Absolute, Gauge, and Differential Pressure Transmitters

Low Power

MI 020-613

Instruction

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https://www.se.com

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Table of Contents

Important Safety Instructions

Read these instructions carefully and look at the equipment to become familiar with it before trying to install, operate, service, or maintain it. The following safety messages might appear throughout this manual or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a “Danger” or “Warning” safety message indicates that an electrical hazard exists that results in personal injury if the instructions are not followed.

This safety alert symbol that lets you know about potential personal injury hazards. Obey all safety messages with this symbol to avoid possible injury or death.

⚠DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

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

⚠WARNING

WARNING indicates a hazardous situation that, if not avoided, **could result in** death or serious injury.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠CAUTION

CAUTION indicates a hazardous situation that, if not avoided, **could result in** minor or moderate injury.

Failure to follow these instructions can result in injury or equipment damage.

NOTICE

NOTICE is used to address practices not related to physical injury.

Failure to follow these instructions can result in equipment damage.

Please Note

Electrical equipment should only be installed, operated, serviced, and maintained by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Introduction

These pressure transmitters measure pressure by applying the pressure to a piezoresistive silicon microsensor within the sensor assembly. The microsensor converts the pressure to a change in resistance, and the resistance change is converted to a 1 to 5 V dc signal that is proportional to the pressure.

- 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.

The pressure transmitter can be supplied with direct-connect or remote diaphragm seals to isolate the measuring element from corrosive or viscous fluids.

Reference Documents

Document	Description
Instructions	
MI 020-611	Absolute, Gauge, and Differential Pressure Transmitters with HART Communication and SIL 2
MI 020-612	Absolute, Gauge, and Differential Pressure Transmitters with FOUNDATION Fieldbus Communication
MI 020-613	Absolute, Gauge, and Differential Pressure Transmitters with Low Power
MI 020–614	Absolute, Gauge, and Differential Pressure Transmitters with Modbus Communication
MI 020-328	Bubble Type Installation for Liquid Level
MI 020-329	High Accuracy Flow Measurement
MI 020-369	Diaphragm Seals
MI 020-543	FM/CSA Safety Information
MI 020-544	ATEX/UKEX/IECEx Safety Information
MI 022-138	Bypass Manifolds - Installation and Maintenance
MI 022-335	Model CO Compact Orifice
Dimensional Prints	
DP 022-335	Model CO Compact Orifice
Parts List	
PL 006-172	Model CO Compact Orifice
Technical Information	
TI 1-50a	Liquid Density Measurement
TI 001-051	Liquid Interface Measurement
TI 001-052	Liquid Level Measurement

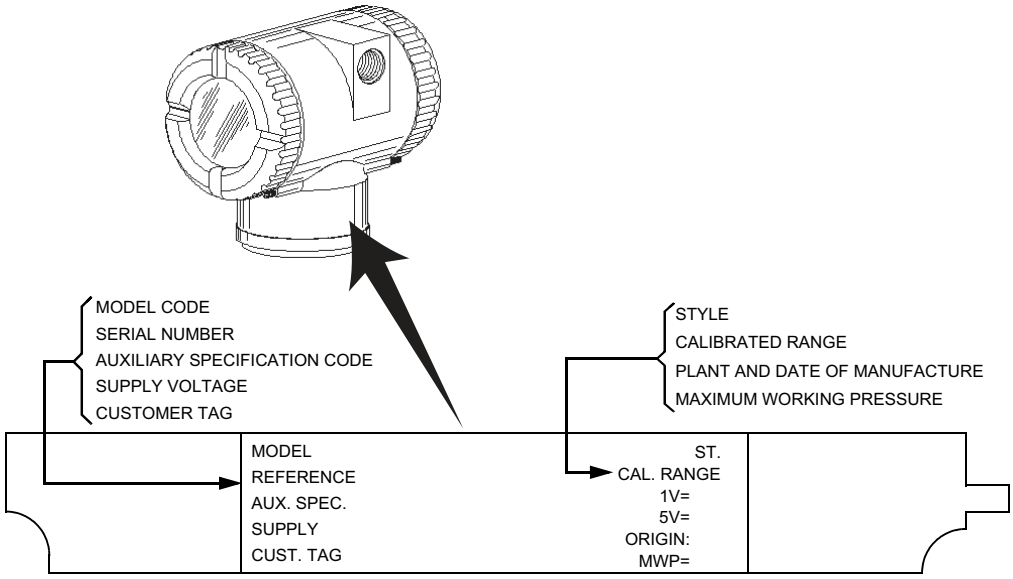
Document	Description
TI 37-75b	Transmitter Material Selection Guide
TI 037-097	Process Sealing of Pressure Transmitters for Use in Class I, Zone 0, 1, and 2 Hazardous Locations

Transmitter Identification

The diagram shows a sample transmitter data plate. This example is for an IGP10S transmitter; the details may be slightly different for other transmitter models.

- For a complete explanation of the model code, refer to Model Codes, page 85.
- The firmware version is identified on the top line of the display when you select **VIEW DB** in the top level menu (Top Level Menu, page 49).

Figure 1 - Data Plate Contents



Standard Specifications

Operative Limits

Influence	Operative Limits[1]
Sensor Body Temperature	
Silicone fill fluid	-46 and +121°C (-50 and +250°F) [2]
Fluorinert fill fluid	-29 and +121°C (-20 and +250°F)[3]
NEOBEE® fill fluid	-18 and +121°C (0 and 250°F)

1. Normal Operating Conditions and Operative Limits are defined per ANSI/ISA 51.1-1979 (R1993).
2. -46 and +50°C (-50 and +122°F) for biplanar AP transmitters.
3. -18°C (0°F) for J range (IGP05S transmitters only).

Influence	Operative Limits[4]
Electronics Temperature	
	-40 and +85°C (-40 and +185°F)[5] [6] [7]
Relative Humidity	0 and 100%[8]
Supply Voltage	9 V dc and 30 V dc
Source Impedance	0 Ω and 2,160 Ω
Output Load	1 and Open Circuit
Mounting Position	No limit
Vibration	
Aluminum Housing	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
Stainless Steel Housing	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

Span and Range Limits

Limits for Direct Connect (AP or GP) Transmitters

Table 1 - Span Limits for Direct Connect Transmitters

Code	Span Limits[9]
C	6.9 and 207 kPa (1 and 30 psi)
D	69 and 1380 kPa (10 and 200 psi)
E	0.69 and 13.8 MPa (100 and 2000 psi)
F	13.8 and 41.4 MPa (2000 and 6000 psi)[10]
H	69 and 207 MPa (10000 and 30000 psi)[10]
J	6.9 and 69 MPa (1000 and 10000 psi)[10]

4. Normal Operating Conditions and Operative Limits are defined per ANSI/ISA 51.1-1979 (R1993).
5. -40 and +75°C (-40 and +167°F) for transmitters with flameproof classification.
6. -40 and +50°C (-40 and +122°F) for biplanar AP transmitters.
7. Display updates are slowed and readability is decreased at temperatures less than -20°C (-4°F).
8. 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.
9. Values listed are in absolute or gauge pressure units, as applicable.
10. Available for gauge pressure transmitters only.

Table 2 - Range Limits for Direct Connect Transmitters

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 1400 kPaa (0 and 200 psia)	0 and 1400 kPa (0 and 200 psig)
E	0 and 14 MPaa (0 and 2000 psia)[11]	0 and 14 MPag (0 and 2000 psig)[11]
F	n/a	0 and 42 MPag (0 and 6000 psig)[11]
H	n/a	0 and 210 MPag (0 and 30000 psig)[11]
J	n/a	0 to 69 MPag (0 to 10000 psig)[11]

Limits for Biplanar (AP or GP) Transmitters

Table 3 - Span Limits for Biplanar Transmitters

Code	Span Limits[12]
A	0.12 and 7.5 kPa (0.5 and 30 inH_2O)[13]
B	0.87 and 50 kPa (3.5 and 200 inH_2O)
C	6.9 and 250 kPa (27.8 and 1000 inH_2O)
D	69 and 2070 kPa (10 and 300 psi)
E	0.69 and 20.7 MPa (100 and 3000 psi)[14]
F	1.38 and 34.5 MPa (200 and 5000 psi)[13] [14]

Table 4 - Range Limits for Biplanar Transmitters

Code	Range Limits — AP	Range Limits — GP
A	n/a	-7.5 and +7.5 kPag (-30 and +30 inH_2Og)
B		-50 and +50 kPag (-200 and +200 inH_2Og)
C	0 and 250 kPaa (0 and 1000 inH_2Oa)	-100 and +250 kPag (-400 and +1000 inH_2Og)
D	0 and 2100 kPaa (0 and 300 psia)[14]	-100 and +2100 kPag (-14.7 and +300 psig)[14]
E	0 and 21 MPaa (0 and 3000 psia)[14]	-0.1 and +21 MPag (-14.7 and +3000 psig)[14]
F	n/a	-0.1 and +35 MPag (-14.7 and +5000 psig)[14]

11. This direct connect range can withstand and indicate a vacuum condition down to a full vacuum, but cannot be ranged to that condition.
12. Values listed are in absolute or gauge pressure units, as applicable.
13. Available for gauge pressure transmitters only.
14. 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.

Limits for DP Transmitters

Table 5 - Span Limits for DP Transmitters

Code	Span Limits
A	0.12 and 7.5 kPa; 0.5 and 30 inH_20; 1.2 and 75 mbar
B	0.87 and 50 kPa; 3.5 and 200 inH_2O; 8.7 and 500 mbar
C	7 and 250 kPa; 28 and 1000 inH_2O; 70 and 2500 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

Table 6 - Range Limits for DP Transmitters

Code	Range Limits
A	-7.5 and +7.5 kPa (-30 and +30 inH_2O)
B	-50 and +50 kPa (-200 and +200 inH_2O)
C	-250 and +250 kPa (-1000 and +1000 inH_2O)
D	-0.103 and +2.1 MPa (-30 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 7 - Maximum Overrange and Proof Pressure for Direct Connect Transmitters

Span Limit Code	Maximum Overrange Pressure	Maximum Proof Pressure[15]
C	0.38 MPa (54 psi)	0.99 MPa (144 psi)
D	2.1 MPa (300 psi)	5.51 MPa (800 psi)
E	20.7 MPa (3,000 psi)	55.1 MPa (8,000 psi)
F[16]	59.1 MPag (8,580 psig)	165 MPa (24,000 psig)
H[16]	231 MPag (33,000 psig)	567 MPa (81,000 psig)
J[17]	99 MPag (14,300 psig)	180 MPa (26,015 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 8 - Maximum Static/Overrange and Proof Pressure for DP and Biplanar Transmitters

Transmitter Configuration[18]	Maximum Static[19] and Overrange Pressure[20]	Maximum Proof Pressure[15]
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[16]	40 MPa (5,800 psi)	100 MPa (14,500 psi)
Option -B3 (B7M), -P4, or -P8	20 MPa (2,900 psi)	77 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[21]	10 MPa (1,500 psi)	40 MPa (6,000 psi)
Option -D9 (17-4 PH ss) or -Y[22]	40 MPa (5,800 psi)	100 MPa (14,500 psi)

Elevated Zero and Suppressed Zero

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

Sensor Fill Fluid

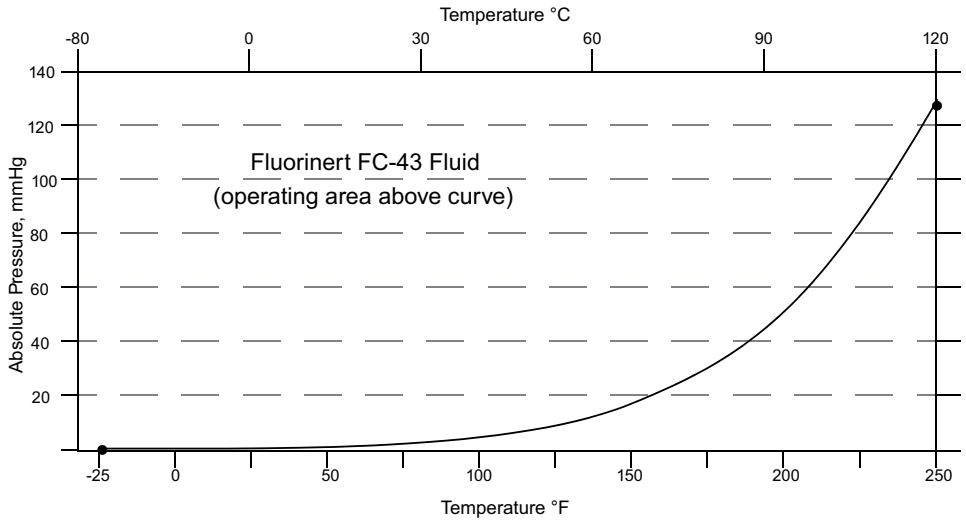
- Silicone fluid — dodecamethylpentasiloxane

15. Meets ANSI/ISA Standard S82.03-1988.
16. Available for gauge pressure transmitters only.
17. Available for gauge pressure transmitters or with the -G option (G 1/2 B Manometer Process Connection) only.
18. Refer to the model code for option descriptions, and for applications and restrictions related to the items listed in the table.
19. Static pressure is relevant only for differential pressure transmitters.
20. Either side can be at higher pressure during overrange.
21. Limited to operating temperatures ranging from -10 to +80°C (14 to 176°F).
22. Differential pressure transmitters only.

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

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



Mounting Position

The transmitter can be mounted in any orientation with considerations specified in Installation, page 19. The housing can be rotated up to one full turn to any desired position for access to adjustments, display, or conduit connections. Refer to Positioning the Housing, page 39.

The display can also be rotated at 90° increments within the housing. Refer to Positioning the Display, page 39.

- 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 diaphragm 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, without Process Connectors	3.5 kg (7.8 lb)
Biplanar or Traditional DP Structure, Aluminum, with Process Connectors	4.2 kg (9.2 lb)
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)

Process Connections

- AP and GP transmitters with direct connect structures can be connected directly to the process using their 1/2 NPT external/internal thread, M20 external thread, or optional G 1/2 B connection.
  - If an optional mounting bracket is used, the transmitter can be connected to the process via the 1/2 NPT external/internal thread, M20 external thread, 1/4 NPT internal thread, or G 1/2 B (model code option -G) connection.
  - Transmitters with a sanitary process connection connect to the process with a Tri-Clamp process connector or a mini tank spud seal.
  - Transmitters with a pulp and paper process connection connect to the process with a threaded or sleeve type connection.
- DP transmitters, and AP or GP transmitters with biplanar stuctures, connect to the process via a 1/4 NPT thread or an optional process connector.

Process Wetted Materials

Process wetted parts compatible with NACE MR0175 and MR0103 are available.

Part	Material(s)
Diaphragm	316L ss, nickel alloy[23]
Process Connections[24] and Covers	316 ss, nickel alloy[23]

Reference (Low) Pressure Side Materials

Silicone, Pyrex™, RTV silicone, or 316L ss.

Electrical Connections

Field wires enter through 1/2 NPT or M20 threaded entrances on either side of the electronics housing. Leads terminate under screw terminals and washers on the terminal block in the field terminal compartment.

23. Equivalent to Hastelloy® C-276. Hastelloy is a registered trademark of Haynes International, Inc.
24. Includes sanitary and pulp and paper process connections.

⚠⚠WARNING

EXPLOSION HAZARD

To help prevent possible explosions and to maintain flameproof, explosionproof, and dust-ignitionproof protection, observe applicable wiring practices. Plug the unused conduit openings with approved conduit plugs. Both plug and conduit must engage a minimum of five full threads for 1/2 NPT connections; eight full threads for M20 connections.

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

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.)

Field Wiring Reversal

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.

NOTICE

RISK OF EQUIPMENT DAMAGE

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.

Failure to follow these instructions can result in equipment damage.

Adjustable Damping

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

Output Signal

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.

Supply Voltage

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

The following table summarizes the requirements.

Minimum Supply Voltage	9 V dc
Maximum Supply Voltage	30 V dc

Minimum Impedance	0 Ω
Maximum Impedance	2,160 Ω

Electrical Ground Connections

The transmitter is equipped with an internal ground connection within the field wiring compartment and an external ground connection at the base of the electronics housing. To minimize galvanic corrosion, place the wire lead or contact between the captive washer and loose washer on the external ground screw.

To help prevent ground loop potentials, if shielded cable is used, ground the shield at the field enclosure only. Do not ground the shield at the transmitter.

Agency Certifications

⚠⚠WARNING

EXPLOSION HAZARD

To help prevent possible explosions and to maintain flameproof, explosionproof, and dust-ignitionproof protection, observe applicable wiring practices. Plug the unused conduit openings with approved conduit plugs. Both plug and conduit must engage a minimum of five full threads for 1/2 NPT connections; eight full threads for M20 connections.

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

⚠WARNING

RISK OF MOISTURE INGRESS

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.

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

Wiring restrictions required to maintain electrical certification of the transmitter are provided in these instructions. Refer to Wiring, page 41.

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 85 for the availability of electrical safety design codes with specific transmitter structures.

⚠⚠DANGER

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. Do not change this mark once it has been applied.

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

Table 9 - Electrical Certifications

Agency Certification, Types of Protection, and Area Classification	Application Conditions[25]	Model Code Option
ATEX/UKEX intrinsically safe, Ex ia IIC	Temperature Class T4, Ta = -40°C to +80°C	AA
ATEX/UKEX flameproof, Ex db IIC	Temperature Class T6, T85°C, Ta = -40°C to +75°C	AD
ATEX/UKEX multiple certifications (includes Codes AA and AN)	Applies to Codes AA and AN	AM
ATEX/UKEX protection type n, Ex ic IIC, or Ex nA	Temperature Class T4, Ta = -40°C to +80°C	AN
ATEX/UKEX multiple certifications (includes Codes AA, AD and AN)	Applies to Codes AA, AN, and AD	AP
INMETRO intrinsically safe, Ex ia IIC	Temperature Class T4, Ta = -40°C to +80°C	BA
INMETRO flameproof, Ex db IIC	Temperature Class T6, T85°C, Ta = -40°C to +75°C	BD
INMETRO multiple certifications (includes INMETRO Codes BA and BD)	Applies to codes BA and BD	BP
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 db 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
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
Multi-marked ATEX/UKEX and IECEx intrinsically safe, Ex ia IIC	Temperature Class T4, Ta = –40°C to +80°C	DA
Multi-marked ATEX/UKEX and IECEx flameproof, Ex db IIC	Temperature Class T6, T85°C, Ta = –40°C to +75°C	DD
Multi-marked ATEX/UKEX and IECEx protection type n, Ex ic IIC	Temperature Class T4, Ta = –40°C to +80°C	DN
IECEx intrinsically safe, Ex ia IIC	Temperature Class T4, Ta = -40°C to +80°C	EA
IECEx flameproof, Ex db IIC	Temperature Class T6, T85°C, Ta = –40°C to +75°C	ED
IECEx multiple certifications, ia, ic, nA	Applies to Codes EA and EN	EM
IECEx protection type n, Ex ic IIC, or Ex nA	Temperature Class T4, Ta = -40°C to +80°C	EN
IECEx multiple certifications, ia, ic, nA, and db	Applies to Codes EA, EN, and ED	EP
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 db IIC	Temperature Class T6 at 75°C and T5 at 85°C maximum ambient	FD
FM multiple certifications (includes FM Codes FA or FN)	Applies to codes FA or FN	FM
FM Classes I, II and III, 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
KC Certification Ex db	Temperature Class T6, T85°C, Ta = –40°C to +75°C	KD

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

Table 9 - Electrical Certifications (Continued)

Agency Certification, Types of Protection, and Area Classification	Application Conditions[26]	Model Code Option
NEPSI intrinsically safe	Temperature Class T4, Ta = -40°C to +80°C	NA
NEPSI flameproof, Ex db IIC	Temperature Class T6, T85°C, Ta = –40°C to +75°C	ND
EAC intrinsically safe, Ex ia	Temperature Class T4, Ta = -40°C to +80°C	RA
EAC flameproof, Ex db	Temperature Class T4, Ta = -40°C to +75°C	RD
EAC protection type n, Ex ic IIC or Ex nA	Temperature Class T4, Ta = -40°C to +80°C	RN
No certification	n/a	ZZ

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

Installation

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

The main electronics enclosure for some models is manufactured from an aluminum alloy. In rare cases, ignition sources due to impact and friction sparks could occur. This must be considered during installation, particularly if the equipment is installed in a Zone 0 location.

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

⚠⚠WARNING

RISK OF ELECTROSTATIC CHARGE AND DUST INGRESS

- When installed in a flammable dust zone, under certain extreme circumstances an incendive electrostatic charge may build up on the painted surfaces, which are non-conducting. Therefore, take precautions to prevent the build-up of electrostatic charge; for example, place the equipment in a location where a charge-generating mechanism (such as wind-blown dust) is unlikely to be present, and clean with a damp cloth.
- When installed in a flammable dust zone, ensure that the cable entry maintains the dust-tightness (IP6X) of the enclosure.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTICE

POTENTIAL EQUIPMENT DAMAGE

To avoid damage to the transmitter sensor, do not use any impact devices, such as an impact wrench or stamping device, on the transmitter.

Failure to follow these instructions can result in equipment damage.

Transmitter Mounting

All transmitters can be mounted to a vertical or horizontal pipe or surface using the optional mounting set. See Pipe Mounting, page 20 and Surface Mounting, page 21.

In addition, direct connect (non-biplanar) absolute and gauge pressure transmitters can be connected directly to the process; see Direct Connected AP and GP Transmitter Mounting, page 21. Differential pressure transmitters can be supported by the process piping; see Process Mounting of a DP Transmitter Supported by Process Piping, page 22.

Refer to Dimensions, page 72 for dimensional information.

When mounting the transmitter, take these considerations into account:

- 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.

- To help prevent damage, do not mount the transmitter directly to the process using the 1/4 NPT internal thread. Use this thread only to connect to the process when the transmitter is mounted with an optional mounting set (Options -M1 through -M8).
- Do not mount the transmitter using the conduit connection and optional mounting set (-M1 through -M6) when vibration conditions exceed 20 m/s^2 (2 “g”).
- If the transmitter is not installed in the vertical position, readjust the zero output to help eliminate the position zero effect.

  NOTE: An absolute pressure transmitter cannot be zeroed by venting the transmitter to atmosphere.
- Where necessary, intrinsically safe equipment may be connected and disconnected while the circuits are energized.
- When used in a dust zone with flammable dusts, fibers, and flyings in groups IIIA, IIB, or IIC, the layer auto-ignition temperature must be at least 75°C greater than the maximum surface temperature marked in the dust coding.
- The equipment is certified for use only in the ambient temperatures marked on the equipment. Do not use it outside this range.
- Do not exceed the maximum process pressure indicated on the marking.
- There are no special checking or maintenance conditions. Periodically inspect all explosion-protected equipment in accordance with the applicable code of practice.

Figure 2 - Pipe Mounting

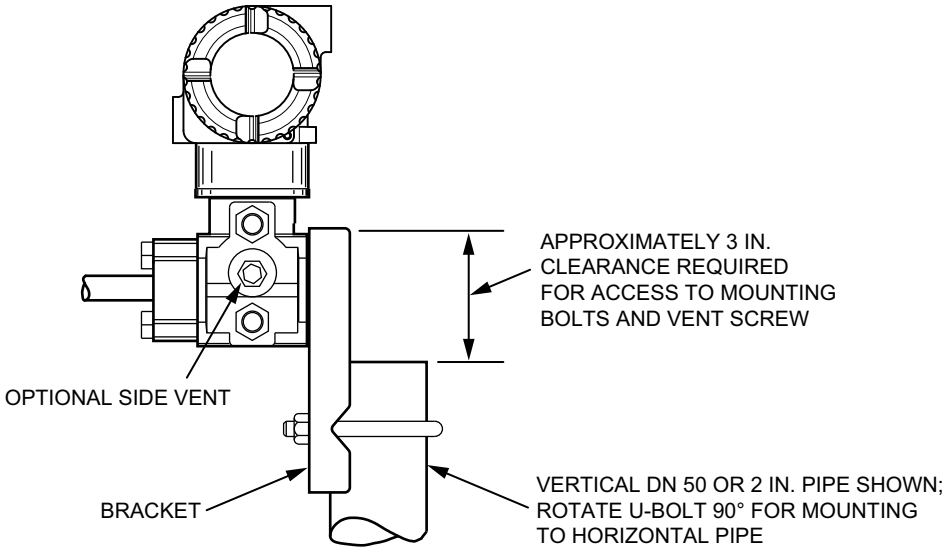


Figure 3 - Surface Mounting

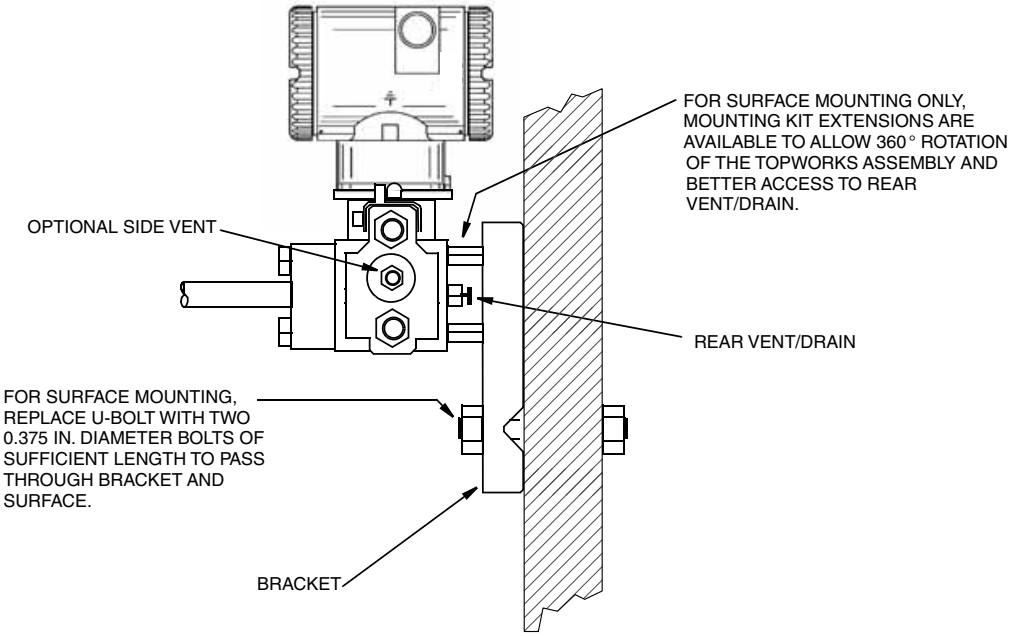


Figure 4 - Direct Connected AP and GP Transmitter Mounting

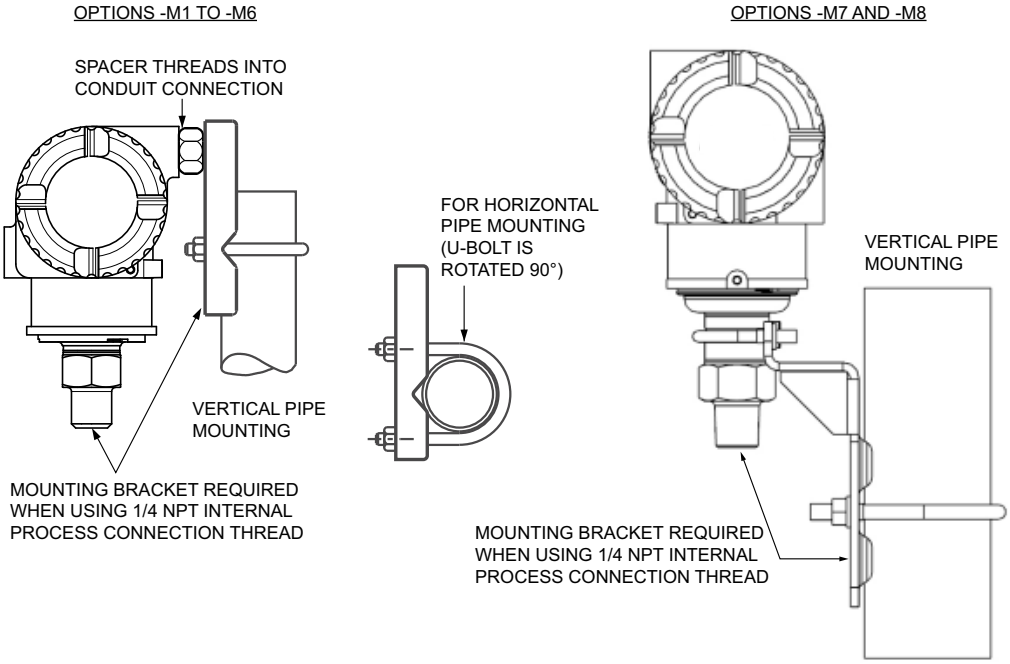
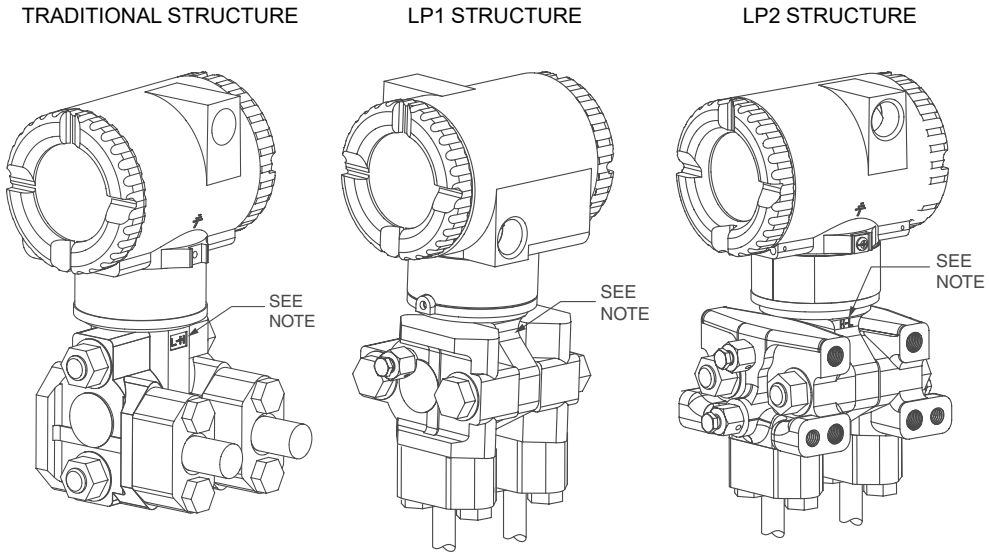


Figure 5 - Process Mounting of a DP Transmitter Supported by Process Piping



NOTE: MARK INDICATING LOW AND HIGH PRESSURE SIDES OF TRANSMITTER

Sanitary Process Connections

Transmitters with a sanitary process connector employ a Tri-Clamp type connection or a mini tank spud seal. Install the transmitter as shown.

For dimensional information, refer to the following documents:

- Tri-Clamp Type Connectors: DP 020-218
- Mini Tank Spud Connectors: DP 020-219

Figure 6 - Mounting a Transmitter with a Sanitary Tri-Clamp Type Connection

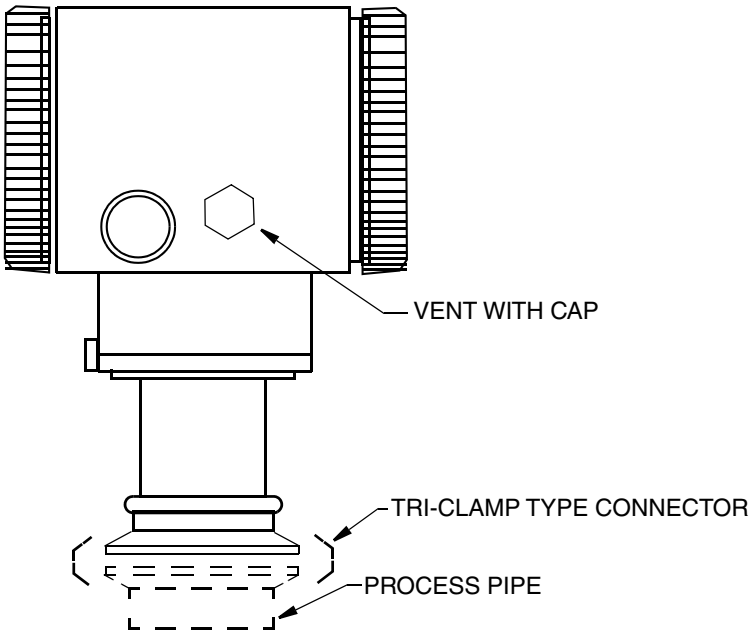
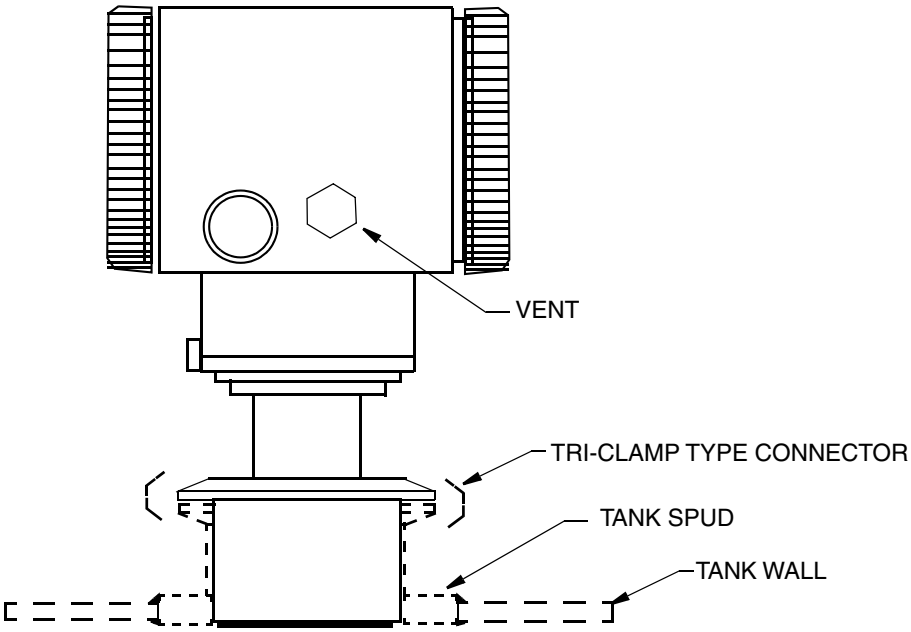


Figure 7 - Mounting a Transmitter with a Sanitary Mini Tank Spud Seal



- If the transmitter is to be mounted horizontally (side of a tank), orient the housing so that the vent is self-draining. For proper measurement, **do not mount the vent facing up.**
- If the vent faces downward, remove the protective cap.
- If the vent clogs, replace it with Part Number D0186DQ (W.L.Gore part number PMF200444). Stock vents and replace them at a predetermined interval as part of preventive maintenance. When installing a new vent, apply torque of 0.6 to 0.8 N-m (5 to 7 lbf-in).
- If the transmitter is subject to routine washdown such as in typical sanitary applications and the vent is oriented so that it is self-draining, the vent will stay clear, and longer intervals between preventive maintenance may be realized.
- If the vent becomes clogged, the resulting pressure measurement error may be as much as 1.5 inH2O per degree C change in temperature. This value is positive with decreasing temperature, and negative with increasing temperature.

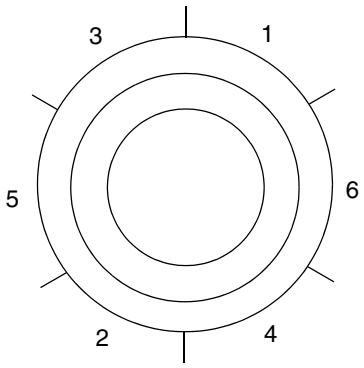
Welding the Tank Spud

Weld the tank spud into a hole cut in the tank as follows:

1. Cut a hole into the process vessel to accept the spud. The spud should fit snugly and uniformly. The nominal diameter of the spud is 3.73 inch (94.7 mm). To assure that the seal is always covered by process fluid, the top of the hole should be below the minimum measurement level.
2. Position the spud mounting ring so that it aligns as closely as possible with the inside wall of the tank, and the weep hole is at the bottom.
3. Tack weld the spud mounting ring to the outside of the tank in four places.
4. Weld the spud mounting ring to the inner surface of the tank:
   a. Spud is 316 stainless steel. Use a compatible welding rod. Do not distort the spud mounting ring by using excessive heat.
   b. Weld the spud mounting ring in sections as indicated in the diagram.
   c. After each section is welded, cool right away with water until the temperature is less than 370°C (700°F) before welding the next section.

5. Grind the weld smooth so the surface is free from irregularities where dirt can lodge.
6. After completing the inner weld, the outer surface can also be welded if desired.

Figure 8 - Welding Procedure



Pulp and Paper Process Connections

Transmitters with pulp and paper process connectors are available in two designs — sleeve type and threaded type. For dimensional information, refer to DP 020-217.

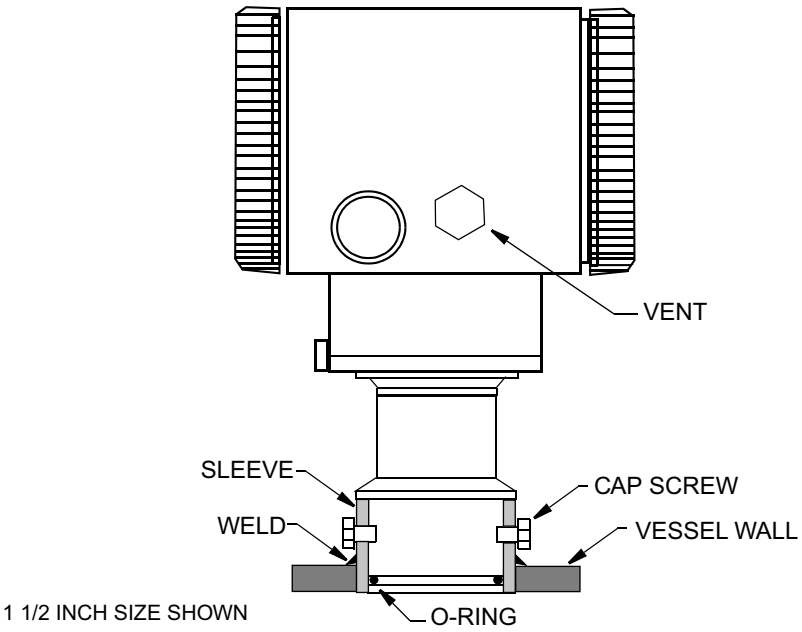
Sleeve-Type Connectors

1. Cut a hole into the process vessel to accept the weld spud. The spud should fit snugly and uniformly. The nominal diameter of the spud is:
   - Nominal 1 inch connector: 33.4 mm (1.32 inch)
   - Nominal 1 1/2 inch connector: 48.3 mm (1.90 inch)
2. Position the sleeve into the hole so that it aligns as closely as possible with the inside wall of the vessel.
3. Tack weld using the welding sequence shown in Welding Procedure, page 24. Cool each section with water until the temperature is below 370°C (700°F) before proceeding to the next section.
4. Weld the circumference of the sleeve using a compatible stainless steel welding rod.

   NOTE: The welder should meet the requirements of ANSI B31.3, ASME Section IX, or other codes, if applicable.
5. Lubricate the o-ring with appropriate lubricant and install it into the sleeve, ensuring that it is properly seated.

   NOTE: If the gasket is not properly seated, a process leak may occur.
6. Insert the transmitter sensor into the sleeve and hold it in place with cap screws.

Figure 9 - Mounting a Transmitter with a Sleeve-Type Pulp and Paper Process Connection



Threaded-Type Connectors

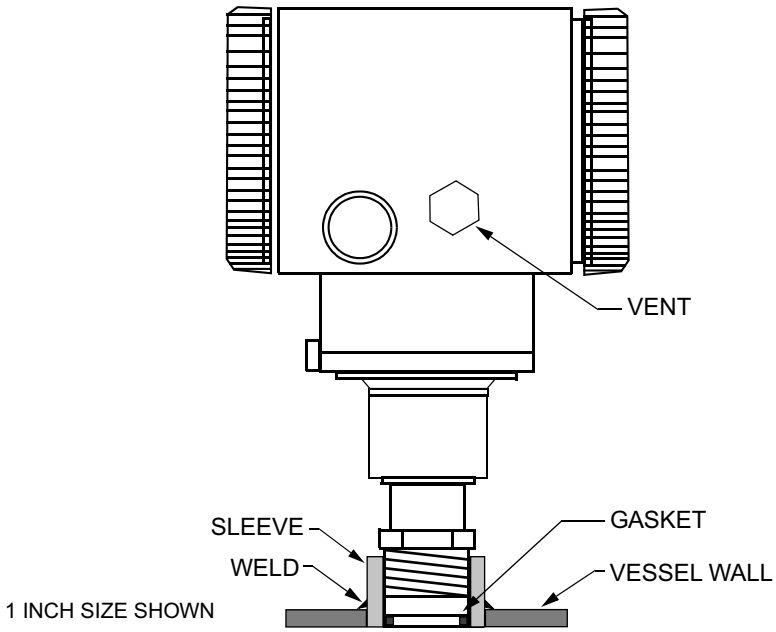
1. Cut a hole into the process vessel to accept the weld spud. The spud should fit snugly and uniformly. The nominal diameter of the spud is:
   - Nominal 1 inch connector: 38.1 mm (1.50 inch)
   - Nominal 1 1/2 inch connector: 60.3 mm (2.38 inch)
   - Nominal 1 1/2 inch connector for Ametek spud: 50.5 mm (1.99 inch)
2. Position the connector into the hole so that it aligns as closely as possible with the inside wall of the vessel.
3. Tack weld using the welding sequence shown in Welding Procedure, page 24. Cool each section with water until the temperature is below 370°C (700°F) before proceeding to the next section.

   NOTE: Use a heat sink during this operation.
   - 1 inch size: Part Number N1214YS
   - 1 1/2 inch size: Part Number N1214YR
4. Weld the circumference of the connector using a compatible stainless steel welding rod.

   NOTE: The welder should meet the requirements of ANSI B31.3, ASME Section IX, or other codes, if applicable.
5. After the connector has cooled, remove the heat sink.
6. Lubricate the gasket with an appropriate lubricant and install it into the connector, ensuring that it is properly seated.

   NOTE: If the gasket is not properly seated, a process leak may occur.
7. Thread the sensor into the connector hand-tight. Then tighten approximately 1/8 turn more.

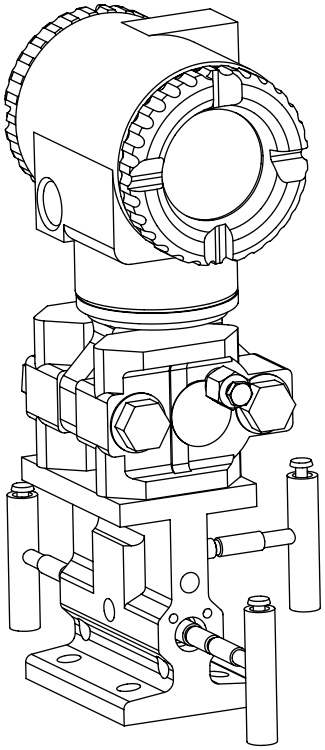
Figure 10 - Mounting a Transmitter with a Threaded-Type Pulp and Paper Process Connection



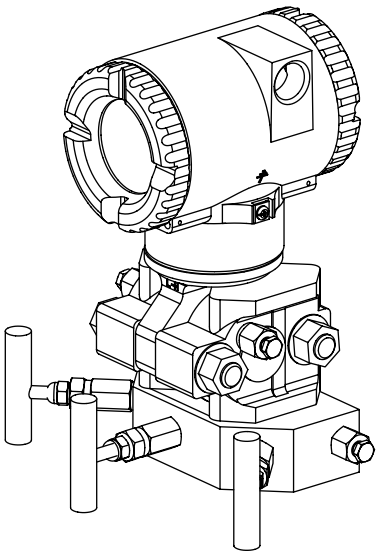
Manifold Mounting of Differential Pressure Transmitters

With manifold mounting, the transmitter is mounted to and supported by a bypass manifold. The bypass manifold can be mounted to a DN 50 or 2 inch pipe with an optional mounting bracket.

Figure 11 - Typical Mounting of a DP Transmitter Supported by a Bypass Manifold

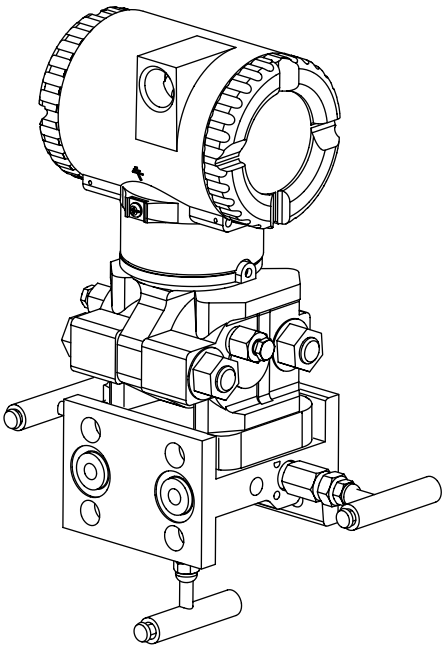


M4A MANIFOLD

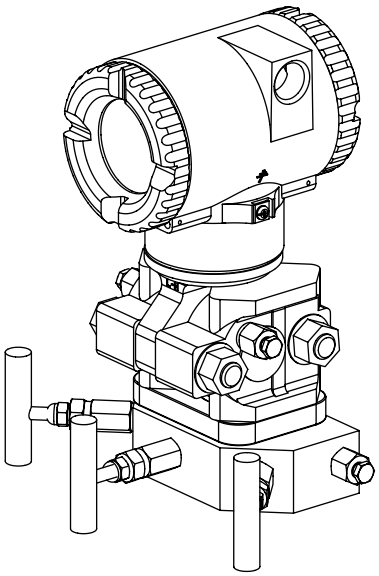


MB3 MANIFOLD

Figure 12 - Typical Mounting of a DP Transmitter on a Coplanar™ Manifold



MT3 MANIFOLD



MC3 MANIFOLD

Mounting a Differential Pressure Transmitter Using a Bracket

To mount a DP transmitter to a pipe or surface, use the Standard Mounting Bracket Set (Model Code Option -M1 or -M2), or the Universal Bracket Mounting Set (Model Code Option -M3).

Standard Mounting Bracket

A DP transmitter with either traditional or LP2 low profile structure can be mounted to a vertical or horizontal DN 50 or 2 in pipe using a standard bracket. See the following figures for details and examples.

Secure the mounting bracket to the transmitter using the four screws provided. Mount the bracket to the pipe. The mounting bracket can also be used for wall mounting by securing the bracket to a wall using the U-bolt mounting holes.

Figure 13 - Pipe or Surface Mounted DP Transmitter Using a Standard Bracket

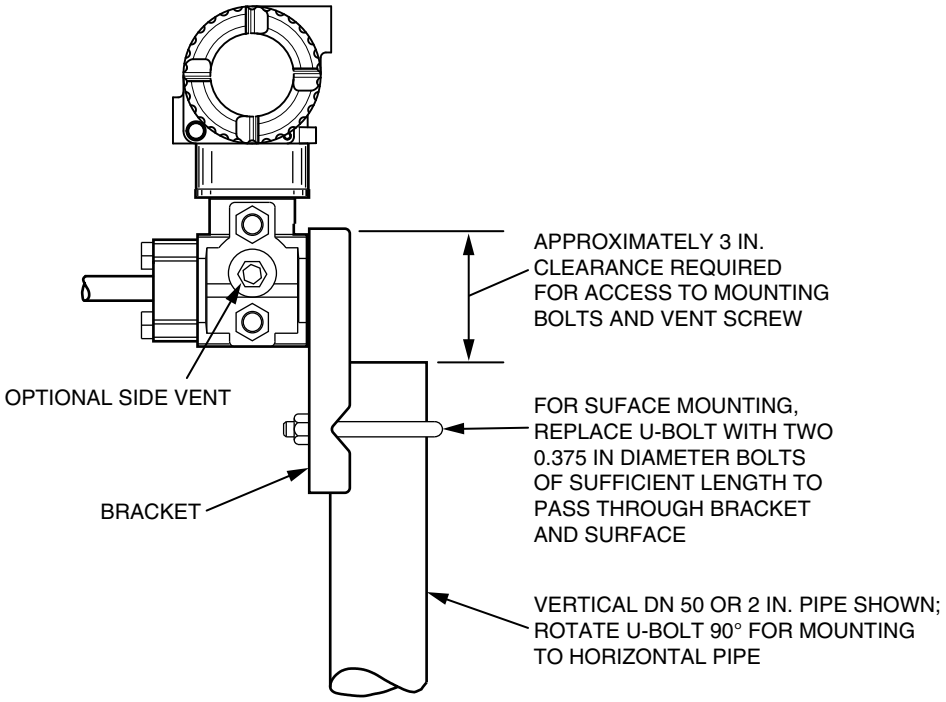
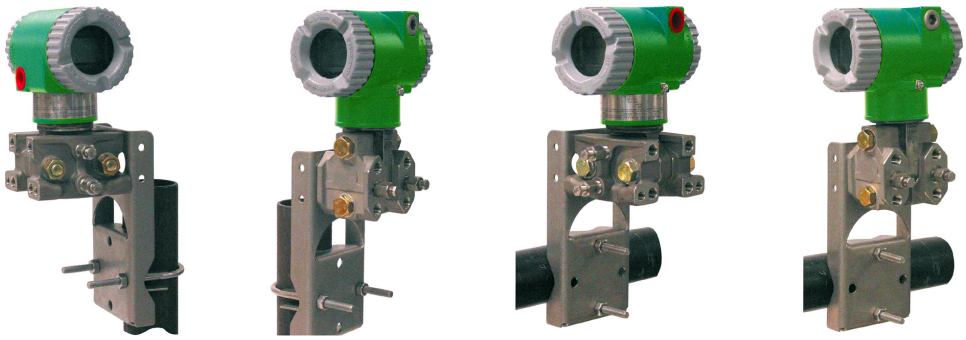


Figure 14 - Examples of DP Transmitters Mounted with a Standard Bracket



Universal Mounting Bracket

A DP transmitter with either traditional or LP2 low profile structure can be mounted in a myriad of positions to a vertical or horizontal DN 50 or 2 in pipe using a universal bracket. See the following figures for details and examples.

Secure the mounting bracket to the transmitter using the two long or four short screws provided. Mount the bracket to the pipe. The mounting bracket can also be used for wall mounting by securing the bracket to a wall using the U-bolt mounting holes.

Figure 15 - Universal Bracket Detail

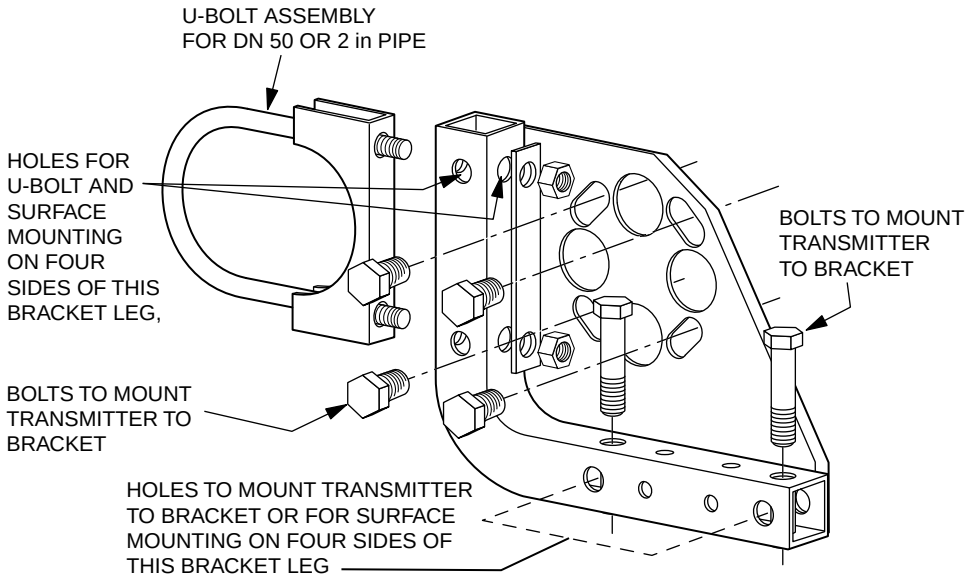


Figure 16 - Mounting a Traditional Structure DP Transmitter with a Universal Bracket

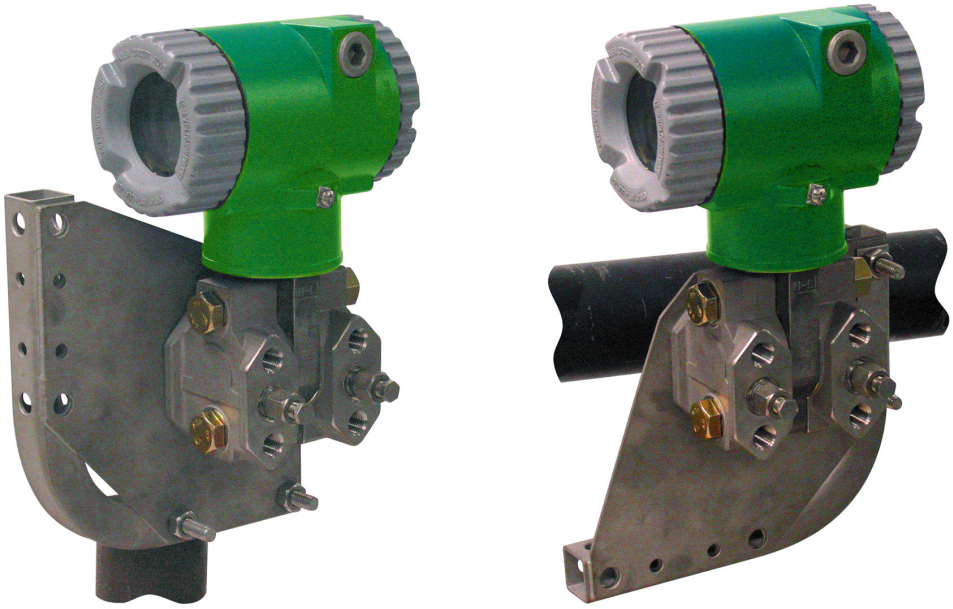


Figure 17 - Mounting a LP2 Structure DP Transmitter to a Vertical Pipe with a Universal Bracket

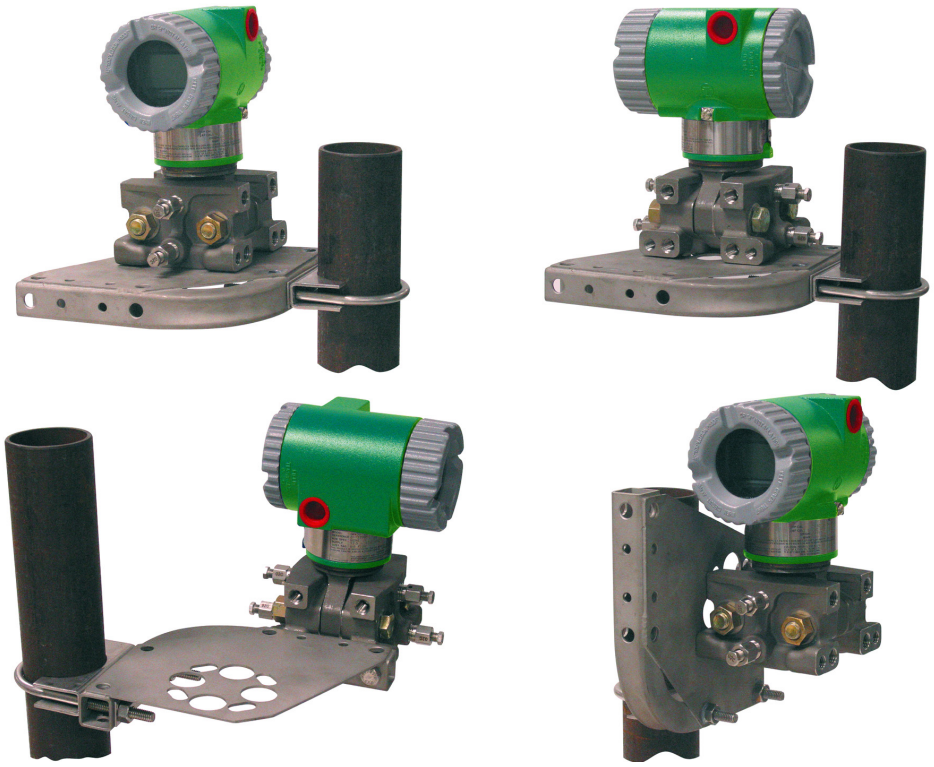


Figure 18 - Mounting a LP2 Structure DP Transmitter to a Horizontal Pipe with a Universal Bracket

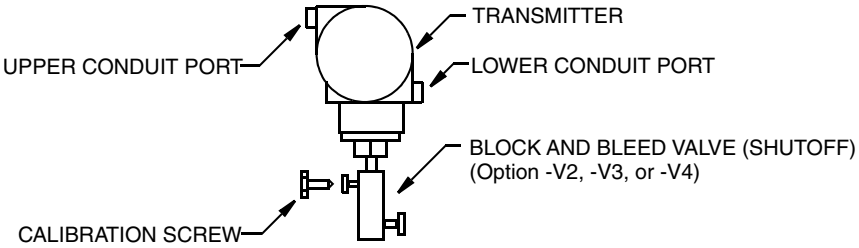
Typical Piping for Absolute and Gauge Pressure Transmitters

Piping for Direct Connect AP and GP Transmitters

The next figure shows a typical piping application for direct connected transmitters. Calibration supply pressure can be applied via a calibration screw. The lower conduit port can be used as a drain for moisture buildup in terminal compartment.

- The use of snubbers is recommended in installations that are prone to high levels of fluid pulsations.
- Pressure transmitters mounted directly to process piping or a pressure vessel may require the use of a shutoff valve (shown) to comply with the requirements of ASME Power Piping Code B31.1 and Chemical and Petroleum Piping Code B31.3.

Figure 19 - Typical Direct Connect Transmitter Piping



- Block and bleed valve maximum pressure:

  40 MPa (6,000 psi) at 38°C (100°F)

  25 MPa (4,000 psi) at 250°C (400°F)

- Calibration screw maximum pressure

  0.7 MPa (100 psi) with Poly-Flo fitting (F0101ES)

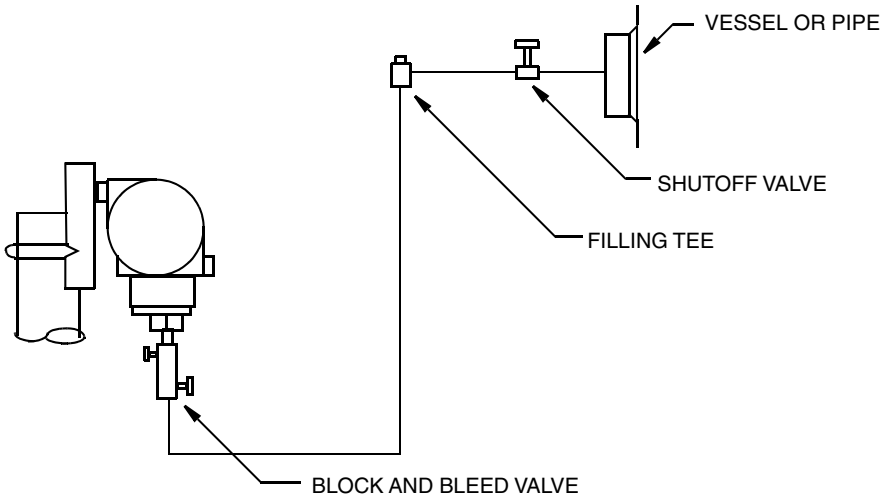
For hot process applications greater than the operative limits of your transmitter[27] — such as steam — additional piping is required to help protect the transmitter from the hot process as shown in the diagram. The piping is filled with water or process fluid. Mount the transmitter below the pressure connection at the pipe.

Although the transmitter is shown mounted vertically, you can also mount it horizontally unless sediment is present. The calibration tee is not required if a calibration screw is used for field calibrations.

If trapped vapor pockets cannot be tolerated in a liquid service and a horizontal process connection is used, install a pipe elbow and vertically position the transmitter with the housing *below* the process connection.

27. 121°C (250°F) for silicone fill fluid, or 82°C (180°F) for Fluorinert fill fluid

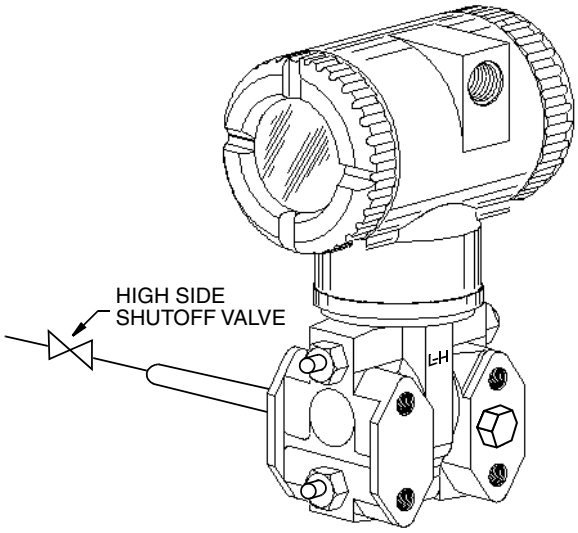
Figure 20 - Hot Process Piping for Direct Connect Transmitters



Piping for Biplanar AP and GP Transmitters

The next figure shows a typical piping application for biplanar transmitters.

Figure 21 - Typical Biplanar Transmitter Piping



To achieve pressure-tight joints, tighten NPT thread one-half to three turns past hand-tight.

Tighten bolts, plugs, and screws to approximately the following torque values:

- Process connector bolts: 61 N-m (45 lbf-ft)
- Drain plugs: 47 N-m (35 lbf-ft)
- Vent and drain screws: 6.8 N-m (5 lbf-ft)

NOTE: The use of snubbers is recommended in installations that are prone to high levels of fluid pulsations.

For hot process applications greater than the operative limits of your transmitter[28] — such as steam — additional piping is required to help protect the transmitter from the

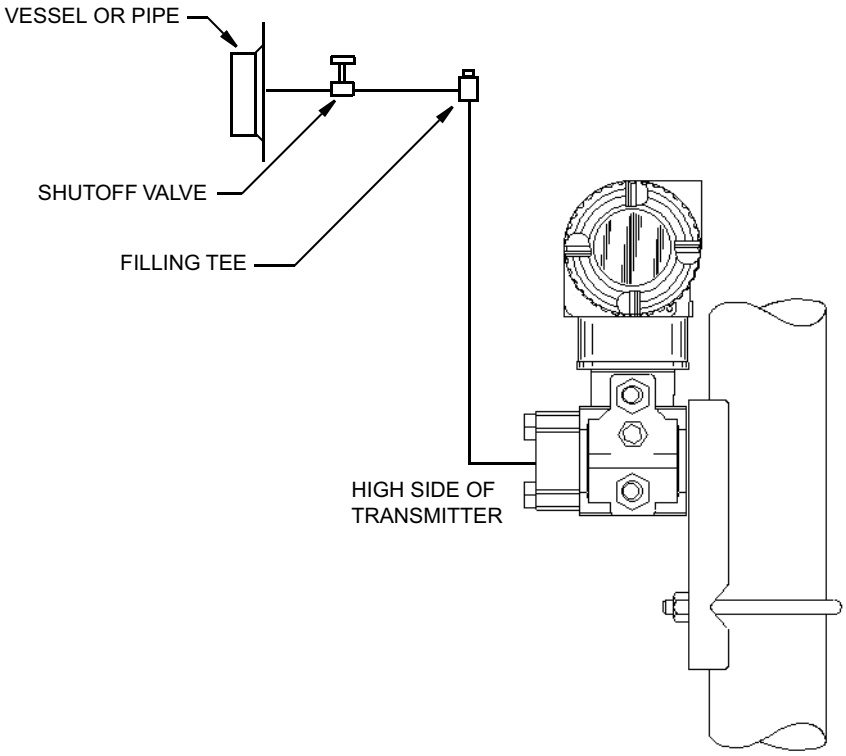
28. 121°C (250°F) for silicone fill fluid, or 82°C (180°F) for Fluorinert fill fluid.

hot process as shown in the diagram. The piping is filled with water or process fluid. Mount the transmitter below the pressure connection at the pipe.

Although the transmitter is shown mounted vertically, you can also mount it horizontally unless sediment is present. The calibration tee is not required if a calibration screw is used for field calibrations.

If trapped vapor pockets cannot be tolerated in a liquid service and a horizontal process connection is used, install a pipe elbow and vertically position the transmitter with the housing *below* the process connection.

Figure 22 - Hot Process Piping for Biplanar Transmitters



Additional Steps for Differential Pressure Transmitter Installation

Venting and Draining — Traditional Structure

Sensor cavity venting and draining is provided for both vertical and horizontal mounting.

- For vertically mounted units, draining is via a vent and drain screw. Venting is possible with side vents (option -V).
- For horizontally mounted units, the unit is self-draining. Venting is via a vent and drain screw.

Figure 23 - Vertical Mounting — Cavity Draining

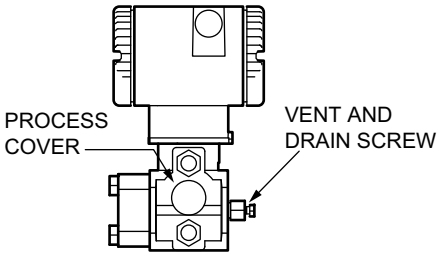


Figure 24 - Vertical Mounting — Cavity Venting

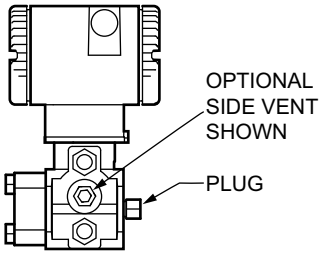
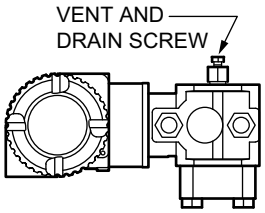


Figure 25 - Horizontal Mounting — Cavity Venting



Venting and Draining — LP1 Low Profile Structure

Sensor cavity venting and draining is provided for both vertical and horizontal mounting.

- For vertically mounted units, the transmitter is self-draining. Venting is via a vent and drain screw.
- For horizontally mounted units, the transmitter can simply be turned over (rotated 180 degrees) to orient the high and low pressure sides in the preferred locations. There is no need to unbolt the process covers.

If the transmitter is connected with a length of impulse piping, such piping should slope up to the transmitter for gas applications, or down for liquid applications.

Figure 26 - Vertical Mounting — Cavity Venting

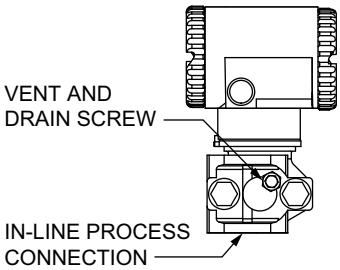
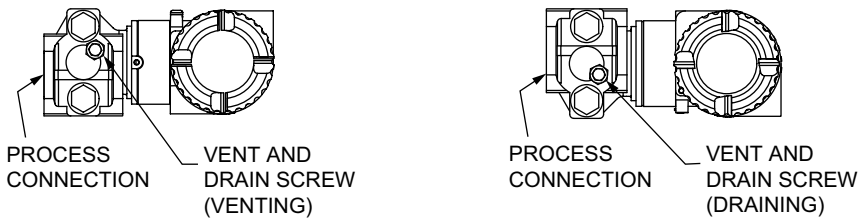


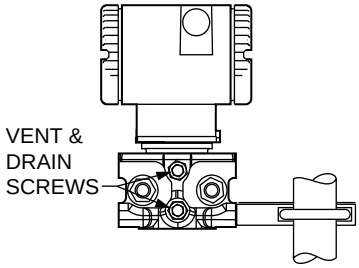
Figure 27 - Horizontal Mounting — Cavity Venting and Draining



Venting and Draining — LP2 Low Profile Structure

The LP2 low profile structure has a full-featured vent and drain design with separate vent and drain screws positioned in each cover for complete venting and draining from the sensor cavity.

Figure 28 - Cavity Venting and Draining



Installation of Flow Measurement Piping

Refer to the diagrams for typical installations with horizontal and vertical process pipes.

The transmitters are shown below the level of the pressure connections at the pipe (usual arrangement, except for gas flow without a seal liquid), and with filling tees in the lines to the transmitter (for a seal liquid).

If the process fluid being measured must not come into contact with the transmitter, the transmitter lines must be filled with a suitable seal liquid as described in Filling the System with Seal Liquid, page 38. In such a case, mount the transmitter below the level of the pressure connections at the pipe. With steam flow, the lines are filled with water to help protect the transmitter from the hot steam. The seal liquid (or water) is added to the lines through the filling tees. To help prevent unequal heads on the transmitter, the tees must be at the same elevation, and the transmitter must be mounted vertically as shown. If a seal liquid is not required, elbows can be used in place of the tees.

Tighten drain plugs and optional vent screws to 20 N-m (15 lbf-ft). Tighten the four process connector bolts to a torque of 61 N-m (45 lbf-ft).

The low and high pressure sides of the transmitter are identified by an L-H marking on the side of the sensor above the label.

With medium viscosity seal liquids and/or long transmitter lines, use larger valve sizes.

- With a **horizontal** line, pressure connections at the pipe should be at the side of the line. However, with gas flow without a seal liquid, connections should be at the top of the line.

- With a **vertical** line, flow should be upwards.
- For **liquid** or **steam** flow, the transmitter should be mounted lower than the pressure connections at the pipe.
- For **gas** flow *without* a seal liquid, the transmitter should be mounted higher than the pressure connections at the pipe.
- For **gas** flow *with* a seal liquid, the transmitter should be mounted lower than the pressure connections.
- It is recommended to use snubbers in installations prone to high levels of fluid pulsations.

Figure 29 - Example of Horizontal Process Line Installation

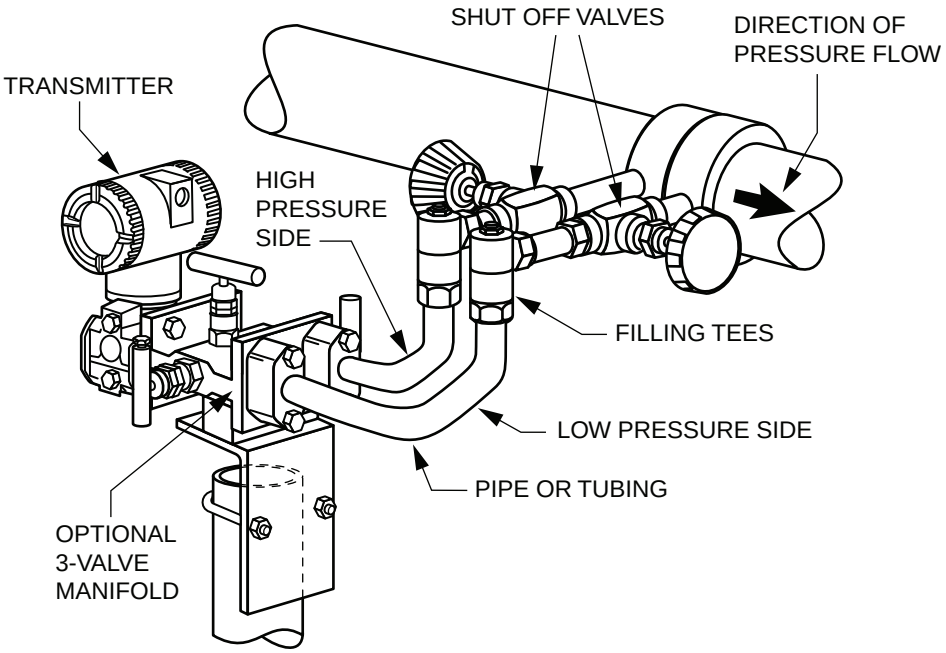
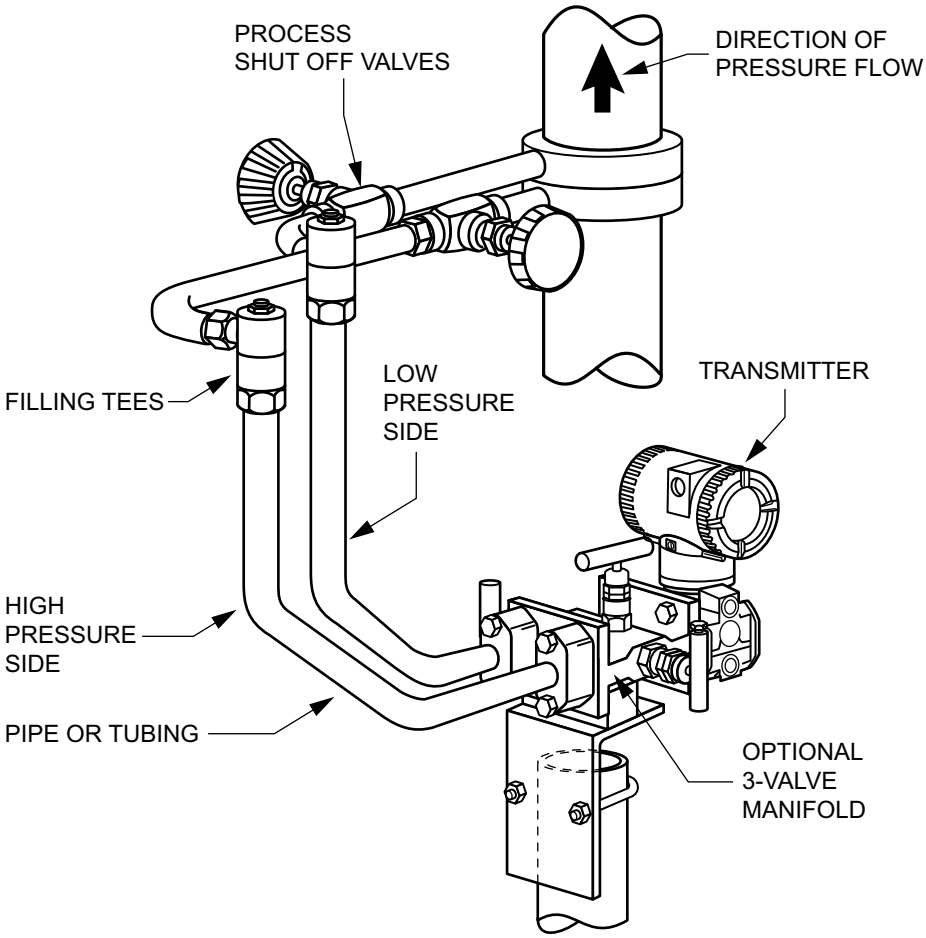


Figure 30 - Example of Vertical Process Line Installation



Filling the System with Seal Liquid

If the process fluid being measured must not come into contact with the transmitter, the transmitter lines must be filled with a suitable seal liquid as follows:

NOTICE

POTENTIAL EQUIPMENT DAMAGE AND PROCESS FLUID CONTAMINATION

To help prevent loss of seal liquid and contamination of process fluid, never open both process shutoff valves and manifold shutoff valves if the bypass valve is open.

Failure to follow these instructions can result in equipment damage and process fluid contamination.

1. If the transmitter is in service, follow the procedure in Taking a Differential Pressure Transmitter out of Operation, page 46.
2. Close both process shutoff valves.
3. Open all three valves on the 3-valve manifold.
4. Partially open the vent screws on the transmitter until all air has been forced out of the transmitter body and lines. Close the vent screws.
5. Refill the tee connections. Replace the plugs and close the bypass valve. Check for leaks.

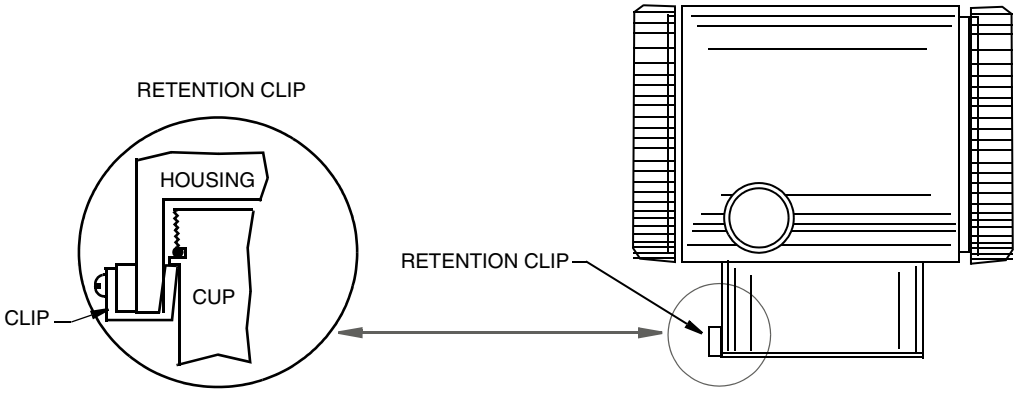
6. Follow the procedure in Putting a Differential Pressure Transmitter into Operation, page 46.

Positioning the Housing

The transmitter housing (topworks) can be rotated up to one full turn in the counterclockwise direction when viewed from above for optimum access to adjustments, display, or conduit connections. The housing has a retention clip that helps prevent rotating the housing to an excessive depth of housing/sensor thread engagement.

NOTICE
POTENTIAL VIBRATION EFFECTS If you remove the housing for maintenance, do not over-tighten it upon reassembly. Hand-tighten it to the bottom of the threads, then back off a half-turn counterclockwise to avoid bottoming out the housing to the sensor. **Failure to follow these instructions can result in amplified vibration effects.**

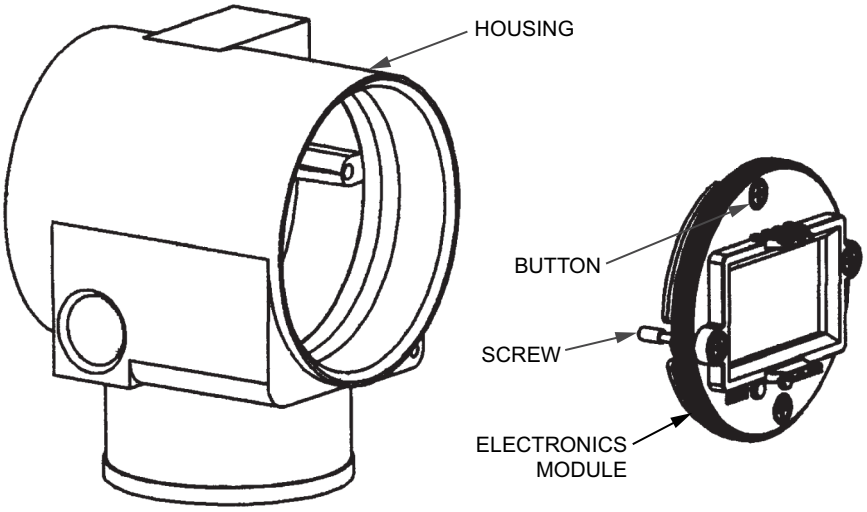
Figure 31 - Housing Clip Location



Positioning the Display

The display can be rotated within the housing at 90° increments to any of four positions. To do this, refer to the diagram and follow these steps.

Figure 32 - Positioning the Display



NOTICE

POTENTIAL EQUIPMENT DAMAGE

Do not turn the display more than 180° in any direction. Doing so can damage its connecting cable.

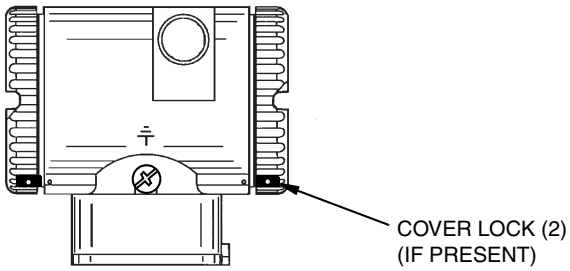
Failure to follow these instructions can result in equipment damage.

1. Turn off the power source to the transmitter.
2. Turn the cover lock screw (if applicable) clockwise to disengage the lock.
3. Remove the electronics compartment cover by rotating it counterclockwise.
4. Remove the electronics module by unscrewing the two screws closest to the sides of the transmitter and pulling out the module.
5. If turning the display 180°, turn the module and return it to the housing by reversing Step 4.
6. If turning the display 90° in either direction:
   a. Remove the two plastic buttons (plugs) by pushing them out from the back of the module.
   b. Unscrew the two screws from the module, then rethread them into the module at 90° from their original position.
   c. Insert the two plastic buttons into the two open screw holes in the module.
   d. Return the module to the housing by reversing Step 4.
7. Reinstall the cover onto the housing by rotating it clockwise to seat the o-ring into the housing. Continue to hand-tighten until the cover contacts the housing metal-to-metal.
8. If cover locks are present, lock the cover as described in Accessing Transmitter Field Terminals, page 42.
9. Restore power to the transmitter.

Cover Locks

Housing cover locks are provided as standard with certain agency certifications and as part of the Custody Transfer Lock and Seal option. To lock the covers, unscrew the locking pin until approximately 6 mm (0.25 in) shows, lining up the hole in the pin with the hole in the housing. Insert the seal wire through the two holes, slide the seal onto the wire ends, and crimp the seal.

Figure 33 - Cover Lock Location



Wiring

The installation and wiring of your transmitter must conform to local code requirements.

⚠WARNING

EXPLOSION HAZARD

Flameproof certification requires that when equipment is intended to be used in an explosive atmosphere caused by the presence of combustible dust, cable entry devices and blanking elements must provide a degree of ingress protection of at least IP6X. They must be suitable for the conditions of use and correctly installed.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTICE

HAZARD OF ELECTRICAL TRANSIENT OR SURGE

Use transient/surge protection in installations prone to high levels of electrical transient and surges.

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

NOTICE

POTENTIAL EQUIPMENT DAMAGE

The Transmitter DC Power Port must be connected to a local power source and must not be connected to a DC Power Distribution Network.

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

Conduit/Cable Gland Connections

The electronics housing has two conduit/cable gland connections to allow access from either side of the housing. These connections are 1/2 NPT or M20 threads per your order. Use the correct threaded devices when making the connections. You can verify the type of thread with the ninth character after the dash in the model code on the data plate. The letter 1 or 3 indicate a 1/2 NPT thread; 5 or 6, an M20 thread. Refer to “Conduit Connection and Housing Material” in Absolute and Gauge Pressure Transmitters, page 85 or Differential Pressure Transmitters, page 96.

The housing comes with an agency approved threaded metal plug in one of the conduit holes and a plastic plug in the other. After you connect the conduit or cable gland, plug the unused hole with the metal plug.

⚠⚠WARNING

EXPLOSION HAZARD

To help prevent possible explosions and to maintain flameproof, explosionproof, and dust-ignitionproof protection, observe applicable wiring practices. Plug the unused conduit openings with approved conduit plugs. Both plug and conduit must engage a minimum of five full threads for 1/2 NPT connections; eight full threads for M20 connections.

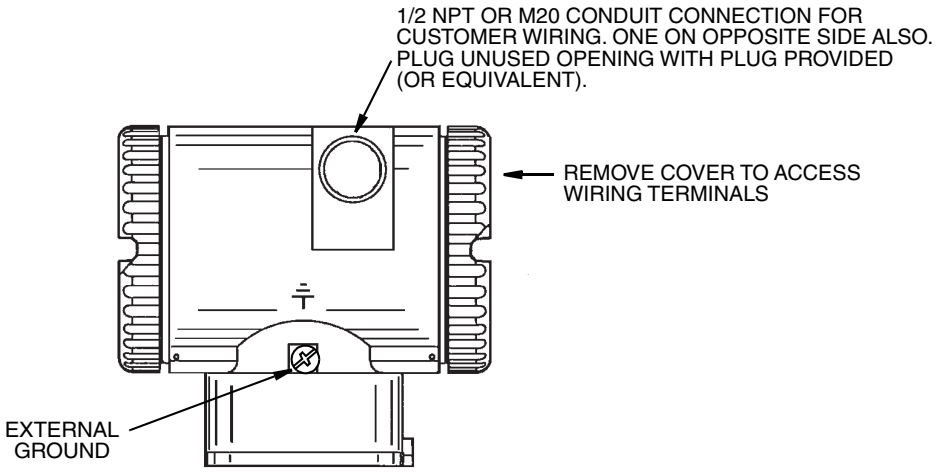
Failure to follow these instructions can result in death or serious injury.

NOTE: In North America, a seal is not required when installed with rigid conduit per requirements of the applicable electrical code. When using instrument cable approved for the hazardous location, a seal must be made with an approved cable gland or conduit seal per the requirements of the applicable electrical code.

Accessing Transmitter Field Terminals

For access to the field terminals, thread the cover lock (if present) into the housing to clear the threaded cover, and remove the cover from the field terminals compartment as shown.

Figure 34 - Accessing Field Terminals



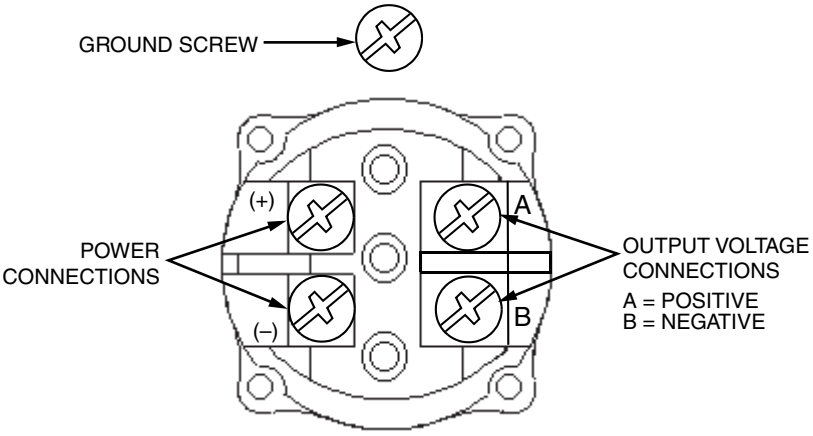
⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

ATEX and UKEX require that when equipment is intended to be used in an explosive atmosphere caused by the presence of combustible dust, cable entry devices and blanking elements must provide a degree of ingress protection of at least IP6X. They must be suitable for the conditions of use and correctly installed.

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

Figure 35 - Identification of Field Terminals



Wiring the Transmitter to a Control Loop

The transmitter is equipped with an internal ground connection within the field wiring compartment, and an external ground connection at the base of the electronics housing. To minimize galvanic corrosion, place the wire lead or terminal between the captive washer and the loose washer on the external ground screw. If shielded cable is used, ground the shield at the field enclosure only. Do not ground the shield at the transmitter.

Power Supply Voltage and Current

The power supply voltage across the transmitter input terminals can be any value between 9 V dc and 30 V dc . The power supply must be capable of providing at least 3 mA current under all conditions. Verify that the power supply loop load resistance and source impedance allow at least 9 V dc across the transmitter input terminals with a current draw of 3 mA.

Output Load

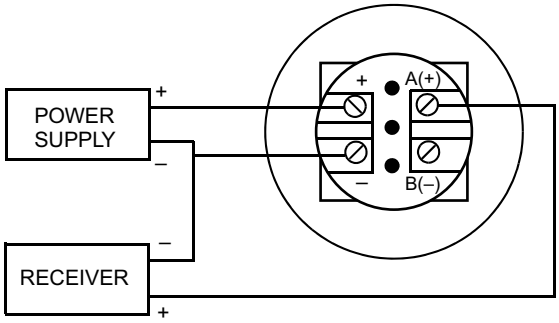
The receiver input impedance can be any value between 1 and Open Circuit.

Three- or Four-Wire Connections

The transmitter is supplied with a four-wire terminal block with the two negative terminals (“-” and “B”) electrically connected internally. This means that the transmitter can be wired with either three wires for wiring economy, or four wires for maximum accuracy.

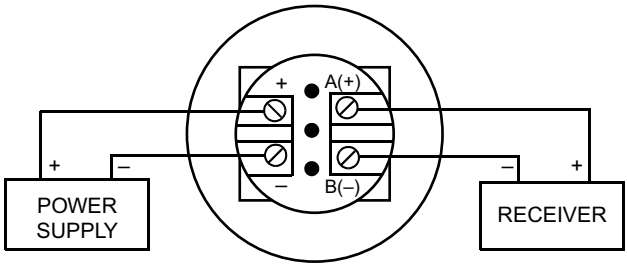
For relatively short wiring runs having low resistance, three-wire connections can be used to minimize wiring costs. However, a voltage drop in the common lead carrying the power supply current causes an error in the 1 to 5 V dc signal.

Figure 36 - Three-Wire Connection



For wiring runs with high resistance (due to long lengths or other reasons) or for maximum accuracy, a four-wire connection can be used to provide input-output isolation. With four-wire configuration, voltage drop in the power supply loop does not affect measurement accuracy.

Figure 37 - Four-Wire Connection



Wiring Instructions

To wire the transmitter, follow these steps:

1. Turn the cover lock screw (if applicable) clockwise to disengage the lock.
2. Remove the field terminals compartment cover by rotating it counterclockwise.
3. Run the supply voltage and output wires (0.50 mm^2 or 20 AWG, typical) through one of the transmitter conduit connections. If a four-wire connection is used, use twisted single pair on the output side to help protect the 1 to 5 V dc output from electrical noise.

   NOTE: Do not run the transmitter wires in the same conduit as the mains (ac power) wires.
4. If shielded cable is used, ground the shield at the receiver only. Do not ground the shield at the transmitter. Cut and/or tape the shield so that it cannot contact the metal housing.

5. Plug the unused conduit connection.

⚠⚠WARNING

EXPLOSION HAZARD

To help prevent possible explosions and to maintain flameproof, explosionproof, and dust-ignitionproof protection, observe applicable wiring practices. Plug the unused conduit openings with approved conduit plugs. Both plug and conduit must engage a minimum of five full threads for 1/2 NPT connections; eight full threads for M20 connections.

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

6. Connect a ground wire to the ground terminal in accordance with local practice.

NOTICE

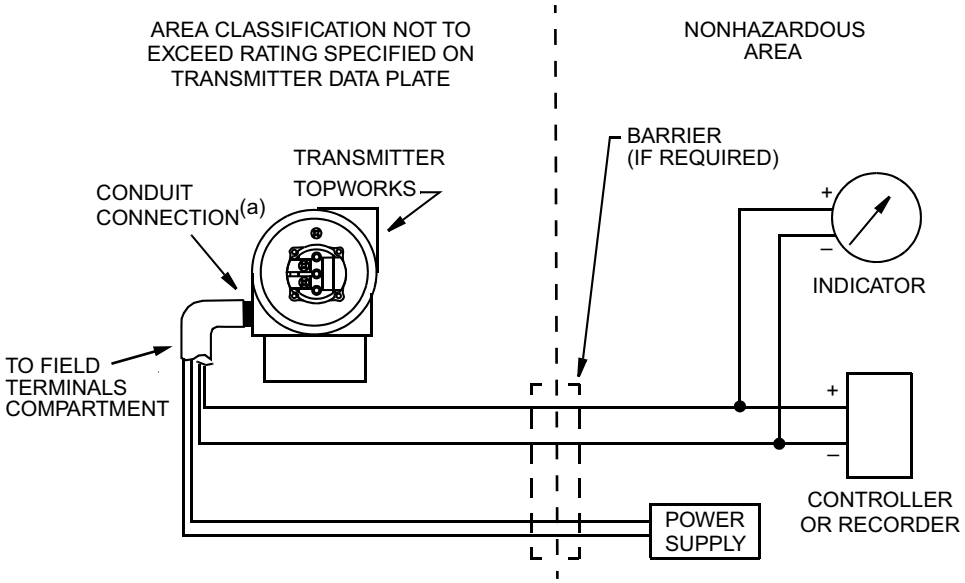
POTENTIAL REDUCED PERFORMANCE OR EQUIPMENT DAMAGE

If the output signal circuit must be grounded, it is preferable to ground it at the negative terminal of the receiver. To avoid errors resulting from ground loops or the possibility of short-circuiting groups of instruments in a loop, there should be only one ground in a loop.

Failure to follow these instructions can result in reduced performance or equipment damage.

7. Connect the power supply and receivers (such as controllers, recorders, indicators) as shown in Three-Wire Connection, page 44 and Four-Wire Connection, page 44. Typical loop wiring is shown in the next diagram.

Figure 38 - Loop Wiring (Four-Wire Connection Shown)

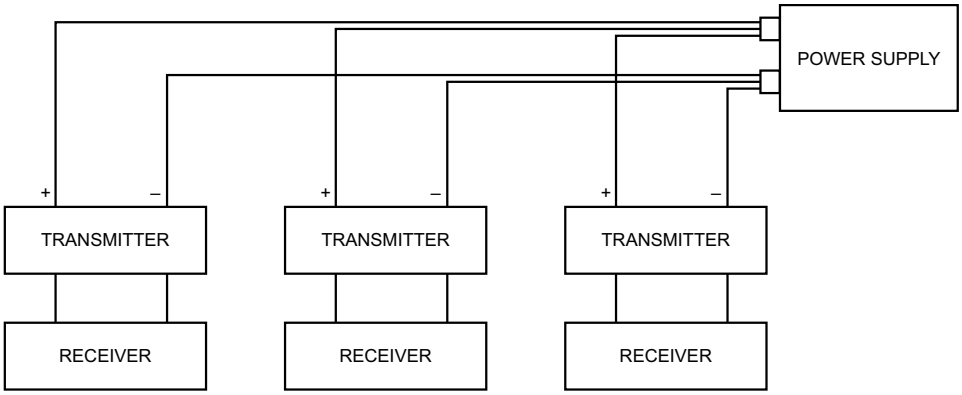


(a) Run conduit down to avoid moisture buildup in field terminals compartment.

8. Reinstall the cover onto the housing by rotating it clockwise to seat the o-ring into the housing, then continue to hand-tighten until the cover contacts the housing metal-to-metal. If cover locks are present, lock the cover as described in Cover Locks, page 41.

9. To wire additional transmitters to the same power supply, repeat these steps for each transmitter. The setup for multiple transmitters connected to a single power supply is shown in the next diagram.

Figure 39 - Wiring Several Transmitters to a Common Power Supply (Four-Wire Connection Shown)



10. For installations with long runs, using two twisted-pair cables with one pair connected to the power supply terminals and one pair connected to the output terminals is recommended. The two twisted pairs can be in individual shields or a common shield with the shield connected to the receiver. Do not connect the shield to the transmitter.

Putting a Differential Pressure Transmitter into Operation

This procedure explains how to sequence the valves in your flow measurement piping or optional bypass manifold to help ensure that your transmitter is not overranged and that seal liquid is not lost. Refer to the diagrams in Installation of Flow Measurement Piping, page 36.

NOTE: This procedure assumes that the process shutoff valves are open.

1. Close both the upstream and downstream transmitter connection valves.
2. Open the bypass valve.
3. Slowly open the upstream transmitter connection valve. Allow the transmitter's output to stabilize.
4. Close the bypass valve.
5. After installing the transmitter, slowly open the upstream transmitter connection valve.

Taking a Differential Pressure Transmitter out of Operation

This procedure explains how to sequence the valves in your flow measurement piping or optional bypass manifold to help ensure that your transmitter is not overranged and that seal liquid is not lost. Refer to the diagrams in Installation of Flow Measurement Piping, page 36.

NOTE: This procedure assumes that the process shutoff valves are open.

1. Close both the upstream and downstream transmitter connection valves.
2. Open the bypass valve.

3. Slowly open the downstream side vent screw on the transmitter to release pressure before disconnecting lines.

> **⚠WARNING**
>
> **RISK OF EXPOSURE**
>
> When venting pressure from the transmitter, wear suitable protective equipment to prevent possible injury from process material, temperature, or pressure.
>
> **Failure to follow these instructions can result in death or serious injury.**

4. Remove the transmitter, if applicable.

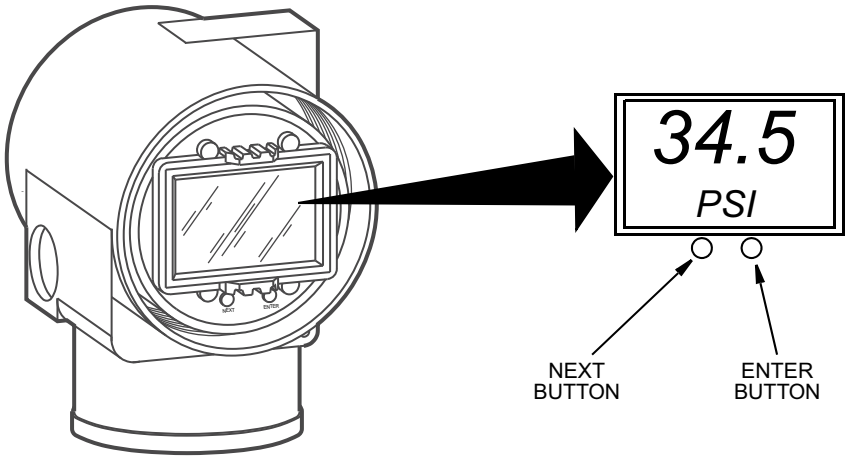
Operation

The local display provides local indication of measurement information on two lines. The upper line displays five digits (four digits when a minus sign is needed); the lower line displays seven alphanumeric characters.

During normal transmitter operation, the display shows the primary measurement (M1).

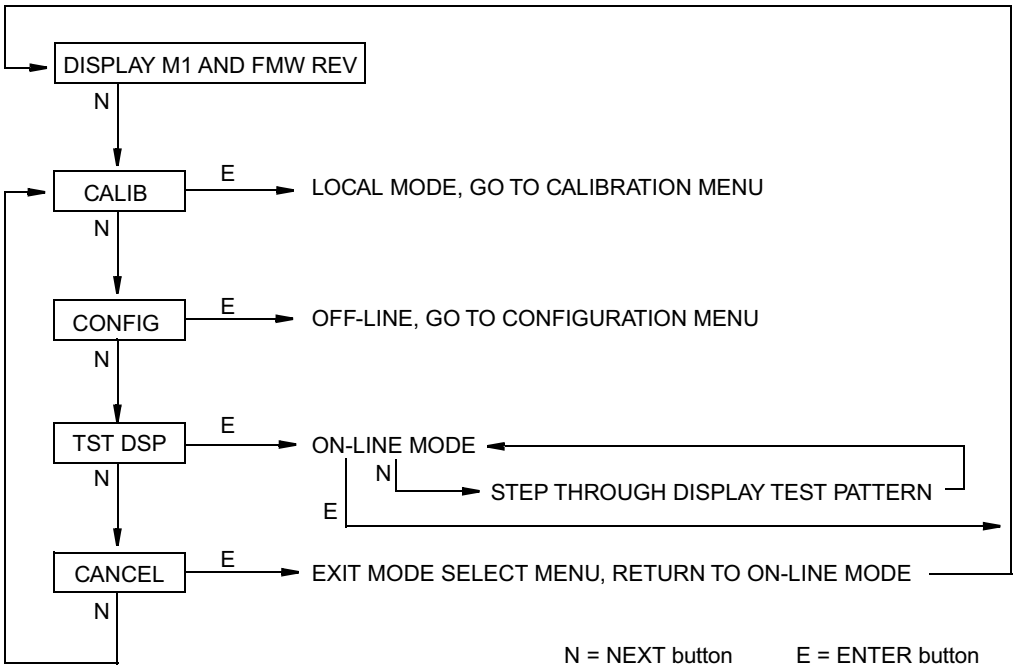
- If the displayed measurement is more than five digits, "**99999**" flashes on the display. Selecting different units (EGUs) may result in a shorter measurement that can fit on the display.
- For AP transmitters, "**a**" is typically added to the unit name on the display (for example, **psia** or **mmHga**). However, if the unit name is six characters long, the "**a**" is not added.

Figure 40 - Local Display



The display and two-button keypad on the front of the transmitter also provide access to calibration, configuration, and other functions. You can access these operations by means of a menu system. To access the multi-level menu from the transmitter's normal operating mode, press **NEXT**. To exit this menu, cancel your calibration or configuration, and return to the normal operating mode at any time, navigate to **Cancel** and press **ENTER**.

Figure 41 - Top Level Menu



Entering Strings and Numeric Values

To enter strings or numeric values, follow these steps:

1. At the appropriate prompt, press the **ENTER** button. The display shows the last (or default) value with the first character flashing.
2. Use the **NEXT** button to select the first character, then press **ENTER**.

   Your selection is entered. The next character flashes.
3. Repeat the previous step until you have entered all five characters. If your string or value has fewer than five characters, use leading or trailing zeroes in the remaining positions, if required.

   When you have entered the fifth character, the display prompts you to place the decimal point.
4. Select the desired decimal point location by pressing **NEXT** until the decimal point is placed as desired. Press **ENTER**.

   NOTE:

   - You cannot place the decimal point immediately after the first digit. For example, you cannot enter a value as 1.2300; you must enter it as 01.230.
   - The decimal position is identified by flashing, except at the position after the fifth digit. At that position, a whole number is represented, and the decimal point is assumed.

   The display advances to the next menu item.

Table 10 - Permitted Characters for the Local Display

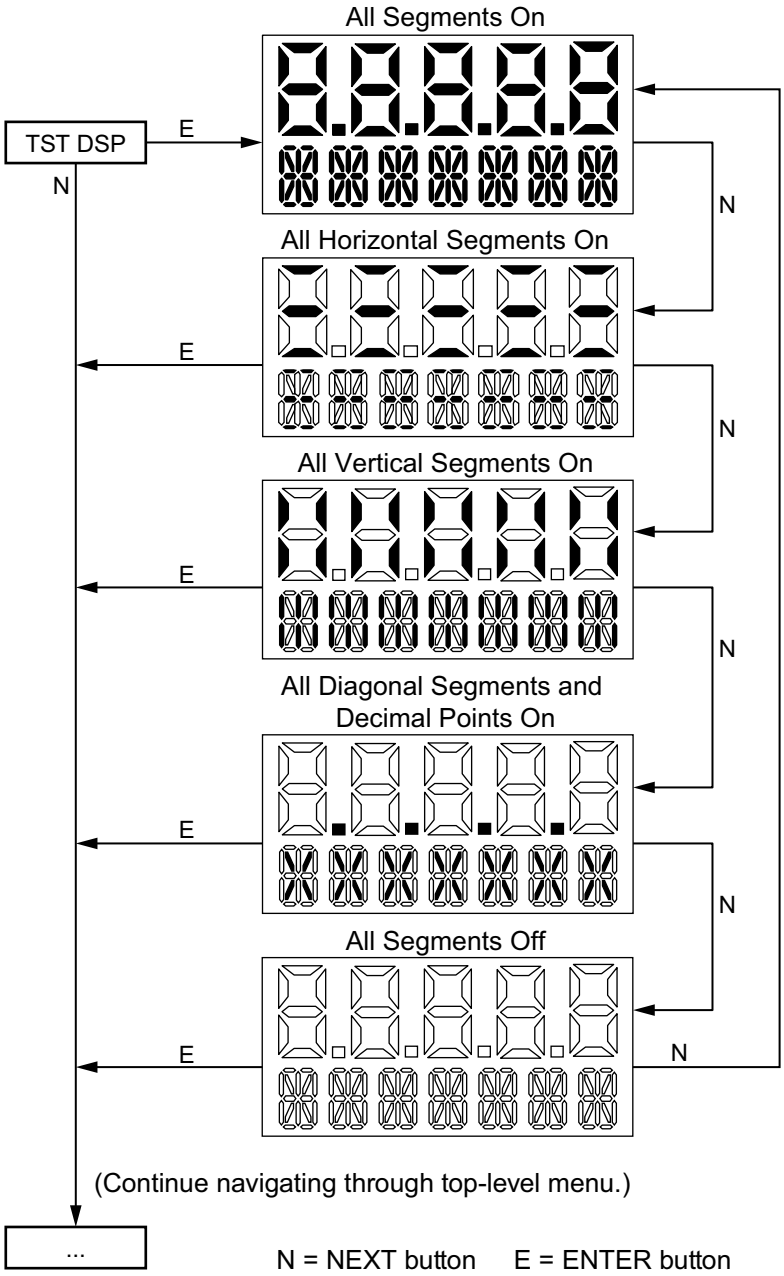
Alphanumeric Characters		Numeric Characters
		- (minus sign)
		.
A-Z (uppercase)	*	0
a-z (lowercase)	+	1
[	- (hyphen)	2
]	. (period)	3
\	/	4
^	0-9	5
_ (underscore)	<	6
(space)	>	7
%	=	8
		9

Testing the Display

You can use the multi-level menu system to test the transmitter display. Follow these steps:

1. From the transmitter's normal operating mode, press **NEXT** to access the transmitter's top level menu.
2. Press **NEXT** to navigate to **TST DSP** and press **ENTER**. The display shows the first test segment pattern.
3. Step through the five test patterns by pressing **NEXT** repeatedly. Refer to the diagram.
4. Exit the display test by pressing **ENTER**.

Figure 42 - Display Test Segment Patterns



Messages

The following operation-related messages may appear on the display.

Message	Description
BAD IN1	Normalized raw pressure input outside of limits. • Extreme overrange or underrange input; correct input condition. • Bad calibration; recalibrate transmitter. • Bad sensor connection; check electronics module connection to sensor. • Inoperative sensor.
BAD IN3	Normalized raw temperature input outside of limits. • Bad sensor connection; check electronics module connection to sensor. • Inoperative sensor.
BAD KEY	Invalid keypress detected. • Pressing **ENTER** when transmitter is online. • Pressing **NEXT** or **ENTER** while WAIT is displayed; try again after WAIT message has cleared.
FDB BAD	CRC error detected in Factory Database on startup. • Incorrect user database; replace sensor. • Bad sensor connection; check electronics module to sensor. • Inoperative sensor.
OVR RNG	Normalized calculation result greater than 2% above calibrated span. • Overrange input; correct input condition. • Bad span calibration; recalibrate span. • Bad sensor connection; check electronics module to sensor connection. • Inoperative sensor.
UDB BAD	CRC error detected in User Database on startup. • Incorrect user database; all configuration and calibration information has been overwritten. Use the display and the menu buttons to verify and/or update every configuration setting. Also, perform all calibrations again before placing the transmitter back into service. • Bad sensor connection; check electronics module to sensor. • Inoperative sensor.
UND RNG	Normalized calculation result greater than 2% below calibrated zero. • Underrange input; correct input condition. • Bad zero calibration; recalibrate zero. • Bad sensor connection; check electronics module to sensor connection. • Inoperative sensor.

Configuration

You can configure the transmitter by accessing the menu system using the **ENTER** and **NEXT** buttons on the local display.

If your transmitter was ordered with optional feature -C2, the factory default values were customized.

Configuration Using the Display

To access configuration mode from normal operating mode, repeatedly press the **NEXT** button until the display reads **CONFIG**. Press the **ENTER** button to select **CONFIG**. The display shows the first item in the Configuration menu.

NOTE:

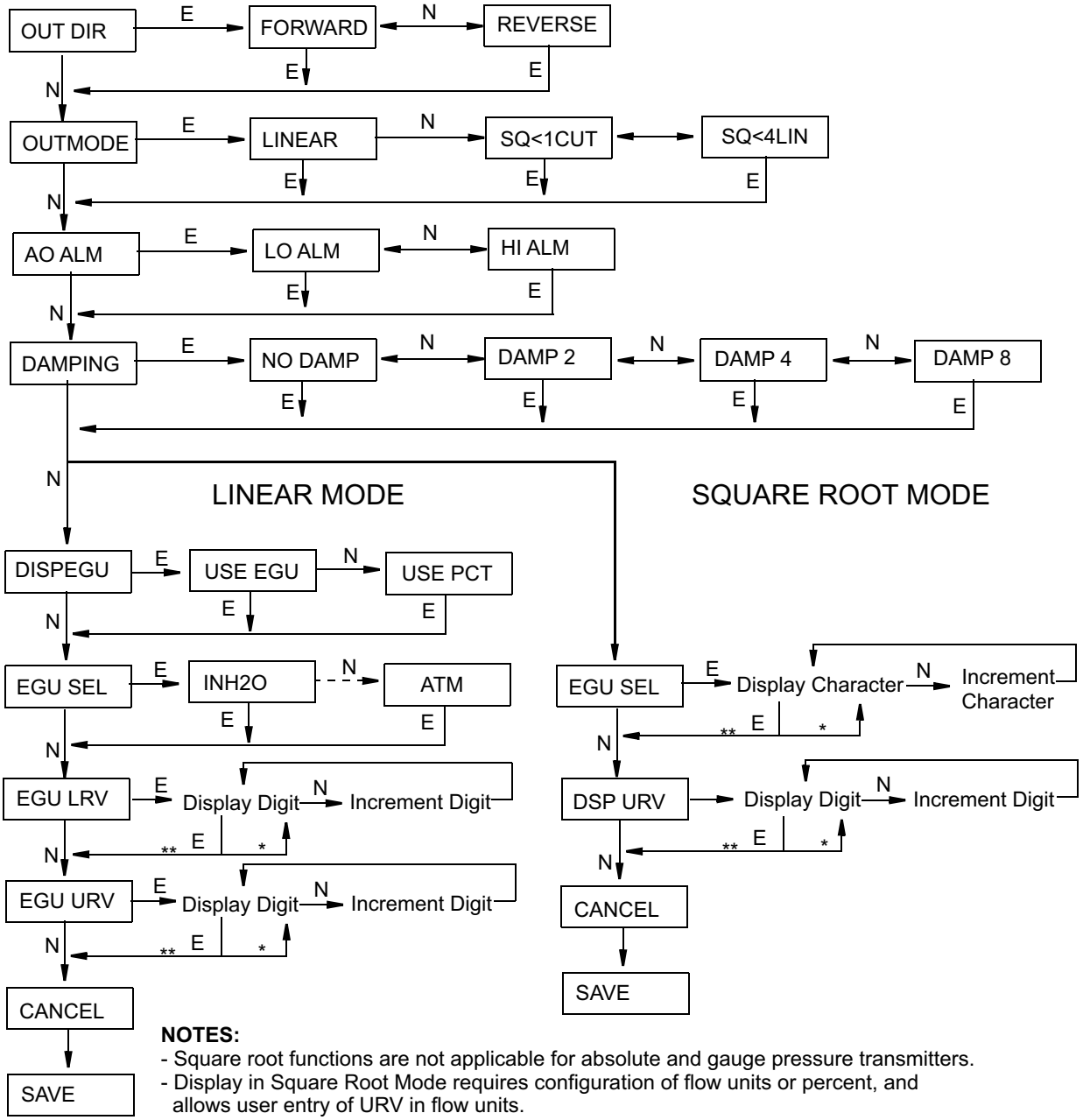
- The standard factory default configuration is not used if model code option -C2 was specified for the order. Option -C2 is a custom factory configuration to user specifications.
- During configuration, a single change could affect several parameters. For this reason, if you make a mistake, review the entire database. Or, use the **CANCEL** feature to restore the transmitter to its starting configuration and begin again.

Proceed to configure your transmitter by using the **NEXT** and **ENTER** buttons to make your selections. Refer to the menu structure diagrams and accompanying table for guidance.

At any time during the configuration, you can **CANCEL** your changes and return to online mode, or **SAVE** your new configuration.

Configuration Menu Structure

Figure 43 - Configuration Menu Structure



NOTES:
- Square root functions are not applicable for absolute and gauge pressure transmitters.
- Display in Square Root Mode requires configuration of flow units or percent, and allows user entry of URV in flow units.
- Display in Linear Mode may be pressure units of calibrated range or percent (no custom units).

*If character is not the last position on the display line, advances to the next character.
**If character is the last position on the display line, advances to the next menu item.

Configuration Menu Items

In general, use the **NEXT** button to advance to the next item, and the **ENTER** button to select the current item.

Table 11 - Configuration Menu Items

Item	Description	Default
OUT DIR	The 1 to 5 V output direction can be set to forward or reverse. To configure the output direction, navigate to the **OUT DIR** menu selection and press **ENTER**. Use the **NEXT** button to select **FORWARD** (1 to 5 V) or **REVERSE** (5 to 1 V), and press **ENTER**.	Forward
OUTMODE	For DP transmitters, to configure the mode of the output, navigate to the **OUTMODE** menu selection and press **ENTER**. Use the **NEXT** button to select **LINEAR**, **SQ<1CUT** (square root with cutoff below 1% of calibrated pressure range), or **SQ<4LIN** (square root with dual slope linear below 4% of calibrated pressure range) and press **ENTER**. If you wish both the output and display to be in square root, it is necessary to first configure **OUTMODE** as **LINEAR** and follow the Linear Mode path to establish the pressure LRV and URV. Then go back and configure **OUTMODE** as one of the square root mode selections and follow the Square Root mode path.	Linear
AO ALM	The 1 to 5 V alarm mode can be configured so that the transmitter's output will be set to either the high value or low value under specific conditions. Navigate to the **AO ALM** menu selection and press **ENTER**. Use the **NEXT** button to select **LO ALM** or **HI ALM** and press **ENTER**.	**HI ALM**
DAMPING	Damping can be set to 0, 2, 4, or 8 seconds. To configure damping, navigate to the **DAMPING** menu selection and press **ENTER**. Use the **NEXT** button to select the desired damping value, then press **ENTER**.	**NO DAMP**
DISPEGU	If the primary output is in linear mode, this parameter allows you to configure the display to show engineering units or percent of span. (If the primary output is a square root flow calculation, **DISPEGU** is not available.) To configure the display to show engineering units or percent, navigate to the **DISPEGU** menu selection and press **ENTER**. Use the **NEXT** button to select **Use EGU** or **Use Pct** and press **ENTER**.	Engineering units
EGU SEL	To configure engineering units for your calibrated range and display, go to **EGU SEL** with the **NEXT** button and press **ENTER**. Depending on how **OUTMODE** is configured, the remainder of the configuration takes one of two paths: • If **OUTMODE** was configured as **LINEAR**, use the **NEXT** button to select one of the following units: inH2O, inHg, ftH2O, mmH2O, mmHg, psi, bar, mbar, g/cm2, kg/cm2, Pa, kPa, MPa, torr, atm and press **ENTER**. The display advances to **EGU LRV**. • If **OUTMODE** was configured as **SQ<1CUT** or **SQ<4LIN**, you can specify any custom display unit up to seven characters in length. The display shows **Percent** with the first character flashing. ◦ Create your new unit name (see Entering Strings and Numeric Values, page 49). If the unit name has fewer than seven characters, use blanks for the remaining positions. When you have configured the seventh positions, the display advances to **DSP URV**.	Linear: Per sales order; Square Root: Percent
EGU URV	This parameter allows you to configure the upper range value of the measurement. To edit the upper range value of the measurement, navigate to the **EGU URV** menu selection and press **ENTER**. Define your URV. (See Entering Strings and Numeric Values, page 49.)	Per sales order
EGU LRV	This parameter allows you to configure the lower range value of the measurement. To edit the lower range value of the measurement, navigate to the **EGU LRV** menu selection and press **ENTER**. Define your LRV. (See Entering Strings and Numeric Values, page 49.)	Per sales order
DSP URV	This parameter allows you to configure the display URV in the units specified. Press **ENTER** at the prompt **DSP URV**and define your URV for the display. (See Entering Strings and Numeric Values, page 49.)	Per sales order

Messages

The following configuration-related messages may appear on the display.

Message	Description
BAD LRV	Entered value for **EGU LRV** is outside sensor limits.
BAD URV	Entered value for **EGU URV** is outside sensor limits.
BAD RNG	Recalculation of turndown during **EGU LRV** or **EGU URV** resulted in an out-of-range value. Entered values for **EGU LRV** and/or **EGU URV** were either too close together or too far apart.
RNG>EGU	Recalculation of display value for **EGU LRV** or **EGU URV** resulted in an out-of-range value. Selection of (linear) EGUs caused display to overflow.
LRVNOT0	Attempted to change mode from **LINEAR** to **SQ<1CUT** or **SQ<4LIN** when **EGU LRV** is not 0.0.

Reranging the Transmitter

The transmitter can be reranged without the application of pressure.

- To do this for AP and GP transmitters, or for DP transmitters in linear mode, reconfigure **EGU LRV** and **EGU URV**.
- To rerange a DP transmitter being used in square root mode, follow these steps:

1. From the **CONFIG** menu, temporarily set **OUTMODE** to **LINEAR**.
2. If necessary, change the units in **EGU SEL** before proceeding.
3. Configure **EGU LRV** and then **EGU URV**. Save this configuration.
4. Set **OUTMODE** back to your choice of square root mode.
5. Change **EGU SEL** and **DSP URV**, if required. Save this configuration.

When **OUTMODE** is set in square root mode, the last saved pressure range that was set by entering **EGU LRV** and **EGU URV** in linear mode is always maintained.

Calibration

You can calibrate the transmitter by accessing the menu system using the **ENTER** and **NEXT** buttons on the display.

One-Point Calibration at LRV

A one-point offset calibration at LRV can be performed with the last two-point calibration enabled.

When a one-point calibration at LRV is performed, the offset adjustment applies to the last two-point calibration. The calibrated accuracy at the LRV point is adjusted and maintained.

Two-Point Field Calibration

The transmitters can be recalibrated to a specific LRV and URV.

NOTICE
POTENTIAL REDUCED PERFORMANCE The accuracy of the input pressure for field span calibration should be a minimum of four times better than the transmitter's reference accuracy specification. An inaccurate span pressure input typically results in degradation of transmitter performance from the factory calibrated state. **Failure to follow these instructions can result in reduced performance.**

Calibration Notes

- For best results in applications where high accuracy is required, rezero the transmitter output once it has stabilized at the final operating temperature.
- Zero shifts resulting from position effects can be eliminated by rezeroing the transmitter output.
- After calibrating, check the underrange and overrange output values to ensure that they extend beyond 1 and 5 volts, respectively.
- (DP transmitters only) When checking the zero reading of a transmitter operating in the square root mode, return the output to the linear mode. This eliminates an apparent instability in the output signal. Return the transmitter output to the square root mode after the zero check is complete.
- Each transmitter is factory calibrated to either a specified or a default calibrated range. This calibration optimizes the accuracy of the internal digital value of pressure over that range. If no range is specified, the default range is zero to the sensor upper range limit (URL).
- The internal digital value of pressure can be shown on the display and converted to a 1 to 5 volt analog output signal.

- The transmitter database has configurable values for both lower range value (LRV) and upper range value (URV). These values are used for two functions:
  - Defining the calibrated range when using the pushbuttons for calibration:
    - When either **CAL LRV** or **CAL URV** is initiated from the pushbuttons, the transmitter expects that the pressure applied at the time the button is pressed is equal to the LRV or URV value, respectively.
    - This function trims the internal digital value of pressure; that is, it performs a calibration based on the application of accurate pressures equal to the values entered for LRV and URV in the transmitter database.
    - This function also sets the 1 and 5 volt output points; that is, the 1 and 5 volt points that correspond to the values of LRV and URV in the database.
    - If the transmitter is configured for reverse range, the 5 volt and 1 volt points correspond to the LRV and URV, respectively.
  - Reranging without the application of pressure:
    - Since the transmitter continually determines an internal digital value of the measured pressure from the lower range limit (LRL) to the upper range limit (URL), the 1 and 5 volt output points can be assigned to any pressure values within the span and range limits without application of pressure.
    - The reranging function is accomplished by entering new database values for LRV and URV.
    - Reranging does not affect the calibration of the transmitter; that is, it does not affect the optimization of the internal digital value of pressure over the calibrated range.
    - If the reranged LRV and URV are not within the calibrated range, the measured values may not be as accurate as when they are within the calibrated range.
- (DP transmitters only) LRV is always zero when the transmitter is configured for square root mode.
- The internal digital value of pressure is sent directly to the display.
  - The display can show any measured pressure in selected units regardless of the calibrated range and the values of LRV and URV (within the limits of the transmitter and display). The display can also be 0 to 100 percent.
  - If the measured pressure is outside the range established by the LRV and URV values in the database, the display shows the measurement but also continually blinks to indicate that the measurement is out of range. The signal is saturated at either the low or high overrange limit, respectively, but the display continually shows the pressure.
  - (DP transmitters only) Custom flow units for display, including 0 to 100 percent, are used when the transmitter is in square root mode.
- The internal digital value of pressure is converted to an analog signal.
  - There is an independent trim on the digital-to-analog conversion stage. This trim allows for slight adjustment of the 1 and 5 volt outputs. This compensates for any small difference between the transmitter output and an external reference device which is measuring the voltage.
    - The trim does not affect the calibration or the reranging of the transmitter and does not affect the internal digital value of pressure or the transmission or display of measured pressure.
    - The trim can be done with or without pressure applied to the transmitter.

- Zeroing does not affect the span.

  When the transmitter is zeroed to compensate for installed position effect, the transmitter can have either LRV pressure applied (**CAL LRV**) or zero pressure applied (**CAL AT0**). If the range is zero-based, either method produces the same result. However, if the range is not zero-based, it is advantageous to have both methods available.

  For example, consider a pressure transmitter having a range of 50 to 100 psig. If it is not feasible to vent the transmitter to atmosphere (or bypass the high and low sides) for zeroing, it can be adjusted while the LRV pressure of 50 psi is applied by using the **CAL LRV** function.

  On the other hand, if the transmitter has been installed but there is no pressure in the process line yet (or if the high and low sides can be connected by a bypass valve), it can be zeroed while open to atmosphere by using the **CAL AT0** function.

  - Zeroing with LRV pressure applied (**CAL LRV**):
    - Before using this zeroing function, apply a pressure to the transmitter equal to the value of LRV stored in the transmitter database.
    - When you zero the transmitter, the internal digital value of the pressure is trimmed to be equal to the value of LRV stored in the database, and the output set to 1 volt.
    - If zeroing is done when the applied pressure is different from the LRV pressure value in the database, the internal digital value of pressure is biased by the difference in the values, but the output is still set at 1 volt.
    - Use the **CAL LRV** and **CAL URV** functions when calibrating a transmitter for a specific range with known input pressures applied for the LRV and URV.
  - Zeroing a gauge or differential pressure transmitter with zero pressure applied (**CAL AT0**)[29]:
    - Make sure that the applied pressure is at zero. This means venting the transmitter to atmosphere, or opening a bypass valve to connect the high and low sides.
    - When you zero the transmitter, the internal digital value of the pressure is trimmed to be equal to zero, and the voltage output is set to an appropriate value such that the output is a nominal 1 volt when the LRV pressure is applied later.
  - Zeroing an absolute pressure transmitter: Temporarily set the LRV to the barometric pressure, and perform a **CAL LRV** function with the transmitter vented to atmosphere. Then, set the LRV back to the proper value.

Calibration Setup

The following sections show setups for field and bench calibration. Use test equipment that is at least four times as accurate as the specified accuracy of the transmitter; otherwise, measurement inaccuracy may be introduced.

29. The **CAL AT0** function is not applicable with an absolute pressure transmitter. If an absolute pressure transmitter is vented to atmosphere, it does not have zero pressure applied. Instead, it has barometric pressure applied (approximately 14.7 psia at sea level).

NOTICE

POTENTIAL REDUCED PERFORMANCE

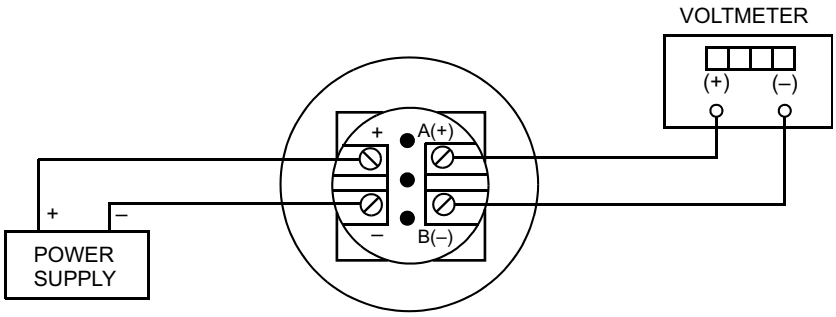
For both field calibration and bench calibration procedures, using a pressure source that is less accurate than the transmitter's reference accuracy specification typically results in degradation of transmitter performance from the factory calibrated state. The accuracy of the input pressure should be a minimum of four times better than the transmitter's reference accuracy specification.

Failure to follow these instructions can result in reduced performance.

NOTE: Calibration is not necessary to rerange the transmitter to a different range. You can accurately rerange the transmitter by changing the lower and upper range values, which are stored in the transmitter database.

Electronic Calibration Equipment

Figure 44 - Setup of Electronic Calibration Equipment



Field Calibration Setup

Field calibration is performed without disconnecting the process piping. If the transmitter is to be removed from the process for calibration, see Bench Calibration Setup, page 63.

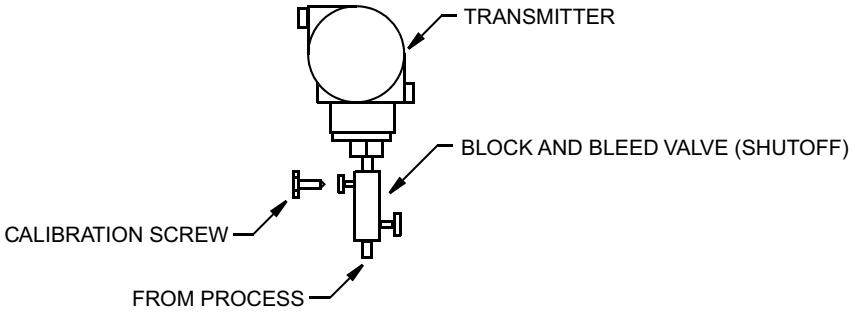
An adjustable air supply and a pressure measuring device are required. For example, a deadweight tester or an adjustable clean air supply and pressure gauge can be used.

Field Calibration — Direct Connect AP and GP Transmitters

Field calibration is possible only if the transmitter is piped as shown in the diagram.

If you are calibrating the output signal, also connect equipment as shown in Electronic Calibration Equipment, page 60.

Figure 45 - Field Calibration Setup for Direct Connect Transmitters



Block and Bleed Valve Maximum Pressure:

- 40 MPa (6000 psi) at 38°C (100°F)
- 25 MPa (4000 psi) at 250°C (400°F)

Calibration Screw Maximum Pressure:

- 0.7 MPa (100 psi) with Poly-Flo Fitting (F0101ES)

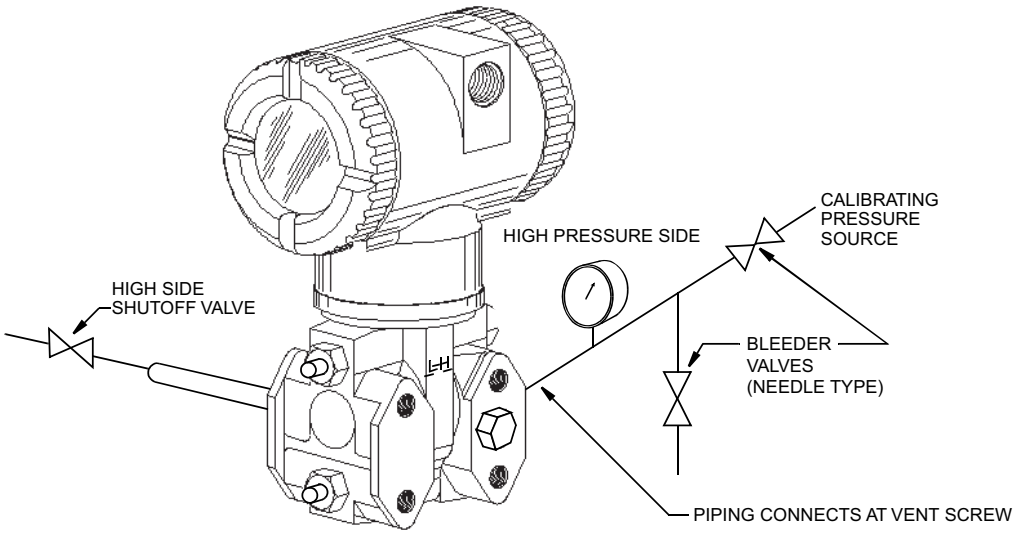
Field Calibration — Biplanar AP and GP Transmitters

Field calibration is possible only if you have a shutoff valve between the process and the transmitter, and the process covers vent screw option (-V1).

The pressure source can be connected to the transmitter with pipe fittings, or it can be connected to the vent screw assembly using a calibration screw. The calibration screw has a PolyFlo fitting and can be used for pressures up to 700 kPa (100 psi). It is available as Part Number F0101ES.

To set up the equipment, refer to the diagram and the following procedure:

Figure 46 - Field Calibration Setup for Biplanar Transmitters



1. Close the shutoff valve between the process and the transmitter.

2. Take the appropriate step:

   a. If a calibration screw **is** being used, remove the vent screw and replace it with the calibration screw. Connect the pressure source to the calibration screw using 6 x 1 mm or 0.250 inch tubing.

   b. If a calibration screw is **not** being used, remove the drain plug or the entire vent screw assembly (as applicable) from the high pressure side of the transmitter. Connect calibration tubing using a suitable thread sealant.

3. If you are calibrating the output signal, also connect equipment as shown in Electronic Calibration Equipment, page 60.

Field Calibration — DP Transmitters

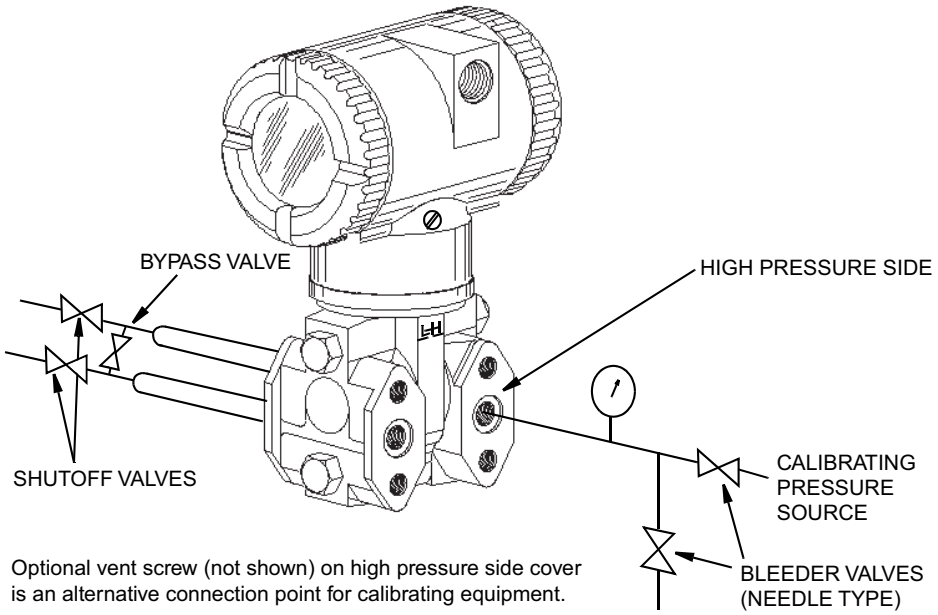
Field calibration is possible only if you have a bypass and shutoff valves between the process and the transmitter, and one of the following:

- Access to the process connections on the nonprocess side of the transmitter
- The optional vent screw in the side of the process covers

The pressure source can be connected to the transmitter with pipe fittings, or it can be connected to the vent screw assembly using a calibration screw. The calibration screw has a PolyFlo fitting and can be used for pressures up to 700 kPa (100 psi). It is available as Part Number F0101ES.

To set up the equipment, refer to the diagram and the following procedure:

Figure 47 - Field Calibration Setup for DP Transmitters



1. If the transmitter is in operation, follow the steps described in Taking a Differential Pressure Transmitter out of Operation, page 46.

NOTICE
POTENTIAL REDUCED PERFORMANCE With liquid service, drain both sides of the transmitter to avoid calibration errors. **Failure to follow these instructions can result in reduced performance.**

2. Take the appropriate step:

   a. If a calibration screw **is** being used, remove the vent screw and replace it with the calibration screw. Connect the pressure source to the calibration screw using 6 x 1 mm or 0.250 inch tubing.

   b. If a calibration screw is **not** being used, remove the drain plug or the entire vent screw assembly (as applicable) from the high pressure side of the transmitter. Connect calibration tubing using a suitable thread sealant.

3. Close the bypass valve that was opened in Step 1.

4. Complete the setup shown in the diagram.

   NOTE: For vacuum applications, connect the calibrating pressure source to the low pressure side of the transmitter.

5. If you are calibrating the output signal, also connect equipment as shown in Electronic Calibration Equipment, page 60.

Bench Calibration Setup

Bench calibration requires disconnecting the process piping. For calibration without disconnecting the process piping, see Field Calibration Setup, page 60.

For DP transmitters and biplanar AP and GP transmitters, connect the input piping to the high pressure side of the transmitter. Vent the low pressure side of the transmitter.

NOTE: For vacuum applications, connect the calibrating pressure source to the low pressure side of the transmitter.

See the following diagrams for the correct setup for each transmitter type. If you are calibrating the output signal, also connect equipment as shown in Electronic Calibration Equipment, page 60.

Figure 48 - Bench Calibration — Direct Connect AP and GP Transmitters

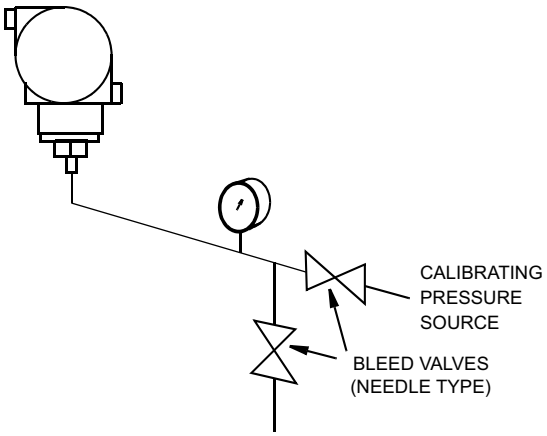


Figure 49 - Bench Calibration — Biplanar AP and GP Transmitters

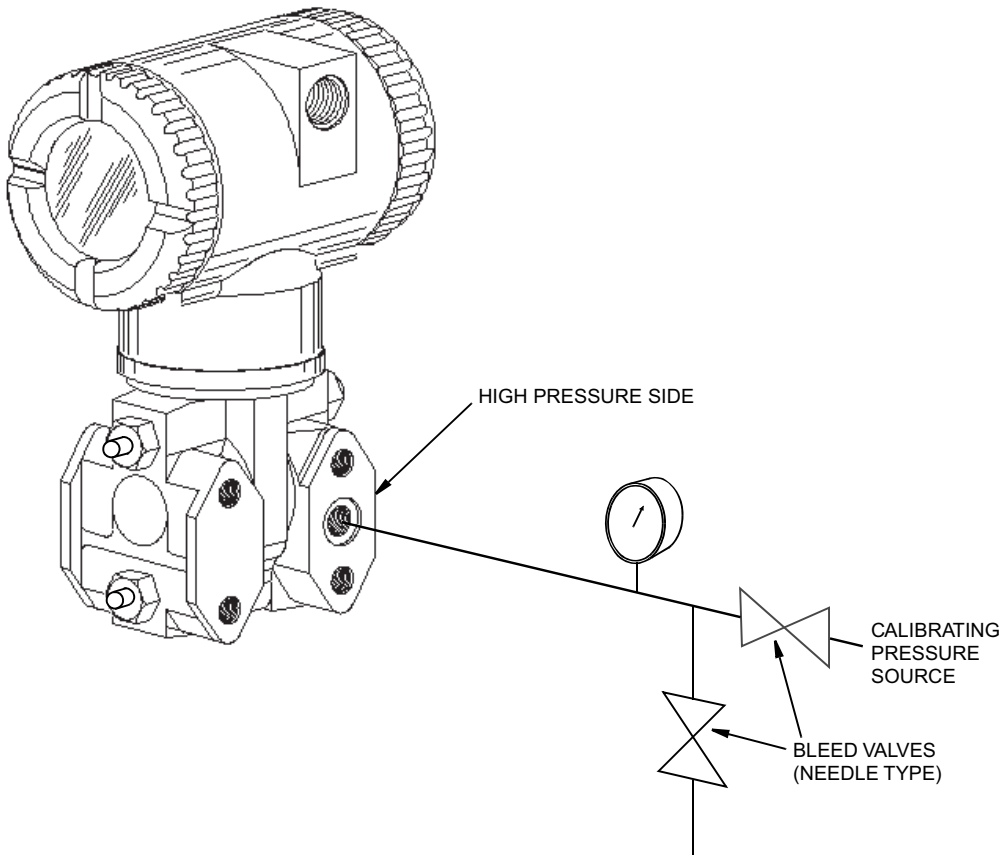
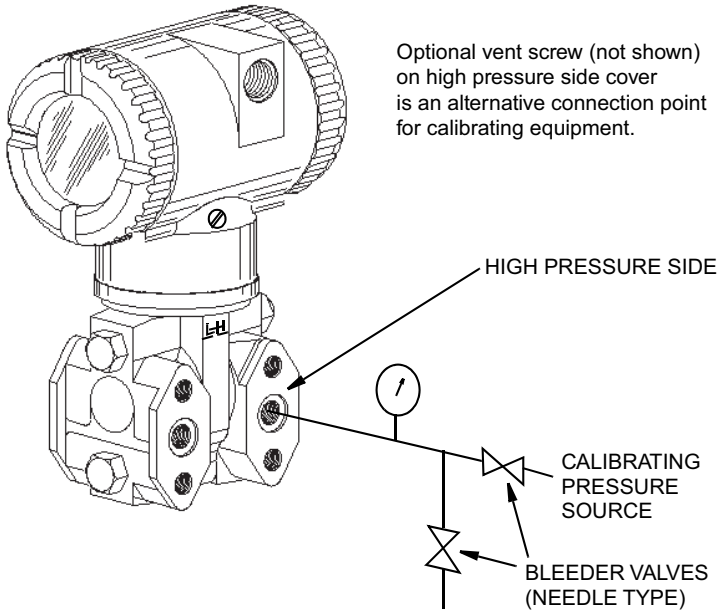


Figure 50 - Bench Calibration — DP Transmitters



Calibration Using the Display

From the display, you can:

- Zero the transmitter at zero pressure

- Calibrate the lower range value (LRV or 0% range value)
- Calibrate the upper range value (URV or 100% range value)
- Rerange your transmitter by adjusting the 0% and 100% range values

To access calibration mode from normal operating mode, press the **NEXT** button repeatedly until the display reads **CALIB**. Press the **ENTER** button to select **CALIB**. The display shows the first item in the Calibration menu.

- During calibration, a single change could affect several parameters. For this reason, if you make a mistake, review the entire database. Or, use the **CANCEL** feature to restore the transmitter to its starting configuration and begin again.
- When you enter calibration mode (**CALIB**), the transmitter output is automatically set to 1 V until you select **CANCEL** or **SAVE** and the transmitter comes back online. Make sure that the control loop is in manual mode before you select **CALIB**.

Proceed to calibrate your transmitter by using the **NEXT** and **ENTER** buttons to make your selections. Refer to the menu structure diagram and accompanying table for guidance.

At any time during the calibration, you can **CANCEL**, restore your prior calibration and return to online mode, or **SAVE** your new calibration.

Figure 51 - Calibration Menu Structure

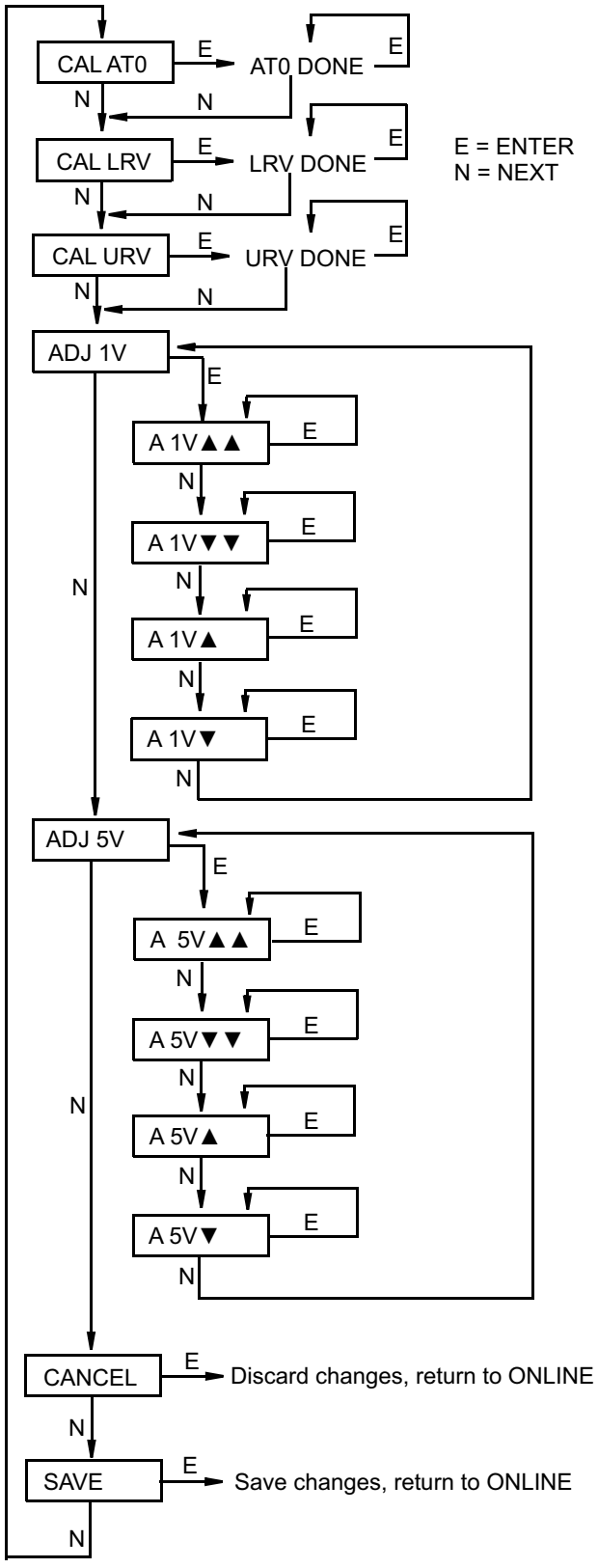


Table 12 - Calibration Menu Items

Item	Description
CAL AT0[30]	This menu option calibrates the transmitter at zero pressure. To set or reset the zero point at zero pressure, apply zero pressure to the transmitter. When **CAL AT0** appears on the display, press **ENTER**. This can be done whether LRV is zero or not. When the process is complete, **Done** appears on the display.
CAL LRV	This menu option calibrates the transmitter at 0% of the transmitter's range (LRV). To set or reset 0% of range input, apply pressure to the transmitter equal to the lower range value (LRV) in the transmitter database. When **CAL LRV** appears on the display, press **ENTER**. **Done** appears on the display when the process is complete.
CAL URV	This menu option calibrates the transmitter at 100% of the transmitter's upper range value (URV). To set or reset 100% of range input, apply pressure to the transmitter equal to the upper range value (URV) in the transmitter database. When **CAL URV** appears on the display, press **ENTER**. **Done** appears on the display when the process is complete.
ADJ 1V[31]	This menu option adjusts the nominal 1 V output. If you configured your transmitter operating mode as 1 to 5 V, you can adjust the 1 V output by going to **ADJ 1V** using the **NEXT** button and pressing **ENTER**. These adjustment menu options are not available when the output is fixed at 1 V (that is, when **LOOP MD** is set to **MA DIS**).
A 1V▲▲	Increases 1 V output by a large (3.397 mV) step.
A 1V▼▼	Decreases 1 V output by a large (3.397 mV) step.
A 1V▲	Increases 1 V output by a small (0.679 mV) step.
A 1V▼	Decreases 1 V output by a small (0.679 mV) step.
ADJ 5V[31]	This menu option adjusts the nominal 5 V output. If you configured your transmitter operating mode as 1 to 5 V, you can adjust the 5 V output by going to **ADJ 5V** using the **NEXT** button and pressing **ENTER**. These adjustment menu options are not available when the output is fixed at 1 V (that is, when **LOOP MD** is set to **MA DIS**).
A 5V▲▲	Increases 5 V output by a large (3.397 mV) step.
A 5V▼▼	Decreases 5 V output by a large (3.397 mV) step.
A 5V▲	Increases 5 V output by a small (0.679 mV) step.
A 5V▼	Decreases 5 V output by a small (0.679 mV) step.

30. This function is not applicable to absolute pressure transmitters.
31. It is not necessary to use the **ADJ 1V** and **ADJ 5V** menu selections (also known as "trim") unless there is a plant requirement to make the 1 and 5 V output values exactly match the readings on certain plant calibration equipment, and the calibration operations result in a small but unacceptable difference between the transmitter's output values and the test equipment's readout values.

Messages

The following calibration-related messages may appear on the display.

Message	Description
LOLIMIT	1 volt and 5 volt calibration adjustment has reached lower limit. • Improper calibration setup; correct setup. • Bad D/A converter; replace electronics module.
HILIMIT	1 volt and 5 volt calibration adjustment has reached upper limit. • Improper calibration setup; correct setup. • Bad D/A converter; replace electronics module.
BADZERO	Recalculation of offset during **CAL AT0** or **CAL LRV** resulted in an out-of-range value. • Applied pressure too high during operation. • Improper calibration setup; correct setup.
BADSPAN	Recalculation of slope during **CAL URV** operation resulted in out of range value. • Applied pressure too low during **CAL URV** operation. • Improper calibration setup; correct setup.

Maintenance

⚠⚠WARNING

EXPLOSION HAZARD

- For nonintrinsically safe installations, to help prevent a potential explosion in a Division 1 hazardous area, de-energize transmitters before you remove the threaded housing covers.
- For explosion proof and non-incendive installations, do not disconnect equipment when a flammable or combustible atmosphere is present.

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

Parts Replacement

For optimum transmitter performance, send the transmitter to the factory to replace parts. Removing the process covers may require recalibration of the transmitter.

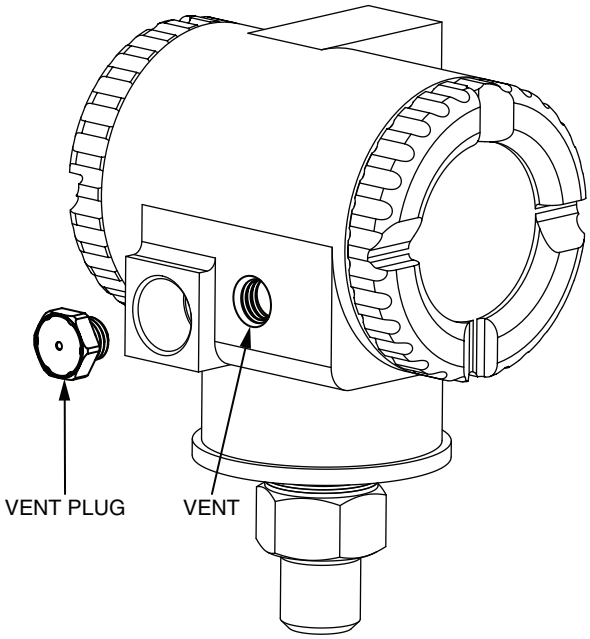
Replacing the Terminal Block Assembly

To replace the terminal block assembly, follow these steps:

1. Turn off the transmitter power source.
2. Turn the cover lock screw (if applicable) clockwise to disengage the lock.
3. Remove the covers from the field terminals and electronics compartments by rotating the covers counterclockwise.
4. Remove the electronics module from the housing by loosening the two captive screws that fasten it to the housing. Then pull the module out of the housing far enough to gain access to the cable connectors on the rear of the module.
5. Remove the four socket head screws fastening the terminal block.
6. Disconnect the terminal block cable connector from the electronics module.
7. Remove the terminal block and the gasket under it.
8. Install the new terminal block and new gasket. Reinstall the four screws and tighten them to a torque of 0.67 N-m (6 lbf-in) in several even increments.
9. Connect the new terminal block cable connector to the electronics module.
10. Reinstall the electronics module.
11. Reinstall the covers onto the housing by rotating them clockwise to seat the o-ring into the housing. Continue to hand-tighten until each cover contacts the housing metal-to-metal.
12. If cover locks are present, lock the cover per the procedure described in Cover Locks, page 41.
13. Turn on the transmitter power source.

Replacing the Vent Plug

Figure 52 - Replacing the Vent Plug



To replace the vent plug (gauge pressure transmitters only), refer to the diagram and follow these steps:

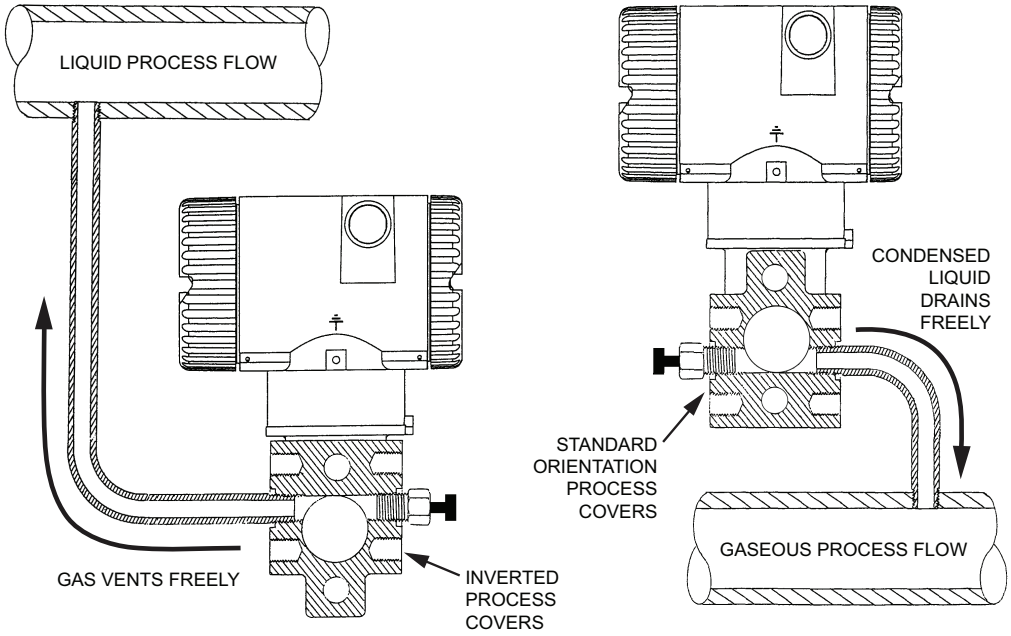
1. Remove the vent plug by unscrewing it counterclockwise.
2. Clean the angled sealing surface on the housing.
3. Lubricate the o-ring and the threads on the new plug with silicone lubricant (part number 0048130 or equivalent).
4. Install the new plug (part number X0179ME) into the housing by screwing it clockwise. Torque to 0.9 ±0.02 N-m (8 ±0.2 lbf-in).

Rotating Process Covers for Venting

Your transmitter provides sensor cavity draining without the need for side drain connections, regardless of whether the transmitter is mounted vertically or horizontally. Sensor cavity venting is provided by mounting the transmitter horizontally or with the optional vent screw (option -V). If you do not have a vent screw, you can achieve venting (instead of draining) with vertical mounting by rotating the process covers.

NOTE: This procedure involves removing the process covers. You may need to recalibrate the transmitter afterwards.

Figure 53 - Sensor Cavity Venting and Draining



To rotate the process covers, refer to the diagram and follow these steps:

1. Turn off the transmitter power source and remove the transmitter from the process.
2. Remove the process covers from the sensor by removing two hex head bolts.
3. Replace the gaskets in the process covers.
4. Rotate the process covers so that the longer tab is at the bottom.
5. Reinstall the process covers and bolts. Torque cover bolts to 100 N-m (75 lbf-ft) in several even increments. Torque values are 68 N-m (50 lbf-ft) for 316 ss bolts; 75 N-m (55 lbf-ft) for B7M bolts.
6. Pressure test the sensor and process cover assembly by applying a hydrostatic pressure of 150% of the maximum static and overrange pressure (see Maximum Static, Overrange, and Proof Pressure Ratings, page 11) to both sides of the process cover/sensor assembly simultaneously through the process connections. Hold pressure for one minute. There should be no leakage of the test fluid through the gaskets. If leakage occurs, re-tighten the cover bolts or replace the gaskets and retest.

⚠ CAUTION
RISK OF POTENTIAL INJURY AND/OR REDUCED PERFORMANCE Perform a hydrostatic test with a liquid, and follow proper hydrostatic test procedures. **Failure to follow these instructions can result in injury or reduced performance.**

Dimensions

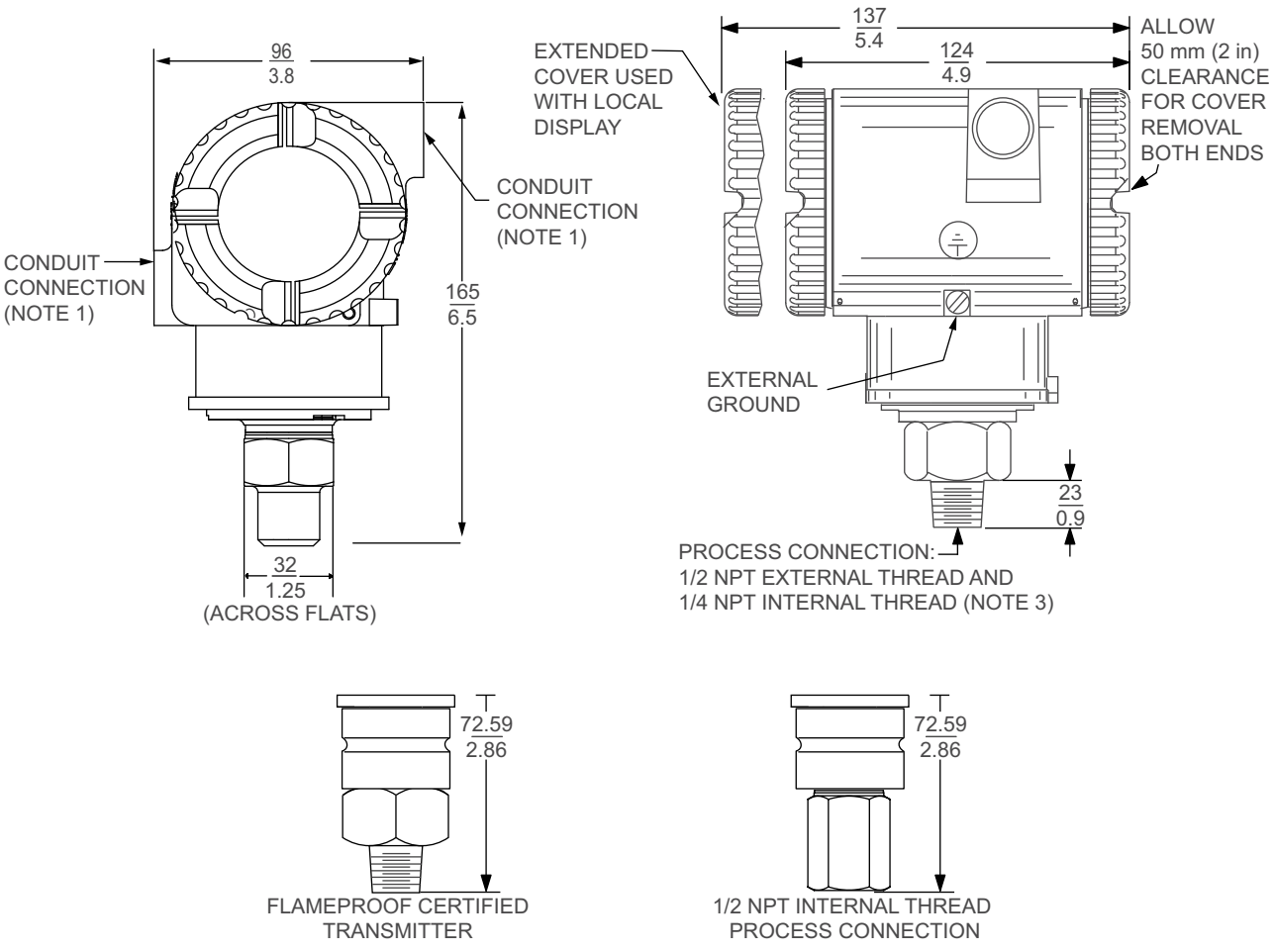
For dimensional information specific to your sales order, contact your sales representative to order a Certified Dimensional Print (CDP).

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

NOTE: For dimensional information on diaphragm seals, see PSS 2A-1Z11 B.

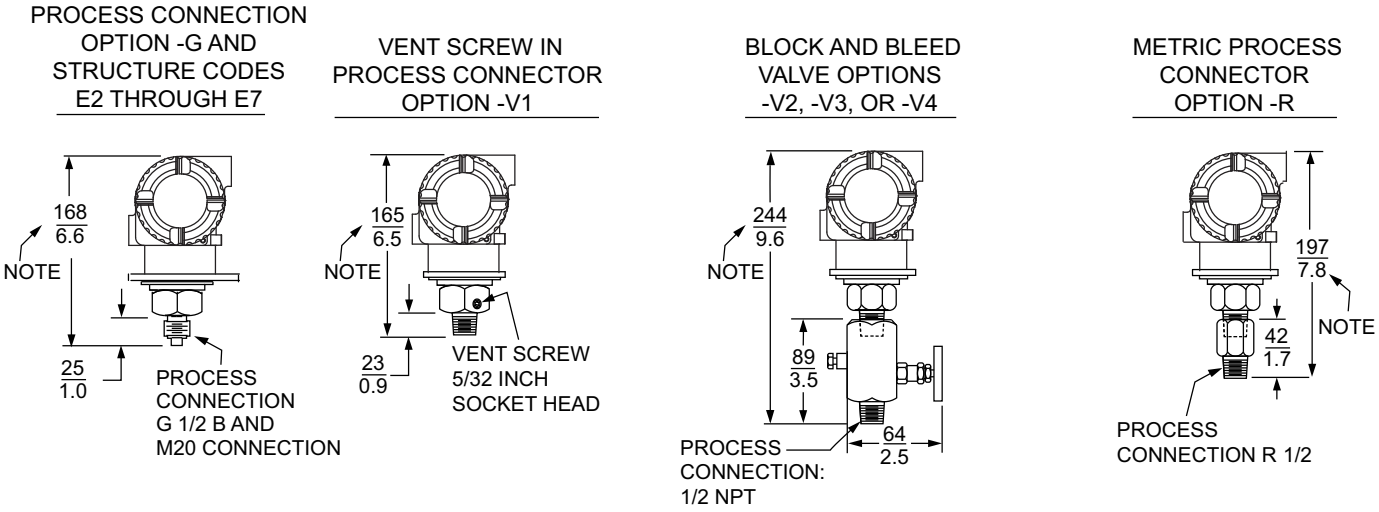
Direct Connect AP and Direct Connect GP Transmitters

Figure 54 - 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. USE A MOUNTING BRACKET.

Figure 55 - Direct Connect AP/GP Transmitters with Options -G, -V1, -V2, -V3, -V4, and -R



NOTE: FOR FLAMEPROOF CERTIFIED TRANSMITTERS, ADD 28 mm (1.1 in) TO OVERALL HEIGHT DIMENSION.

Figure 56 - Direct Connect AP/GP Transmitters with Options -M1, -M2, -M5, and -M6

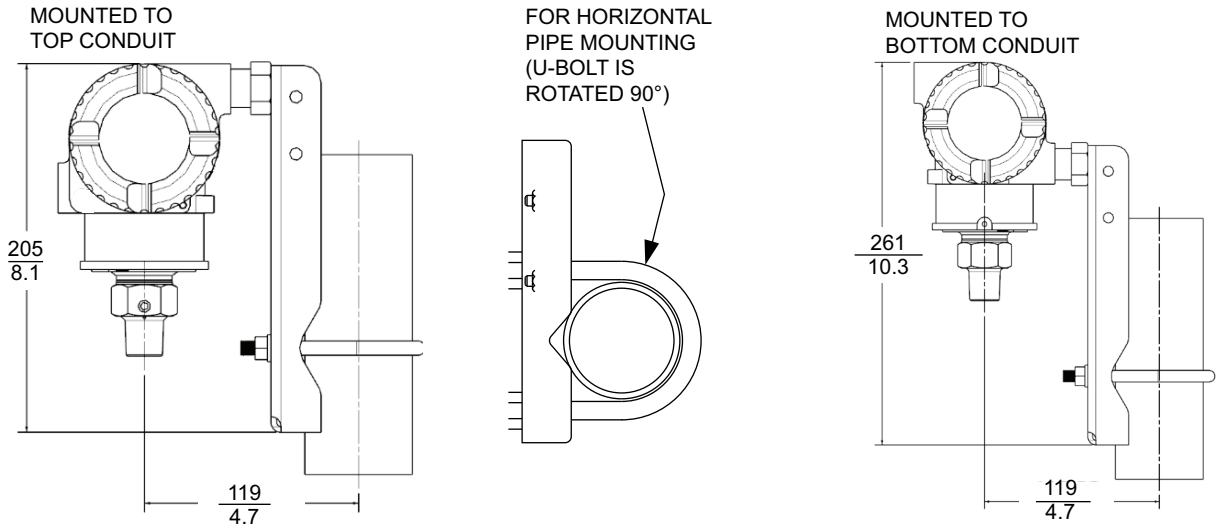


Figure 57 - Flameproof Direct Connect AP/GP Transmitters with Options -M7 and -M8

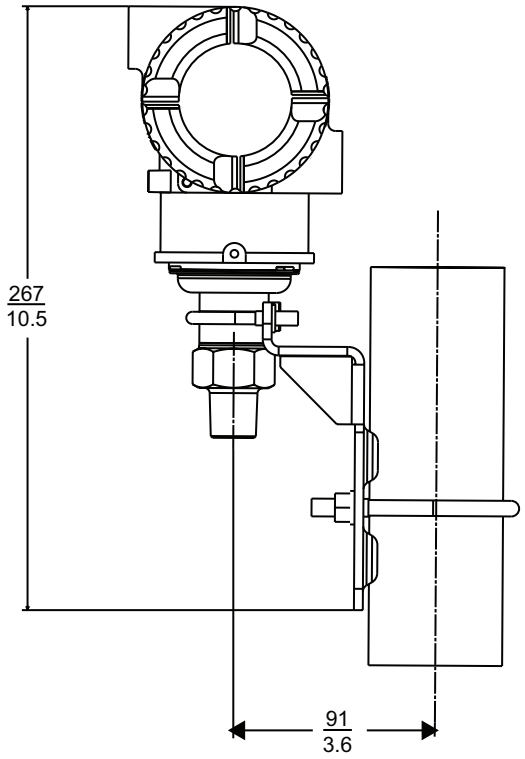
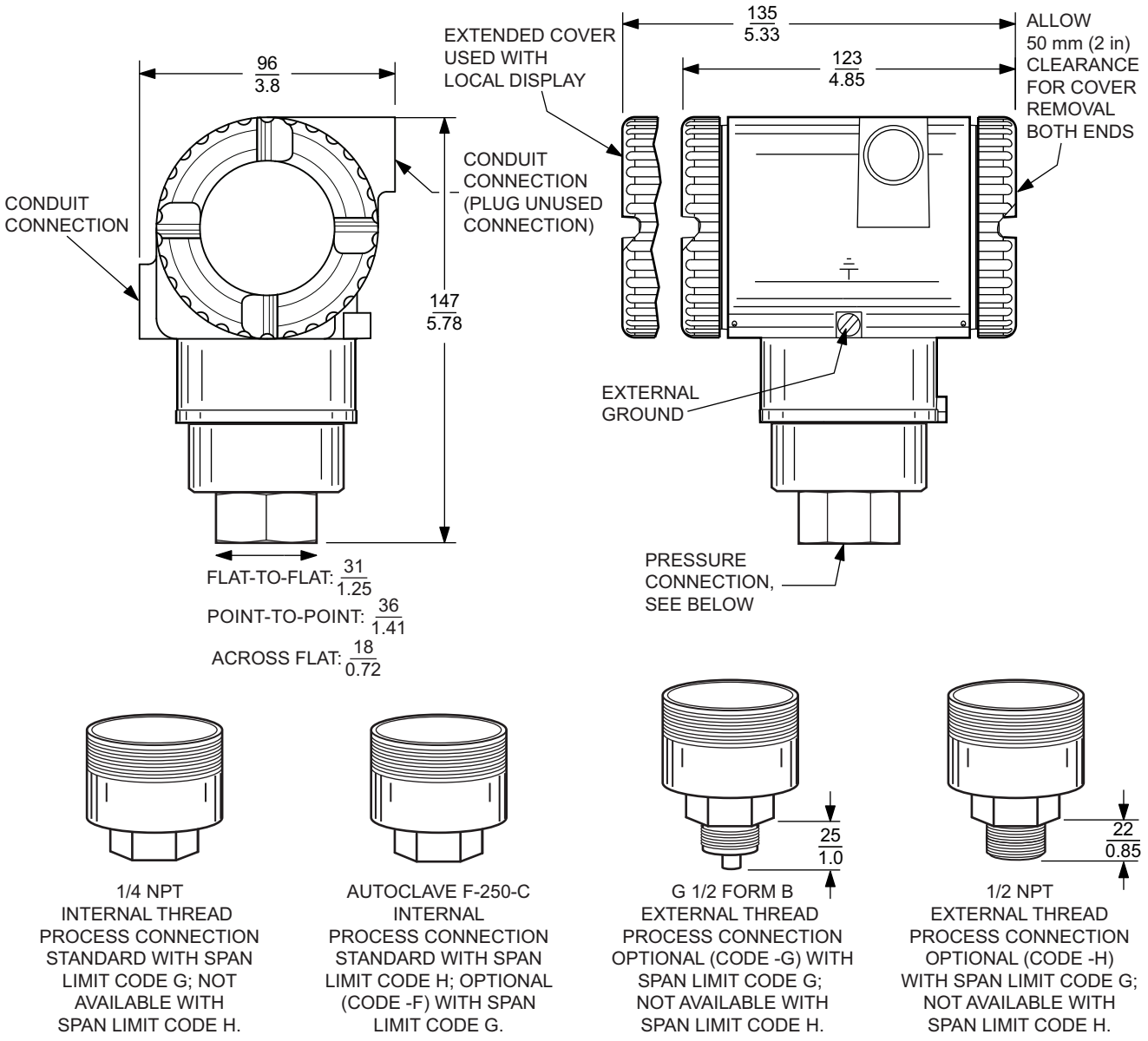
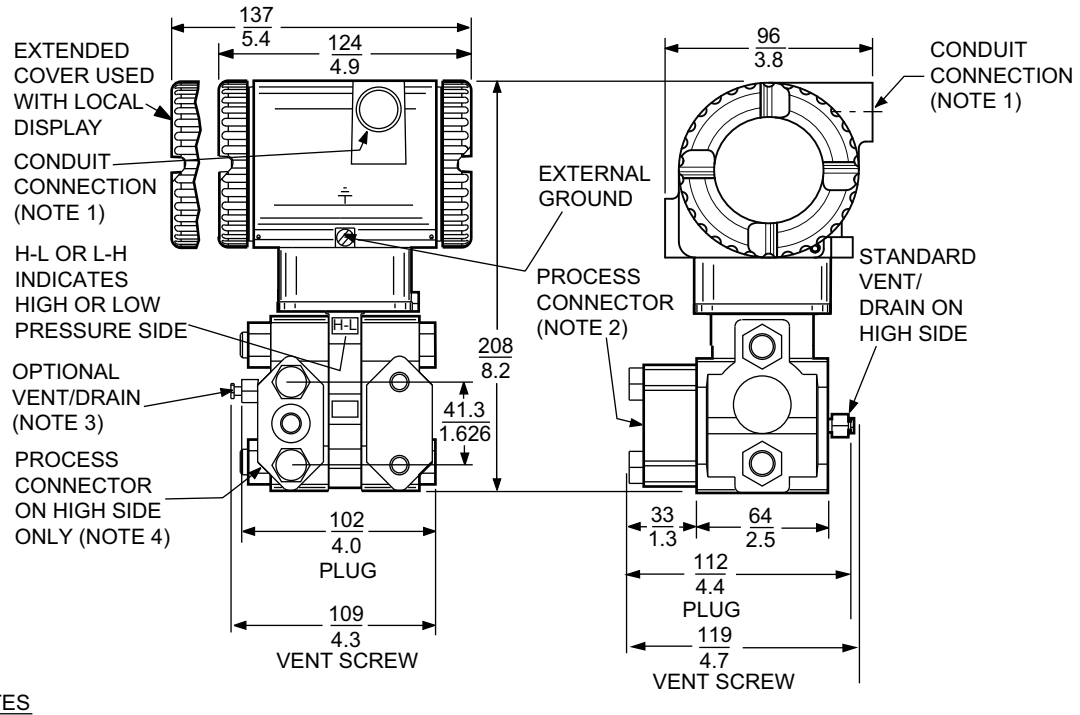


Figure 58 - Direct Connect GP Transmitters for High Gauge Pressure Measurement



Biplanar AP and Biplanar GP Transmitters

Figure 59 - 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 60 - Biplanar AP/GP Transmitters with Options -D1, -D2, -D3, -D4, -D5, -D6, -D7, -D8, and -D9

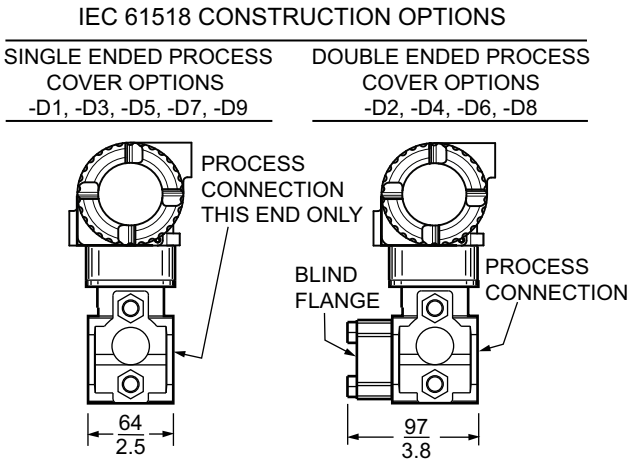


Figure 61 - Biplanar AP/GP Transmitters with Options -M0 and -M9 (Standard Stainless Steel or Painted Steel Bracket)

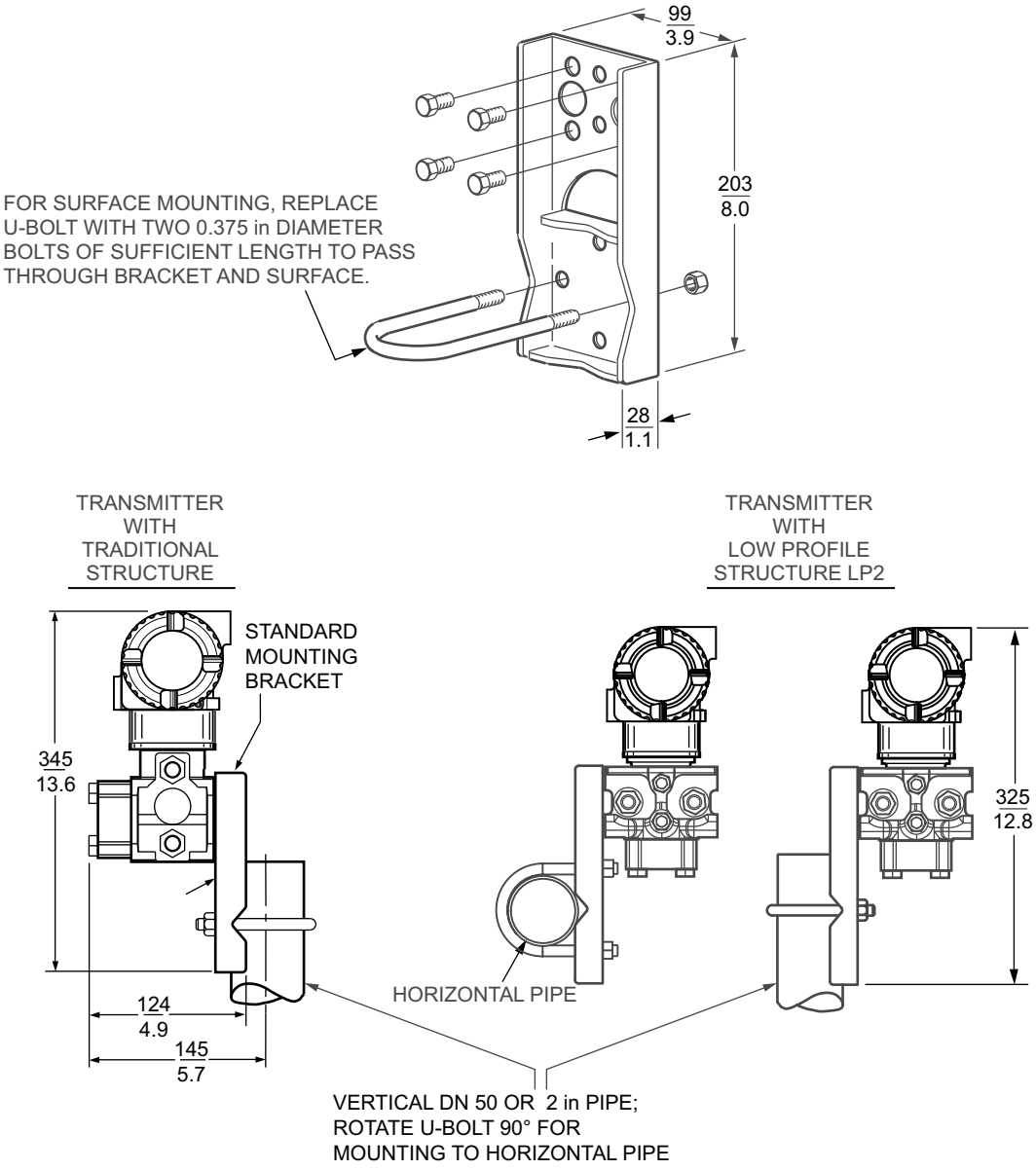
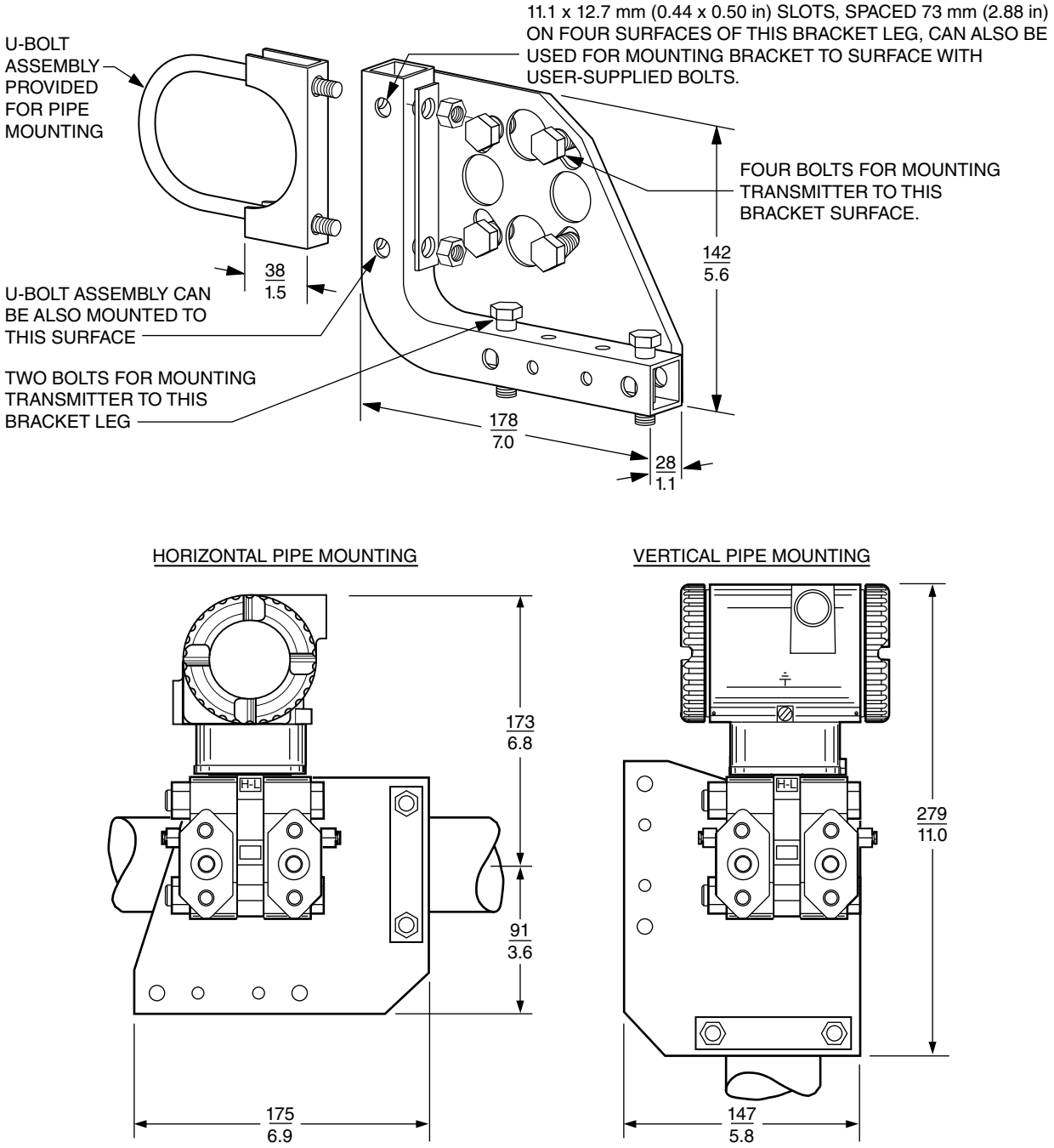
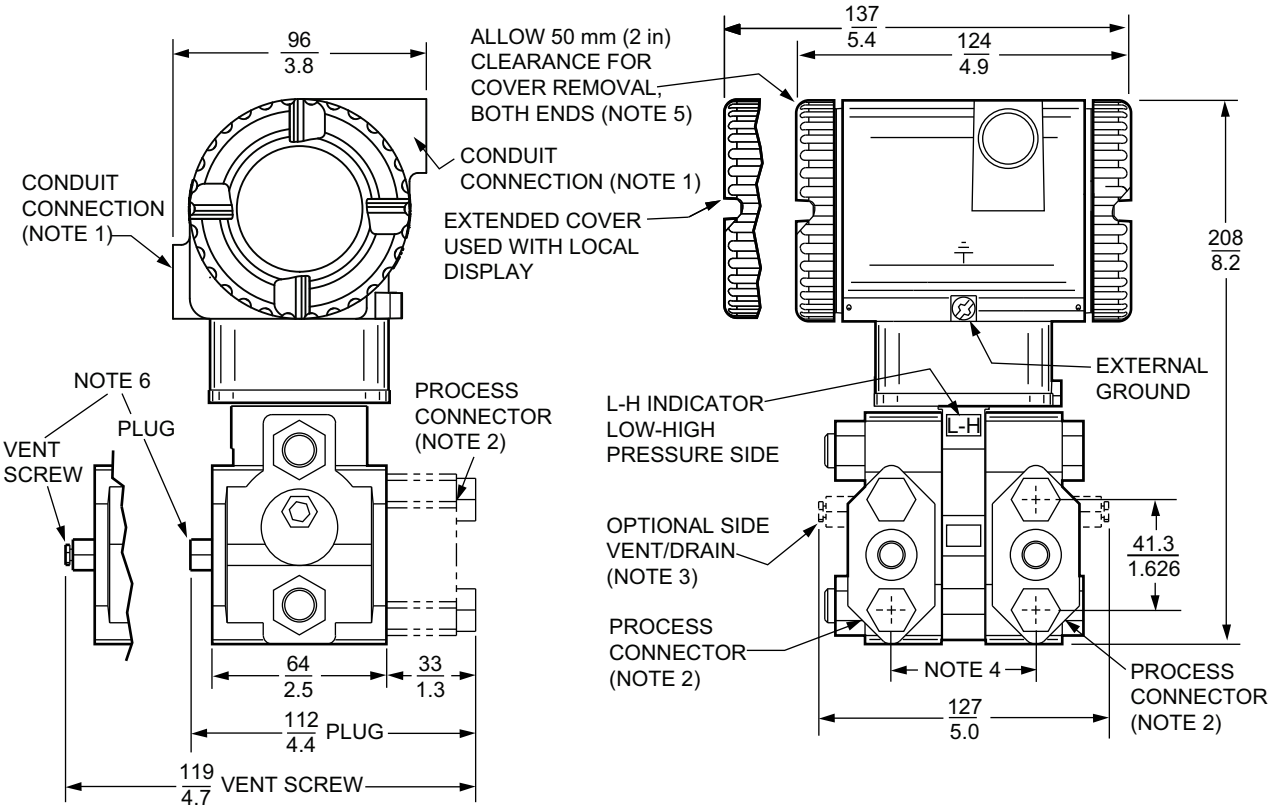


Figure 62 - Biplanar AP/GP Transmitters with Option -M3 (Universal Bracket)



DP Transmitters

Figure 63 - 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.

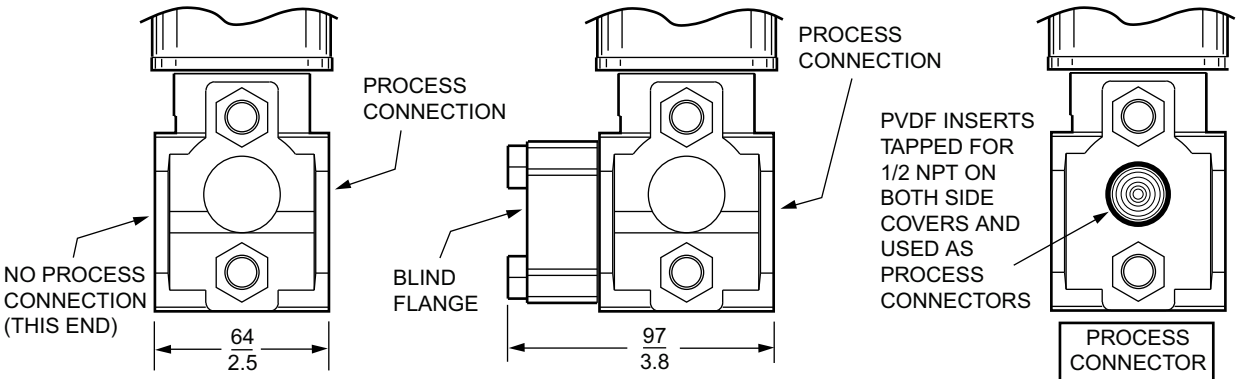
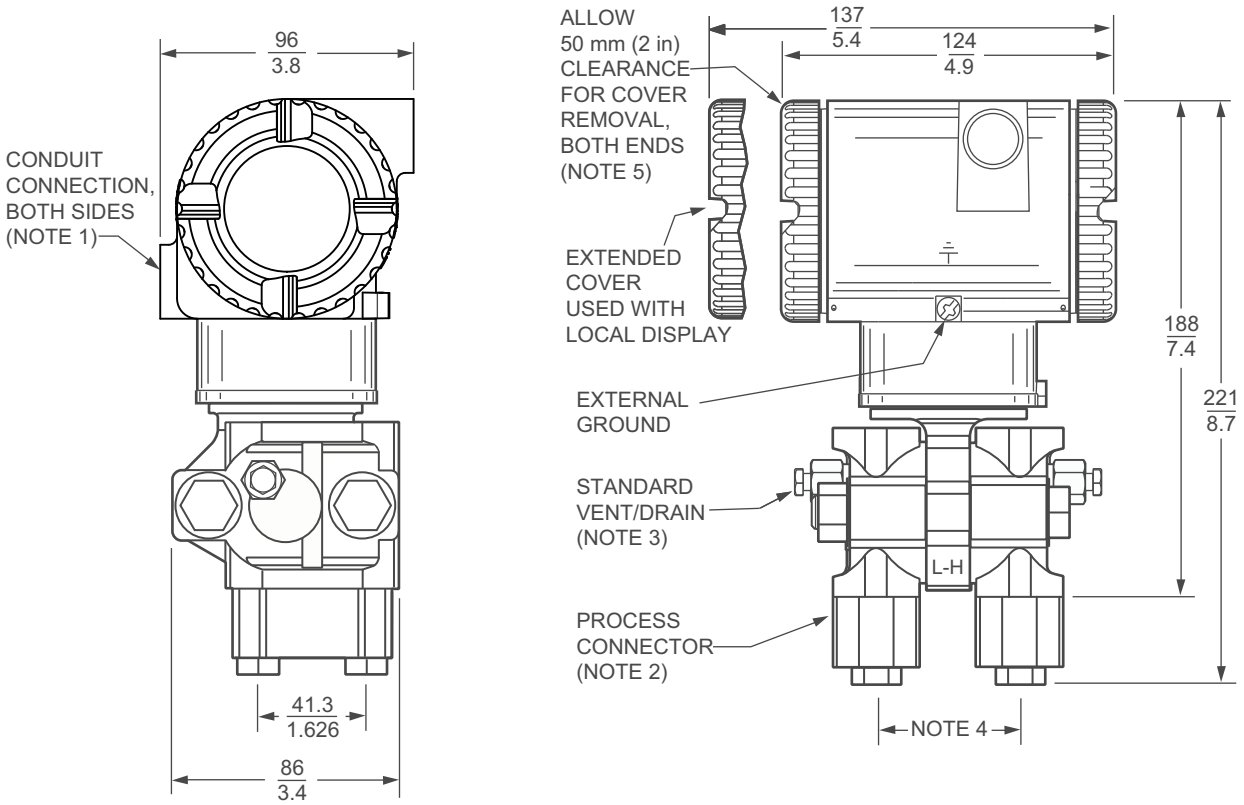
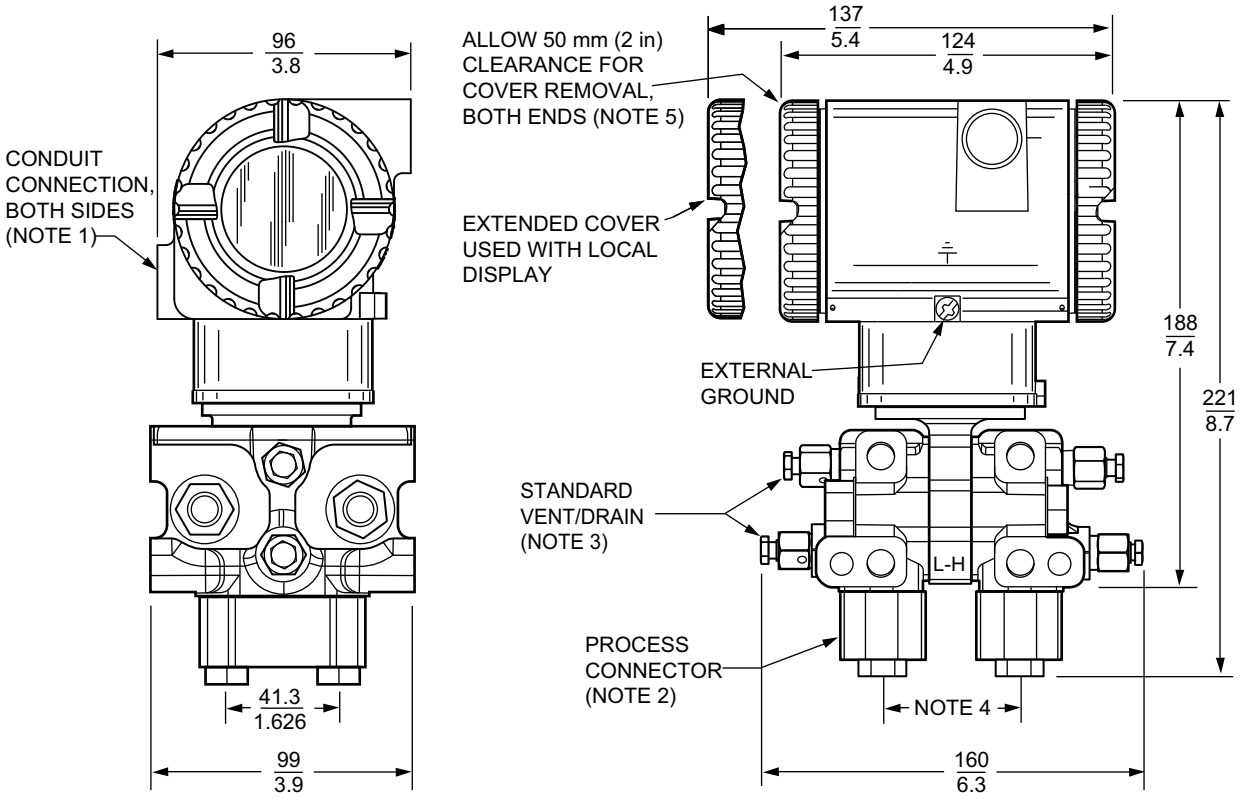


Figure 64 - DP Transmitters with Low Profile 1 (LP1) Structure



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 65 - 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 66 - DP Transmitters with Traditional or LP2 Structure and Options -M1 and -M2 (Standard Style Mounting Bracket)

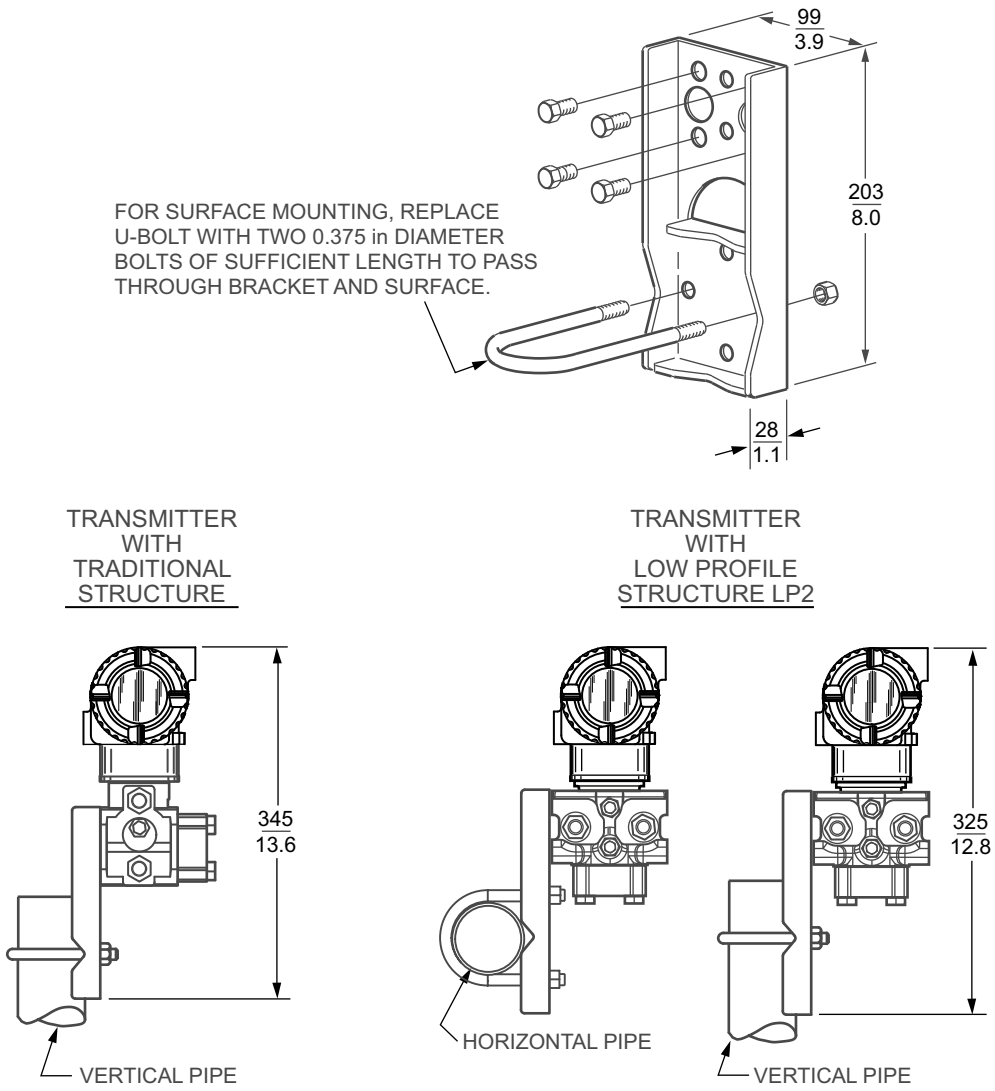
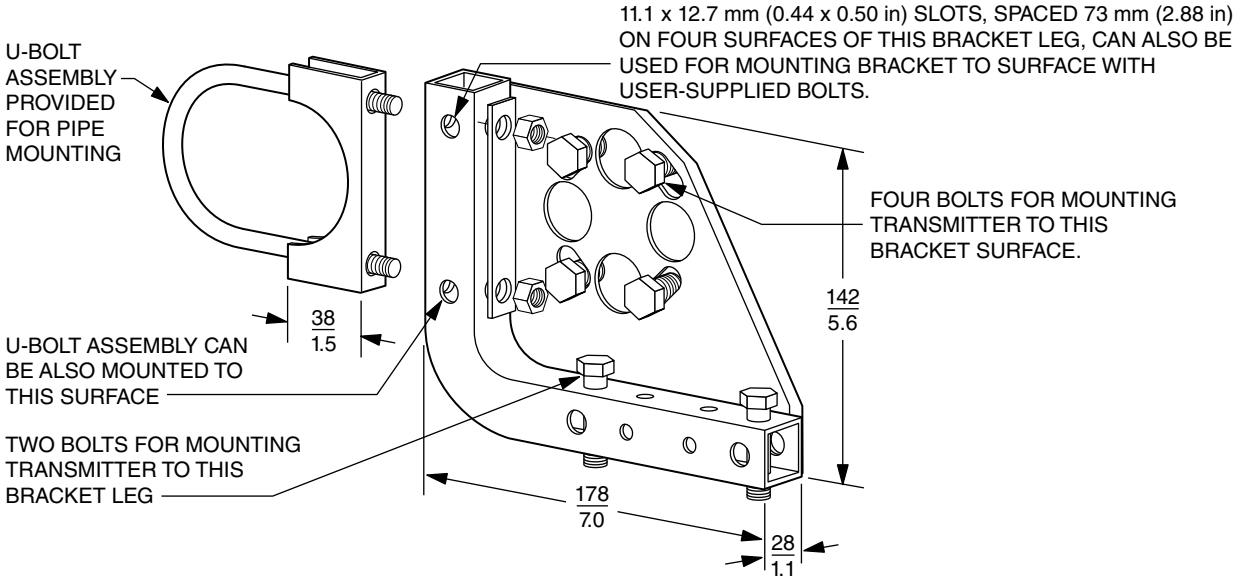
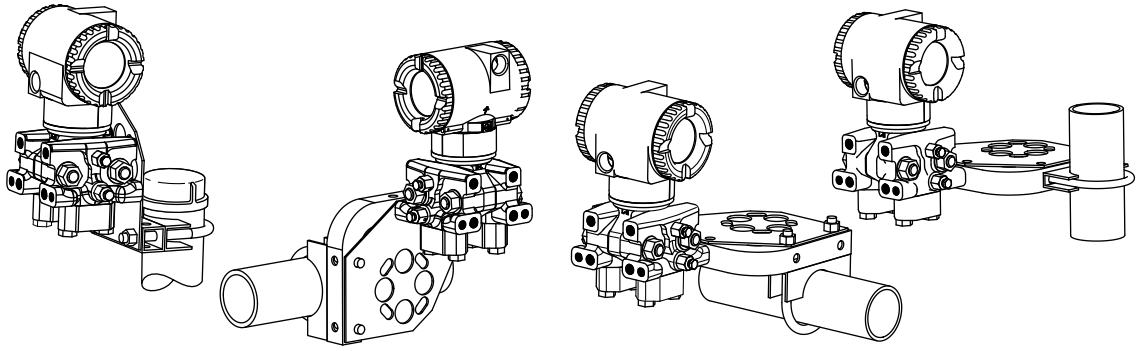


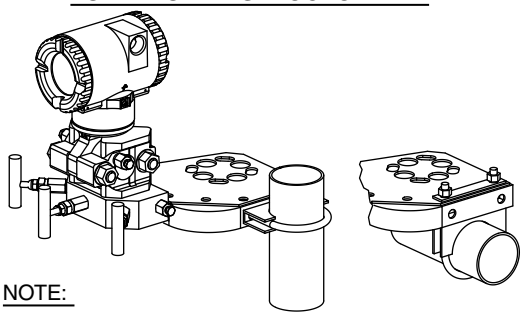
Figure 67 - DP Transmitters with Option -M3 (Universal Style Mounting Bracket Kit)



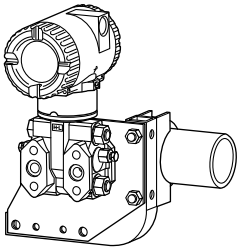
TYPICAL PIPE MOUNTING WITH LOW PROFILE STRUCTURE LP2



TYPICAL PIPE MOUNTING
LOW PROFILE STRUCTURE LP1



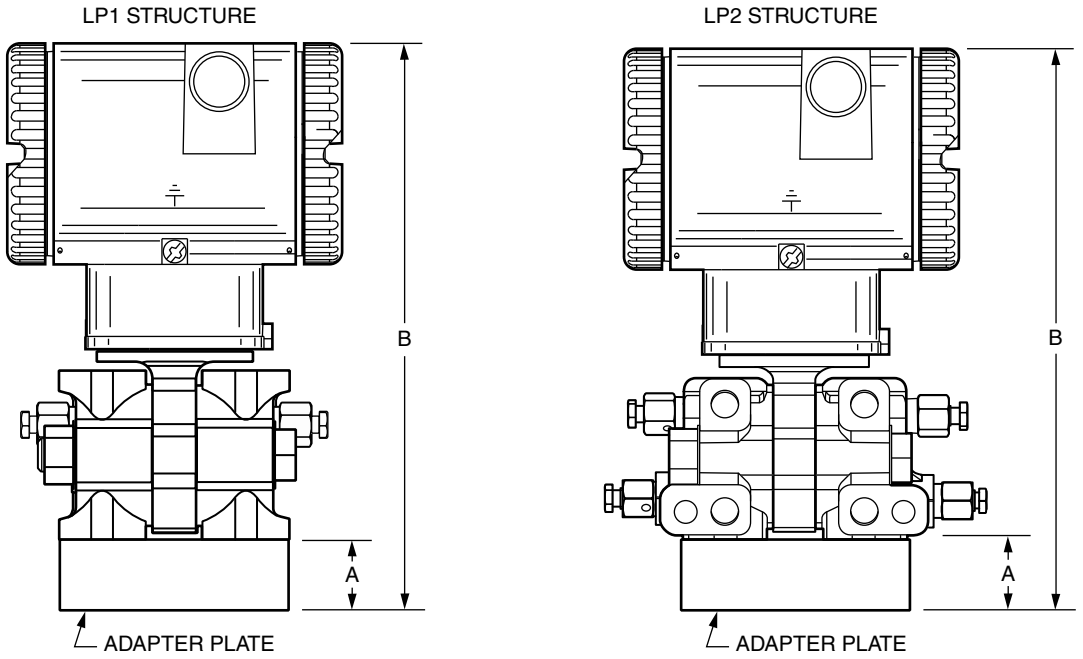
TYPICAL PIPE MOUNTING
WITH TRADITIONAL STRUCTURE



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 68 - 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 69 - DP Transmitters with Traditional Structure and Structure Codes -78 and -79 (Filled PVDF Connection)

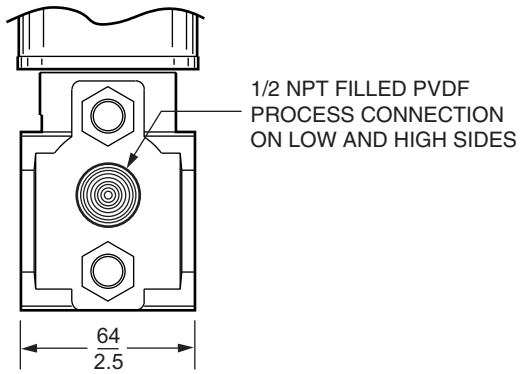
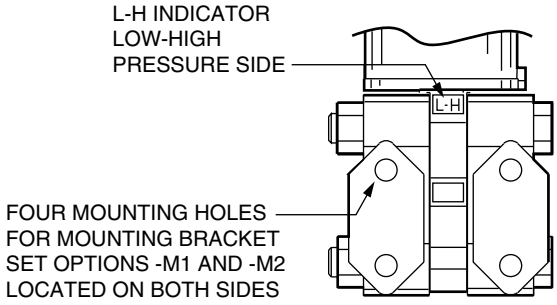


Figure 70 - DP Transmitters with Traditional Structure and Options -D1 to -D9



Parts

Model Codes

These tables list all of the available options, including other protocols, for the Absolute, Gauge, and Differential Pressure Transmitters.

Absolute and Gauge Pressure Transmitters

Table 13 - Absolute and Gauge Pressure Transmitters

Code	Description
Model	
IAP	Absolute Pressure Transmitter
IGP	Gauge Pressure Transmitter
Tier	
05S	Value Performance[32]
10S	Advanced Performance[33] with FoxCal™
50S	Premium Performance[34] with FoxCal™
Electronics Versions/Output Signals	
-T	HART and 4 to 20 mA with SIL 2
-F	FOUNDATION Fieldbus H1 Digital Communications[35]
-M	Modbus RTU[36]
-V	Low Power Electronics, 1 to 5 Volts[37]

32. Refer to PSS 2A-1S05 A for accuracy specifications.
33. Refer to PSS 2A-1S10 A for accuracy specifications.
34. Refer to PSS 2A-1S50 A for accuracy specifications.
35. Not available with the Value (05S) transmitter.
36. Not available with the Premium (50S) transmitter.
37. Available only with the Value (05S) transmitter.

Table 13 - Absolute and Gauge Pressure Transmitters (Continued)

Code	Description
Structure Codes	
Structure — Direct Connect[38] [39]	
20	316L ss Process Sensor; Co-Ni-Cr Diaphragm; Silicone Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.[40]
21	316L ss Process Sensor; Co-Ni-Cr Diaphragm; Inert Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.[40]
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.[40]
33	C276 Process Sensor; C276 Diaphragm; Inert Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.[40]
34	316L ss Process Sensor; Co-Ni-Cr Diaphragm; Silicone Fill; 1/2 NPT Internal Conn. Only[41] [40]
35	316L ss Process Sensor; Co-Ni-Cr Diaphragm; Inert Fill; 1/2 NPT Internal Conn. Only[41] [40]
36	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; 1/2 NPT Internal Conn. Only[41]
37	316L ss Process Sensor; 316L ss Diaphragm; Inert Fill; 1/2 NPT Internal Conn. Only[41]
38	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; 1/2 NPT Internal Conn. Only[41]
39	316L ss Process Sensor; C276 Diaphragm; Inert Fill; 1/2 NPT Internal Conn. Only[41]
E2	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; M20 External Conn. Only[41]
E3	316L ss Process Sensor; 316L ss Diaphragm; Inert Fill; M20 External Conn. Only[41]
E4	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; M20 External Conn. Only[41]
E5	316L ss Process Sensor; C276 Diaphragm; Inert Fill; M20 External Conn. Only[41]
E6	C276 Process Sensor; C276 Diaphragm; Silicone Fill; M20 External Conn. Only[41] [42]
E7	C276 Process Sensor; C276 Diaphragm; Inert Fill; M20 External Conn. Only[41] [42]

38. Not available with Electrical Certification codes that end in D or P.
39. Not available with Electronics Version -M.
40. Not available with the Value (05S) transmitter.
41. Not available with option codes -V1, -V2, -V3, and -V4.
42. Not available with the IAP05S transmitter.

Table 13 - Absolute and Gauge Pressure Transmitters (Continued)

Code	Description
Structure — Direct Connect Gold-Plated[43] [44] [45]	
42	316L ss Process Sensor; Co-Ni-Cr Diaphragm; Silicone Fill; 1/2 NPT Internal Conn. Only[46]
43	316L ss Process Sensor; Co-Ni-Cr Diaphragm; Inert Fill; 1/2 NPT Internal Conn. Only[46]
44	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; 1/2 NPT Internal Conn. Only[46]
45	316L ss Process Sensor; 316L ss Diaphragm; Inert Fill; 1/2 NPT Internal Conn. Only[46]
46	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; 1/2 NPT Internal Conn. Only[46]
47	316L ss Process Sensor; C276 Diaphragm; Inert Fill; 1/2 NPT Internal Conn. Only[46]
70	316L ss Process Sensor; Co-Ni-Cr Diaphragm; Silicone Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
71	316L ss Process Sensor; Co-Ni-Cr Diaphragm; Inert Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
72	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
73	316L ss Process Sensor; 316L ss Diaphragm; Inert Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
80	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
81	316L ss Process Sensor; C276 Diaphragm; Inert Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
82	C276 Process Sensor; C276 Diaphragm; Silicone Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
83	C276 Process Sensor; C276 Diaphragm; Inert Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
G2	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; M20 External Conn. Only[46]
G3	316L ss Process Sensor; 316L ss Diaphragm; Inert Fill; M20 External Conn. Only[46]
G4	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; M20 External Conn. Only[46]
G5	316L ss Process Sensor; C276 Diaphragm; Inert Fill; M20 External Conn. Only[46]
G6	C276 Process Sensor; C276 Diaphragm; Silicone Fill; M20 External Conn. Only[46]
G7	C276 Process Sensor; C276 Diaphragm; Inert Fill; M20 External Conn. Only[46]

43. Not available with Electrical Certification codes that end in D or P.
44. Not available with Electronics Version -M.
45. Not available with the Value (05S) transmitter.
46. Not available with option codes -V1, -V2, -V3, and -V4.

Table 13 - Absolute and Gauge Pressure Transmitters (Continued)

Code	Description
Structure — Direct Connect Flameproof	
52	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.
5G	316L ss Process Sensor; 316L ss/Gold Plated Diaphragm; Silicone Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.[47]
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.
6G	316L ss Process Sensor; C276/Gold Plated Diaphragm; Silicone Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.[47]
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.[48]
6P	C276 Process Sensor; C276/Gold Plated Diaphragm; Silicone Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.[47]
63	C276 Process Sensor; C276 Diaphragm; Inert Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.[48]
90	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; 1/2 NPT Internal Conn. Only[49]
91	316L ss Process Sensor; 316L ss Diaphragm; Inert Fill; 1/2 NPT Internal Conn. Only[49]
92	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; 1/2 NPT Internal Conn. Only[49]
93	316L ss Process Sensor; C276 Diaphragm; Inert Fill; 1/2 NPT Internal Conn. Only[49]
F2	316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; M20 External Conn. Only[49]
F3	316L ss Process Sensor; 316L ss Diaphragm; Inert Fill; M20 External Conn. Only[49]
F4	316L ss Process Sensor; C276 Diaphragm; Silicone Fill; M20 External Conn. Only[49]
F5	316L ss Process Sensor; C276 Diaphragm; Inert Fill; M20 External Conn. Only[49]
F6	C276 Process Sensor; C276 Diaphragm; Silicone Fill; M20 External Conn. Only[49] [48]
F7	C276 Process Sensor; C276 Diaphragm; Inert Fill; M20 External Conn. Only[49] [48]
Structure — Direct Connect, Prepared for Diaphragm Seals — Diaphragm Seals Provided[50] [51]	
D1	316L ss Process Sensor and Diaphragm; Silicone Fill; Prepared for Direct Connect Seal[52]
D2	316L ss Process Sensor and Diaphragm; Inert Fill; Prepared for Direct Connect Seal[52]
S3	316L ss Process Sensor and Diaphragm; Silicone Fill; Prepared for Remote Mount Seal[53]
S4	316L ss Process Sensor and Diaphragm; Inert Fill; Prepared for Remote Mount Seal[53]
Structure — Direct Connect, Prepared for Diaphragm Seals — Diaphragm Seals Not Provided[50] [54] [51]	
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
Structure — Direct Connect Flameproof, Prepared for Diaphragm Seals — Diaphragm Seals Provided	
D5	316L ss Process Sensor and Diaphragm; Silicone Fill; Prepared for Direct Connect Seal[52]
D6	316L ss Process Sensor and Diaphragm; Inert Fill; Prepared for Direct Connect Seal[52]
S5	316L ss Process Sensor and Diaphragm; Silicone Fill; Prepared for Remote Mount Seal[53]
S6	316L ss Process Sensor and Diaphragm; Inert Fill; Prepared for Remote Mount Seal[53]

47. Not available with the Value (05S) transmitter.
48. Not available with the IAP05S transmitter.
49. Not available with option codes -V1, -V2, -V3, and -V4.
50. Not available with Electrical Certification codes that end in D or P.
51. Not available with Electronics Version -M.
52. Specify direct connect seal DS-F, DS-G, DS-H, DS-K, DS-L, DS-M, or DS-N.
53. Specify remote mount seal DS-C, DS-F, DS-G, DS-H, DS-J, DS-K, DS-L, DS-M, or DS-N.
54. These structures are prepared for attachment of diaphragm seals by others. Do not specify a seal model code.

Table 13 - Absolute and Gauge Pressure Transmitters (Continued)

Code	Description
Structure — Direct Connect Flameproof, Prepared for Diaphragm Seals — Diaphragm Seals Not Provided[55]	
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
Structure — Direct Connect, Prepared for Sanitary or Pulp and Paper Seals (Vented Housing)[56] [57] [58]	
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)
Structure — Direct Connect, High Pressure (Gauge Pressure Only)[59]	
28	13-8 Moly ss Process Sensor and Diaphragm; Autoclave F-250-C Connection[60]
Structure — Biplanar (Vented Low Side Process Cover and Diaphragm)	
B0	316 ss Cover; Co-Ni-Cr Diaphragm; Silicone Fill[61]
B1	316 ss Cover; Co-Ni-Cr Diaphragm; Inert Fill[61]
B2	316 ss Cover; 316L ss Diaphragm; Silicone Fill
B3	316 ss Cover; 316L ss Diaphragm; Inert Fill
BG	316 ss Cover; 316 ss Gold-Plated Diaphragm; Silicone Fill[61]
B4	316 ss Cover; Monel Diaphragm; Silicone Fill[61]
B5	316 ss Cover; Monel Diaphragm; Inert Fill[61]
B6	316 ss Cover; C276 Diaphragm; Silicone Fill

55. These structures are prepared for attachment of diaphragm seals by others. Do not specify a seal model code.
56. Not available with Electrical Certification codes that end in D or P.
57. Available with Span Limit codes C and D for -V and -T electronics, and available only with Span code D for -F electronics.
58. Not available with Electronics Version -M.
59. Available only with the Value (05S) transmitter.
60. Available with Span Limit code H only.
61. Not available with the Value (05S) transmitter.

Table 13 - Absolute and Gauge Pressure Transmitters (Continued)

Code	Description
B7	316 ss Cover; C276 Diaphragm; Inert Fill
N4	Monel Cover; Monel Diaphragm; Silicone Fill[62]
N5	Monel Cover; Monel Diaphragm; Inert Fill[62]
C6	C276 Cover; C276 Diaphragm; Silicone Fill[62]
C7	C276 Cover; C276 Diaphragm; Inert Fill[62]
C8	C276 Cover; Tantalum Diaphragm; Silicone Fill[62]
C9	C276 Cover; Tantalum Diaphragm; Inert Fill[62]
78	PVDF Insert; Tantalum Diaphragm; Silicone Fill[62] [63]
79	PVDF Insert; Tantalum Diaphragm; Inert Fill[62] [63]
Structure — LP1 Biplanar (Not Available with Diaphragm Seals)	
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
CC	C276 Cover; C276 Diaphragm; Silicone Fill[62]
CD	C276 Cover; C276 Diaphragm; Inert Fill[62]
Structure — LP2 Biplanar (Not Available with Diaphragm Seals)	
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
Structure — Biplanar, Prepared for Diaphragm Seals — Diaphragm Seals Provided[64] [65] [66]	
P1	316 ss Cover; 316L ss Process Sensor and Diaphragm; Silicone Fill; Prepared for Direct Connect Seal[67]
P2	316 ss Cover; 316L ss Process Sensor and Diaphragm; Inert Fill; Prepared for Direct Connect Seal[67]
P3	316 ss Cover; 316L ss Process Sensor and Diaphragm; Silicone Fill; Prepared for Remote Mount Seal[68]
P4	316 ss Cover; 316L ss Process Sensor and Diaphragm; Inert Fill; Prepared for Remote Mount Seal[68]
Structure — Biplanar, Prepared for Diaphragm Seals — Diaphragm Seals Not Provided[64] [65] [66] [69]	
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

62. Not available with the Value (05S) transmitter.
63. Maximum pressure rating is 2.1 MPa (300 psi); temperature limits are derated to -7 and +82°C (+20 and +180°F).
64. Not available with optional Biplanar Process Connector (codes -F1 through -F6).
65. Not available with options -X1, -X2, or -X3.
66. Span Limit code A not available for biplanar structures P1, P2, P3, P4, P5, and P6.
67. Specify direct connect seal DS-C, DS-F, DS-G, DS-H, DS-K, DS-L, DS-M, DS-N, or DS-P.
68. Specify remote mount seal DS-C, DS-F, DS-G, DS-H, DS-J, DS-K, DS-L, DS-M, or DS-N.
69. These structures are prepared for attachment of diaphragm seals by others. Do not specify a seal model code.

Table 13 - Absolute and Gauge Pressure Transmitters (Continued)

Code	Description
Span Limits	
Transmitters with Direct Connect Structures	
C[70]	With -T Electronics: 6.9 and 207 kPa (1 and 30 psi) With -V Electronics: 6.9 and 207 kPa (1 and 30 psi)
D	With -T, -M, or -F Electronics: 3.4 and 1380 kPa (0.5 and 200 psi) With -V Electronics: 69 and 1380 kPa (10 and 200 psi)
E	With -T, -M, or -F Electronics: 0.034 and 13.8 MPa (5 and 2000 psi) With -V Electronics: 0.69 and 13.8 MPa (100 and 2000 psi)
F[71]	With -T, -M, or -F Electronics: 0.52 and 41.4 MPa (75 and 6000 psi) With -V Electronics: 13.8 and 41.4 MPa (2000 and 6000 psi)
H[71]	With -T or -M Electronics: 69 and 207 MPa (10000 and 30000 psi)[72] With -V Electronics: 69 and 207 MPa (10000 and 30000 psi)[72]
J[73]	6.9 and 69 MPa (1000 and 10000 psi)[74]
Transmitters with Biplanar Structures	
A[71]	With -T, -M, or -F Electronics: 0.12 and 7.5 kPa (0.5 and 30 inH_2O) With -V Electronics: 0.12 and 7.5 kPa (0.5 and 30 inH_2O)
B	With -T, -M, or -F Electronics: 0.12 and 50 kPa (0.5 and 200 inH_2O) With -V Electronics: 0.87 and 50 kPa (3.5 and 200 inH_2O)
C	With -T, -M, or -F Electronics: 0.62 and 250 kPa (2.49 and 1000 inH_2O) With -V Electronics: 6.9 and 250 kPa (27.8 and 1000 inH_2O)
D	With -T, -M, or -F Electronics: 26 and 2070 kPa (3.75 and 300 psi)[75] With -V Electronics: 69 and 2070 kPa (10 and 300 psi)[75]
E	With -T, -M, or -F Electronics: 0.26 and 20.7 MPa (37.5 and 3000 psi)[75] With -V Electronics: 0.69 and 20.7 MPa (100 and 3000 psi)[75]
F[71]	With -T, -M, or -F Electronics: 1.1 and 34.5 MPa (165 and 5000 psi)[75] With -V Electronics: 1.38 and 34.5 MPa (200 and 5000 psi)[75]
Conduit Connection and Housing Material	
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

70. Not available with Electronics Version -M.
71. Available for gauge pressure transmitters only.
72. Available with Structure code 28 only.
73. Available for gauge pressure transmitters or with the -G option (G 1/2 B Manometer Process Connection) only.
74. Available only with Direct Connect structures that have 1/2 NPT external diameter and either 316L ss or C276 diaphragm material.
75. Not available with Structure codes 78 and 79 (PVDF process covers).

Table 13 - Absolute and Gauge Pressure Transmitters (Continued)

Code	Description
Electrical Certifications	
AA	ATEX/UKEX intrinsically safe, Ex ia IIC[76] [77]
AD	ATEX/UKEX flameproof, Ex db IIC[78]
AM	ATEX/UKEX multiple certifications (includes Codes AA and AN)[76] [77]
AN	ATEX/UKEX protection type n, Ex ic IIC, or Ex nA[76] [77]
AP	ATEX/UKEX multiple certifications (includes Codes AA, AD and AN)[76] [78]
BA	INMETRO intrinsically safe, Ex ia IIC[76] [77]
BD	INMETRO flameproof, Ex db IIC[78]
BP	INMETRO multiple certifications (includes INMETRO Codes BA and BD)[76] [78]
CA	CSA intrinsically safe, Zone certified Ex ia[76]
CD	CSA zone certified flameproof Ex db IIC; also explosion proof, dust ignition-proof[78]
CM	CSA multiple certifications (includes CSA Codes CA and CN)[76]
CN	CSA non-incendive, Zone certified Ex nA IIC[76]
CP	CSA multiple certifications (includes CSA Codes CA, CD and CN)[76] [78]
DA	Multi-marked ATEX/UKEX and IECEx intrinsically safe, Ex ia IIC[76] [77]
DD	Multi-marked ATEX/UKEX and IECEx flameproof, Ex db IIC[78]
DM	Multi-marked ATEX/UKEX and IECEx multiple certifications, ia, ic[76] [77]
DN	Multi-marked ATEX/UKEX and IECEx protection type n, Ex ic IIC[76] [77]
DP	Multi-marked ATEX/UKEX and IECEx multiple certifications, ia, ic, and db[76] [78]
EA	IECEx intrinsically safe, Ex ia IIC[76] [77]
ED	IECEx flameproof, Ex db IIC[78]
EM	IECEx multiple certifications, ia, ic, nA[76] [77]
EN	IECEx protection type n, Ex ic IIC, or Ex nA[76] [77]
EP	IECEx multiple certifications, ia, ic, nA, and db[76] [78]
FA	FM Classes I, II and III Division 1 intrinsically safe, AEx ia IIC[76]
FD	FM Classes I, II and III Division 1 explosion proof, dust-ignition proof, Zone approved AEx db IIC[78]
FM	FM multiple certifications (includes FM Codes FA or FN)[76]
FN	FM Classes I, II and III, Division 2 non-incendive, Zone approved AEx nA IIC[76]
FP	FM multiple certifications (includes FM Codes FA, FD or FN)[76] [78]
KD	KC Certification Ex db[78]
NA	NEPSI intrinsically safe[76] [77]
ND	NEPSI flameproof, Ex db IIC[78]

76. Not available with Electronics Version -M.
77. Not available with Structure codes TA, T2, T3, TB, T4, T5, M1, M6, M9.
78. Available with all biplanar structures and only the following Direct Connect Structure codes: 52, 5G, 53, 60, 6G, 61, 62, 6P, 63, 90, 91, 92, 93, F2, F3, F4, F5, F6, F7, D5, D6, S5, S6, SH, SJ, and 28.

Table 13 - Absolute and Gauge Pressure Transmitters (Continued)

Code	Description
RA	EAC intrinsically safe, Ex ia[79] [80]
RD	EAC flameproof, Ex db[81]
RN	EAC protection type n, Ex ic IIC or Ex nA[79] [80]
ZZ	No certification[79]
Optional Mounting Bracket Sets	
-M1	Painted Steel Bracket, Plated Steel Bolts, 1/2 NPT, Direct Connect Only[82] [83] [84]
-M2	Stainless Steel Bracket, Stainless Steel Bolts, 1/2 NPT, Direct Connect Only[82] [83] [84]
-M3	Universal Stainless Steel Mounting Bracket Set, Stainless Steel Hardware, Biplanar Only
-M5	Painted Steel Bracket, Plated Steel Bolts, M20, Direct Connect Only[82] [83] [85]
-M6	Stainless Steel Bracket, Stainless Steel Bolts, M20, Direct Connect Only[82] [83] [85]
-M7	Stainless Steel Bracket for Flameproof Direct Connect Sensor Structures[86]
-M8	Painted Steel Bracket for Flameproof Direct Connect Sensor Structures[86]
-M9	Painted Steel Bracket, Plated Steel Bolts, Biplanar Only
-M0	Stainless Steel Bracket, Stainless Steel Bolts, Biplanar Only
Optional Vent Screw and Block and Bleed Valve	
-V1	316 ss Vent Screw in Process Connection[82] [87] [88]
-V2	Block and Bleed Valve, Carbon Steel[82] [87] [89]
-V3	Block and Bleed Valve, 316 ss[82] [87] [89]
-V4	Block and Bleed Valve, 316 ss w/ Monel Trim, NACE Approved[82] [87] [89]
-V5	Vent Screw in Side of Process Cover[90] [91]
-V6	Omit Vent Screw[92]
Optional Biplanar Process Connector Type (same material as Process Cover)[93]	
-F1	1/4 NPT[94]
-F2	1/2 NPT[95]
-F3	RC 1/4[94]
-F4	RC 1/2[95]
-F6	1/2 Schedule 80 Weld Neck[94]

79. Not available with Electronics Version -M.
80. Not available with Structure codes TA, T2, T3, TB, T4, T5, M1, M6, M9.
81. Available with all biplanar structures and only the following Direct Connect Structure codes: 52, 5G, 53, 60, 6G, 61, 62, 6P, 63, 90, 91, 92, 93, F2, F3, F4, F5, F6, F7, D5, D6, S5, S6, SH, SJ, and 28.
82. Not available with biplanar structures.
83. Not available with Electrical Certification codes that end in D or P.
84. Available with Conduit Connection and Housing Material codes 1 and 3 only.
85. Available with Conduit Connection and Housing Material codes 5 and 6 only.
86. Available only with flameproof Direct Connect Structure codes, excluding D5 and D6.
87. Not available with option -G.
88. Available only with 1/2 NPT 316L ss Structure codes 22, 23, 30, 31, 52, 5G, 53, 60, 6G, and 61. Structure Codes 70, 71, 72, 73, 80, and 81 also available for -T and -F electronics only.
89. Available only with structures that have 1/2 NPT external connections.
90. Available only with biplanar Structure codes B0, B1, B2, B3, BG, B4, B5, B6, B7, N4, N5, C6, C7, C8, C9.
91. Not available with optional IEC 61518 Construction codes -D1 through -D9.
92. Available only for transmitters with LP1 structures.
93. Process Connectors not available with Structure codes LL, LM, LC, or LD when Optional Mounting Bracket option -M3, -M9, or -M0 is selected.
94. Available with all biplanar structures that have 316L ss or Monel process covers.
95. Available with all biplanar structures except those with PVDF process covers.

Table 13 - Absolute and Gauge Pressure Transmitters (Continued)

Code	Description
Options for Digital Indicator with Pushbuttons	
-L1	Digital Display, Pushbuttons and Window Cover[96]
-L2	Substitute Solid Cover over Digital Display[97]
Optional IEC 61518 Construction[98] [99]	
-D1	Single-Ended Process Cover with B7 Steel Bolt; No Connector Screw; MWP=2320 psi[100]
-D2	Double-Ended Process Cover[101] with B7 Steel Bolt; Size M10 Steel Connector Screw; MWP=1500 psi[102] [103] [104]
-D3	Single-Ended Process Cover with B7 Steel Bolt; No Connector Screw; MWP=3626 psi[100]
-D4	Double-Ended Process Cover[101] with B7 Steel Bolt; Size 7/16 Steel Connector Screw; MWP=1500 psi[102] [103] [104]
-D5	Single-Ended Process Cover with 316 ss Bolt; No Connector Screw; MWP=2175 psi[100]
-D6	Double-Ended Process Cover[101] with 316 ss Bolt; Size 7/16 316 ss Connector Screw; MWP=1500 psi[102] [103] [104]
-D7	Single-Ended Process Cover with 17-4 PH Bolt; No Connector Screw; MWP=3626 psi[100]
-D8	Double-Ended Process Cover[101] with 17-4 PH Bolt; Size 7/16 17-4 PH Connector Screw; MWP=1500 psi[102] [103] [104]
-D9	Single-Ended Process Cover with 17-4 PH Bolt; No Connector Screw; MWP=5800 psi[100]
Optional Cleaning and Preparation[105]	
-X1	Unit Degreased – for Silicone Fill Sensors Only[106]
-X2	Cleaned and Prepared for Oxygen Service – for Inert Fill Sensors Only[107] [108]
-X3	Cleaned and Prepared for Chlorine Service[107] [109]
Optional Bolting (Process Covers and Process Connectors)[98] [110] [111] [112]	
-B1	316 ss Bolts and Nuts (high corrosion protection; MWP derated to 2175 psi)[113]
-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)[113]
Optional Conduit Thread Adapters[114] [115] [116]	
-A1	Hawke-Type 1/2 NPT Brass Cable Gland
-A3	M20 Connector

96. Not available with Electronics Version -V.
97. Available only with Electronics Version -V.
98. 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.
99. Not available with optional Biplanar Process Connector (codes -F1 through -F6).
100. Available with Biplanar Structure codes B0, B1, B2, B3, BG, B4, B5, B6, B7, LL, LM, LC, and LD.
101. Blind connector supplied.
102. 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.
103. Available only with Structure codes B0, B1, B2, B3, BG, B4, B5, B6, and B7.
104. Not available with optional Mounting Bracket Sets -M3, -M9, and -M0.
105. Not available with Span code H.
106. Available only with structures that have silicone fill and are not prepared for seals.
107. Available only with structures that have inert fill (excluding Structure code 79) and are not prepared for seals.
108. 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.
109. 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.
110. Not available with Structure codes 78 and 79 (PVDF process covers).
111. Not available with optional IEC 61518 Construction codes -D1 through -D9.
112. Available with biplanar structures only.
113. See Maximum Static, Overrange, and Proof Pressure Ratings, page 11 for pressure deratings when certain IEC 61518 options and Bolting Options -B1 or -B3 are specified.
114. Not available with Electrical Certification codes that end in D or P.
115. Available with Conduit Connection and Housing Material codes 1 and 3 only.
116. Available only with -ZZ (no extra certification).

Table 13 - Absolute and Gauge Pressure Transmitters (Continued)

Code	Description
Optional Custom Factory Configuration	
-C1	Custom Factory Calibration (Calibration and Unit Tags Required)[117]
-C2	Custom Factory Configuration (requires Configuration Form to be filled out)
Optional Electronics Housing Features	
-Z1	External Zero Adjustment[118] [119]
-Z2	Custody Transfer Lock and Seal[120]
-Z3	External Zero Adjustment and Custody Transfer Lock/Seal[118] [119] [120]
Optional Ermeto Connectors	
-E3	316 ss for Connecting 6 mm Tubing to 1/4 NPT Process Connector[121]
-E4	316 ss for Connecting 12 mm Tubing to 1/2 NPT Process Connector[122]
Optional Manifold Configurations	
-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)
Optional SIL 2 Selections[123]	
-S1	Yellow Cover for SIL 2 on Electronics/Indicator Side of Housing[124]
-S2	Red Cover for SIL 2 on Electronics/Indicator Side of Housing[124]
Miscellaneous Optional Selections	
-F	Autoclave F-250-C (GP transmitters only)
-G	G 1/2 B Manometer Process Connection[125]
-G1	Metal O-Ring for Diaphragm Seals in Vacuum Service[126]
-H	1/2 NPT External Thread (GP transmitters only)
-J	Low Temperature Operative Limit -50°C (-58°F)[118] [127] [128] [129]
-R	R 1/2 Process Connection (1/2 NPT to R 1/2 Adapter)[130]
-S7	Ra 15 Sanitary Seal Finish[131]
-T	Supplemental Customer Tag (Stainless Steel Tag Wired onto Transmitter)

117. Not available as a selection for the Value (05S) transmitter because it is standard for these models.
118. Not available with Electronics Version -V.
119. Not available for structures with sanitary or pulp and paper seals.
120. 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.
121. Available only with Biplanar Structure codes B0, B1, B2, B3, BG, B4, B5, B6, and B7, and Optional Biplanar Process Connector Type code -F1.
122. Available only with Biplanar Structure codes B0, B1, B2, B3, BG, B4, B5, B6, and B7, and Optional Biplanar Process Connector Type code -F2.
123. Available only with Electronics Version -T.
124. Not available with Electronics Version -M.
125. Available with non–gold-plated 316L ss direct connect structures with 1/2 NPT external connections.
126. Available only with Structure codes P1, P2, P3, P4, P5, and P6.
127. Not available with Structure codes 78 and 79 (PVDF process covers).
128. Not available with Optional IEC 61518 Construction codes -D2, -D4, -D6, and -D8.
129. Not available with Direct Connect Structure codes 21, 23, 31, 33, 35, 37, 39, E3, E5, E7, 43, 45, 47, 71, 73, 81, 83, G3, G5, G7, 53, 61, 63, 91, 93, F3, F5, F7; Biplanar Structure codes B1, B3, B5, B7, N5, C7, C9, 78, 79, LM, LD, CD, L3, L7, D2, S4, SD, P2, P4, P6, D6, S6, SJ; and all Sanitary/Pulp and Paper structures.
130. Available with 316L ss direct connect structures with 1/2 NPT external connections.
131. Only available with Structure codes TA, T2, T3, TB, T4, T5, M1, M6, M9.

Differential Pressure Transmitters

Table 14 - Differential Pressure Transmitters

Code	Description
Model	
IDP	Differential Pressure Transmitter
Tier	
05S	Value Performance[132]
10S	Advanced Performance[133] with FoxCal™
50S	Premium Performance[134] with FoxCal™
Electronics Versions/Output Signals	
-T	HART and 4 to 20 mA with SIL 2
-F	FOUNDATION Fieldbus H1 Digital Communications[135]
-M	Modbus RTU[136]
-V	Low Power Electronics, 1 to 5 Volts[137]
Structure Codes	
Structure — Traditional[138]	
20	316 ss Cover; Co-Ni-Cr Diaphragm; Silicone Fill; Max Static Pressure=25 MPa (3626 psi)[135]
21	316 ss Cover; Co-Ni-Cr Diaphragm; Inert Fill; Max Static Pressure=25 MPa (3626 psi)[135]
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)
24	316 ss Cover; Monel Diaphragm; Silicone Fill; Max Static Pressure=25 MPa (3626 psi)[135]
25	316 ss Cover; Monel Diaphragm; Inert Fill; Max Static Pressure=25 MPa (3626 psi)[135]
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)
34	Monel Cover; Monel Diaphragm; Silicone Fill; Max Static Pressure=25 MPa (3626 psi)[135]
35	Monel Cover; Monel Diaphragm; Inert Fill; Max Static Pressure=25 MPa (3626 psi)[135]
46	C276 Cover; C276 Diaphragm; Silicone Fill; Max Static Pressure=25 MPa (3626 psi)[135]
47	C276 Cover; C276 Diaphragm; Inert Fill; Max Static Pressure=25 MPa (3626 psi)[135]
48	C276 Cover; Tantalum Diaphragm; Silicone Fill; Max Static Pressure=25 MPa (3626 psi)[135]
49	C276 Cover; Tantalum Diaphragm; Inert Fill; Max Static Pressure=25 MPa (3626 psi)[135]
78	PVDF Insert; Tantalum Diaphragm; Silicone Fill; Max Static Pressure=2.07 MPa (300 psi)[135] [139]
79	PVDF Insert; Tantalum Diaphragm; Inert Fill; Max Static Pressure=2.07 MPa (300 psi)[135] [139]

132. Refer to PSS 2A-1S05 A for accuracy specifications.
133. Refer to PSS 2A-1S10 A for accuracy specifications.
134. Refer to PSS 2A-1S50 A for accuracy specifications.
135. Not available with the Value (05S) transmitter.
136. Not available with the Premium (50S) transmitter.
137. Available only with the Value (05S) transmitter.
138. Maximum static pressure can be derated by optional selections.
139. Maximum static pressure rating is 2.1 MPa (300 psi); temperature limits are -7 and +82°C (+20 and +180°F).

Table 14 - Differential Pressure Transmitters (Continued)

Code	Description
Structure — LP1 Direct Mount (Not Available with Diaphragm Seals); Maximum Static Pressure=25 MPa (3626 psi)[140]	
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
CC	C276 Cover; C276 Diaphragm; Silicone Fill[141]
CD	C276 Cover; C276 Diaphragm; Inert Fill[141]
Structure — LP2 Bracket Mount or Direct Mount (Not Available with Diaphragm Seals); Maximum Static Pressure=25 MPa (3626 psi)[140]	
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
Structure — Prepared for Diaphragm Seals — Diaphragm Seals Provided (Static Pressure Rating Limited by Seal)[142] [143] [144]	
S1	316 ss Cover; 316L ss Diaphragm; Silicone Fill; Remote Mount Seals, Both Sides
S2	316 ss Cover; 316L ss Diaphragm; Inert Fill; Remote Mount Seals, Both Sides
S3	316 ss, 1/2 NPT Cover; 316L ss Diaphragm; Silicone Fill; Remote Mount Seal, High Side
S4	316 ss, 1/2 NPT Cover; 316L ss Diaphragm; Inert Fill; Remote Mount Seal, High Side
S5	316 ss, 1/2 NPT Cover; 316L ss Diaphragm; Silicone Fill; Remote Mount Seal, Low Side
S6	316 ss, 1/2 NPT Cover; 316L ss Diaphragm; Inert Fill; Remote Mount Seal, Low Side
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
Structure — Prepared for Diaphragm Seals — Diaphragm Seals Not Provided (Static Pressure Rating Limited by Seal)[142] [144]	
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

140. Maximum static pressure can be derated by optional selections.
141. Not available with the Value (05S) transmitter.
142. Not available with options -X1, -X2, or -X3.
143. Both transmitter and diaphragm seal model numbers are required. See PSS 2A-1Z11 B for diaphragm seal model codes.
144. Available only with Process Connector Type code 0.

Table 14 - Differential Pressure Transmitters (Continued)

Code	Description
Span Limits	
A[145]	With -T, -M, or -F Electronics: 0.12 and 7.5 kPa; 0.5 and 30 inH_2O; 1.2 and 75 mbar With -V Electronics: 0.12 and 7.5 kPa; 0.5 and 30 inH_20; 1.2 and 75 mbar
B	With -T, -M, or -F Electronics: 0.12 and 50 kPa; 0.5 and 200 inH_2O; 1.2 and 500 mbar With -V Electronics: 0.87 and 50 kPa; 3.5 and 200 inH_2O; 8.7 and 500 mbar
C	With -T, -M, or -F Electronics: 0.62 and 250 kPa; 2.5 and 1000 inH_2O; 6.22 and 2500 mbar With -V Electronics: 7 and 250 kPa; 28 and 1000 inH_2O; 70 and 2500 mbar
D	With -T, -M, or -F 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[146]	With -T, -M, or -F 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
Process Connector Type (Same Material as the Process Cover)	
0	None
1	1/4 NPT[146 147 148]
2	1/2 NPT[146 147]
3	RC 1/4[146 147 148]
4	RC 1/2[146 147]
6	1/2 Schedule 80 Weld Neck[146 147 148]
7	None; PVDF insert tapped for 1/2 NPT process inlet located on side of process cover[149]
Conduit Connection and Housing Material	
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
Electrical Certifications	
AA	ATEX/UKEX intrinsically safe, Ex ia IIC[150]
AD	ATEX/UKEX flameproof, Ex db IIC
AM	ATEX/UKEX multiple certifications (includes Codes AA and AN)[150]
AN	ATEX/UKEX protection type n, Ex ic IIC, or Ex nA[150]
AP	ATEX/UKEX multiple certifications (includes Codes AA, AD and AN)[150]
BA	INMETRO intrinsically safe, Ex ia IIC[150]
BD	INMETRO flameproof, Ex db IIC
BP	INMETRO multiple certifications (includes INMETRO Codes BA and BD)[150]

145. Span limit code A is not available with diaphragm seals, except for sanitary spud seal model DS-P4.
146. Not available with Structure codes 78 and 79 (PVDF process covers).
147. Not available with structures that have seals on both sides.
148. Not available with structures that have C276 process covers.
149. Available only with Structure codes 78 and 79 (PVDF process covers).
150. Not available with Electronics Version -M.

Table 14 - Differential Pressure Transmitters (Continued)

Code	Description
CA	CSA intrinsically safe, Zone certified Ex ia[151]
CD	CSA zone certified flameproof Ex db IIC; also explosion proof, dust ignition-proof
CM	CSA multiple certifications (includes CSA Codes CA and CN)[151]
CN	CSA non-incendive, Zone certified Ex nA IIC[151]
CP	CSA multiple certifications (includes CSA Codes CA, CD and CN)[151]
DA	Multi-marked ATEX/UKEX and IECEx intrinsically safe, Ex ia IIC[151]
DD	Multi-marked ATEX/UKEX and IECEx flameproof, Ex db IIC
DN	Multi-marked ATEX/UKEX and IECEx protection type n, Ex ic IIC[151]
EA	IECEx intrinsically safe, Ex ia IIC[151]
ED	IECEx flameproof, Ex db IIC
EM	IECEx multiple certifications, ia, ic, nA[151]
EN	IECEx protection type n, Ex ic IIC, or Ex nA[151]
EP	IECEx multiple certifications, ia, ic, nA, and db[151]
FA	FM Classes I, II and III Division 1 intrinsically safe, AEx ia IIC[151]
FD	FM Classes I, II and III Division 1 explosion proof, dust-ignition proof, Zone approved AEx db IIC
FM	FM multiple certifications (includes FM Codes FA or FN)[151]
FN	FM Classes I, II and III, Division 2 non-incendive, Zone approved AEx nA IIC[151]
FP	FM multiple certifications (includes FM Codes FA, FD or FN)[151]
KD	KC Certification Ex db
NA	NEPSI intrinsically safe[151]
ND	NEPSI flameproof, Ex db IIC
RA	EAC intrinsically safe, Ex ia[151]
RD	EAC flameproof, Ex db
RN	EAC protection type n, Ex ic IIC or Ex nA[151]
ZZ	No certification[151]
Optional Mounting Bracket Sets[152] [153]	
-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

151. Not available with Electronics Version -M.
152. Not available with Structure codes F1, F2, F3, and F4 (direct connect seal).
153. Requires Process Connection 0 for LP1 structures LL, LM, LC, LD, CC, and CD.

Table 14 - Differential Pressure Transmitters (Continued)

Code	Description
Optional Adapter Plates[154] [155] [156]	
-P1	Adapter Set for MC Coplanar Manifolds, B7 Bolts[157]
-P2	Adapter Set for MC Coplanar Manifolds, 316 ss Bolts[158]
-P3	Adapter Set for MC Coplanar Manifolds, 17-4 ss Bolts[159]
-P4	Adapter Set for MC Coplanar Manifolds, B7M Bolts[160]
-P5	Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, B7 Bolts[157]
-P6	Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, 316 ss Bolts[158]
-P7	Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, 17-4 ss Bolts[159]
-P8	Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, B7M Bolts[160]
Options for Digital Indicator with Pushbuttons	
-L1	Digital Display, Pushbuttons and Window Cover[161]
-L2	Substitute Solid Cover over Digital Display[162]
Optional IEC 61518 Construction[155] [163] [164]	
-D1	Single-Ended Process Cover with B7 Steel Bolt; No Connector Screw; MWP=2320 psi
-D2	Double-Ended Process Cover[165] with B7 Steel Bolt; Size M10 Steel Connector Screw; MWP=1500 psi[166] [167]
-D3	Single-Ended Process Cover with B7 Steel Bolt; No Connector Screw; MWP=3626 psi
-D4	Double-Ended Process Cover[165] with B7 Steel Bolt; Size 7/16 Steel Connector Screw; MWP=1500 psi[166] [167]
-D5	Single-Ended Process Cover with 316 ss Bolt; No Connector Screw; MWP=2175 psi
-D6	Double-Ended Process Cover[165] with 316 ss Bolt; Size 7/16 316 ss Connector Screw; MWP=1500 psi[166] [167]
-D7	Single-Ended Process Cover with 17-4 PH Bolt; No Connector Screw; MWP=3626 psi
-D8	Double-Ended Process Cover[165] with 17-4 PH Bolt; Size 7/16 17-4 PH Connector Screw; MWP=1500 psi[166] [167]
-D9	Single-Ended Process Cover with 17-4 PH Bolt; No Connector Screw; MWP=5800 psi
Optional Cleaning and Preparation	
-X1	Unit Degreased – for Silicone Fill Sensors Only[168]
-X2	Cleaned and Prepared for Oxygen Service – for Inert Fill Sensors Only[169] [170]
-X3	Cleaned and Prepared for Chlorine Service[169] [171]

154. Not available with optional IEC 61518 Construction codes -D1 through -D9.
155. Available only with Process Connector Type code 0.
156. Only available with LP1 and LP2 structures that have 316 ss process covers.
157. Not available with Bolting Options -B1, -B2, or -B3.
158. Available only with option -B1.
159. Available only with option -B2.
160. Available only with option -B3.
161. Not available with Electronics Version -V.
162. Available only with Electronics Version -V.
163. See Maximum Static, Overrange, and Proof Pressure Ratings, page 11 for pressure deratings when certain IEC 61518 options and Bolting Options -B1 or -B3 are specified.
164. Available only with Structure codes 20 through 27. Not available with options -V and -V1.
165. Blind connector supplied.
166. Not available with Mounting Bracket Set options -M1, -M2, and -M3.
167. 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.
168. Available only with structures that have silicone fill and are not prepared for seals.
169. Available only with structures that have inert fill (excluding Structure code 79) and are not prepared for seals.
170. 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.
171. 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.

Table 14 - Differential Pressure Transmitters (Continued)

Code	Description
Optional Bolting (Process Covers and Process Connectors)[172] [173] [174] [175]	
-B1	316 ss Bolts and Nuts (high corrosion protection; MWP derated to 2175 psi)[176]
-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)[176]
Optional Conduit Thread Adapters[177] [178] [179]	
-A1	Hawke-Type 1/2 NPT Brass Cable Gland
-A3	M20 Connector
Optional Custom Factory Configuration	
-C1	Custom Factory Calibration (Calibration and Unit Tags Required)[180]
-C2	Custom Factory Configuration (requires Configuration Form to be filled out)
Optional Electronics Housing Features	
-Z1	External Zero Adjustment[181]
-Z2	Custody Transfer Lock and Seal[182]
-Z3	External Zero Adjustment and Custody Transfer Lock/Seal[181] [182]
Optional Ermeto Connectors	
-E3	316 ss for Connecting 6 mm Tubing to 1/4 NPT Process Connector[183]
-E4	316 ss for Connecting 12 mm Tubing to 1/2 NPT Process Connector[184]
Optional Manifold Configurations	
-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)
Optional SIL 2 Selections[185]	
-S1	Yellow Cover for SIL 2 on Electronics/Indicator Side of Housing[186]
-S2	Red Cover for SIL 2 on Electronics/Indicator Side of Housing[186]

172. Not available with Structure codes 78 and 79 (PVDF process covers).
173. Not available with optional IEC 61518 Construction codes -D1 through -D9.
174. For stainless steel bolts with IEC 61518 construction, specify -D5 to -D9, as required, instead of -B1 or -B2.
175. Not available with structures that have Monel process covers.
176. See Maximum Static, Overrange, and Proof Pressure Ratings, page 11 for pressure deratings when certain IEC 61518 options and Bolting Options -B1 or -B3 are specified.
177. Not available with Electrical Certification codes that end in D or P.
178. Available with Conduit Connection and Housing Material codes 1 and 3 only.
179. Available only with -ZZ (no extra certification).
180. Not available as a selection for the Value (05S) transmitter because it is standard for these models.
181. Not available with Electronics Version -V.
182. Cover locks are provided as standard with Electrical Certification codes that end in D or P (flameproof).
183. Available only with Structure codes 20 to 27, and Process Connector codes 0 and 1.
184. Available only with Structure codes 20 to 27, and Process Connector code 2.
185. Available only with Electronics Version -T.
186. Not available with Electronics Version -M.

Table 14 - Differential Pressure Transmitters (Continued)

Code	Description
Miscellaneous Optional Selections	
-G1	Metal O-Ring for Diaphragm Seals in Vacuum Service[187] [188]
-GP	Gold Plated Diaphragm[189] [190] [191]
-J	Low Temperature Operative Limit -50°C (-58°F)[192] [193] [194] [195]
-T	Supplemental Customer Tag (Stainless Steel Tag Wired onto Transmitter)
-V	Supply Vent Screw in Side of Each Process Cover[196]
-V1	Omit Vent Screw in Side of Each Process Cover[197]
-Y	Static Pressure Rating to 40 MPa (5800 psi) and 17-4 ss Bolts and Nuts[193] [198] [199] [200]

Transmitter Parts

Warning

⚠WARNING

RISK OF MOISTURE INGRESS

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.

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

187. When the diaphragm seal is used in vacuum applications, -G1 is required. This selection substitutes a vacuum service metal gasket for the standard PTFE process cover gasket.
188. Available only with structure codes for diaphragm seals.
189. Available only with Structure code 22.
190. Not available with options -X1, -X2, or -X3.
191. Not available with the Value (05S) transmitter.
192. Not available with Electronics Version -V.
193. Not available with Structure codes 78 and 79 (PVDF process covers).
194. Not available with Optional IEC 61518 Construction codes -D2, -D4, -D6, and -D8.
195. Not available with structures that have inert fill fluid.
196. Available only with Traditional Structure codes 20 to 49.
197. Available only with LP1 Direct Mount structures with 316 ss process covers.
198. Not available with structures prepared for diaphragm seals.
199. Not available with Bolting Options -B1, -B2, or -B3.
200. Not available with structures that have Monel process covers.

Parts for Direct Connect AP and GP Transmitters

Figure 71 - Direct Connect Transmitters

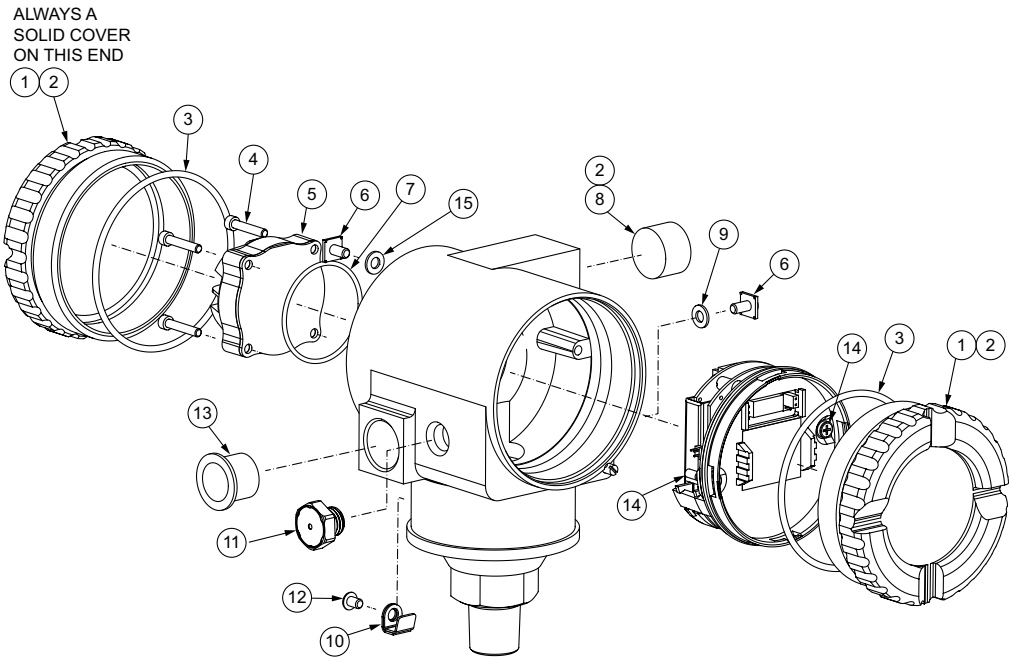


Table 15 - Parts for Direct Connect Transmitters

Item	Part No.	Qty.	Part Name
1	Cover, Electronics Housing; see Housing Covers, page 116.		
2	**Below**	1	**Grease, 1.75 oz. Tube**
	X0180JB		Lubit-8 for Transmitters with Aluminum Housing
	X0114AA		Never-Seez for Transmitters with Stainless Steel Housing
3	X0201FC	2	O-Ring, Cover
4	**Below**	4	**Screw, Terminal Block Assembly, 0.138-32 x 0.750**
	X0133UW		Steel Screw - used with Aluminum Housing
	X0133VP		316 ss Screw - used with 316 ss Housing
5	D0149FE	1	Terminal Block Assembly (Electronics Version -V)
6	D0162VJ	2	Screw Assembly, Ground, 0.164-32 x 0.750
7	X0144KR	1	O-Ring
8	**Below**	1	**Pipe Plug for Unused Conduit Connection – see Warning, page 102**
	B0139CA		Aluminum, 1/2 NPT; with Housing Code 1
	B0139SK		316 ss, 1/2 NPT; with Housing Code 3
	X0178MC		Aluminum, M20; with Housing Code 5
	X0178MB		316 ss, M20; with Housing Code 6
9	X0173YA	1	Washer, Ext. Ground, 0.196 ID, 0.383 OD
10	D0197PS	1	Retention Clip
11	X0179ME	1	Vent Plug; for GP Transmitter with sanitary or pulp and paper seals only
12	X0174EK	1	Screw, Button Head; 0.164-32 x 0.25 long

Table 15 - Parts for Direct Connect Transmitters (Continued)

Item	Part No.	Qty.	Part Name
13	S0102BT	1	Plug, Poly (remove prior to Transmitter installation)
14	**Below**	2	**Screw, Captive, Pan Head, 0.138-32 x 0.615**
	D0162VM		Steel Screw - used with Aluminum Housing
	D0166CY		316 ss Screw - used with 316 ss Housing

Parts for Biplanar AP and GP Transmitters

Figure 72 - Biplanar Transmitter Topworks

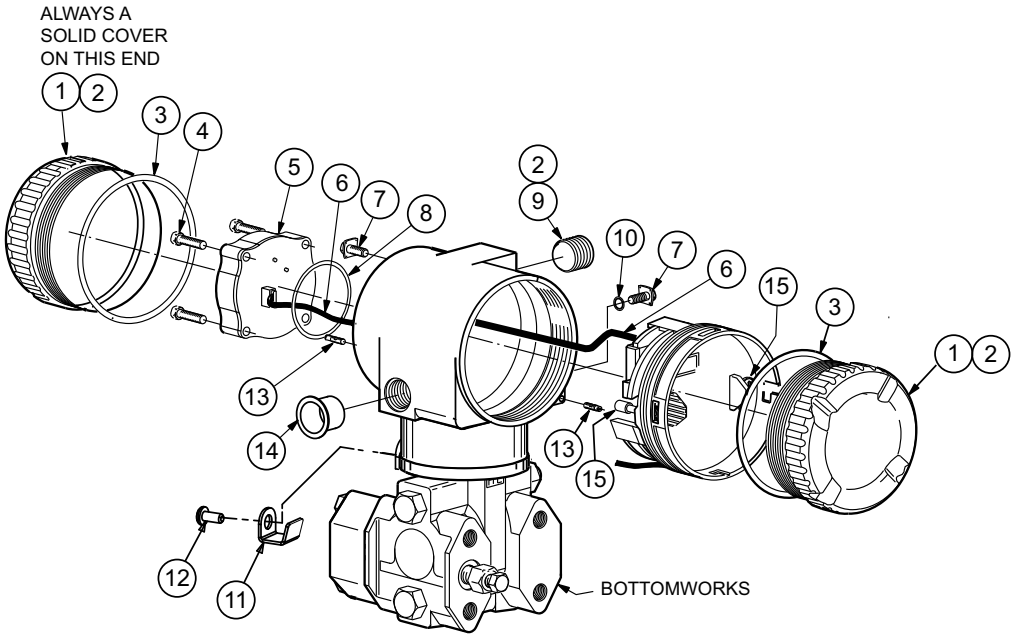


Table 16 - Parts for Biplanar Transmitter Topworks

Item	Part No.	Qty.	Part Name
1	Cover, Electronics Housing; see Housing Covers, page 116		
2	**Below**	1	**Grease, 1.75 oz. Tube**
	X0180JB		Lubit-8 for Transmitters with Aluminum Housing
	X0114AA		Never-Seez for Transmitters with Stainless Steel Housing
3	X0201FC	2	O-Ring, Cover
4	**Below**	4	**Screw, Terminal Block Assembly, 0.138-32 x 0.750**
	X0133UW		Steel Screw - used with Aluminum Housing
	X0133VP		316 ss Screw - used with 316 ss Housing
5	D0149FE	1	Terminal Block Assembly (Electronics Version -V)
6	P0177JE	1	Power Cable, Replaceable
7	D0162VJ	4	Screw Assembly, Ground, 0.164-32 x 0.375
8	X0144KR	1	O-Ring

Table 16 - Parts for Biplanar Transmitter Topworks (Continued)

Item	Part No.	Qty.	Part Name
9	**Below**	1	**Pipe Plug for Unused Conduit Connection – see Warning, page 102**
	B0139CA		Aluminum,1/2 NPT; with Housing Code 1
	B0139SK		316 ss, 1/2 NPT; with Housing Code 3
	X0178MC		Aluminum, M20; with Housing Code 5
	X0178MB		316 ss, M20; with Housing Code 6
10	X0173YA	1	Washer, Ext. Ground, 0.196 ID, 0.383 OD
11	D0197PS	1	Retention Clip
12	X0174EK	1	Screw, Button Hd; 0.164-32 x 0.25
13	D0162WM	2	Screw, Lock, 0.164-32; part of Optional Selection -Z2; see Custody Transfer Lock and Seal (Option -Z2), page 123
14	S0102BT	1	Plug, Poly (remove prior to Transmitter installation)
15	**Below**	2	**Screw, Captive, Pan Head, 0.138-32 x 0.615**
	D0162VM		Steel Screw - used with Aluminum Housing
	D0166CY		316 ss Screw - used with 316 ss Housing

Figure 73 - Biplanar Transmitter Bottomworks for Use with Traditional Structures

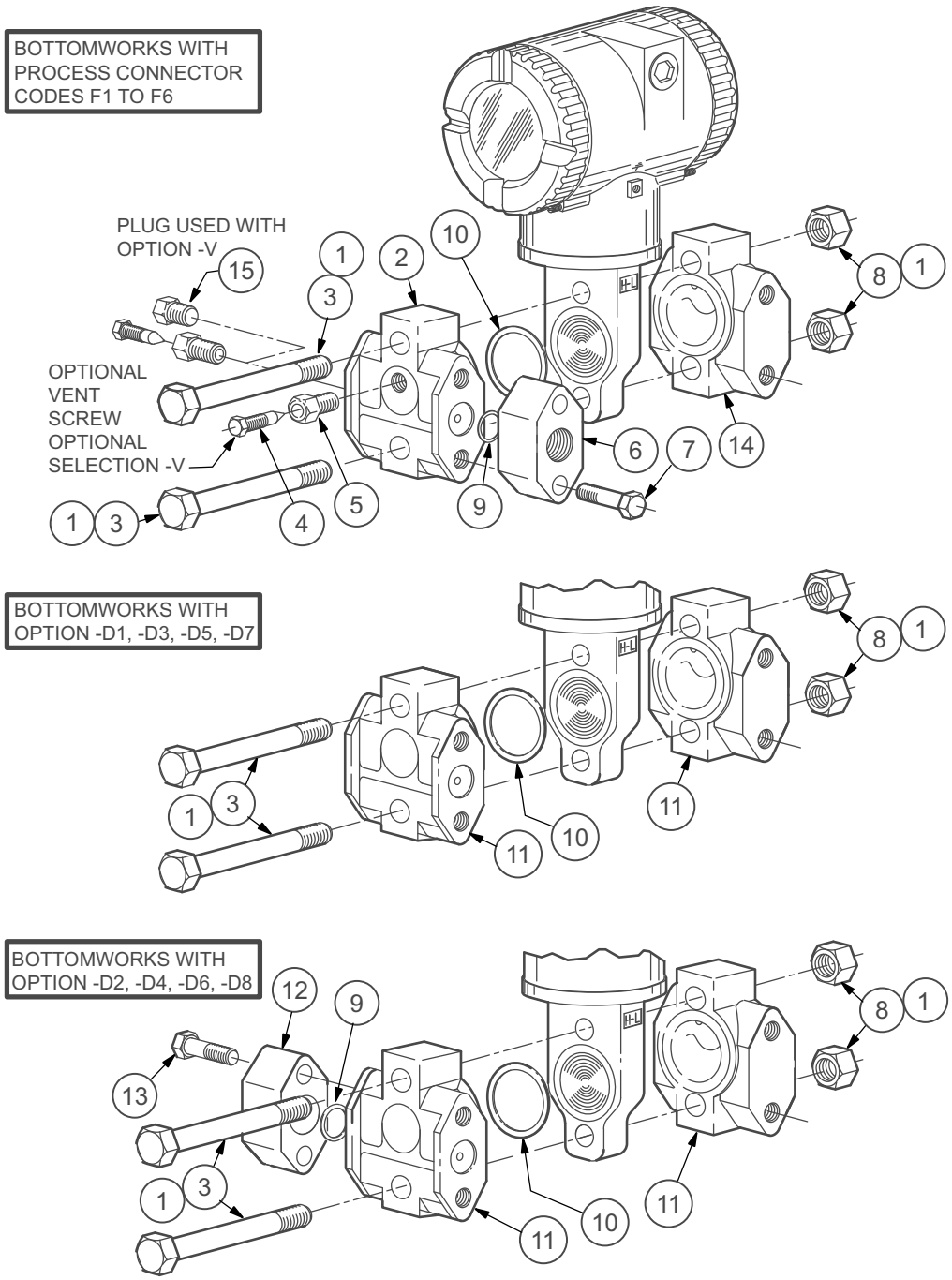


Table 17 - Parts for Biplanar Transmitter Bottomworks for Use with Traditional Structures

Item	Part No.	Qty.	Part Name
1	**Below**	1	**Grease, 1.75 oz. Tube**
	X0118CC		Lubriplate for Transmitters with Aluminum Housing
	X0114AA		Never-Seez for Transmitters with Stainless Steel Housing
2	**Below**	1	**Process Cover (Process Connector Type codes F1 - F6)**[201]
	D0161NA		High Side, 316 ss
	D0161NC		High Side, Nickel Alloy[202]
	D0161ND		High Side, Monel
	D0161NE		Side Vent, 316 ss
	D0161NG		Side Vent, Nickel Alloy[202]
	D0161NH		Side Vent, Monel
3	**Below**	2	**Screw, hex head, 0.500-13 x 3.5**
	X0173RP		2H (ASTM A193, Gr. B7 [std])
	X0173TQ		316 ss (ASTM F593, Group 2) (Options -B1. -D5, -D6)
	X0173UK		ASTM A193, Gr. B7M (Option -B3)
	X0173TD		17-4 ss (ASTM A564, Type 630) (Options -B2, -D7, -D8)
4	**Below**	2	**Vent Screw**
	B0138MJ		316 ss (std)
	B0138MK		Monel[201]
	D0175PQ		Nickel alloy[201] [203]
5	**Below**	1	**Vent Plug**[204]
	D0161QT		316 ss (std)
	D0161QU		Monel[201]
	D0175PP		Nickel alloy[201] [203]
6	1 Process Connector (see Process Connectors for Biplanar Transmitters with Traditional Structures, page 109)		

201. Metallic process wetted material conforming to NACE Standard MR0175 and MR0103.
202. Equivalent to Hastelloy® C. Hastelloy is a registered trademark of Haynes International, Inc.
203. Equivalent to Hastelloy® C-276. Hastelloy is a registered trademark of Haynes International, Inc.
204. For simplified calibration, install F0101ES screw for pressure up to 0.7 MPa (100 psi).

Table 17 - Parts for Biplanar Transmitter Bottomworks for Use with Traditional Structures (Continued)

Item	Part No.	Qty.	Part Name
7	**Below**	2	**Screw, hex head, 0.438-20 x 1.5 (for threaded connectors, Codes F1 - F4)**
	X0100MN		ASTM A193 Gr. B7 (std)
	X0171VP		ASTM A193, Gr. B7M (Option -B3)
	X0118AX		17-4 Stainless Steel (Options -B2, -D7, -D8)
	N1205RQ		316 ss (Options -B1, -D5, -D6)
	Below		**Screw, hex head, 0.438-20 x 1.0 (for weld neck connectors, Code F6)**
	X0100NT		ASTM A193, Gr. B7 (std)
	X0171VN		ASTM A193, Gr. B7M (Option -B3)
	X0118AY		17-4 Stainless Steel (Option -B2)
	X0173TP		316 ss (Option -B1)
8	**Below**	2	**Nut, hex head, 0.500-13**
	X0173RN		Nut, hex head, 0.500-13
	X0173UL		ASTM A194, Gr. 2HM (Option -B3)
	X0173UJ		17-4 ss (ASTM F594, Group 2) (Options -B2, -D7, -D8)
	X0173TR		316 ss (ASTM F594, Group 2) (Options -B1, -D5, -D6)
9	D0114RB	1	Gasket, PTFE
10	D0161QQ	1	Glass-filled PTFE (standard)
11	**Below**	1	**Cover, 316 ss**
	D0161NK		High Side, Single Ended Process Connection M10, ss (Option -D1)
	D0161NM		High Side, Single Ended Process Connection 7/16, ss (Options -D3, -D5, -D7)
	D0161NN		Double Ended Process Connection M10, ss (Option -D2)
	D0161NA		Double Ended Process Connection 7/16, ss (Options -D4, -D6, -D8)
12	D0153RK	1	Kidney Flange, Blind, 316 ss - for use with Options -D2, -D4, -D6, and -D8 (for double-ended process cover)
13	**Below**	4	**Screw, Hex Head, Steel, for Blind Kidney Flange - for Options -D2, -D4, -D6, -D8**
	X0173MJ		M10 x 1.5 x 40 mm, for Option -D2
	X0100MN		0.437-20 x 1.5 in, for Options -D4, -D6, and -D8
14	**Below**	1	**Cover, Low Side - for Process Connector Codes F1 - F6**
	D0161NR		M10, ss
	D0161NP		7/16, ss
15	**Below**	1	**Pipe Plug**
	D0161LU		316 ss (std)
	D0161LV		Monel
	D0161LW		Nickel alloy[205]

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

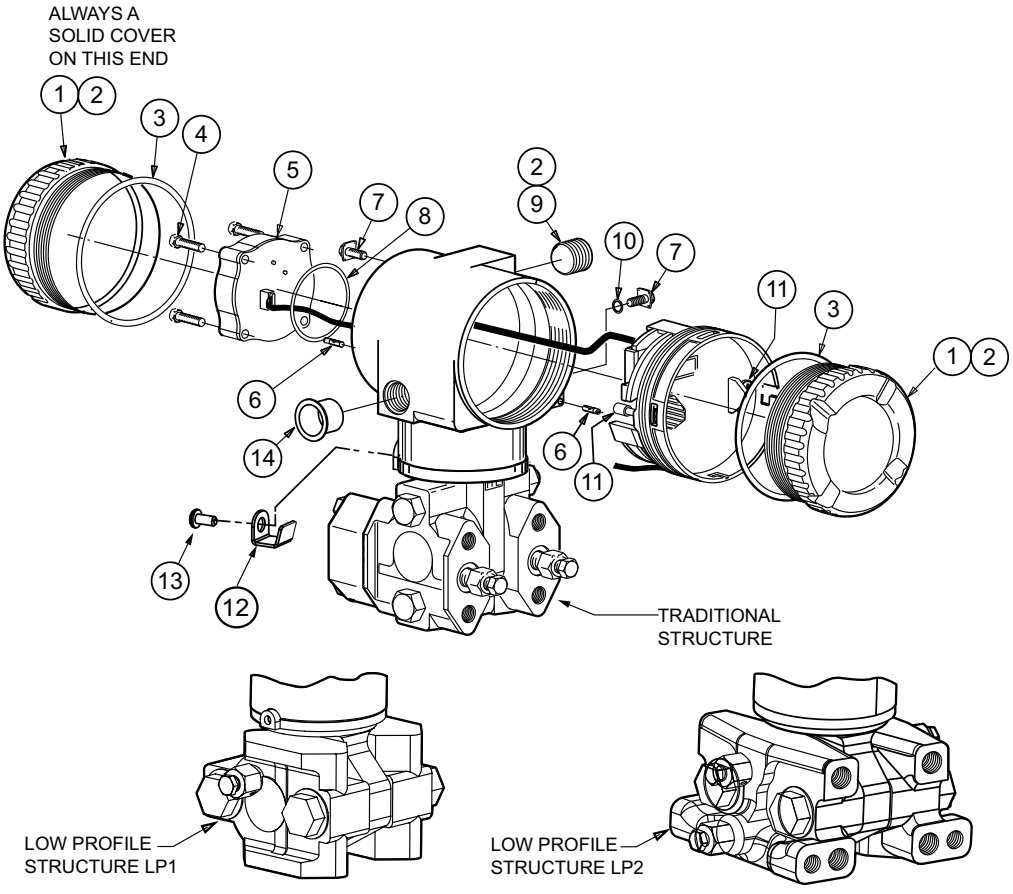
Process Connectors

Table 18 - Process Connectors for Biplanar Transmitters with Traditional Structures

Process Connector Code	Connector Description	Used with Cover Material		
		Stainless Steel	Nickel Alloy[206]	Monel[207]
F1	1/4 NPT	N0141XT	–	N0141XK
F2	1/2 NPT	N0141XN	B0139JW	N0141XL
F3	Rc 1/4	B0139BD	–	N0139BC
F4	Rc 1/2	B0139BG	B0139JV	B0139BF
F6	1/2 Schedule 80 Weld Neck	N0141XR	–	D0143CZ

Parts for DP Transmitters

Figure 74 - DP Transmitter Topworks



206. Equivalent to Hastelloy® C. Hastelloy is a registered trademark of Haynes International, Inc.
207. Not applicable for Low Power.

Table 19 - Parts for DP Transmitter Topworks

Item	Part No.	Qty.	Part Name
1	Cover, Electronics Housing; see Housing Covers, page 116.		
2	**Below**	1	**Grease, 1.75 oz. Tube**
	X0180JB		Lubit-8 for Transmitters with Aluminum Housing
	X0114AA		Never-Seez for Transmitters with Stainless Steel Housing
3	X0201FC	2	O-Ring, Cover
4	**Below**	4	**Screw, Terminal Block Assembly, 0.138-32 x 0.750**
	X0133UW		Steel Screw - used with Aluminum Housing
	X0133VP		316 ss Screw - used with 316 ss Housing
5	D0149FE	1	Terminal Block Assembly (Electronics Version -V); Power Cable (P0177JE) is available separately
6	D0162WM	2	Screw, Lock, 0.164-32; part of Optional Selection -Z2; see Custody Transfer Lock and Seal (Option -Z2), page 123
7	D0162VJ	4	Screw Assembly, Ground, 0.164-32 x 0.375
8	X0144KR	1	O-Ring
9	**Below**	1	**Pipe Plug for Unused Conduit Connection – see Warning, page 102**
	B0139CA		Aluminum,1/2 NPT; with Housing Code 1
	B0139SK		316 ss, 1/2 NPT; with Housing Code 3
	X0178MC		Aluminum, M20; with Housing Code 5
	X0178MB		316 ss, M20; with Housing Code 6
10	X0173YA	1	Washer, Ext. Ground, 0.196 ID, 0.383 OD
11	Below	2	**Screw, Captive, Pan Head, 0.138-32 x 0.615**
	D0162VM		Steel Screw - used with Aluminum Housing
	D0166CY		316 ss Screw - used with 316 ss Housing
12	D0197PS	1	Retention Clip
13	X0174EK	1	Button Head Screw; 0.164-32 x 0.25 long
14	S0102BT	1	Poly Plug (remove prior to Transmitter installation)

Figure 75 - DP Transmitter Bottomworks for Use with Traditional Structures

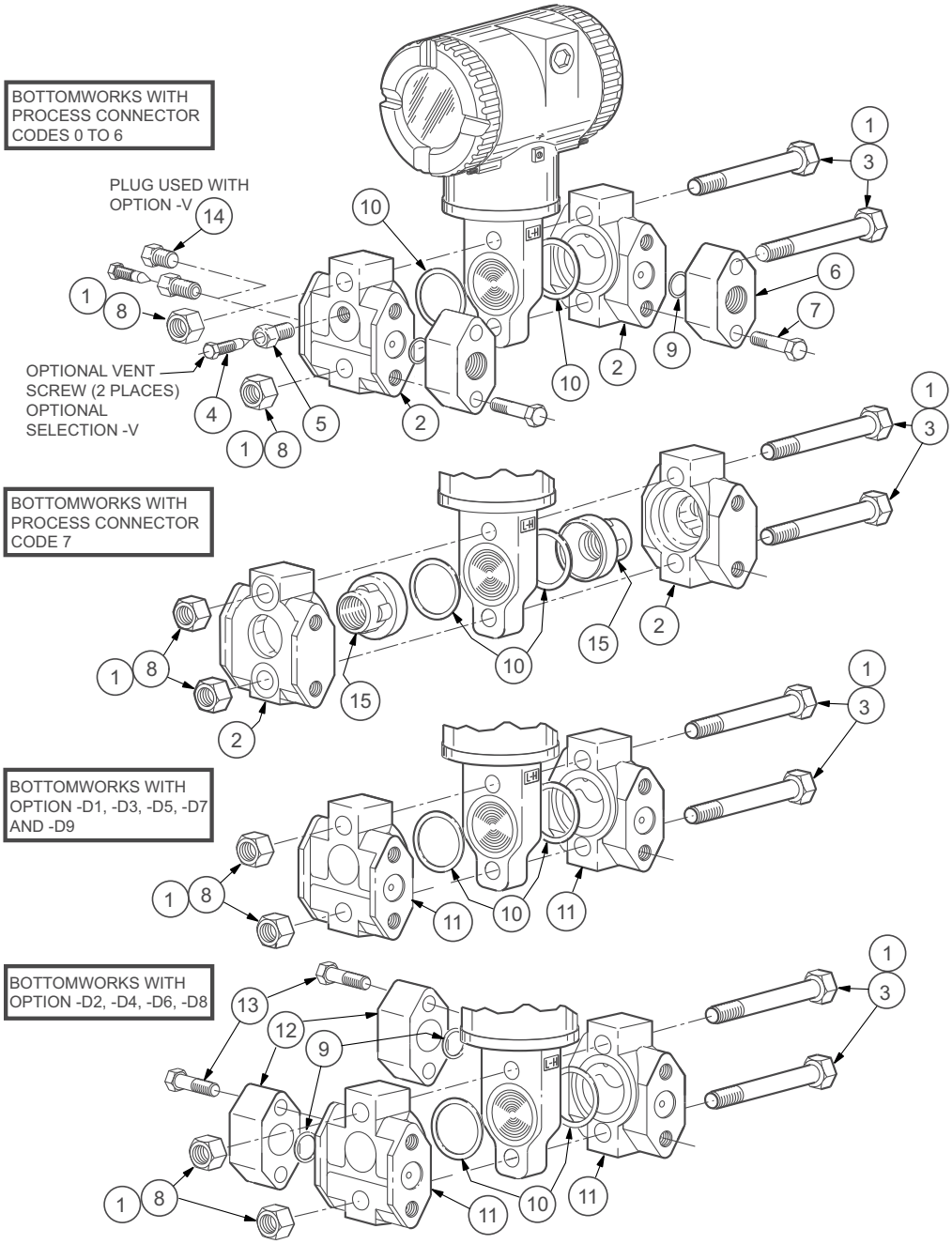


Table 20 - Parts for DP Transmitter Bottomworks for Use with Traditional Structures

Item	Part No.	Qty.	Part Name
1	**Below**	1	**Grease, 1.75 oz. Tube**
	X0118CC		Lubriplate for Transmitters with Aluminum Housing
	X0114AA		Never-Seez for Transmitters with Stainless Steel Housing
2	**Below**	2	**Process Cover for use with Process Connection Codes 0–6**[208]
	D0161NA		316 ss
	D0161NC		Nickel Alloy[209]
	D0161ND		Monel
	Below		**Side Vent Process Cover for use with Process Connection Codes 0-6**[208]
	D0161NE		316 ss
	D0161NG		Nickel Alloy[209]
	D0161NH		Monel
	D0175TB		316 ss Cover for use with Process Connector Code 7 only (PVDF insert fits into cover)[210]
3	**Below**	2	**Screw, Hex Head, 0.500-13 x 3.5**
	X0173RP		2H (ASTM A193, Gr. B7 [standard])
	X0173TQ		316 ss (ASTM F593, Group 2) (Options -B1, -D5, -D6)
	X0173UK		ASTM A193, Gr. B7M (Option -B3)[208]
	X0173TD		17-4 ss (ASTM A564, Type 630) (Options -B2, -D7, -D8, -D9)
4	**Below**	2	**Vent Screw**
	B0138MJ		316 ss (standard)
	B0138MK		Monel[208]
	D0175PQ		Nickel Alloy[208] [211]
5	**Below**	2	**Vent Plug**[212]
	D0161QT		316 ss (standard)
	D0161QU		Monel[208]
	D0175PP		Nickel Alloy[208] [211]
6	2 Process Connectors (see Process Connectors for Biplanar Transmitters with Traditional Structures, page 109)		

208. Metallic process wetted material conforming to NACE Standard MR0175 and MR0103.
209. Equivalent to Hastelloy® C. Hastelloy is a registered trademark of Haynes International, Inc.
210. Not available with Low Power.
211. Equivalent to Hastelloy® C-276. Hastelloy is a registered trademark of Haynes International, Inc.
212. For simplified calibration, install F0101ES screw for pressure up to 0.7 MPa (100 psi).

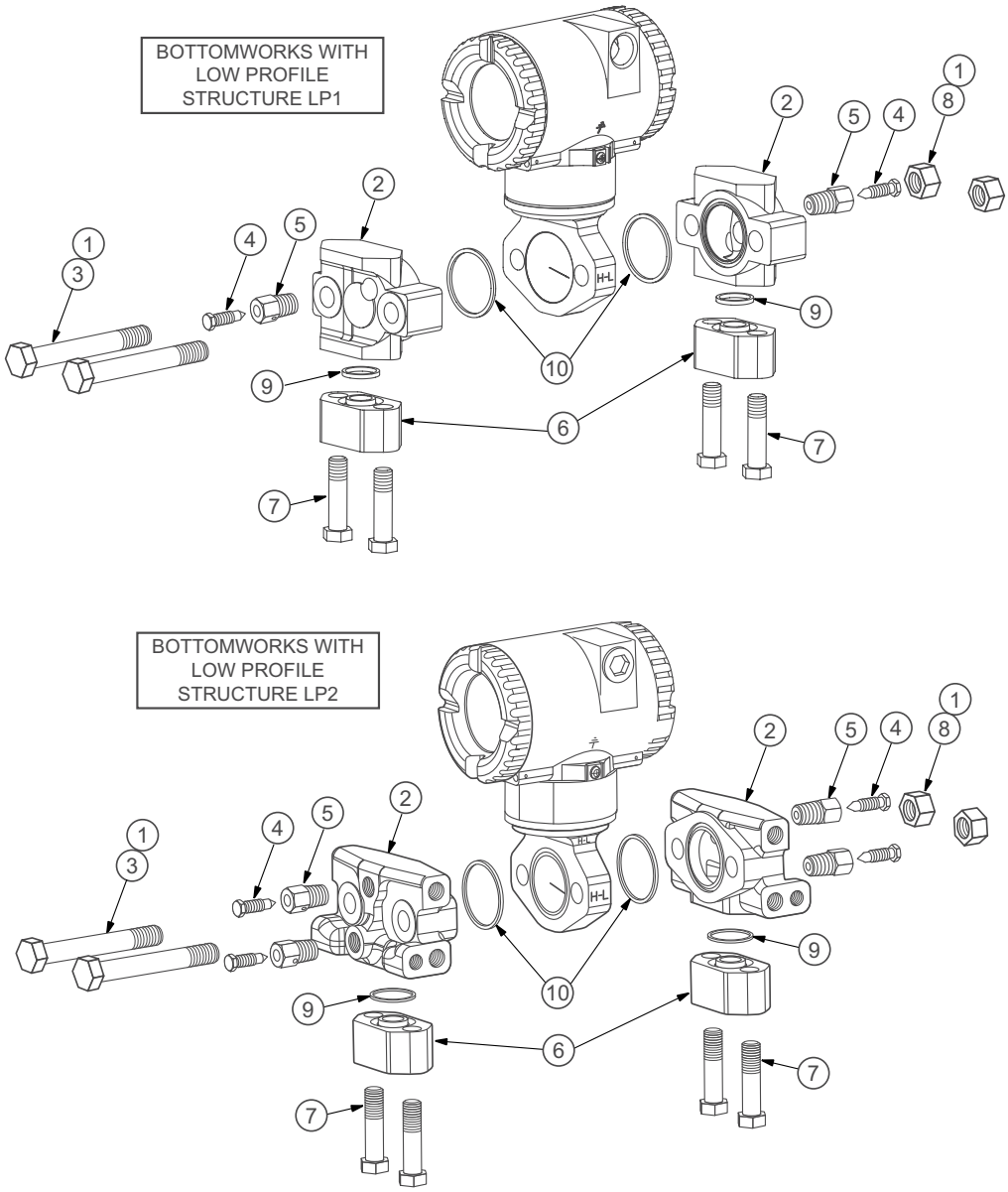
Table 20 - Parts for DP Transmitter Bottomworks for Use with Traditional Structures (Continued)

Item	Part No.	Qty.	Part Name
7	**Below**	4	**Screw, Hex Head, 0.438-20 x 1.5 (for threaded connectors, Codes 1-4)**
	X0100MN		ASTM A193 Gr. B7 (standard)
	X0171VP		ASTM A193, Gr. B7M (Option -B3)
	X0118AX		17-4 Stainless Steel (Options -B2, -D7, -D8, -D9, -Y)
	N1205RQ		316 ss (Options -B1, -D5, -D6)
	Below	4	**Screw, Hex Head, 0.438-20 x 1.0 (for weld neck connectors, Code 6)**
	X0100NT		ASTM A193, Gr. B7 (standard)
	X0171VN		ASTM A193, Gr. B7M (Option -B3)
	X0118AY		17-4 Stainless Steel (Options -B2, -Y)
	X0173TP		316 ss (Option -B1)
8	**Below**	2	**Nut, Hex Head, 0.500-13**
	X0173RN		2H (ASTM A193, Gr. B7) (standard) option
	X0173TR		316 ss (ASTM F594, Group 2) (Options -B1, -D5, -D6)
	X0173UJ		17-4 ss (ASTM F594, Group 2) (Options -B2, -D7, -D8, and -D9)
	X0173UL		ASTM A194, Gr. 2HM (Option -B3)
9	D0114RB	2	Gasket, PTFE
10	D0161QQ	2	Gasket, Process Cover, Glass-filled PTFE (Standard)
11	**Below**	1	**Cover, 316 ss - for use with Options -D1, -D3, -D5, -D7, and -D9**
	D0161NK		Single-ended process connection M10 (Option -D1) (High Side)
	D0161NJ		Single-ended process connection M10 (Option -D1) (Low Side)
	D0161NM		Single-ended process connection 7/16 (Options -D3, -D5, -D7) (High Side)
	D0161NL		Single-ended process connection 7/16 (Options -D3, -D5, -D7) (Low Side)
	D0174BU		Single-ended process connection 7/16 (Option -D9) (High Side)
	D0174BT		Single-ended process connection 7/16 (Option -D9) (Low Side)
	Below	2	**Cover, 316 ss - for use with Options -D2, -D4, -D6, and -D8**
	D0161NN		Double-ended process connection M10 (Option -D2)
	D0161NA		Double-ended process connection 7/16 (Options -D4, -D6, -D8)
12	D0153RK	2	Kidney Flange, Blind, 316 ss - for use with Options -D2, -D4, -D6, and -D8 (for double-ended process cover)
13	**Below**	4	**Screw, Hex Head, steel - for use with Options -D2, -D4, -D6, and -D8**
	X0173MJ		M10 x 1.5 x 40 mm, for Option -D2
	X0100MN		0.437-20 x 1.5 in, for Options -D4, -D6, and -D8

Table 20 - Parts for DP Transmitter Bottomworks for Use with Traditional Structures (Continued)

Item	Part No.	Qty.	Part Name
14	**Below**	2	**Pipe Plug, Hex Head, 1/4 NPT**
	D0161LU		316 ss
	D0161LV		Monel
	D0161LW		Nickel Alloy[213]
15	D0175TA	2	Insert, PVDF – for use with Process Connector Code 7 only[214]

Figure 76 - DP Transmitter Bottomworks for Use with Low Profile Structures LP1 and LP2



213. Equivalent to Hastelloy® C-276. Hastelloy is a registered trademark of Haynes International, Inc.
214. Not available with Low Power.

Table 21 - Parts for DP Transmitter Bottomworks for Use with Low Profile Structures LP1 and LP2

Item	Part No.	Qty.	Part Name
1	**Below**	1	**Grease, 1.75 oz. Tube**
	X0118CC		Lubriplate for Transmitters with Aluminum Housing
	X0114AA		Never-Seez for Transmitters with Stainless Steel Housing
2	**Below**	1/2[215]	**Process Cover with Process Connection Codes 0-6**[216]
	D0170WW		with LP1; High Side Cover; 316 ss
	D0170WY		with LP1; Low Side Cover; 316 ss
	D0174BZ		with LP2, High and Low Side Covers; 316 ss
3	**Below**	2	**Screw, Hex Head, 0.500-13 x 3.5**
	X0173RP		2H (ASTM A193, Gr. B7 [standard])
	X0173UK		ASTM A193, Gr. B7M (Option -B3)
	X0173TQ		316 ss (ASTM F593, Group 2) (Option -B1)
	X0173TD		17-4 ss (ASTM A564, Type 630) (Options -B2)
4	**Below**	2/4[215]	**Vent Screw**
	B0138MJ		316 ss
	D0175PQ		Nickel Alloy[216] [217]
5	**Below**	2/4[215]	**Vent Plug, 316 ss**[218]
	D0161QT		316 ss
	D0175PP		Nickel Alloy[216] [217]
6	**Below**	2	**Process Connectors, used with stainless steel cover**
	N0141XT		Tapped for 1/4 NPT, Process Connector Code 1
	N0141XN		Tapped for 1/2 NPT, Process Connector Code 2
	B0139BD		Tapped for R 1/4, Process Connector Code 3
	B0139BG		Tapped for R 1/2, Process Connector Code 4
	N0141XR		1/2 Schedule 80 Weld Neck, Process Connector Code 6
7	**Below**	4	**Screw, Hex Head, 0.438-20 x 1.5 for threaded connectors, Codes 1-4**
	X0100MN		ASTM A193 Gr. B7 (Standard)
	X0171VP		ASTM A193, Gr. B7M (Option -B3)
	N1205RQ		316 ss (Option -B1)
	X0118AX		17-4 Stainless Steel (Option -B2)
	Below		**Screw, Hex Head, 0.438-20 x 1.0 (for weld neck connectors, Code 6)**
	X0100NT		ASTM A193, Gr. B7 (standard)
	X0171VN		ASTM A193, Gr. B7M (Option -B3)
	X0173TP		316 ss (Option -B1)
	X0118AY		17-4 Stainless Steel (Option -B2)

215. The LP2 structure has twice as many vent screws and vent plugs as the LP1 structure. Thus, “2/4” means two for LP1 and four for LP2; “4/8” means four for LP1 and eight for LP2.
216. Metallic process wetted material conforming to NACE Standard MR0175 and MR0103.
217. Equivalent to Hastelloy® C-276. Hastelloy is a registered trademark of Haynes International, Inc.
218. For simplified calibration, install F0101ES screw for pressure up to 0.7 MPa (100 psi).

Table 21 - Parts for DP Transmitter Bottomworks for Use with Low Profile Structures LP1 and LP2 (Continued)

Item	Part No.	Qty.	Part Name
8	**Below**	1	**Nut, 0.500-13**
	X0173RN		2H, ASTM A193, Gr. B7 (standard)
	X0173UL		ASTM A194, Gr. 2HM (Option -B3)
	X0173TR		316 ss, ASTM F594, Group 2 (Option -B1)
	X0173UJ		17-4 ss, ASTM F594, Group 2 (Option -B2)
9	D0114RB	2	Gasket, PTFE; Sensor Assembly to Process Cover
10	D0161QQ	2	Gasket, Glass-Filled PTFE; Process Connector to Process Cover

Housing Covers

Description	Aluminum Housing	Stainless Steel Housing
Solid Cover	D0162AP	D0162VD
Window Cover	D0162LG	D0162VG

Optional Selections

Refer to Model Codes, page 85 for available options for each transmitter model.

Mounting Bracket Sets for Direct Connect Transmitters

Figure 77 - Mounting Bracket Sets for Non-Flameproof Direct Connect Transmitter Structures (Options -M1, -M2, -M5, and -M6)

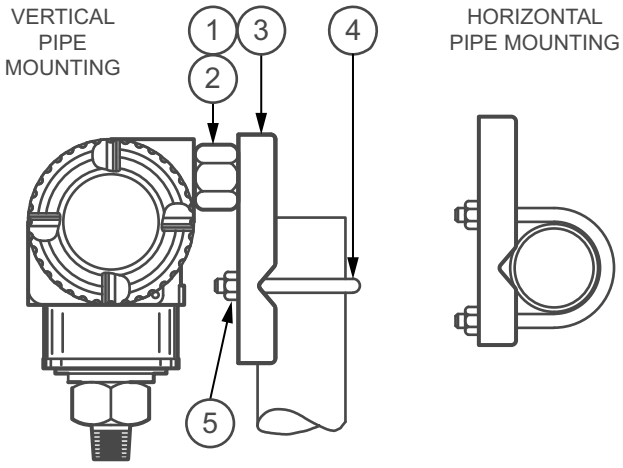


Table 22 - Parts for Mounting Bracket Sets with Painted Steel, for Aluminum Housing (Option -M1)

Item	Part No.	Qty.	Part Name
Set	B0188DL	1	Mounting Bracket Set; for Aluminum Housing; 1/2 NPT Connections (includes items 1–5 below)
1	X0116FB	1	Screw, Hex Head, Plated cs, 0.375-24 x 0.625
2	B0188DN	1	Adapter Plug, 1/2 NPT to 0.375-24, ss
3	N0141ZW	1	Mounting Bracket, Painted Steel
4	D0114SM	1	U-Bolt, Steel
5	0011962	2	Nut, Hex Head, Plated cs, 0.312-18

Table 23 - Parts for Mounting Bracket Sets with Stainless Steel, for Stainless Steel Housing (Option -M2)

Item	Part No.	Qty.	Part Name
Set	N1207AE	1	Mounting Bracket Set; for 316 ss Housing; 1/2 NPT Connections (includes items 1–5 below)
1	P0120RM	1	Screw, Hex Head, ss, 0.375-24 x 0.625
2	B0188DN	1	Adapter Plug, 1/2 NPT to 0.375-24, ss
3	N1205MF	1	Mounting Bracket, ss
4	N1205MX	1	U-Bolt, ss
5	Z1217HV	2	Nut, Hex Head, ss, 0.312-18

Table 24 - Parts for Mounting Bracket Sets with Painted Steel, for Aluminum Housing (Option -M5)

Item	Part No.	Qty.	Part Name
Set	D0179FN	1	Mounting Bracket Set; for Aluminum Housing; M20 Connections (includes items 1–5 below)
1	X0116FB	1	Screw, Hex Head, Plated cs, 0.375-24 x 0.625
2	D0179FM	1	Adapter Plug, M20 to 0.375-24, ss
3	N0141ZW	1	Mounting Bracket, Painted Steel
4	D0114SM	1	U-Bolt, Steel
5	0011962	2	Nut, Hex Head, Plated cs, 0.312-18

Table 25 - Parts for Mounting Bracket Sets with Stainless Steel, for Stainless Steel Housing (Option -M6)

Item	Part No.	Qty.	Part Name
Set	D0179FP	1	Mounting Bracket Set; for 316 ss Housing; M20 Connections (includes items 1–5 below)
1	P0120RM	1	Screw, Hex Head, ss, 0.375-24 x 0.625
2	D0179FM	1	Adapter Plug, M20 to 0.375-24, ss
3	N1205MF	1	Mounting Bracket, ss
4	N1205MX	1	U-Bolt, ss
5	Z1217HV	2	Nut, Hex Head, ss, 0.312-18

Figure 78 - Mounting Bracket Sets for Flameproof Direct Connect Transmitter Structures (Options -M7 and -M8)

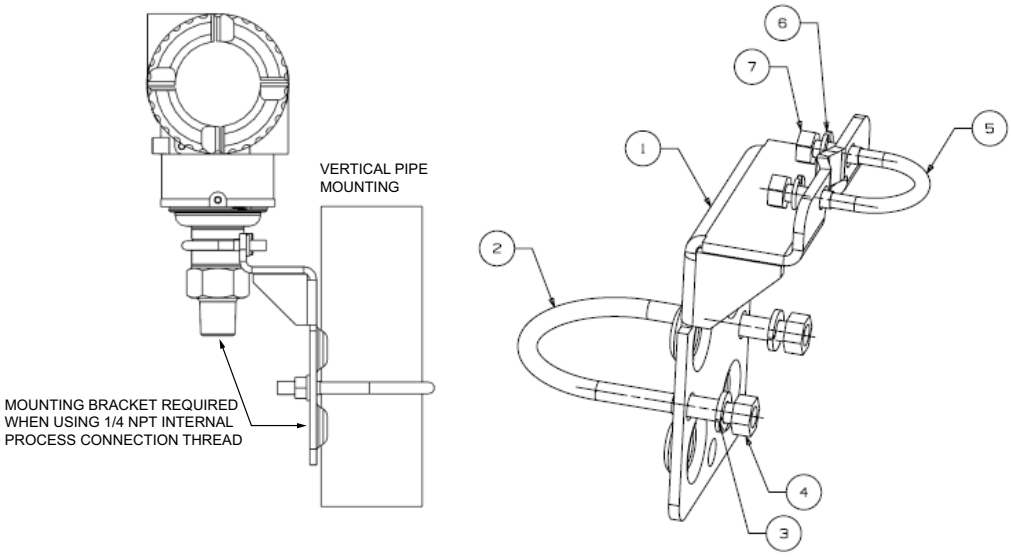


Table 26 - Parts for ATEX/UKEX Mounting Bracket Sets, Stainless Steel (Option -M7)

Item	Part No.	Qty.	Part Name
Set	D0170ZQ	1	Mounting Bracket Set; ATEX/UKEX (includes items 1–7 below)
1	D0170ZR	1	Mounting Bracket
2	N1205MX	1	U-Bolt, 5/16-18 ss
3	A2015AB	2	Lock Washer, 5/16-18 ss
4	X0142BW	2	Nut, Hex Head, 5/16-18 ss
5	D0170ZU	2	U-Bolt, 1/4-20 ss
6	0036504	2	Lock Washer, 1/4 ss
7	X0142BL	2	Nut, Hex Head, 1/4-20 ss

Table 27 - Parts for ATEX/UKEX Mounting Bracket Sets, Carbon Steel (Option -M8)

Item	Part No.	Qty.	Part Name
Set	D0170ZT	1	Mounting Bracket Set; ATEX/UKEX (includes items 1–7 below)
1	D0197WF	1	Mounting Bracket
2	D0186MA	1	U-Bolt, 5/16-18 Steel
3	A2004WP	2	Lock Washer, 5/16-18 Steel
4	X0142BV	2	Nut, Hex Head, 5/16-18 Steel
5	D0170ZV	2	U-Bolt, 1/4-20 Steel
6	0042965	2	Lock Washer, 1/4 Steel
7	X0142BK	2	Nut, Hex Head, 1/4-20 Steel

Mounting Bracket Sets for DP and Biplanar Transmitters

Figure 79 - Standard Style Mounting Bracket Sets and Optional Standoff Kits for DP Transmitters (Options -M1 and -M2) and Biplanar Transmitters (Options -M9 and -M0)

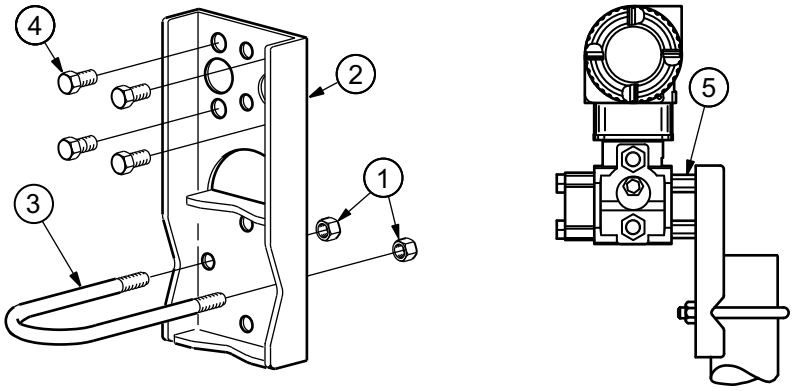


Table 28 - Parts for Standard Style Mounting Bracket Set with Painted Steel (DP Option -M1; Biplanar Option -M9)

Item	Part No.	Qty.	Part Name
Set	N0141ZT	1	Mounting Bracket Set (includes items 1–4 below)
1	0011962	2	Nut, Hex Head, Plated cs, 0.312-18
2	N0141ZW	1	Mounting Bracket, Painted Steel
3	D0114SM	1	U-Bolt, Steel
4	X0100NW	4	Screw, Hex Head, Steel, 0.437-20 x 0.625

Table 29 - Parts for Standard Style Mounting Bracket Set with Stainless Steel (DP Option -M2; Biplanar Option -M0)

Item	Part No.	Qty.	Part Name
Set	N1205YD	1	Mounting Bracket Set (includes items 1–4 below)
1	Z1217HV	2	Nut, Hex Head, ss, 0.312-18
2	N1205MF	1	Mounting Bracket, ss
3	N1205MX	1	U-Bolt, ss
4	P0120RN	4	Screw, Hex Head, ss, 0.437-20 x 0.625

Table 30 - Parts for Optional Standoff Kits (Not Included in -M1/M9 or -M2/M0 Options)

Item	Part No.	Qty.	Part Name
5	D0170ME	1	Kit with Four Steel Standoffs, for use with Option -M1 (DP) or Option -M9 (Biplanar)
	D0170MJ	1	Kit with Four 316 ss Standoffs, for use with Option -M2 (DP) or Option -M0 (Biplanar)

Figure 80 - Universal Style Mounting Bracket Set for DP and Biplanar Transmitters (Option -M3)

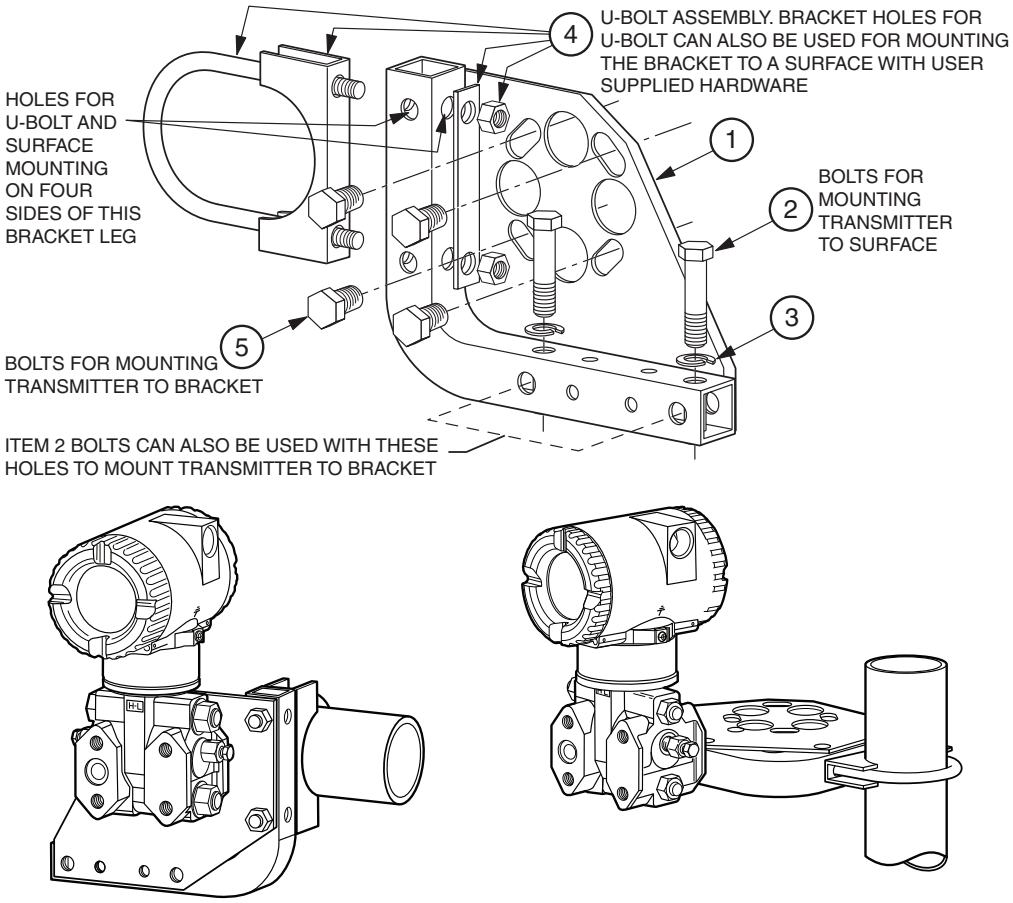


Table 31 - Parts for Universal Style Mounting Bracket Set (Option -M3)

Item	Part No.	Qty.	Part Name
Set	D0170XH	1	Universal Pipe Mounting Set (includes items 1–5 below)
1	D0170VJ	1	Mounting Bracket, ss
2	X0173UR	1	Screw, Hex Head, 0.375-16 x 1.5, , ss
3	A2012TZ	2	Lock Washer, 0.382 I.D., ss
4	D0170VM	1	U-Bolt Assembly, ss, with U-Bolt, 0.312-18; Saddle Clamp; Washer Plate; Nut, Hex Head, 0.312-18
5	P0120RN	4	Screw, hex head, 0.437-20 x 0.625, ss

Vent Screw (Option -V1)

Figure 81 - Vent Screw (Option -V1)

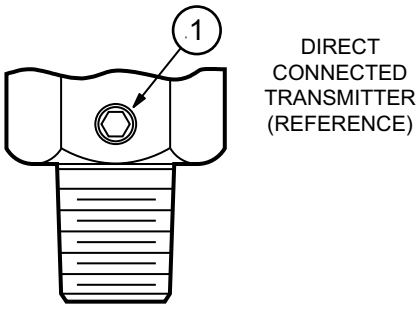


Table 32 - Parts for Vent Screw (Option -V1)

Item	Part No.	Qty.	Part Name
1	D0161SW	1	Vent Screw, 316 ss

Block and Bleed Valve (Options -V2, -V3, and -V4)

Figure 82 - Block and Bleed Valve (Options -V2, -V3, and -V4)

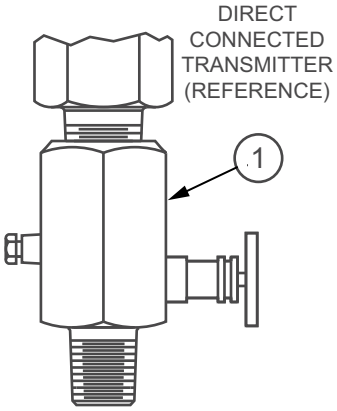


Table 33 - Parts for Block and Bleed Valve (Options -V2, -V3, and -V4)

Item	Part No.	Qty.	Part Name
1	X0172BU	1	Block and Bleed Valve, Carbon Steel (Option -V2)
	X0172BV		Block and Bleed Valve, 316 ss (Option -V3)
	X0172BW		Block and Bleed Valve, 316 ss Body, Monel Trim, NACE Approved (Option -V4)

Adapter Plates (Options -P1 to -P8) for Direct Mounting to Coplanar Manifolds

Figure 83 - Adapter Plates (Options -P1 to -P8) for Direct Mounting to Coplanar Manifolds

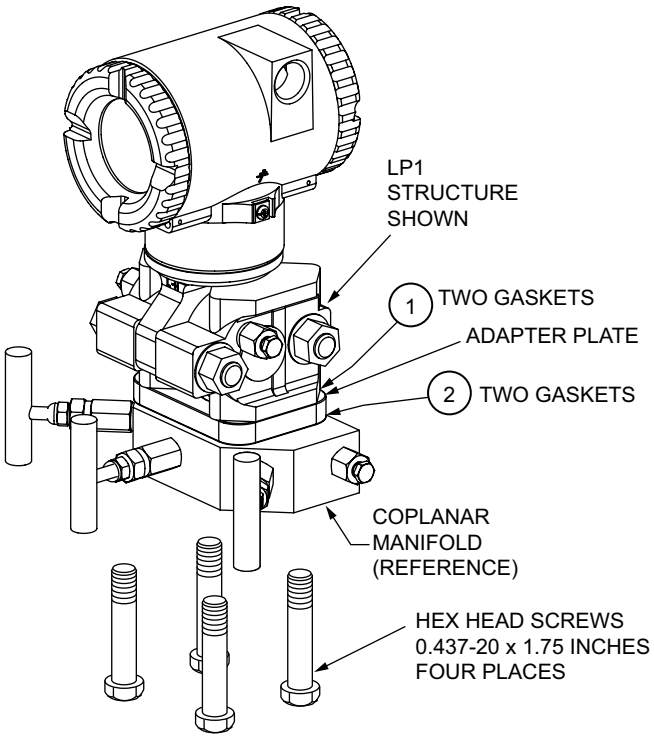


Table 34 - Parts for Adapter Plate Kits -P1 to -P4, Used with "MC" Manifold

Item	Part No.	Qty.	Part Name
n/a	D0170XJ	1	Adapter Plate Kit; B7 Screws; Option -P1
	D0170XM		Adapter Plate Kit; 316 ss Screws; Option -P2
	D0170XN		Adapter Plate Kit; 17-4 ss Screws; Option -P3
	D0170XP		Adapter Plate Kit; B7M Screws; Option -P4

Table 35 - Parts for Adapter Plate Kits -P5 to -P8, Used with "MT3" Manifold

Item	Part No.	Qty.	Part Name
n/a	D0170XQ	1	Adapter Plate Kit; B7 Screws; Option -P5
	D0170XR		Adapter Plate Kit; 316 ss Screws; Option -P6
	D0170XS		Adapter Plate Kit; 17-4 ss Screws; Option -P7
	D0170XT		Adapter Plate Kit; B7M Screws; Option -P8

Table 36 - Gaskets (Included in Kits)

Item	Part No.	Qty.	Part Name
1	D0114RB	2	Gasket, Transmitter to Adapter Plate
2	D0170XK	2	Gasket, Manifold to Adapter Plate

Conduit Connections (Options -A1 and -A3)

Figure 84 - Conduit Connections (Options -A1 and -A3)

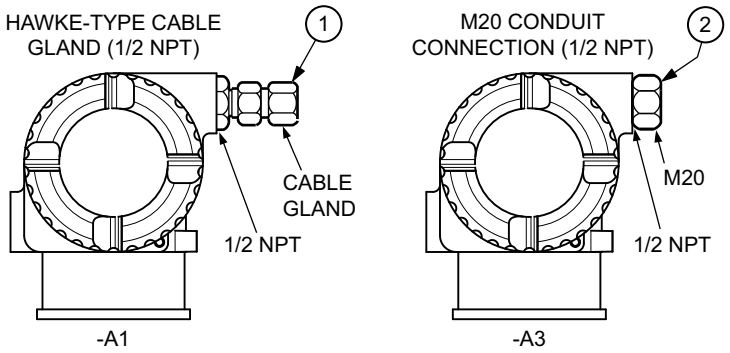


Table 37 - Parts for Conduit Connections (Options -A1 and -A3)

Item	Part No.	Qty.	Part Name
1	N7141HX	1	Hawke-Type 1/2 NPT Brass Cable Gland (Option -A1)
2	N7141DX	1	M20 Connector (Option -A3)

Custody Transfer Lock and Seal (Option -Z2)

Figure 85 - Custody Transfer Lock and Seal (Option -Z2)

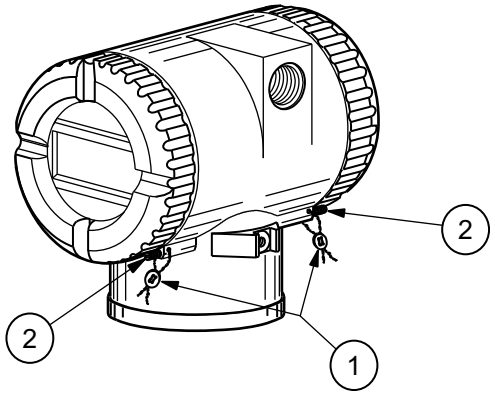


Table 38 - Parts for Custody Transfer Lock and Seal (Option -Z2)

Item	Part No.	Qty.	Part Name
1	S001806	2	Kit with Lock-Out Seal, Wire, and Instructions
2	D0162WM	1	Lock Screw, 0.164-32

Ermeto Connectors (Options -E3 and -E4)

Figure 86 - Ermeto Connectors (Options -E3 and -E4)

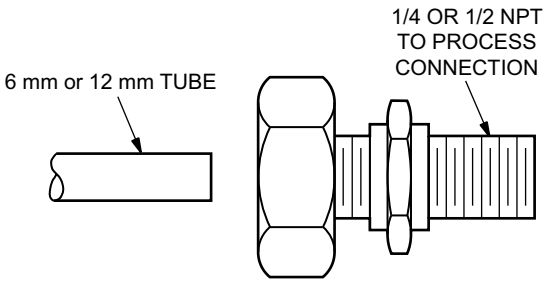


Table 39 - Parts for Ermeto Connectors (Options -E3 and -E4)

Item	Part No.	Qty.	Part Name
n/a	U7002AS	1	Process Connector, 316 ss, 640 bar, 1/4 NPT x 6 mm, Option -E3
	U7002AP		Process Connector, 316 ss, 640 bar, 1/2 NPT x 12 mm, Option -E3

Metric Process Connection (Option -R)

Figure 87 - Metric Process Connection (Option -R)

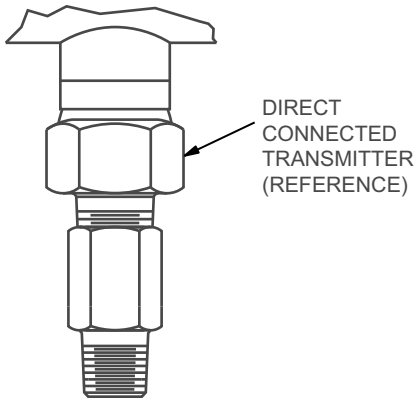


Table 40 - Parts for Metric Process Connection (Option -R)

Item	Part No.	Qty.	Part Name
n/a	X0171ZX	1	Pipe Adapter, 316 ss, 1/2 NPT to Rc 1/2

Recommended Spare Parts

Table 41 - Spare Parts for Direct Connect AP and GP Transmitters

Item No.	Part Number	Part Name	Number of Parts Recommended for		
			1 Inst.	5 Inst.	20 Inst.
See Direct Connect Transmitters, page 103					
3	X0201FC	O-Ring, Cover	0	2	4
10	D0197PS	Retention Clip	1	2	4
11	X0179ME	Vent Plug; for Direct Connect GP with sanitary or pulp and paper seals only	1	2	4
12	X0174EK	Button Head Screw	1	2	4

Table 42 - Spare Parts for Biplanar AP and GP Transmitters

Item No.	Part Number	Part Name	Number of Parts Recommended for		
			1 Inst.	5 Inst.	20 Inst.
See Biplanar Transmitter Topworks, page 104					
3	X0201FC	O-Ring, Cover	0	2	4
11	D0197PS	Retention Clip	1	2	4
12	X0174EK	Button Head Screw	1	2	4
See Biplanar Transmitter Bottomworks for Use with Traditional Structures, page 106					
4	**Below**	**Vent Screw**	0	2/4[219]	4/8[219]
	B0138MJ	316 ss (standard)			
	B0138MK	Monel[220]			
	D0175PQ	Nickel alloy[221] (to NACE Standard MR0175/MR0103)			
5	**Below**	**Vent Plug**	0	2/4[219]	4/8[219]
	D0161QT	316 ss (standard)			
	D0161QU	Monel[220]			
	D0175PP	Nickel alloy[221] (to NACE Standard MR0175/MR0103)			
9	D0114RB	Gasket, PTFE	1	2	4
10	D0161QQ	Glass-filled PTFE (Standard)	1	2	4

Table 43 - Spare Parts for DP Transmitters

Item No.	Part Number	Part Name	Number of Parts Recommended for		
			1 Inst.	5 Inst.	20 Inst.
See DP Transmitter Topworks, page 109					
3	X0201FC	O-Ring, Cover	0	2	4
12	D0197PS	Retention Clip	1	2	4
13	X0174EK	Screw, Button Head	1	2	4

219. The LP2 structure has twice as many vent screws and vent plugs as the LP1 structure. Thus, “2/4” means two for LP1 and four for LP2; “4/8” means four for LP1 and eight for LP2.
220. Metallic process wetted material conforming to NACE Standard MR0175 and MR0103.
221. Equivalent to Hastelloy® C-276. Hastelloy is a registered trademark of Haynes International, Inc.

Table 43 - Spare Parts for DP Transmitters (Continued)

Item No.	Part Number	Part Name	Number of Parts Recommended for		
			1 Inst.	5 Inst.	20 Inst.
See DP Transmitter Bottomworks for Use with Traditional Structures, page 111					
4	**Below**	**Vent Screw**	0	2	4
	B0138MJ	316 ss (standard)			
	B0138MK	Monel[222]			
	D0175PQ	Nickel alloy[223] (to NACE Standard MR0175/MR0103)			
5	**Below**	**Vent Plug**	0	2	4
	D0161QT	316 ss (standard)			
	D0161QU	Monel[222]			
	D0175PP	Nickel alloy[223] (to NACE Standard MR0175/MR0103)			
9	D0114RB	Gasket, PTFE	2	2	4
10	D0161QQ	Gasket, Process Cover, Glass-filled PTFE (Standard)	2	4	8
See DP Transmitter Bottomworks for Use with Low Profile Structures LP1 and LP2, page 114					
4	**Below**	**Vent Screw**	0	2/4[224]	4/8[224]
	B0138MJ	316 ss			
	D0175PQ	Nickel alloy[223]			
5	**Below**	**Vent Plug**	0	2/4[224]	4/8[224]
	D0161QT	316 ss			
	D0175PP	Nickel alloy[223]			
9	D0114RB	Gasket, PTFE	2	4	8
10	D0161QQ	Gasket, Glass-Filled PTFE	2	4	8
See Adapter Plates (Options -P1 to -P8) for Direct Mounting to Coplanar Manifolds, page 122					
1	D0114RB	Gasket - Transmitter to Adapter Plate	2	4	8
2	D0170XK	Gasket - Manifold to Adapter Plate	2	4	8

222. Metallic process wetted material conforming to NACE Standard MR0175 and MR0103.
223. Equivalent to Hastelloy® C-276. Hastelloy is a registered trademark of Haynes International, Inc.
224. The LP2 structure has twice as many vent screws and vent plugs as the LP1 structure. Thus, “2/4” means two for LP1 and four for LP2; “4/8” means four for LP1 and eight for LP2.

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As standards, specifications, and design change from time to time,
please ask for confirmation of the information given in this publication.

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