting without costly pipe stands.

TRANSMITTER STRUCTURES

Traditional and low profile structures (LP1 and LP2) are offered to accommodate and to provide flexibility in transmitter installations. See paragraphs below.

Traditional Structure

The traditional structure (Figure 3) utilizes the right angle design common to most DP 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.

Sensor cavity venting and draining is provided for both vertical and horizontal transmitter installation, using innovative tangential connections to the sensor cavity (Figures 4 and 5). Optional side vents are offered for sensor cavity venting in the upright position (Figure 6).

An extensive variety of process-wetted materials are available for the process covers on this highly versatile and widely used transmitter.

Figure 3. Vertical Mounting Showing Process Connections at 90 degrees

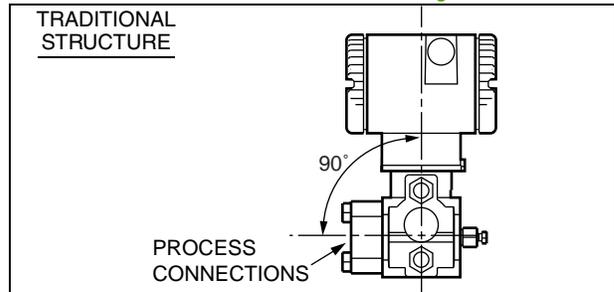


Figure 4. Vertical Mounting - Cavity Draining

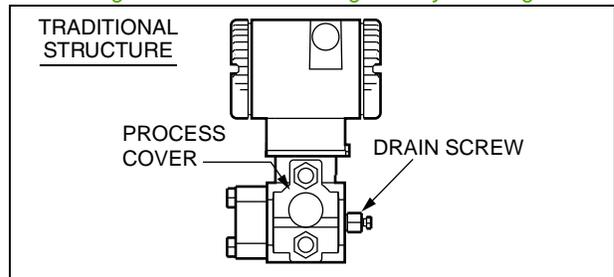


Figure 5. Horizontal Mounting - Cavity Venting, and Self-Draining into Process Line

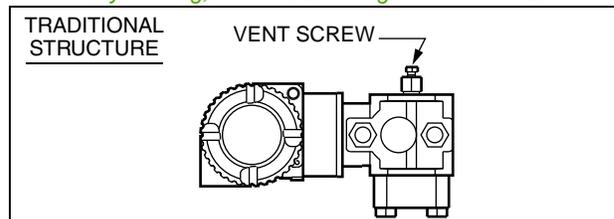
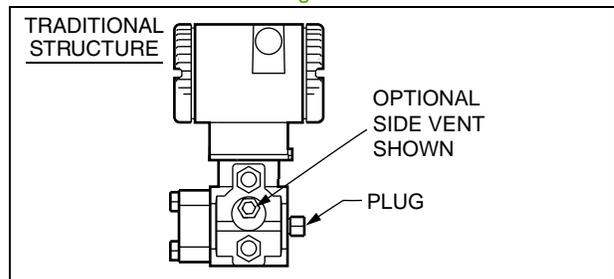


Figure 6. Vertical Mounting - Cavity Venting, and Self-Draining into Process Line



Low Profile Structures

The low profile structures utilize an in-line design, placing the process connections in line with the transmitter centerline (Figures 7 and 8). This allows mounting of 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.

The low profile structures provide a mounting style similar to that used by competitive Coplanar™ transmitters. This makes it easy to select Foxboro 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 Rosemount Model 305RC or Anderson Greenwood Models MC3, MC5G, MC5P, and MT3 by use of an optional adapter plate (Figure 9).

Also, when assembled to the same process piping or manifold as a Coplanar transmitter, one of the electrical conduit connections is located within ± one inch of the similar conduit connection on the competitive transmitter, assuring ease of retrofit or conformance with installation design drawings.

All parts making up the low profile versions are identical to the parts in the traditional version except for the process covers and the external shape of the sensor cell body.

For user convenience, two types of low profile structures are offered, type LP1 and LP2. The process covers are the only transmitter parts that differ between structure types LP1 and LP2.

Refer to the sections that follow for further descriptions of low profile structures LP1 and LP2.

Figure 7. Low Profile Structure - LP1 Shown

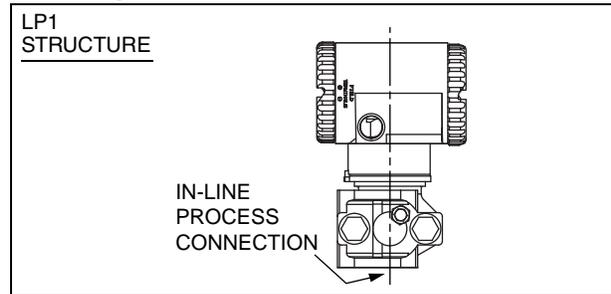


Figure 8. LP1 Shown Directly Mounted to Manifold

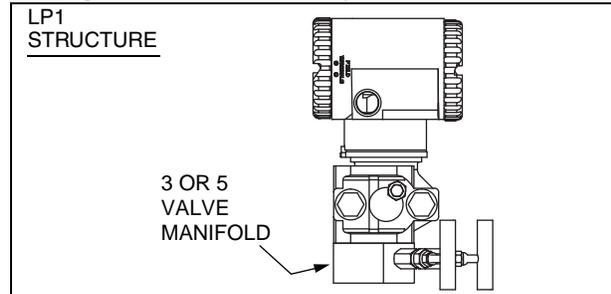
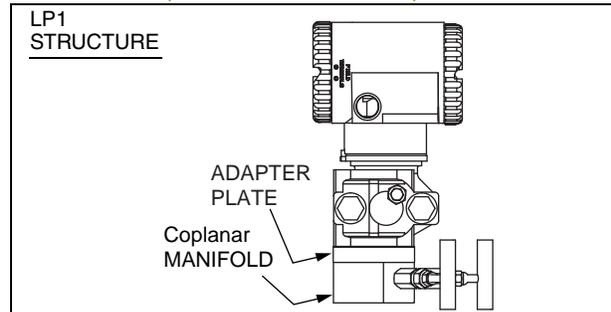


Figure 9. LP1 Shown Mounted to a Coplanar Manifold using an Optional Intermediate Adapter Plate



Low Profile Structure LP1 – Direct Mount

Low Profile Structure LP1 is a compact, inexpensive, lightweight design for direct mounting to a separately mounted manifold or process piping. These transmitters are not typically bracket-mounted.

They are supplied as standard 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 (Figure 10) or horizontally, and are suitable for nearly all applications, including liquids, gases, and steam. For horizontal installation, they can simply be “turned over” (rotated 180 degrees - Figures 11 and 12) to orient the high and low pressure sides in the preferred locations. There is no need to unbolt process covers. The topworks housing can also be rotated, as shown, to orient the conduit connections in the desired position.

In the vertical, upright position, they are also self-draining and are ideal for gas flow rate service, when directly mounted to a manifold located above the horizontal pipeline. The vent screw can be omitted for this or other applications, if desired.

Figure 10. Upright Mounting

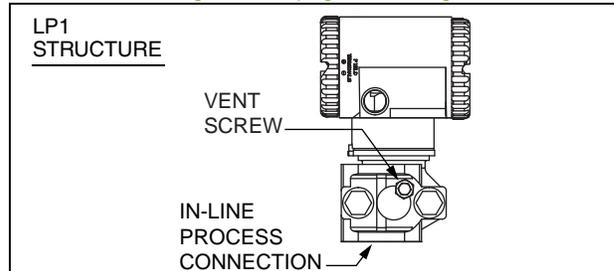


Figure 11. Horizontal Mounting with Vent Screw

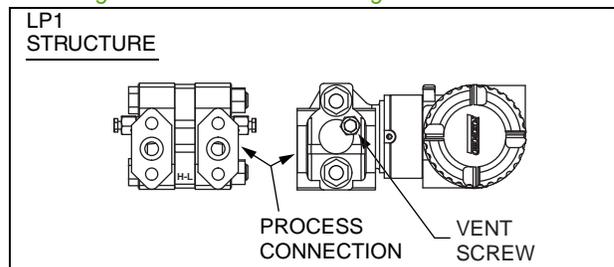
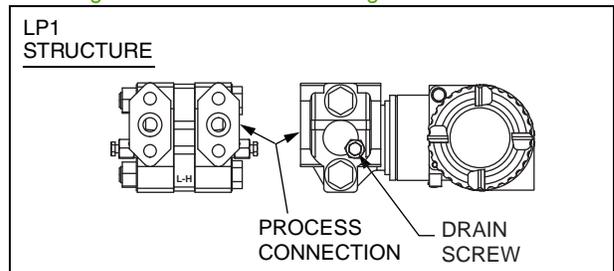


Figure 12. Horizontal Mounting with Drain Screw



Low Profile Structure LP2 - Bracket or Direct Mount

The LP2 Structure can be either bracket or direct mounted. Drilled and tapped mounting holes facilitate mounting to either new or existing Foxboro brackets (Options -M1, -M2, and -M3), as well as standard brackets supplied with existing Coplanar transmitters. See Figures 13 and 14.

These transmitters can also be directly mounted to manifolds or process piping and are available with the same optional adapter used with structure LP1 to fit existing Coplanar manifolds (Figure 15).

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

Figure 13. Shown on Foxboro Universal Bracket

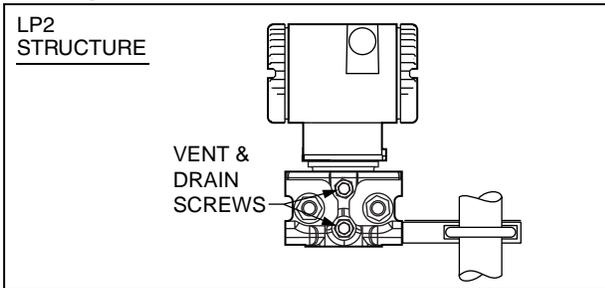


Figure 14. Shown on Coplanar Bracket

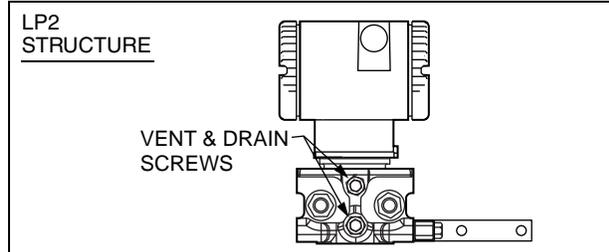
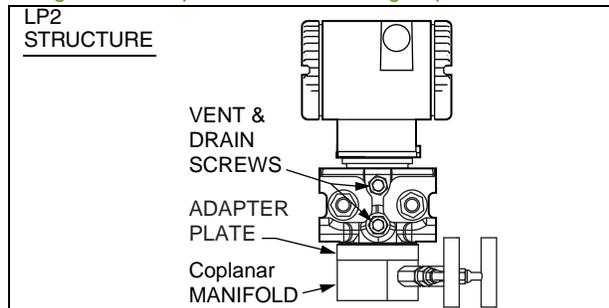


Figure 15. Adapter Mount to Existing Coplanar Manifold



PRESSURE SEALS

Pressure seals are used with transmitters having a traditional structure 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 tend to collect and solidify.

Table 1 lists the various pressure seals that can be used with an IDP10 Transmitter. To order a transmitter with seals, both a Transmitter Model Number and Seal Model Number are required. For a complete listing of pressure seal models and specifications, see PSS 2A-1Z11 A. Also see Figure for typical pressure seal configurations.

Table 1. Pressure Seals Used with IDP10 Transmitters

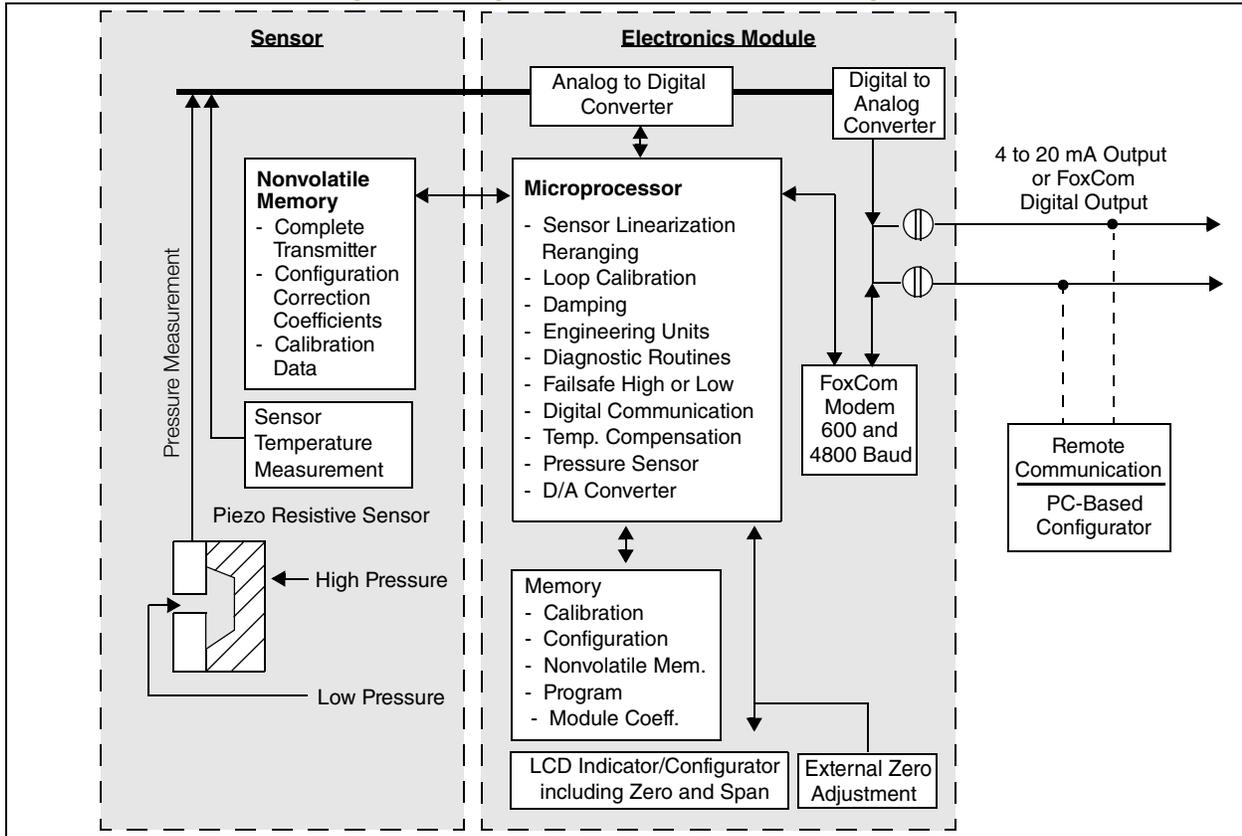
Direct Connect Pressure Seal Assemblies		
Seal Model	Seal Description	Process Connections
PSFLT	Flanged, Direct Connect (Flanged Level), Flush or Extended Diaphragm	ANSI Class 150/300/600 flanges and BS/DIN PN 10/40, 10/16, 25/40 flanges
PSSCT	Sanitary, Direct Connect (Level Seal), Flush Diaphragm	Process Connection to Sanitary Piping with 2- or 3-inch Tri-Clamp
PSSST	Sanitary, Direct Connect (Level Seal), Extended Diaphragm	Process Connection to 2-in Mini Spud or 4-in Standard Spud; Tri-Clamp
Remote Mount, Capillary-Connected Pressure Seal Assemblies		
Seal Model	Seal Description	Process Connections
PSFPS	Flanged, Remote Mount, Flush Diaphragm	ANSI Class 150/300/600 flanges and BS/DIN PN 10/40 flanges
PSFES	Flanged, Remote Mount, Extended Diaphragm	ANSI Class 150/300/600 flanges and BS/DIN PN 10/40, 10/16, 25/40 flanges
PSFAR	Flanged, Remote Mount, Recessed Diaphragm	ANSI Class 150/300/600/1500 flanges
PSTAR	Threaded, Remote Mount, Recessed Diaphragm	1/4, 1/2, 3/4, 1, or 1 1/2 NPT internal thread
PSISR	In-Line Saddle Weld, Remote Mount, Recessed Diaphragm	Lower housing of seal is in-line saddle welded to nominal 3- or 4-inch (and larger) Pipe
PSSCR	Sanitary, Remote Mount, Flush Diaphragm	Process Connection secured with a Tri-Clamp to a 2- or 3-inch pipe
PSSSR	Sanitary, Remote Mount, Extended Diaphragm	Process Connection to 2-in Mini Spud or 4-in Standard Spud; Tri-Clamp

Figure 16. Typical Pressure Seals used with IDP10 Transmitters



TRANSMITTER FUNCTIONAL BLOCK DIAGRAM - FIGURE 17

Figure 17. Intelligent Transmitter Functional Block Diagram



FUNCTIONAL SPECIFICATIONS

Span Limits for IDP10 d/p Cell Transmitters

Span Code	kPa	psi	mbar	mmHg	mmH ₂ O	inH ₂ O
A (a)	0.12 and 7.5	0.018 and 1.1	1.2 and 75	0.93 and 56	12 and 750	0.5 and 30
B	0.87 and 50	0.125 and 7.2	8.7 and 500	6.5 and 375	87 and 5000	3.5 and 200
C	7 and 210	1 and 30	70 and 2100	50 and 1500	700 and 21 000	28 and 840
Span Code	MPa	psi	bar	mHg	mH ₂ O	ftH ₂ O
D	0.07 and 2.1	10 and 300	0.7 and 21	0.5 and 15	7 and 210	23 and 690
E (b)	0.7 and 21 (b)	100 and 3000 (b)	7 and 210 (b)	5 and 150 (b)	70 and 2100 (b)	230 and 6900 (b)

- a. Span Limit Code "A" not available when pressure seals are selected.
- b. When certain options are specified, the upper span and range limits are reduced as shown in the "Options Impact" table below.

Range Limits for IDP10 d/p Cell Transmitters (a)

Span Code	kPa	psi	mbar	mmHg	mmH ₂ O	inH ₂ O
A (b)	-7.5 and +7.5	-1.1 and +1.1	-75 and +75	-56 and +56	-750 and +750	-30 and +30
B	-50 and +50	-7.2 and +7.2	-500 and +500	-375 and +375	-5000 and +5000	-200 and +200
C	-210 and +210	-30 and +30	-2100 and +2100	-150 and +150	-21 000 and +21 000	-840 and +840
Span Code	MPa	psi	bar	mHg	mH ₂ O	ftH ₂ O
D	-0.21 and +2.1	-30 and +300	-2.1 and +21	-1.5 and +15	-21 and +210	-69 and +690
E (c)	-0.21 and 21 (c)	-30 and +3000 (c)	-2.1 and +210 (c)	-1.5 and +150 (c)	-21 and +2100 (c)	-69 and +6900 (c)

- a. Positive values indicate HI side of sensor at the high pressure, and negative values indicate LO side of sensor at the high pressure.
- b. Span Limit Code "A" not available when pressure seals are selected.
- c. When certain options are specified, the upper span and range limits are reduced as shown in the "Options Impact" table below.

Impact of Certain Options on Span and Range Limits (a)

Option	Description (Also see Model Code)	Span and Range Limits Derated to:
-B3	B7M Bolts and Nuts (NACE)	20 MPa (2900 psi, 200 bar, or kg/cm ²)
-D1	DIN Construction	16 MPa (2320 psi, 160 bar or kg/cm ²)
-D5 or -B1	DIN Construction or 316 ss Bolting	15 MPa (2175 psi, 150 bar or kg/cm ²)
-D2, -D4, -D6, or -D8 (a)	DIN Construction (a)	10 MPa (1500 psi, 100 bar or kg/cm ²) (a)

- a. Refer to Model Code section for application and restrictions related to the items listed in the table.

Maximum Static and Proof Pressure Ratings for IDP10 d/p Cell Transmitters (a)

Transmitter Configuration (See Model Code for Description of Options)	Static Pressure Rating			Proof Pressure Rating (b)		
	MPa	psi	bar	MPa	psi	bar
With Option -D9 or -Y	40	5800	400	100	14500	1000
Standard or with Option -B2, -D3, or -D7	25	3626	250	100	14500	1000
With Option -B3	20	2900	200	70	11150	700
With Option -D1	16	2320	160	64	9280	640
With Option -B1 or -D5	15	2175	150	60	8700	600
With Option -D2, -D4, -D6, or -D8	10	1500	100	40	6000	400
With Structure Codes 78 and 79 (pvdf insert)	2.1	300	21	8.4	1200	84

- a. Refer to Model Code section for application and restrictions related to the items listed in the table.
- b. Proof pressure ratings meet ANSI/ISA Standard S82.03-1988. Unit may become nonfunctional after application of proof pressure.

Output Signal and Configuration

Digital FoxCom and/or 4 to 20 mA. Configurable using I/A Series system (with applicable FBMs), PC-based Configurator, or optional LCD Indicator with on-board pushbuttons.

Field Wiring Reversal

No transmitter damage.

Suppressed Zero and Elevated Zero

Suppressed or elevated zero ranges acceptable as long as Span and Range Limits are not exceeded.

Electronics and Sensor Temperatures

Readable from I/A Series system or PC-based Configurator. Measurement is transmitter temperature, at the sensor and electronics module, not necessarily process temperature.

Adjustable Damping

Response time is normally 0.75 s, or electronically adjustable setting of 0.00 (none), 0.25, 0.50, 1, 2, 4, 8, 16, or 32 seconds, whichever is greater, for 90% recovery from an 80% input step as defined in ANSI/ISA S51.1 (for 63.2% recovery, 0.50 s with sensors B to E, and 0.60 s with sensor A.)

Zero and Span Adjustments

Zero and span adjustments can be initiated from the I/A Series Workstation (with applicable FBMs), the PC-based Configurator, or the optional LCD Indicator with on-board pushbuttons.

Minimum Allowable Absolute Pressure vs. Transmitter Temperature

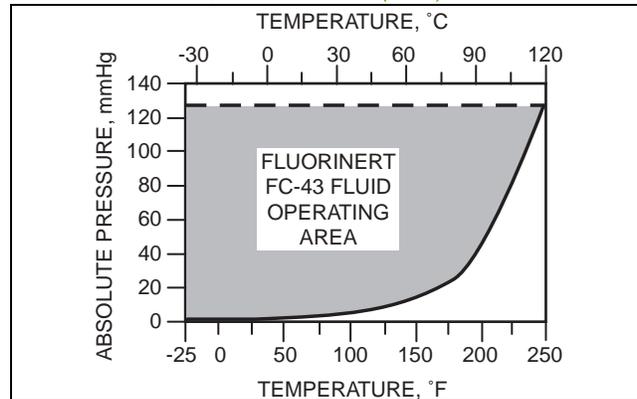
WITH SILICONE FILL FLUID

Full vacuum: up to 121 °C (250 °F)

WITH INERT FILL FLUID

Refer to Figure 18.

Figure 18. Minimum Allowable Absolute Pressure vs. Transmitter Temperature, INERT FC-43, 2.6 cSt at 25°C (77°F)



Supply Voltage Requirements and External Loop Load Limitations

DIGITAL OUTPUT

Power supplied through I/A Series system

4 to 20 mA OUTPUT (See Figure 19)

Nominal minimum supply voltage shown in Figure 19 is 11.5 V dc. This value can be reduced to 11 V dc by using a plug-in jumper across the test receptacles in the field wiring compartment terminal block. An optional plug-in shorting bar (Figure) is offered for this purpose.

Zeroing for Nonzero-Based Ranges

Dual Function Zeroing allows zeroing with the transmitter open to atmosphere, even when there is a nonzero-based range. This greatly simplifies position effect zeroing on many pressure and level applications. It applies to Optional LCD Indicator and Optional External Zero Adjustment.

Current Outputs for Overrange, Fail, and Offline Conditions

OFFLINE:	User Configurable (between 4 and 20 mA)
SENSOR FAILURE:	User Configurable to Fail LO or Fail HI
FAIL LO:	3.60 mA
UNDERRANGE:	3.75 mA
OVERRANGE:	21.00 mA
FAIL HI:	22.00 mA

Write Protect Jumper

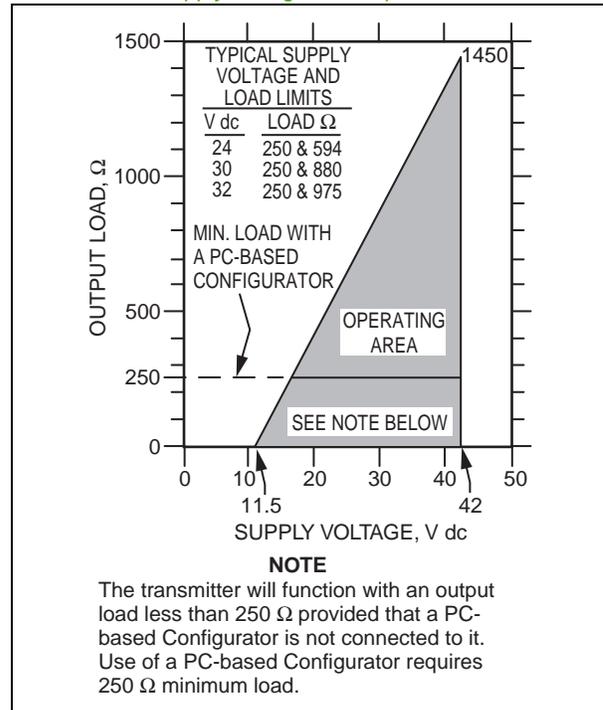
Can be positioned to lock out all configurators from making transmitter database changes. This makes transmitter suitable for Safety Shutdown System Applications that require this feature.

Square Root Low Flow Cutoff

User configurable from I/A Series system, PC-based Configurator, or optional LCD Indicator with on-board pushbuttons to provide either:

- ▶ Cutoff to Zero at flows < 10% of maximum flow (1% of maximum differential pressure).
- ▶ Or Active Point-to-Point line between zero and 20% of maximum flow (4% of maximum differential pressure).

Figure 19. 4 to 20 mA Output, Supply Voltage vs. Output Load



Configuration and Calibration Data

All factory characterization data and user configuration and calibration data are stored in the sensor, as shown in the transmitter block diagram, Figure . This means that the electronics module can be replaced with one of like type, without the need for reconfiguration or recalibration. Although module replacement can affect accuracy up to 0.20% of span, this error can be removed by an mA trim without application of pressure.

Electronics Upgradeability

As stated above, all factory characterization data is stored in the sensor and is accessed by each electronics module type. This means that electronics modules can be changed from one type to another, allowing for easy upgrade from an analog output type to a fully intelligent type module. Changing module types may require reconfiguration and recalibration, but all factory characterization data is retained.

Communications

Configurable for either the Analog Mode or Digital Mode. Digital communications 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.

ANALOG MODE (4 to 20 mA)

The analog 4 to 20 mA output signal is updated 30 times per second, minimum. Digital communications between the transmitter and a PC-based Configurator, or applicable I/A Series system FBM is rated for distances up to 1800 m (6000 ft). The digital communications rate is 600 baud and requires a minimum loop load of 250 ohms. See Figure 21.

DIGITAL MODE (FIXED CURRENT)

Digital Mode requires connection to an applicable I/A Series system FBM. The digital output signal is updated 10 times per second (matching the FBM) and carries not only the pressure measurement, but also the sensor and electronics temperatures (internal recalculation rate for temperature is one time per second). Digital communications between the transmitter and the FBM, or between the transmitter and PC-based Configurator is rated for distances up to 600 m (2000 ft). The digital communications rate is 4800 baud and requires a minimum loop load of 250 ohms. See Figure 22.

Remote Communications

If the transmitter is configured for digital output and is digitally integrated into an I/A Series system, the system has full access to all of the “Display” and “Display and Reconfigure” items listed below.

Also, regardless of whether the transmitter is configured for digital output or analog 4 to 20 mA output, the PC-based Configurator and applicable I/A Series system FBMs have full access to all of the “Display” and “Display and Reconfigure” items listed below.

The PC-based Configurator may be connected anywhere along the communications wiring loop, and does not disturb the communications signals. Plug-in connection points are provided on the transmitter terminal block.

“Display” ITEMS

- ▶ Process Measurement
- ▶ Transmitter Temperature (Electronics and Sensor)
- ▶ mA Output (if so configured)
- ▶ Transmitter Model and Serial Number

“Display and Reconfigure” ITEMS

- ▶ Output in mA, %, or Engineering Units (EGU)
- ▶ Zero and Span, Including Reranging
- ▶ Zero Elevation and Suppression
- ▶ Linear or Square Root Output
- ▶ 4 to 20 mA or Digital Output
- ▶ Pressure and Plant EGU
- ▶ Temperature Sensor Failure Strategy
- ▶ Electronic Damping
- ▶ Failsafe Direction (High or Low)
- ▶ Tag Number, Tag Name, and Device Name
- ▶ Transmitter Location
- ▶ Calibrator's Initials
- ▶ Date of Last Calibration

Configuration Capability

CALIBRATED RANGE

- Input range within Span and Range Limits.
- One of pressure units shown in Table 2.

**OUTPUT MEASUREMENT #1 —
DIGITAL PRIMARY VARIABLE AND 4-20 mA**

Mode

Linear or Square Root

Units for Linear Mode

As specified for calibrated range, or a custom unit.

Units for Square Root Mode

% of flow, or a custom unit.

**OUTPUT MEASUREMENT #2 —
DIGITAL SECONDARY VARIABLE**

Mode

Linear or Square Root (Independent of Measurement #1)

Units for Linear Mode

One of pressure units shown in Table 2, or a custom unit.

Units for Square Root Mode

% of flow, or a custom unit.

Measurements #1 and #2

These measurements may be swapped.

Table 2. Allowable Pressure Units for Calibrated Range

inH ₂ O	inHg	Pa	mbar	psi
ftH ₂ O	mmHg	kPa	bar	atm
mmH ₂ O	cmHg	MPa	g/cm ²	kg/cm ²
cmH ₂ O	dy/cm ²	torr		

Optional Custom Configuration (Option -C2)

For the transmitter to be custom configured by the factory, the user must fill out a data form. If this option is not selected, a standard default configuration will be provided; for example:

Parameter	Default Config.	Example of Option -C2
Tagging Info. (Max.)		
Tag Number (12 char.)	per S.O.	FT103A
Tag Name (14 char.)	Tag Name	Feedwater
Location (14 char.)	Location	Building 4
Device Name (6 char.)	DevNam	FT103A
Calibrated Range		
Pressure EGU	per S.O. (a)	inH ₂ O
LRV	per S.O. (b)	0
URV	per S.O.(b)	100
Measurement #1		
Linear/Sq. Root (Flow)	Linear	Sq. Rt
EGU	per S.O. (c)	gal/min
Range	per S.O.(c)	0 to 500
Output	4 to 20 mA	4 to 20 mA
Measurement #2		
Linear/Sq. Root (Flow)	Linear	Linear
EGU	%	inH ₂ O
Range	0 to 100	0 to 100
Other		
Electronic Damping	None	0.5 s
Failure Strategy	Continue	Failsafe
Failsafe Direction	Upscale	Downscale
Ext. Zero Option	Enabled	Disabled

- a. Select from Table 2. If not specified, the default calibration is zero to maximum span; default units vary by sensor code.
- b. Within Span and Range Limits for a selected sensor code.
- c. Same as calibrated range.

Any of the above configurable parameters can easily be changed using a remote configurator.

Optional LCD Digital Indicator (Figure 20)

Indicator provides:

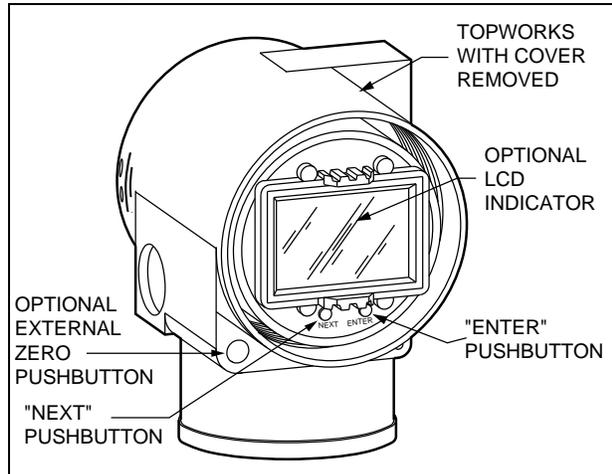
- ▶ Two Lines; five numeric characters on top line (four when a minus sign is needed) and seven alphanumeric characters on bottom line.
- ▶ Measurement Readout; Value displayed on top line, and units label displayed on bottom line.
- ▶ Configuration and Calibration Prompts.

Pushbuttons (two) provide the following Configuration and Calibration functions:

- ▶ Zero and Span settings, non-interactive to automatically set output to either 4 mA or 20 mA using the "NEXT" and "ENTER" pushbuttons.
- ▶ 4 and 20 mA Jog Settings, allows user to easily increment the mA output signal up or down in fine steps to match a value shown on an external meter.
- ▶ Linear or Square Root Output
- ▶ Forward or Reverse Output
- ▶ Damping Adjustment
- ▶ Enable/Disable Optional External Zero
- ▶ Failsafe Direction (High or Low)
- ▶ Units Label (Bottom Line of Display)
- ▶ Settable Lower and Upper Range Values for Transmission and Display (Top Line)
- ▶ Reranging
- ▶ Secondary Digital Measurement
- ▶ mA Output Value during Offline Conditions

- ▶ Pushbutton Password Protection; to lock out Configuration or Calibration/Configuration
- ▶ Tag

Figure 20. LCD Indicator with Pushbuttons



Optional External Zero Adjustment

An external pushbutton (Figure) mechanism is isolated from the electronics compartment and magnetically activates an internal reed switch through the housing. This eliminates a potential leak path for moisture or contaminants to get into the electronics compartment. This zero adjustment can be disabled by a configuration selection.

FUNCTIONAL BLOCK DIAGRAMS (FIGURE 21 and FIGURE 22)

Figure 21. 4 to 20 mA Output Functional Block Diagram

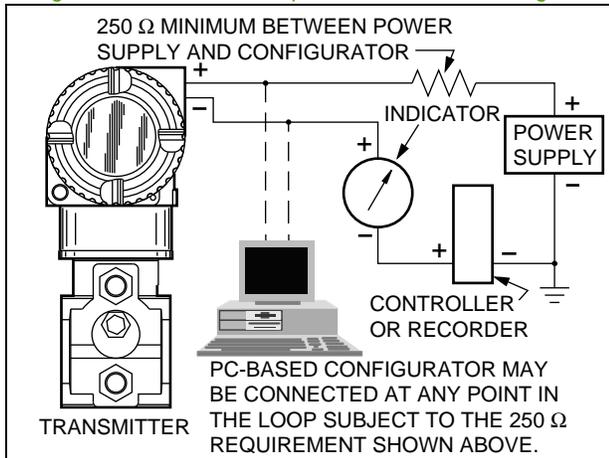
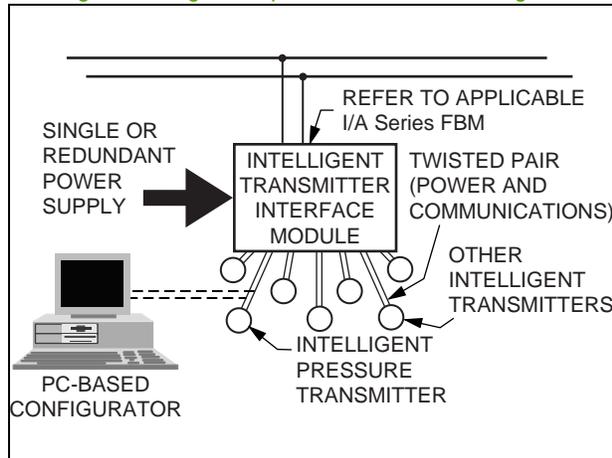


Figure 22. Digital Output Functional Block Diagram



OPERATING, STORAGE, AND TRANSPORTATION CONDITIONS

Influence	Reference Operating Conditions	Normal Operating Conditions (a)	Operative Limits (a)	Storage and Transportation Limits
Process Connection Temp. ▶ with Silicone Fill Fluid ▶ with Inert Fill Fluid	▶ 24 ± 2°C (75 ± 3°F) ▶ 24 ± 2°C (75 ± 3°F)	▶ -29 to + 82°C (-20 to +180°F) ▶ -29 to + 82°C (-20 to +180°F)	▶ -46 and +121°C (b) (-50 and +250°F) (b) ▶ -29 and +121°C (-20 and +250°F)	▶ Not Applicable ▶ Not Applicable
Electronics Temperature ▶ with LCD Indicator (c)	▶ 24 ± 2°C (75 ± 3°F) ▶ 24 ± 2°C (75 ± 3°F)	▶ -29 to + 82 °C (d) (-20 to +180 °F) (d) ▶ -20 to + 82 °C (d) (-4 to +180 °F) (d)	▶ -40 and +85°C (d) (-40 and +185°F) (d) ▶ -29 and +85°C (d) (-20 and +185°F) (d)	▶ -54 and +85°C (-65 and +185°F) ▶ -54 and +85°C (-65 and +185°F)
Relative Humidity (e)	50 ±10%	0 to 100%	0 and 100%	0 and 100% Noncondensing
Supply Voltage – mA Output	30 ±0.5 V dc	11.5 to 42 V dc (f)	11.5 and 42 V dc (f)	Not Applicable
Output Load – mA Output	650 Ω	0 to 1450 Ω	0 and 1450 Ω	Not Applicable
Vibration	1 m/s ² (0.1 “g”)	6.3 mm (0.25 in) Double Amplitude: from 5 to 15 Hz with Aluminum Housing and from 5 to 9 Hz with 316 ss Housing ----- 0 to 30 m/s ² (0 to 3 “g”) from 15 to 500 Hz with Aluminum Housing; and 0 to 10 m/s ² (0 to 1 “g”) from 9 to 500 Hz with 316 ss Housing		11 m/s ² (1.1 “g”) from 2.5 to 5 Hz (in Shipping Package)
Mounting Position	Upright or Horizontal (g)	Upright or Horizontal (g)	No Limit	Not Applicable

- a. When Structure Codes 78/79 (pvdf inserts in Hi- and Lo-side process covers) are used, maximum overrange is 2.1 MPa (300 psi), and temperature limits are -7 and +82°C (20 and 180°F); when DIN Construction Options D2/D4/D6/D8 are used, temperature limits are 0 and 60°C (32 and 140°F).
- b. Selection of Option “-J” extends the low temperature operative limit of transmitters with silicone filled sensors down to -50°C (-58°F).
- c. Although the LCD will not be damaged at any temperature within the “Storage and Transportation Limits”, updates will be slowed and readability decreased at temperatures outside the “Normal Operating Conditions”.
- d. Refer to the Electrical Safety Specifications section for a restriction in ambient temperature with certain electrical certifications.
- e. With topworks cover on and conduit entrances sealed.
- f. 11.5 V dc can be reduced to 11 V dc by using a plug-in shorting bar; see “Supply Voltage Requirements” section and Figure .
- g. Sensor process wetted diaphragms in a vertical plane.

PERFORMANCE SPECIFICATIONS

Zero-Based Calibrations; Cobalt-Nickel-Chromium or Stainless Steel Sensor w/Silicone Fluid; Under Reference Operating Conditions unless otherwise Specified; URL = Upper Range Limit and Span = Calibrated Span

Accuracy (Linear Output)⁽³⁾

Accuracy, % of Span (a) (b)	
Spans ≥10% URL	Spans <10% URL
±0.075%	±[0.04 + 0.0035 (URL/Span)]%

- a. Add ±0.05% for Span Code A, and ±0.02% for Span Code E.
- b. Subtract ±0.025% for digital output accuracy.

Accuracy (Square Root Output)⁽³⁾

Operating Point % of Flow Rate Span	Accuracy % of Flow Rate Span
50% and Greater	Accuracy % from "Accuracy (Linear Output)"
Less than 50% (to cutoff)	$\frac{\text{(Accuracy \% from Table 1)(50)}}{\text{Operating Point in \% of Flow Rate Span}}$

Stability

Long term drift is less than ±0.05% of URL per year over a 5-year period.⁽⁴⁾

Calibration Frequency

The 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:

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

Power-up Time

Less than 5 seconds for output to reach first valid measurement.

RFI Effect

The output error is less than 0.1% of span for radio frequencies in the range of 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.)

Supply Voltage Effect

The output changes less than 0.005% of span for each 1 V change within the specified supply voltage requirements. See Figure 19.

Vibration Effect

Total effect is ±0.2% of URL per "g" for vibrations in the frequency range of 5 to 500 Hz; with double amplitudes of 6.3 mm (0.25 in) in the range of 5 to 15 Hz, or accelerations of 3 "g" in the range of 15 to 500 Hz, whichever is smaller, for transmitter with aluminum housing; and with double amplitudes of 6.3 mm (0.25 in) in the range of 5 to 9 Hz, or accelerations of 1 "g" in the range of 9 to 500 Hz, whichever is smaller, for transmitter with 316 ss housing.

Position Effect

Transmitter may be mounted in any position. Any zero effect caused by mounting position can be eliminated by rezeroing. There is no span effect.

3. Accuracy includes Linearity, Hysteresis, and Repeatability.

4. Add an additional 0.05% to stability specification for Span Code A.

Static Pressure Effect

The zero and span shift for a 7 MPa, 1000 psi, change in static pressure is:

ZERO SHIFT (a)

Span Code	Zero Shift-Static Pressure Effect
A	± 0.30% URL (b)
B and C	± 0.10% URL
D	± 0.50% URL (b)
E	± 0.50% URL

- a. Can be calibrated out by zeroing at nominal line pressure.
- b. Per 3.5 MPa (500 psi) for Span Codes A and D.

SPAN SHIFT

±0.15% of Reading

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.)

Ambient Temperature Effect

Total effect for a 28°C (50°F) change within Normal Operating Condition limits is:

Span Code	Ambient Temperature Effect
A	± (0.18% URL + 0.025% Span)
B and C	± (0.03% URL + 0.060% Span)
D	± (0.05% URL + 0.045% Span)
E	± (0.08% URL + 0.025% Span)

NOTE

For additional ambient temperature effect when pressure seals are used, see PSS 2A-1Z11 A.

PHYSICAL SPECIFICATIONS

Process Cover and Connector Material (Process Wetted)

Carbon Steel, 316 ss, Monel, Nickel alloy⁽⁵⁾, or pvdf (Kynar) inserts in 316 ss covers for transmitter traditional structure; and 316 ss for transmitter low profile structures. For exceptional value and corrosion resistance, 316 ss is the least expensive material.

Process Cover and Process Connection Gaskets

Glass filled ptfе, or Viton when Structure Codes 78/79 (pvdf inserts) are used.

Process Cover Bolts and Nuts

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.

Sensor Fill Fluids

Silicone Oil or Inert (FC-43)

Sensor Material (Process Wetted)

Co-Ni-Cr, 316 L ss, Gold-Plated 316L ss, Monel, Nickel alloy⁽⁵⁾, or Tantalum for transmitter traditional structure; and 316L ss or Nickel alloy⁽⁵⁾ for transmitter low profile structures. For exceptional value and corrosion resistance, 316L ss is the least expensive material. Refer to TI 037-078 and TI 37-75b for information regarding the corrosion resistance of Co-Ni-Cr and other sensor materials.

Environmental Protection

The enclosure has the dusttight and weatherproof rating of IP66 as defined by IEC 60529, and provides the environmental and corrosion resistant protection rating of NEMA 4X.

5. Equivalent to Hastelloy® C.

Electronics Housing and Housing Covers

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

Electrical Connections

Field and RTD sensor wires enter through 1/2 NPT, PG 13.5, or M20 threaded entrances, as specified, on either side of the electronics housing. Wires terminate under screw terminals and washers on terminal block in the field terminal compartment. Unused entrance is plugged to insure moisture and RFI/EMI protection. See Figure 23.

Electronics Module

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

Mounting Position

The transmitter may be mounted in any orientation.

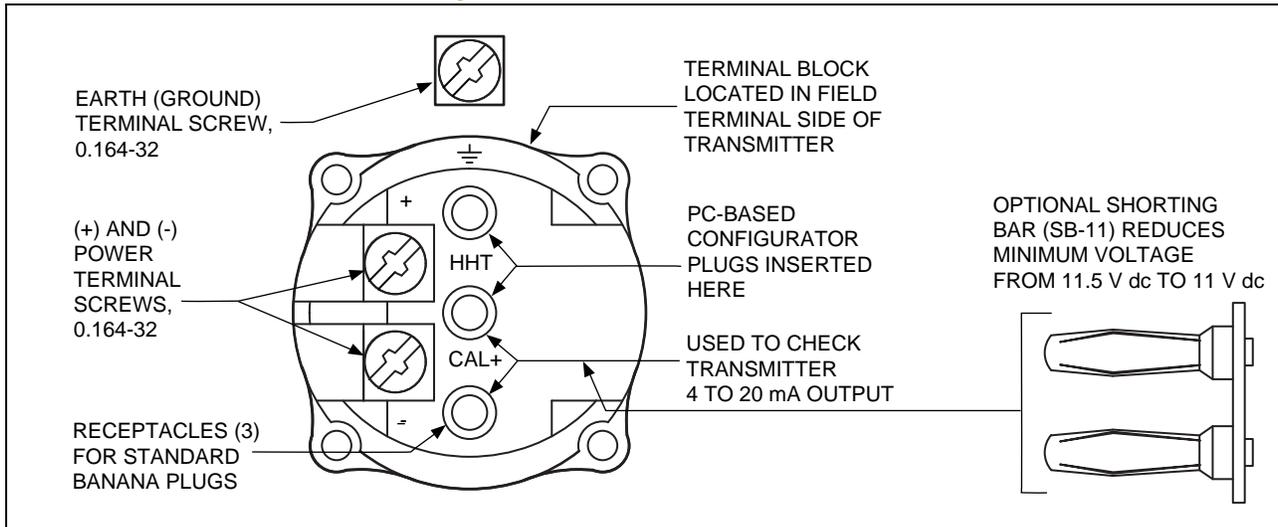
Approximate Mass (with Process Connectors)

- 4.2 kg (9.2 lb) – with Traditional Structure
- Add 0.1 kg (0.2 lb) – with Low Profile Structure LP1
- Add 0.8 kg (1.8 lb) – with Low Profile Structure LP2
- Add 1.1 kg (2.4 lb) – with 316 ss Housing
- Add 0.2 kg (0.4 lb) – with LCD Indicator Option

Dimensions

See “Dimensions - Nominal” on page 28 and Dimensional Print DP 020-446.

Figure 23. Field Terminal Connections



ELECTRICAL SAFETY SPECIFICATIONS

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Elec. Safety Design Code
ATEX intrinsically safe; II 1 GD, EEx ia IIC, Zone 0; or II 1/2 GD EEx ib IIC, Zone 0/Zone 1.	Temperature Class T4..T6 T135°C -40°C to 80°C.	E
ATEX flameproof; II 2 GD, EEx d IIC, Zone 1.	Temperature Class T6, T85°C; Ta = -50°C to +80°C.	D
ATEX protection n; II 3 GD, EEx nL IIC, Zone 2.	Temperature Class T4..T6 T135°C -40°C to 80°C.	N
ATEX multiple certifications, ia & ib, d, and n. Refer to Codes D, E, and N for details.	Applies to Codes D, E, and N. (a)	M
CSA intrinsically safe for Class I, Div. 1, Groups A, B, C, and D; Class II, Div. 1, Groups E, F, and G; and Class III, Div. 1.	Connect per MI 020-427. Temperature Class T6 at 40°C, and T4A at 85°C maximum ambient.	C
CSA explosionproof for Class I, Div. 1, Groups B, C, and D; and dust-ignitionproof for Class II, Div. 1, Groups E, F, and G; and Class III, Div. 1.	Maximum Ambient Temperature 85°C.	C
CSA for Class I, Div. 2, Groups A, B, C, and D; Class II, Div. 2, Groups F and G; Class III, Div. 2.	Temperature Class T6 at 40°C and T4A at 85°C maximum ambient.	C
CSA field device zone certified flameproof Ex d IIC. Also, all certifications of Code C above.	Maximum Ambient Temperature 85°C.	B
FM intrinsically safe for Class I, Div. 1, Groups A, B, C, and D; Class II, Div. 1, Groups E, F, and G; and Class III, Div. 1.	Connect per MI 020-427. Temperature Class T4A at 40°C and T4 at 85°C maximum ambient.	F
FM explosionproof for Class I, Div. 1, Groups B, C, and D; and dust-ignitionproof for Class II, Div. 1, Groups E, F, and G; and Class III, Div. 1.	Temperature Class T6 at 80°C and T5 at 85°C maximum ambient.	F
FM nonincendive Class I, Div. 2, Groups A, B, C, and D; Class II, Div. 2, Groups F and G; and Class III, Div. 2.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient.	F
FM field device zone certified flameproof AEx d IIC. Also, all certifications of Code F above.	Temperature Class T6 at 80°C and T5 at 85°C maximum ambient.	G
IECEx flameproof, Ex d IIC.	Temperature Class T6, Ta = 80°C; T5, Ta = 85°C; Ambient Temperature -20 to +85°C.	V

- a. When selecting ATEX Code M, the user must permanently mark (check off on rectangular box on data plate) one type of protection only (ia and ib, d, or n). This mark cannot be changed once it is applied.

NOTE

Transmitter has been designed to meet the Electrical Safety Specifications listed above. Contact Global Customer Support (see back page) for information or status of testing laboratory approvals or certifications.

MODEL CODE

Description	Model		
I/A Series, Electronic d/p Cell Transmitter for Differential Pressure Measurement	IDP10		
Electronics Versions and Output Signal			
Intelligent; Digital, FoxCom or 4 to 20 mA dc, configurable (Version -D)	-D		
Structure Code - Select from one of the following six groups:			
1. Transmitter with Traditional Structure			
<u>Covers</u>	<u>Sensor</u>	<u>Fill Fluid</u>	
Steel	Co-Ni-Cr	Silicone	10
Steel	Co-Ni-Cr	Inert	11
Steel	316L ss	Silicone	12
Steel	316L ss	Inert	13
Steel	Nickel alloy (a)	Silicone	16
Steel	Nickel alloy (a)	Inert	17
316 ss	Co-Ni-Cr	Silicone	20
316 ss	Co-Ni-Cr	Inert	21
316 ss	316L ss	Silicone	22
316 ss	316L ss	Inert	23
316 ss	316L ss, Gold Plated	Silicone	2G
316ss	Monel	Silicone	24
316 ss	Monel	Inert	25
316 ss	Nickel alloy (a)	Silicone	26
316 ss	Nickel alloy (a)	Inert	27
Monel	Monel	Silicone	34
Monel	Monel	Inert	35
Nickel alloy (a)	Nickel alloy (a)	Silicone	46
Nickel alloy (a)	Nickel alloy (a)	Inert	47
Nickel alloy (a)	Tantalum	Silicone	48
Nickel alloy (a)	Tantalum	Inert	49
pvdf Insert (Kynar)	Tantalum	Silicone (Used w/Process Connector Type 7)	78 (b)
pvdf Insert (Kynar)	Tantalum	Inert (Used w/Process Connector Type 7)	79 (b)
2. Transmitter with Low Profile Structure LP1 (Not available with Pressure Seals)			
<u>Covers</u>	<u>Sensor</u>	<u>Fill Fluid</u>	
316 ss	316L ss	Silicone	LL
316 ss	316L ss	Inert	LM
316 ss	Nickel alloy (a)	Silicone	LC
316 ss	Nickel alloy (a)	Inert	LD
3. Transmitter with Low Profile Structure LP2 (Not available with Pressure Seals)			
<u>Covers</u>	<u>Sensor</u>	<u>Fill Fluid</u>	
316 ss	316L ss	Silicone	52
316 ss	316L ss	Inert	53
316 ss	Nickel alloy (a)	Silicone	56
316 ss	Nickel alloy (a)	Inert	57

MODEL CODE

MODEL CODE (CONTINUED)

Description	Model		
4. Transmitter prepared for Foxboro Model Coded Remote Mount Seals (c) (d)			
Transmitter prepared for Remote Seals on Both HI and LO Sides, Silicone Fill in Sensor	S1		
Transmitter prepared for Remote Seals on Both HI and LO Sides, Inert Fill in Sensor	S2		
Transmitter prepared for Remote Seal HI Side, 1/2 NPT Connector LO Side, Silicone Fill in Sensor	S3		
Transmitter prepared for Remote Seal HI Side, 1/2 NPT Connector LO Side, Inert Fill in Sensor	S4		
Transmitter prepared for Remote Seal LO Side, 1/2 NPT Connector HI Side, Silicone Fill in Sensor	S5		
Transmitter prepared for Remote Seal LO Side, 1/2 NPT Connector HI Side, Inert Fill in Sensor	S6		
5. Transmitter Prepared for Foxboro Model Coded Direct Connect Seals (c)			
PSFLT, PSSCT, or PSSST Direct Connect Seal on HI Side; 1/2 NPT Process Connector LO Side; Silicone Fill	F1		
PSFLT, PSSCT, or PSSST Direct Connect Seal on HI Side; 1/2 NPT Process Connector LO Side; Inert Fill	F2		
PSFLT, PSSCT, or PSSST Direct Connect Seal on HI Side; 1/2 NPT Process Connector LO Side; Inert Fill	F3		
PSFLT, PSSCT, or PSSST Direct Connect Seal on HI Side; Remote Seal with Capillary LO Side; Silicone Fill	F4		
PSFLT, PSSCT, or PSSST Direct Connect Seal on HI Side; Remote Seal with Capillary LO Side; Inert Fill			
6. Transmitter Prepared for non-Foxboro Seals			
Remote Seals on High and Low Sides; Silicone Fill in Sensor	SA		
Remote Seals on High and Low Sides; Inert Fill in Sensor	SB		
Remote Seal on High Side and 1/2 NPT Connector on Low Side, Silicone Fill in Sensor	SC		
Remote Seal on High Side and 1/2 NPT Connector on Low Side, Inert Fill in Sensor	SD		
Remote Seal on Low Side and 1/2 NPT Connector on High Side, Silicone Fill in Sensor	SE		
Remote Seal on Low Side and 1/2 NPT Connector on High Side, Inert Fill in Sensor	SF		
Span Limits (Differential Pressure Units)			
kPa	inH₂O	mbar	
0.12 and 7.5	0.5 and 30	1.2 and 75	A (e)
0.87 and 50	3.5 and 200	8.7 and 500	B
7 and 210	28 and 840	70 and 2100	C
MPa	psi	bar	
0.07 and 2.1	10 and 300	0.7 and 21	D
0.7 and 21	100 and 3000	7 and 210	E (f)
Process Connector Type (Material Same as Process Cover Material) (g)			
See below:			
▶ For d/p: No connectors; both covers tapped for 1/4 NPT (316 ss only, no side vents)	0		
▶ Flange Mount Hi Side: 1/2 NPT, 316 ss Process Connector on Lo Side (F1 and F2 only)			
▶ Flange Mount Hi Side: No connectors; both sides prepared for seals (F3 and F4 only)			
▶ Two Remote Seals: No connectors; both covers tapped for capillary connection (S1, S2, SA, SB only)			
▶ One Remote Seal: 1/2 NPT, 316 ss Process Connector on Side Opposite Seal (S3 to S6, SC to SF only)			
1/4 NPT, Not with Structure Codes 46 to 49, 78, 79, or pressure seals	1		
1/2 NPT, Not with Structure Codes 78 or 79, or pressure seals	2		
Rc 1/4, Not with Structure Codes 46 to 49, 78, 79, or pressure seals	3		
Rc 1/2, Not with Structure Codes 78 or 79, or pressure seals	4		
1/2 Schedule 80 Welding Neck, Not with Structure Codes 46 to 49, 78, 79, or pressure seals	6		
None; pvdf Insert tapped for 1/2 NPT/Process Inlet on Side of 316 ss Process Covers (only with 78/79 above)	7		

MODEL CODE (CONTINUED)

Description	Model
Conduit Connection and Housing Material	
1/2 NPT Conduit Connection, Aluminum Housing	1
PG 13.5 Conduit Connection, Aluminum Housing (With Electrical Safety Codes E, D, M, and N only)	2
1/2 NPT Conduit Connection, 316 ss Housing	3
PG 13.5 Conduit Connection, 316 ss Housing (With Electrical Safety Codes E, D, M, and N only)	4
M20 Conduit Connection, Both Sides, Aluminum Housing (With Electrical Safety Codes E, D, M, and N only)	5
M20 Conduit Connection, Both Sides, 316 ss Housing (With Electrical Safety Codes E, D, M, and N only)	6
Electrical Safety - See Electrical Safety Specifications section for descriptions	
ATEX II 1 GD, EEx ia IIC, Zone 0; or II 1/2 GD, EEx ib IIC, Zone 0/1	E
ATEX II 2 GD, EEx d IIC, Zone 1 (h)	D
ATEX II 3 GD, EEx nL IIC, Zone 2	N
ATEX Multiple Certifications (includes ATEX Codes E, D, and N) (h) (See Electrical Safety Specifications section for <u>user marking</u>)	M
CSA Certified Division 1 intrinsically safe, explosionproof, dust-ignitionproof, and Division 2, Classes I, II, and III	C
CSA Zone Certified Ex d IIC; also all certifications of Code C above (h)	B
FM approved Division 1 intrinsically safe, explosionproof, dust-ignitionproof, and nonincendive FM Zone approved AEx d IIC; also all approvals of Code F above (h)	F G
IECEx flameproof, Ex d IIC	V
Optional Selections	
Refer to Optional Selections below.	
Mounting Bracket Set (i)	
Standard Style Painted Steel Bracket with Plated Steel Bolts (not available with LP1 structure)	-M1
Standard Style Stainless Steel Bracket with Stainless Steel Bolts (not available with LP1 structure)	-M2
Universal Style Stainless Steel Bracket w/Stainless Steel Bolts (not w/Structure Codes LL, LM, LC, or LD)	-M3
Digital Indicator with Pushbuttons	
Digital Indicator, Pushbuttons, and Window Cover	-L1
DIN 19213 Construction used with Process Connector Code 0 and 316 ss Covers with no side vents (not available when remote or direct connect seals are specified)	
Single Ended Process Cover with M10, B7 Steel Bolting (j) (k)	-D1
Double Ended Process Cover with M10, B7 Steel Bolting (Blind Kidney Flange on Back) (j) (l) (m)	-D2
Single Ended Process Cover with 7/16 in, B7 Steel Bolting; standard pressure rating 25 MPa (3626 psi) (k)	-D3
Double Ended Process Cover with 7/16 in, B7 Steel Bolting (Blind Kidney Flange on Back) (j) (l) (m)	-D4
Single Ended Process Cover with 7/16 in, 316 ss Bolting (j) (k)	-D5
Double Ended Process Cover with 7/16 in, 316 ss Bolting (Blind Kidney Flange on Back) (j) (l) (m)	-D6
Single Ended Process Cover with 7/16 in, 17-4 ss Bolting; standard pressure rating 25 MPa (3626 psi) (k)	-D7
Double Ended Process Cover with 7/16 in, 17-4 ss Bolting (Blind Kidney Flange on Back) (j) (l) (m)	-D8
Single Ended Process Cover with 7/16 in, 17-4 ss Bolting; pressure rating 40 MPa (5800 psi) (k) Not available with Span Codes A, D, or E; or Option Codes -V, -B1, -B2, -B3, or -Y	-D9

MODEL CODE

MODEL CODE (CONTINUED)

Description	Model
Cleaning and Preparation - Not Available with Gold-Plated Sensor, Structure 2G, or Pressure Seals	
Unit Degreased - for Silicone Filled Sensors Only (Not for Oxygen/Chlorine/Other Fluids that may react with Silicone)	-X1
Cleaned and Prepared for Oxygen Service - for Inert Filled Sensors Only (Not Available with Carbon Steel Covers or with Silicone Filled Sensors)	-X2
Cleaned and Prepared for Chlorine Service - for Inert Filled Sensors Only (n) (Not Available with Carbon Steel Covers or with Silicone Filled Sensors)	-X3
Bolting for Process Covers/Connectors - Not with DIN 19213 Construction or Structure Codes 78 and 79 (o)	
316 ss Bolts and Nuts (Pressure Derated; Not Available with -Y Option) (j)	-B1
17-4 ss Bolts and Nuts (m) (n)	-B2
B7-M Bolts and Nuts (NACE)(Pressure Derated) (j)	-B3
Conduit Thread Adapters (Not available with Conduit Connection Codes 5 and 6)	
Hawke-Type 1/2 NPT Cable Gland for use with Conduit Connection Codes 1 and 3 (p)	-A1
Plastic PG 13.5 Cable Gland for use with Conduit Connection Codes 2 and 4 (q)	-A2
M20 Conduit Thread Adapter for use with Conduit Connection Codes 1 and 3 (p)	-A3
Brass PG 13.5 Cable Gland (Trumpet-Shaped) for use w/Conduit Connection Codes 2 and 4 (q)	-A4
Electronics Housing Features	
External Zero Adjustment	-Z1
Custody Transfer Lock and Seal	-Z2
External Zero Adjustment and Custody Transfer Lock/Seal	-Z3
Custom Factory Configuration	
Digital Output (4 to 20 mA default if not selected)	-C1
Full Factory Configuration (Requires Configuration Form to be Filled Out)	-C2
Tubing Connectors - Not available with Structure Codes 78 and 79; also not available with Seals	
Steel, Connecting 6 mm Tubing to 1/4 NPT Process Connector Only with Structure Codes 10 to 13; and Process Connector Codes 0 and 1	-E1
Steel, Connecting 12 mm Tubing to 1/2 NPT Process Connector Only with Structure Codes 10 to 13; and Process Connector Code 2	-E2
316 ss, Connecting 6 mm Tubing to 1/4 NPT Process Connector Only with Structure Codes 10 to 13 and 20 to 23; and Process Connector Codes 0 and 1	-E3
316 ss, Connecting 12 mm Tubing to 1/2 NPT Process Connector Only with Structure Codes 10 to 13 and 20 to 23; and Process Connector Code 2	-E4
Vent Screw in Process Cover	
Supply Vent Screw in Side of Each Process Cover (Available only on Traditional Process Cover Structure Codes 10 to 49)	-V
Omit Vent Screw in Side of Each Process Cover (Available only on Type LP1 Low Profile Process Cover Structures Codes LL, LM, LC, and LD)	-V1
Adapter Plate, Bolts, and Gaskets for Direct Mount to Competitive Manifolds (r)	
See inside pages for manifold compatibility.	
Adapter Set for MC Coplanar Manifolds, B7 Bolts (not with options -B1, -B2, or -B3)	-P1
Adapter Set for MC Coplanar Manifolds, 316 ss Bolts (requires -B1 option)	-P2
Adapter Set for MC Coplanar Manifolds, 17-4 ss Bolts (requires -B2 option)	-P3
Adapter Set for MC Coplanar Manifolds, B7M Bolts (requires -B3 option)	-P4
Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, B7 Bolts (not with options -B1, -B2, or -B3)	-P5
Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, 316 ss Bolts (requires -B1 option)	-P6
Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, 17-4 ss Bolts (requires -B2 option)	-P7
Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, B7M Bolts (requires -B3 option)	-P8
Gaskets	
Metal O-ring for pressure seals in Vacuum Service (s)	-G1

MODEL CODE (CONTINUED)

Description	Model
Instruction Books (Common MI, Brochure, and Full Documentation Set on DVD is Standard) Without Instruction Book and DVD; only "Getting Started" brochure is supplied.	-K1
Miscellaneous Optional Selections Low Temperature Operative Limit of Electronics Housing Extended Down to -50°C (-58°F) Not available with sensors and seals with Inert fill; Structure Codes 78 and 79; and DIN Options -D2, -D4, -D6, and -D8 Supplemental Customer Tag (Stainless Steel Tag wired onto Transmitter) Static Pressure Rating to 40 MPa (5800 psi); Only with Span Codes B and C Not available with: – Options -B1, -B2, and -B3 (t) – Options -D1 to -D9 – Structure Codes 34, 35, 78, 79, S1 to S6, SA to SF, F1 to F4	-J -T -Y

- a. Equivalent to Hastelloy® C.
- b. Maximum static pressure rating is 2.1 MPa (300 psi); temperature limits are -7 and +82°C (20 and 180°F).
- c. Both Transmitter and Pressure Seal Model Numbers are required. See PSS 2A-1Z11 A for the various pressure seal Model Codes.
- d. Remote Seal Models that may be specified are PSFPS, PSFES, PSFAR, PSTAR, PSISR, PSSCR, and PSSSR
- e. Span Limit Code A is not available with pressure seals, except for Sanitary Spud Seals Models PSSSR-.4 and PSSST-.4.
- f. Span Limit Code E is not available with Structure Codes 78 and 79 above (pvdf insert in HI side cover).
- g. Select Code "0" if a pressure seal is specified. Otherwise select Code 1 through 7.
- h. Cover lock provided as standard with Electrical Safety Codes D, B, G, M, and V.
- i. Mounting sets not offered with direct connect (flange mount) seals.
- j. See Functional Specifications section for pressure deratings when certain DIN 19213 versions and Bolting Options -B1 and -B3 are specified.
- k. Not available with Low Profile Structure Codes 52 to 67.
- l. Temperature limits derated to 0 and 60°C (32 and 140°F). Also not available with Structure Codes 52 to 57, and LL, LM, LC, or LD.
- m. Mounting Bracket Set options are not available.
- n. When -X3 is specified, the standard bolting is replaced with 17-4 ss bolts and nuts. Therefore, there is no need to specify Option -B2 when selecting the Chlorine Service Option -X3.
- o. Not available with DIN construction options. For stainless steel bolts with DIN construction, specify -D5 to -D9, as required.
- p. Available with Electric Safety Codes E, D, M, and N only.
- q. Available with Electric Safety Code E only.
- r. Adapter plate options -P1 to -P8 are not available with:
 - Pressure Seal Structure Codes.
 - Process Connector Codes 1-7.
 - DIN Construction Options -D1, -D2, -D4, -D5, -D6, -D7, -D8, -D9.
- s. -G1 is a required option when pressure seal will be used in vacuum applications. This option substitutes vacuum service metal gasket for standard ptfe process cover gasket.
- t. -B2 Bolt Option (17-4 ss) is not available with the -Y option because 17-4 ss bolts and nuts are supplied as part of the -Y option.

SUGGESTED RFQ SPECIFICATIONS

The manufacturer shall provide field-mounted differential pressure transmitter(s) featuring remote digital communications capability for measuring differential pressure and transmitting a 4 to 20 mA dc and/or digital output signal (software selectable) for use in a standard two-wire dc supply voltage system. They are offered with traditional or low profile structures. Transmitters with a traditional structure can also be provided (as required) with direct connect seals, or remote mount, capillary connected seals. The specifications for these transmitters are as follows:

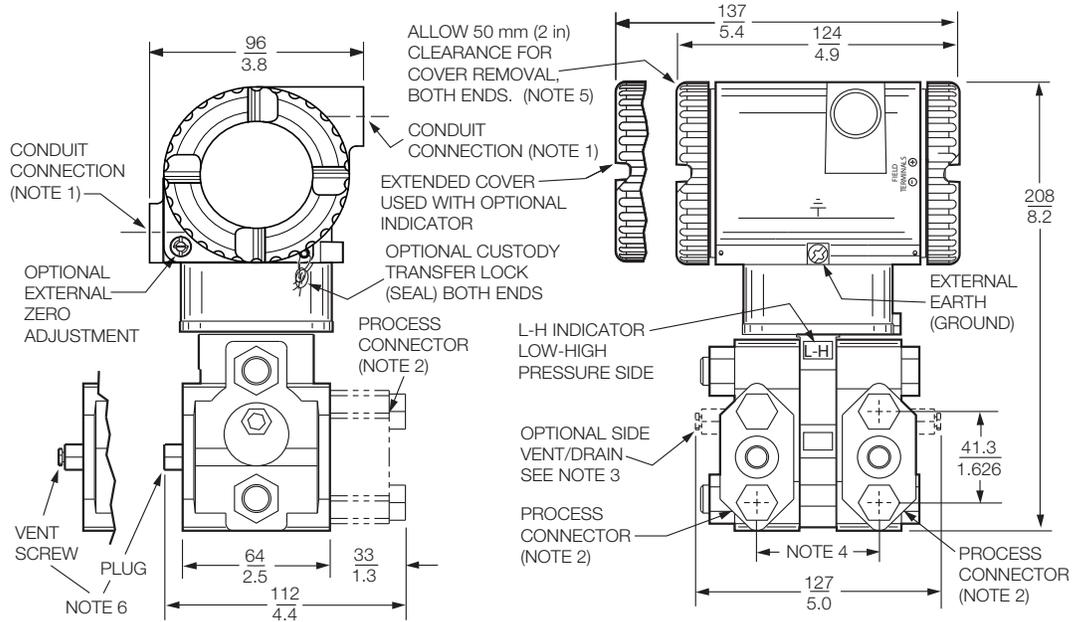
Communication Protocol:	FoxCom, digital or 4 to 20 mA dc output signal, configurable
Remote Communications:	Must not interfere with output
Accuracy:	Digital Output, Linear: $\pm 0.050\%$ of calibrated span 4 to 20 mA Output, Linear: $\pm 0.075\%$ of calibrated span
Damping:	Settable for a range of none to 32 seconds
RFI Protection:	0.1% error between 27 and 1000 MHz at 30 V/m field intensity
Span Limits:	0.5 and 30 inH ₂ O, 3.5 and 200 inH ₂ O, 1 and 30 psi, 10 and 300 psi, 100 and 3000 psi, as specified; or SI and metric equivalents.
Proof Pressure:	14 500 psi for standard transmitters
Mounting:	On process piping, manifold, or optional mounting bracket
Input Connection:	With process connectors to accept 1/4 NPT, 1/2 NPT, Rc 1/4, Rc 1/2, or 1/2 Schedule 80 welding neck; or 1/2 NPT pvdf inserts installed in 316 ss process covers; or prepared for a direct connect seal; or prepared for a single remote capillary connected seal, or two remote capillary connected seals.
Electronics Housing:	316 ss, or aluminum housing with epoxy finish
Modular Electronics:	Enclosed in a NEMA 4X (IEC IP66) housing sealed with O-rings for protection against moisture or other contaminants. Optional Integral LCD indicator with on-board configuration pushbuttons.
Process Cover:	Traditional Structures Steel, 316 ss, Monel, Nickel alloy (a), or pvdf insert Low Profile Structures: 316 ss
Sensor Materials:	Traditional Structure: 316L ss, Nickel alloy (a), Co-Ni-Cr, Monel, Tantalum, or Gold-Plated 316L ss Low Profile Structures: 316L ss or Nickel alloy (a)
Approvals and Certifications:	Must be suitable for Division 1 hazardous locations, and conform to all applicable European Union Directives. Also versions available to meet Agency flameproof and zone requirements.
Approximate Mass: (with Process Connectors)	4.2 kg (9.2 lb), with Traditional Structures; Add 0.1 kg (0.2 lb) with Low Profile Structure LP1; Add 0.8 kg (1.8 lb) with Low Profile Structure LP2; Add 1.1 kg (2.4 lb) with 316 ss housing; Add 0.2 kg (0.4 lb) with optional LCD indicator.
Model Code:	I/A Series Intelligent IDP10 d/p Cell Transmitter with FoxCom Communication Protocol, with or without pressure seals, or equivalent.

a. Equivalent to Hastelloy® C.

DIMENSIONS - NOMINAL

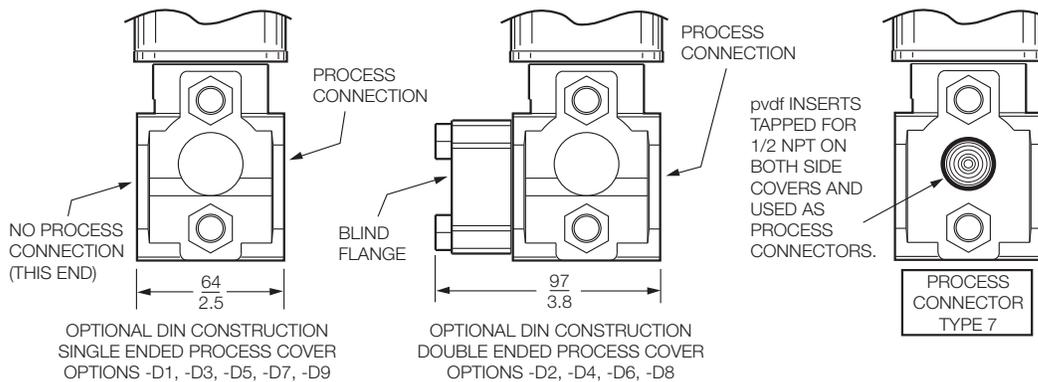
mm
in

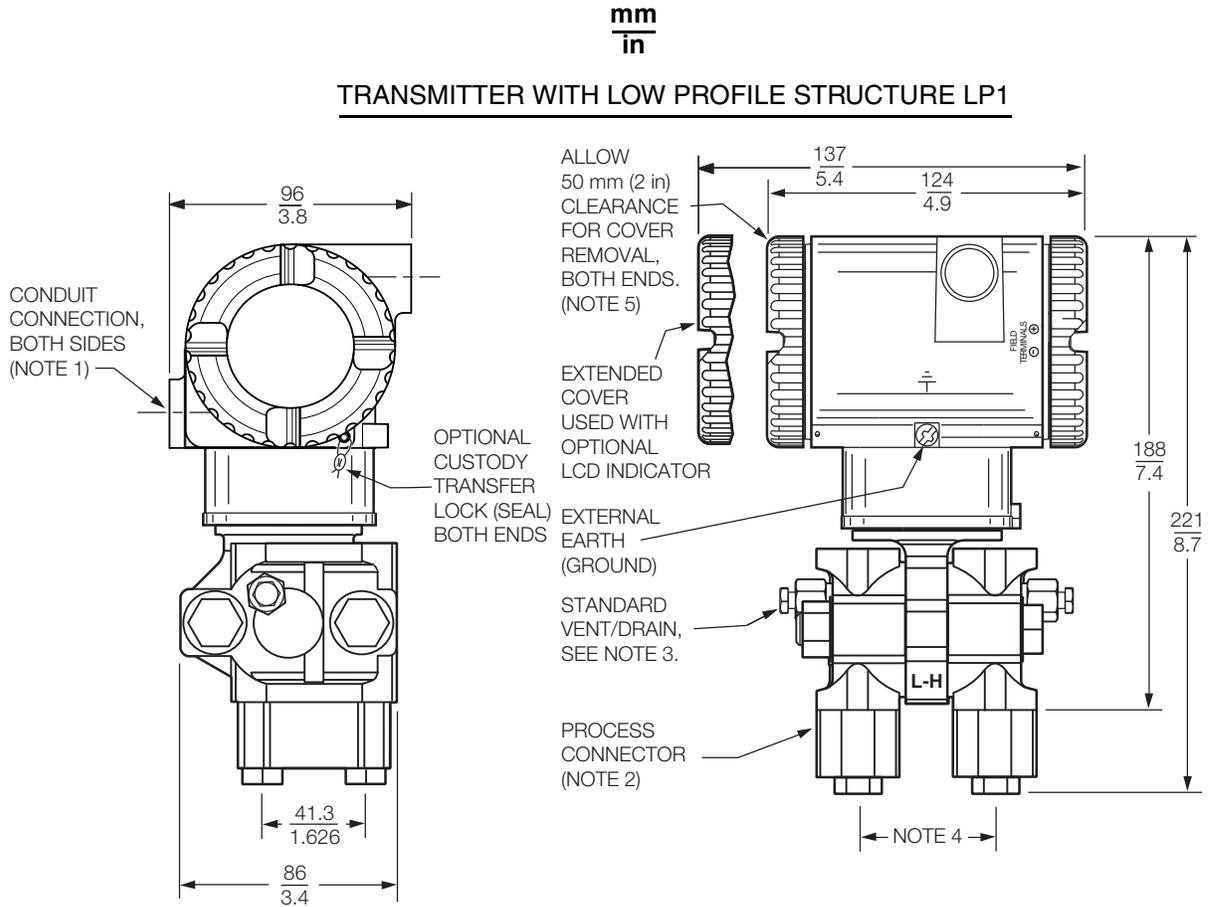
TRANSMITTER WITH TRADITIONAL STRUCTURE



NOTES:

1. CONDUIT CONNECTION 1/2 NPT OR PG 13.5, BOTH SIDES: PLUG UNUSED CONNECTION WITH METAL PLUG (SUPPLIED).
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.



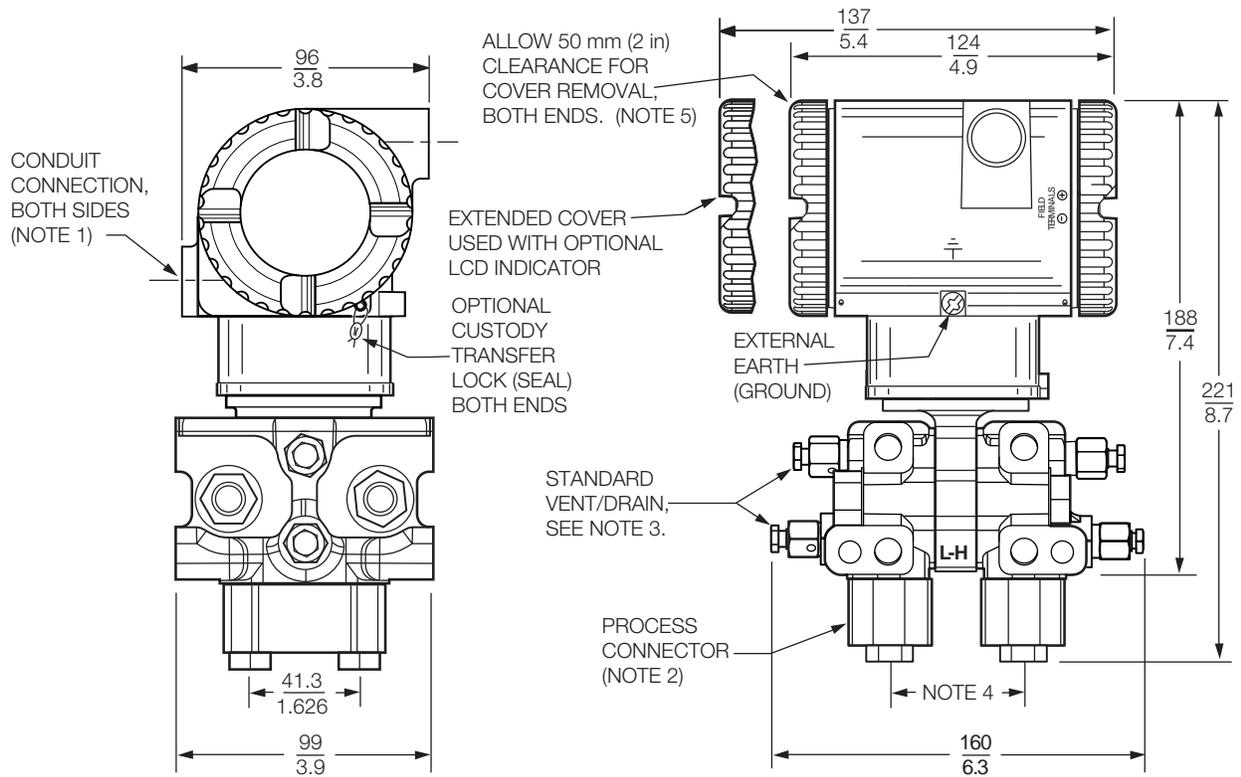


NOTES:

1. CONDUIT CONNECTION 1/2 NPT, PG 13.5, OR M20, BOTH SIDES: PLUG UNUSED CONNECTION WITH METAL PLUG (SUPPLIED).
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.

$\frac{\text{mm}}{\text{in}}$

TRANSMITTER WITH LOW PROFILE STRUCTURE LP2

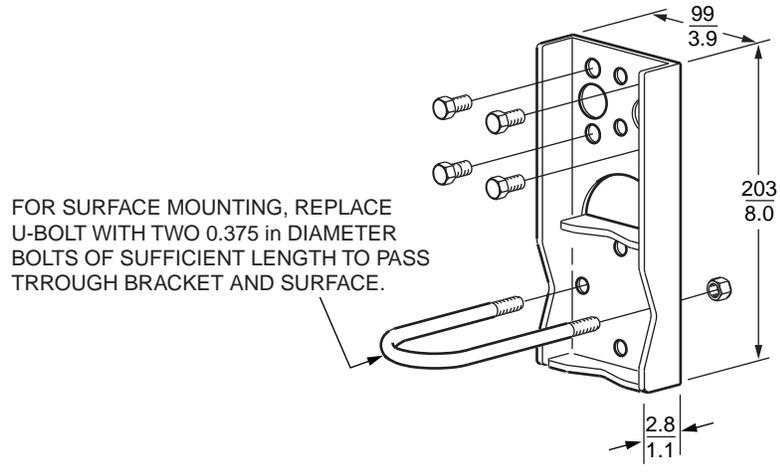


NOTES:

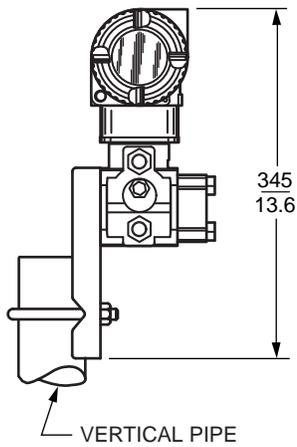
1. CONDUIT CONNECTION 1/2 NPT, PG 13.5, OR M20, BOTH SIDES: PLUG UNUSED CONNECTION WITH METAL PLUG (SUPPLIED).
2. PROCESS CONNECTORS MAY BE REMOVED AND TRANSMITTER MOUNTED DIRECTLY ON A MANIFOLD, OR CONNECTIONS MADE DIRECTLY TO PROCESS COVER USING 1/4 NPT INTERNAL THREAD IN PROCESS COVER.
3. THE TRANSMITTER'S 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.

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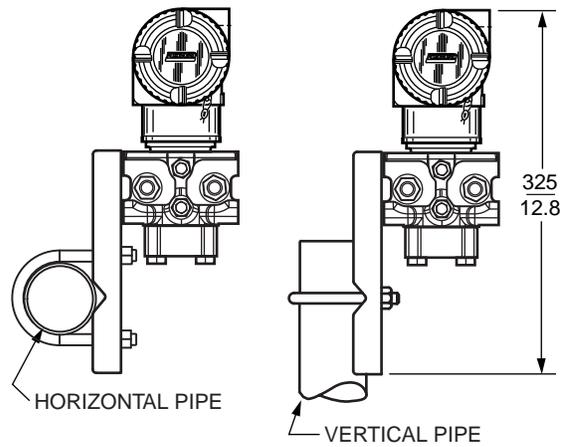
TRANSMITTER WITH STANDARD STYLE MOUNTING BRACKET KIT (Options -M1 and -M2)



TRANSMITTER WITH TRADITIONAL STRUCTURE

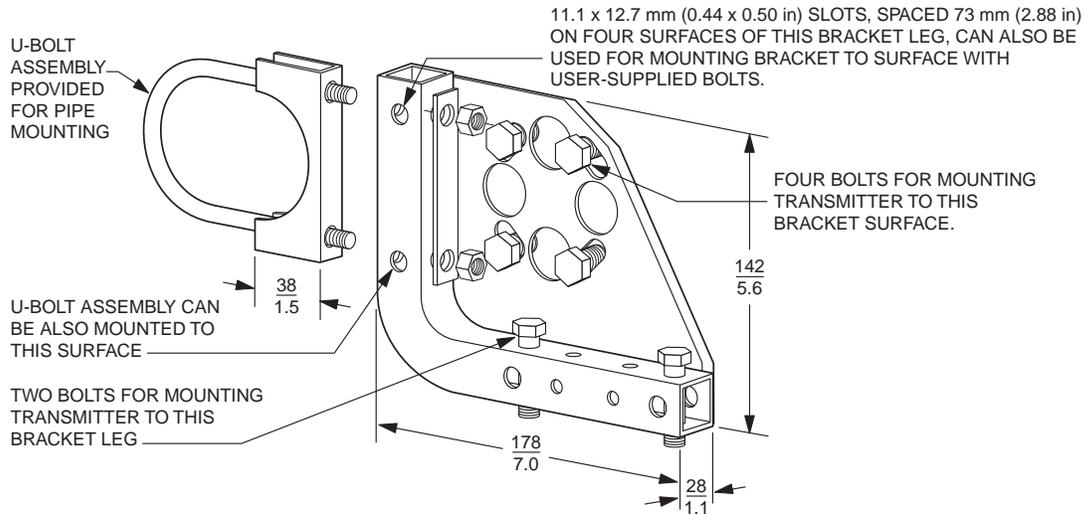


TRANSMITTER WITH LOW PROFILE STRUCTURE LP2

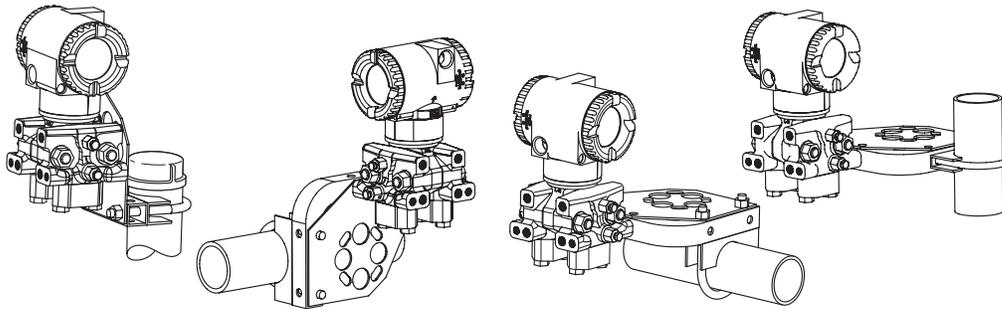


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TRANSMITTER WITH UNIVERSAL STYLE MOUNTING BRACKET KIT (Option -M3)

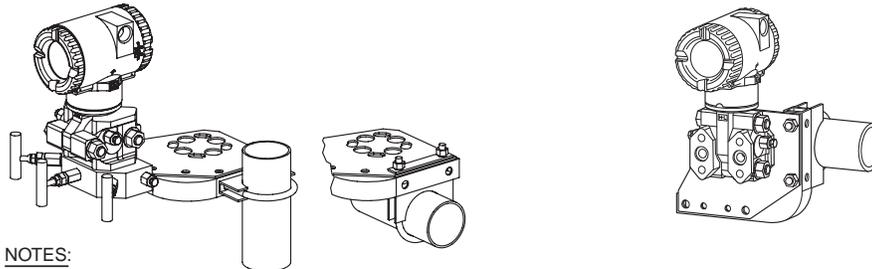


TYPICAL PIPE MOUNTING WITH LOW PROFILE STRUCTURE LP2



**TYPICAL PIPE MOUNTING
LOW PROFILE STRUCTURE LP1**

**TYPICAL PIPE MOUNTING
WITH TRADITIONAL STRUCTURE**



NOTES:

1. 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.
2. REFER TO DIMENSIONAL PRINT DP 020-446 FOR FURTHER IDP10 MOUNTING CONFIGURATIONS, INCLUDING MOUNTING WITH -P SERIES OPTIONAL MOUNTING PLATES.

NOTES



ORDERING INSTRUCTIONS

1. Model Number(s) as follows:
 - Transmitter only if pressure seals are not selected
 - Both transmitter and pressure seals if pressure seals are selected with traditional structure. See PSS 2A-1Z11 A.
2. Calibrated Pressure Range (using Allowable Pressure Units from the table below).

inH ₂ O	inHg	Pa	mbar	psia
ftH ₂ O	mmHg	kPa	bar	atm
mmH ₂ O	cmHg	MPa	g/cm ²	kg/cm ²
cmH ₂ O	dy/cm ²	torr		

3. Configuration Data Form when Factory Calibration Option -C2 is specified.
4. Options and Accessories not in Model Code (see PSS 2A-1Z9 E).
5. User Tag Data - Data Plate; 32 characters maximum. For additional tag data, specify Optional Supplemental Tag -T.
6. User Tag Data - Software (Database); 12 characters maximum (user configured).

OTHER FOXBORO PRODUCTS

The Foxboro product lines offer a broad range of measurement and instrument products, including solutions for pressure, flow, analytical, temperature, positioning, controlling, and recording. For a list of these offerings, visit our web site at:

www.fielddevices.foxboro.com