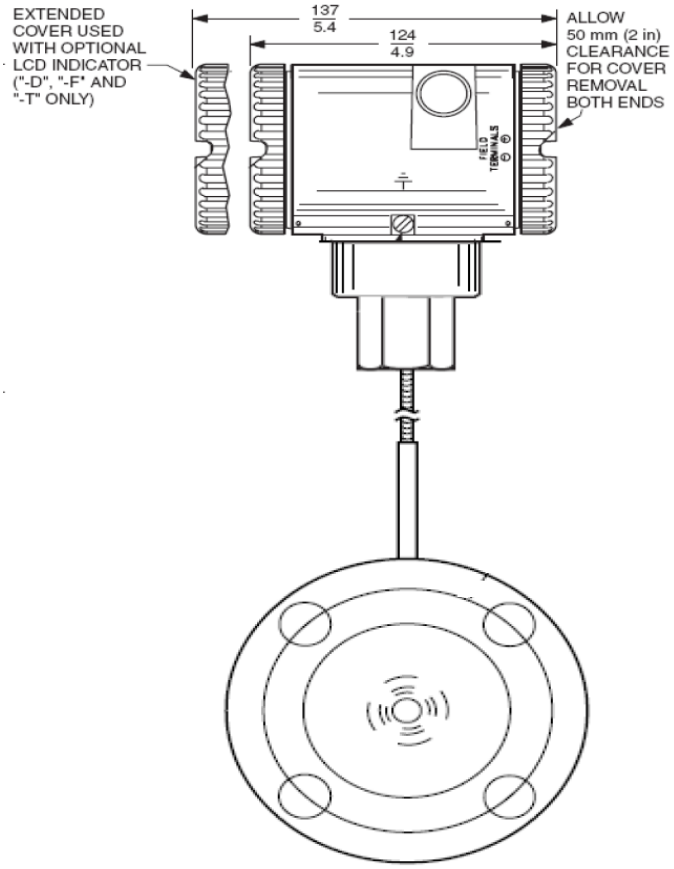
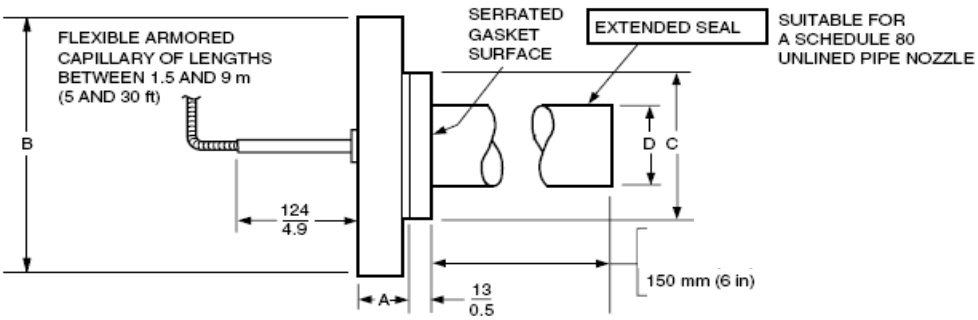
PRESSURE TRANSMITTERS

PT-63.10	Model :	IGP10-AS3E1F-M1	+ REMOTE SEAL :	PSFES-D3S6G314B
PT-63.4	Model :	IGP10-AS3D1F-M1	+ REMOTE SEAL :	PSFES-D3S6E314B



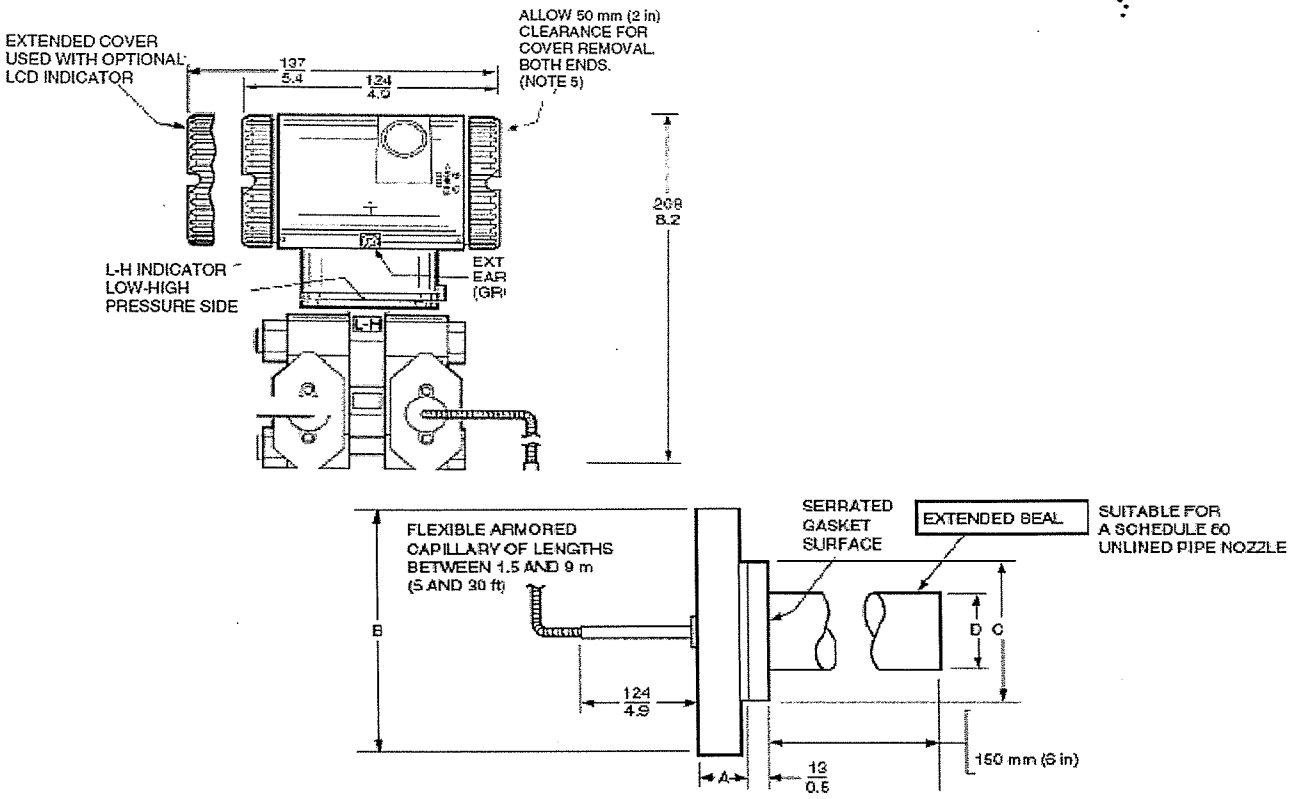


Capillary length = 3 m

TAG	Nominal Flange Size	FLG Press. Rating	Number of Bolt Holes	Bolt Hole Diameter	Bolt Circle Diameter	Dim. A	Dim. B	Dim. C	Dim. D
PT-63.10	3 Inch	Class 600	8	22	168	38	211	127	72,4
PT-63.4	3 Inch	Class 150	4	19	152	23	191	127	70,9

DIFFERENTIAL PRESSURE TRANSMITTERS

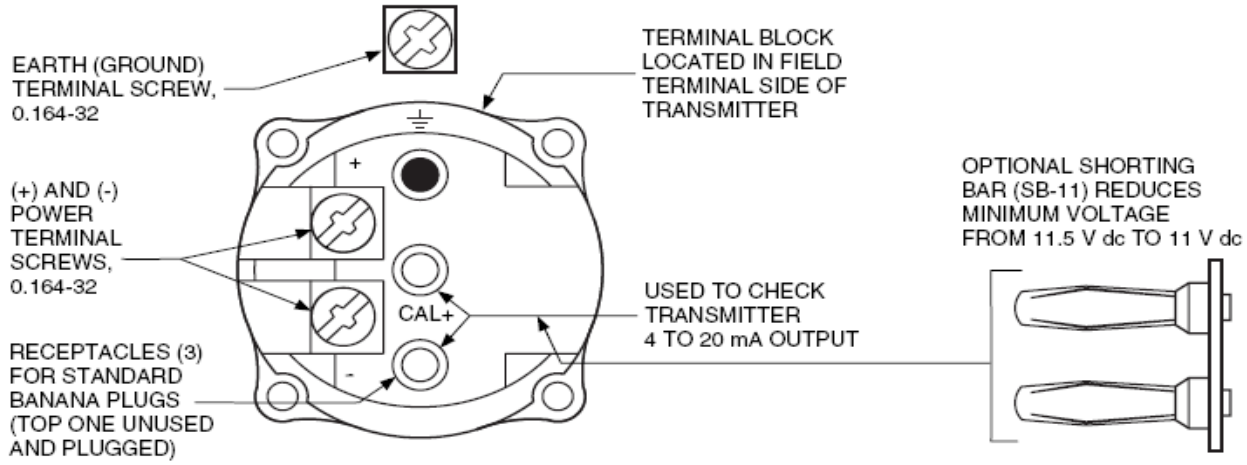
LT-63.2 Model : IDP10-AF1B01F + REMOTE SEAL : PSFLT-B3S6E51



Capillary length = 3 m

TAG	Nominal Flange Size	FLG Press. Rating	Number of Bolt Holes	Bolt Hole Diameter	Bolt Circle Diameter	Dim. A	Dim. B	Dim. C	Dim. D
LT-63.2	3 Inch	Class 150	4	19	152	23	191	127	70,9

FIELD TERMINAL CONNECTIONS



invensys
Operations Management

TEST REPORT N. 9766

Milan, 21 March 2011

CUSTOMER:	DESMET BALLESTRA
PURCHASE ORDER:	101589
INVENSYS REF:	10ITA9766
SUBJECT:	TRANSMITTERS

All above-mentioned instruments have been subject to following tests:

- Visual and dimensional check	100%
- Checking of characteristics	100%
- Nameplate and tagging check	100 %
-Calibration certificates review	100%
-Accuracy ,hysteresys ,repeatability ,sensitivity check	100%

All instruments have been found in compliance with the order and spec.requirements.

INVENSYS SYSTEMS ITALIA S.p.A.

FM Approvals
1151 Boston Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: **781 762 4300** F: 781-762-9375 www.fmapprovals.com

CERTIFICATE OF COMPLIANCE

HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

IaP10-bcdef-g. Pressure Transmitter.
XP/I/1/BCD/T6 Ta = 80°C; T5 Ta = 85°C; I/1/AEx d IIC, T6 Ta =75°C; DIP/II,III/1/EFG/T6 Ta = 80°C; T5 Ta = 85°C; Type 4X; IP66/IP68
a = Type: A (Absolute) or G (Gauge).
b = Communication: A, D, F, T, V, M or P
c = Process connection:20, 21, 22, 23, 26, 28, 30, 31, 32, 33, 50-53, 60-63 D1, D2, D5, D6, S3, S4, S5, S6, SC, SD, SH, SJ TA, TB, T2, T3, T4, T5, M1, M6, M9, PX, PZ, PA, PB, PC, PD, PE, PF, PG, PH or PJ
c = Process connection: (applicable for Zone 1 only) 50-53, 60-63, D5, D6, S5, S6, SH, SJ.
d = Span: C, D, E, F, G, H or K.
e = Conduit connection and housing material: 1 or 3.
f = Electrical Certification: F, G or O
g = Optional features: M1, M2, L1, L2, A3, C1, C2, V1 through V4, Z1, Z2, Z3, G, K, R, T, W and/or J.

IaP10-Tbcdef-g. Pressure Transmitter.
XP/I/1/BCD/T6 Ta = 80°C; T5 Ta = 85°C; I/1/AEx d/IIC T6 Ta = 75°C -DIP/II,III/1/EFG/T6 Ta = 80°C; T5 Ta = 85°C; Type 4X; IP66/IP68
a = Type: A (Absolute) or G (Gauge).
b = Process connection: 20, 21, 22, 23, 26, 28, 30, 31, 32, 33, 50-53, 60-63, D1, D2, D5, D6, S3, S4, S5, S6, SC, SD, TA, TB, T2, T3, T4, T5, M1, M6, M9, PX, PZ, PA, PB, PC, PD, PE, PF, PG, PH or PJ.
c = Process connection (applicable for Zone 1 only): 50-53, 60-63, D5, D6, S5, S6, SH, SJ.
d = Span: C, D, E, F, G, H or K.
e = Conduit connection and housing material: 1 or 3.
f = Electrical Certification: F, G or O
g = Optional features: S2, M1, M2, L1, L2, A3, C1, C2, V1 through V4, Z1, Z2, Z3, G, K, R, T, W and/or J.

IaP20-bcdefg-h. Pressure Transmitter.
XP/I/1/BCD/T6 Ta = 80°C; T5 Ta = 85°C; I/1/AEx d IIC T6 Ta = 80°C; T5 Ta = 85°C;
DIP/ II,III/1/EFG/ T6 Ta = 80°C; T5 Ta = 85°C; Type 4X; IP66/IP68
a = Type: A (Absolute) or G (Gauge).
b = Communication: A, D, F, T, V, M or P
c = Structure: 10 through 13, 16, 17, 20 through 27, 2G, 34, 35, 46, 47, 48, 49, 78, 79, LL, LM, LC, LD, CC, CD, SC, SD, F1, F2, S3 or S4.
d = Span: A, B, C, D or E.
e = Process connection: 0, 1, 2, 3, 4, 6 or 7.

f = Conduit connection: 1 or 3.
g = Electrical Certification F, G or O
h = Optional features: M1, M2, L1, L2, D1 through D8, X1, X2, X3, B1, B2, A3, C1, C2, Z1, Z2, Z3, E1 through E4, K, T, V, W and/or J.

IaP20-Tbcdef-g. Pressure Transmitter.
XP/I/1/BCD/T6 Ta = 80°C; T5 Ta = 85°C; I/1/AEx d IIC T6 Ta = 80°C; T5 Ta = 85°C;
DIP/II,III/1/EFG/T6 Ta = 80°C; T5 Ta = 85°C; Type 4X; IP66/IP68
a = Type: A (Absolute) or G (Gauge).
b = Structure: 10 through 13, 16, 17, 20 through 27, 2G, 34, 35, 46, 47, 48, 49, 78, 79, LL, LM, LC, LD, CC, CD, SC, SD, F1, F2, S3 or S4.
c = Span: A, B, C, D or E.
d = Process connection: 0, 1, 2, 3, 4, 6 or 7.
e = Conduit connection: 1 or 3.
f = Electrical Certification: F, G or O
g = Optional features: S2, M1, M2, L1, L2, D1 through D8, X1, X2, X3, B1, B2, A3, C1, C2, Z1, Z2, Z3, E1 through E4, K, T, V, W and/or J.

IDP10-abcdef-g. Pressure Transmitter.
XP/I/1/BCD/T6 Ta = 80°C; I/1/AEx d IIC T6 Ta = 80°C; T5 Ta = 85°C; T5 Ta = 85°C;
DIP/II,III/1/EFG/T6 Ta = 80°C; T5 Ta = 85°C; Type 4X; IP66/IP68
a = Communication: A, D, F, T, V, M or P.
b = Structure: 10 through 13, 16, 17, 20 through 27, 2G, 34, 35, 46 through 49, 78, 79, LL, LM, LC, LD, CC, CD, S1 through S6, SA through SF, F1, F2, F3 or F4.
c = Span: A, B, C, D or E.
d = Process connection: 0, 1, 2, 3, 4, 6 or 7.
e = Conduit connection and housing material: 1 or 3
f = Electrical Certification F, 0 or G
g = Optional features: 1 through 5, FA through FH, FJ through FM, R1 through R9, RA through RH, RJ through RN, RP, RQ, RR, RT, RY, M1, M2, L1, L2, D1 through D8, S1 through S9, S0, SA through SF, SJ through SN, SP through SV, X1, X2, X3, B1, B2, A3, C1, C2, Z1, Z2, Z3, E1 through E4, K, T, V, W, Y and/or J.

IDP10-Tabcde-f. Pressure Transmitter.
XP/I/1/BCD/T6 Ta = 80°C; I/1/AEx d/IIC/T6 Ta = 80°C; T5 Ta = 85°C; T5 Ta = 85°C;
DIP/II,III/1/EFG/T6 Ta = 80°C; T5 Ta = 85°C; Type 4X; IP66/IP68
a = Structure: 10 through 13, 16, 17, 20 through 27, 2G, 34, 35, 46 through 49, 78, 79, LL, LM, LC, LD, CC, CD, S1 through S6, SA through SF, F1, F2, F3 or F4.
b = Span: A, B, C, D or E.
c = Process connection: 0, 1, 2, 3, 4, 6 or 7.
d = Conduit connection and housing material: 1 or 3.
e = Electrical Certification F, G or O
f = Optional features: S2, 1 through 5, FA through FH, FJ through FM, R1 through R9, RA through RH, RJ through RN, RP, RQ, RR, RT, RY, M1, M2, L1, L2, D1 through D8, S1 through S9, S0, SA through SF, SJ through SN, SP through SV, X1, X2, X3, B1, B2, A3, C1, C2, Z1, Z2, Z3, E1 through E4, K, T, V, W, Y and/or J.

IPI10-abcd-e. Pneumatic to Current Converter.
XP/I/1/BCD/T6 Ta =80°C; T5 Ta = 85°C; DIP/II,III/1/EFG/T6 Ta =80°C; T5 Ta = 85°C; Type 4X; IP66/IP68
a = Communication: A.
b = Input signal: 2, 3, 4, 5, or 6.
c = Conduit connection and housing material: 1 or 3.
d = Electrical Certification F or O
e = Optional features: L3, A3, Z1, Z2, Z3, K, T, W and/or Y.

IGPa-bcdef-g. Pressure Transmitter.
XP/I/1/BCD/T6 Ta = 80°C; T5 Ta = 85°C; I/1/AEx d IIC, T6 Ta =75˚C; DIP/II,III/1/EFG/T6 Ta = 80°C; T5

Ta = 85°C; Type 4X; IP66/IP68
a = Model: 25 or 50.
b = Communication: D, F, T, M or P
c = Structure: 22, 23, 50-53, 60-63, D1, D2, D5, D6, S3, S4, S5, S6, SC, SD, SH, SJ, TA, TB, T2, T3, T4, T5, M1, M6, M9, PX, PZ, PA, PB, PC, PD, PE, PF, PG, PH or PJ.
c = Structure: (applicable for Zone 1 only) 50-53, 60-63, D5, D6, S5, S6, SH, SJ.
d = Span: D or E.
e = Conduit connection and housing material: 1 or 3.
f = Electrical Certification: F, G or O
g = Optional features: M1, M2, M3, M4, L1, X1, X2, A3, C1, C2, C3, Z1, Z2, Z3, K, K1, K4, T, V1, V2, V3, V4, W and/or J.

IDPa-bcdefg-h. Pressure Transmitter.
XP/I/1/BCD/T6 Ta = 80°C; T5 Ta = 85°C; I/1/AEx d IIC T6 Ta = 80°C; T5 Ta = 85°C;
DIP/II,III/1/ EFG / T6 Ta = 80°C; T5 Ta = 85°C; Type 4X; IP66/IP68
a = Model: 25 or 50.
b = Communication: D, F, T, M or P.
c = Structure: 22, 23, 26, 27, 46, 47, LL, LM, LC, LD, CC, CD, S1, S2, S3, S4, S5, S6, SA, SB, SC, SD, SE, SF, F1, F2, F3 or F4.
d = Span: B or C.
e = Process connection: 0, 1, 2, 3, 4 or 6.
f = Conduit connection and housing material: 1 or 3.
g = Electrical Certification: F, G or O
h = Optional features: M2, L1, D1 through D8, X1, X2, X3, B1, B2, A3, C1, C2, Z1, Z2, Z3, E1 through E4, K1, K4, T, V, W and/or J.

IMVa-bcdefghi-j. Multivariable Transmitter.
XP/I/1/BCD/T6 Ta = 80°C; T5 Ta = 85°C; I/1/AEx d IIC T6 Ta = 80°C; T5 Ta = 85°C;
DIP/II,III/1/EFG/T6 Ta = 80°C; T5 Ta = 85°C; Type 4X; IP66/IP68
a = Model 25 or 30.
b = Communications Protocol: D, F, T, M or P.
c = Process structure: 22, 23, 26, 27, 46, 47, LL, LM, LC, LD, CC or CD.
d = Differential pressure span limits: A, B or C.
e = Absolute pressure span limits: C, D or E.
f = Other measurements: 1 or none.
g = Process connector type: 0, 1, 2, 3, 4 or 6.
h = Conduit connection and housing material: 1 or 3.
i = Electrical Certification: F, G or O
j = Optional features: M1, M2, L1, D1 through D8, X1, X2, X3, B1, B2, B3, A3, Z2, E1 through E4, C1, C2, K1, T, V, W and/or J.

Equipment Ratings:

Explosionproof for use in Class I, Division 1, Groups B, C and D; Temperature Class T5 = 85°C; T6 Ta = 80°C; Flameproof for use in Class I, Zone 1, AEx d IIC; Temperature Class T5 = 85°C; T6 Ta = 75°C, Dust-Ignitionproof for use in Class II and III, Division 1, Groups E, F and G; Temperature Class T5 = 85°C; T6 Ta = 80°C; indoor and outdoor, Type 4X; IP66/IP68, Hazardous (Classified) Locations.
Seal not required, except for Acetylene where a conduit seal is required within 2 inches of enclosure.

IaP10-bcdef-g. Pressure Transmitter.
IS/I,II,III/1/ABCDEFG/T4A; T4 Ta = 85°C; - MI020-427; Entity; NI/I/2/ABCD/T4A; T4 Ta = 85°C;
S/II,III/2/FG/T4A; T4 Ta = 85°C; Type 4X; IP66/IP68
Entity Parameters:
When b = D: Vmax = 36.1V, Imax = 110mA, Ci = 3nF, Li = 0mH.
a = Type: A (Absolute) or G (Gauge).
b = Communication: A or D. (A for NI only)

c = Process connection: 20, 21, 22, 23, 26, 28, 30, 31, 32, 33, 50-53, 60-63, D1, D2, D5, D6, S3, S4, S5, S6, SC, SD, SH, SJ, TA, TB, T2, T3, T4, T5, M1, M6, M9, PX, PZ, PA, PB, PC, PD, PE, PF, PG, PH, PJ.
d = Span: C, D, E, F, G, H or K.
e = Conduit connection and housing material: 1 or 3.
f = Electrical Certification: F or O
g = Optional features: M1, M2, L1, L2, A3, C1, C2, V1 through V4, Z1, Z2, Z3, G, K, R, T, W and/or J.

IaP20-bcdefg-h. Pressure Transmitter.
IS/I,II,III/1/ABCDEFG/T4A; T4 Ta = 85°C - MI020-427; Entity; NI/I/2/ABCD/T4A; T4 Ta = 85°C; S/II,III/2/FG/T4A; T4 Ta = 85°C; Type 4X; IP66/IP68
Entity Parameters:
When b = D, Vmax = 36.1 V, Imax = 110mA, Ci = 3nF, Li = 0mH.
a = Type: A (Absolute) or G (Gauge).
b = Communication: A or D. (A for NI only)
c = Structure: 10 through 13, 16, 17, 20 through 27, 2G, 34, 35, 46, 47, 48, 49, 78, 79, LL, LM, LC, LD, CC, CD, SC, SD, F1, F2, S3 or S4.
d = Span: A, B, C, D or E.
e = Process connection: 0, 1, 2, 3, 4, 6 or 7.
f = Conduit connection: 1 or 3.
g = Electrical Certification: F or O
h = Optional features: M1, M2, L1, L2, D1 through D8, X1, X2, X3, B1, B2, A3, C1, C2, Z1, Z2, Z3, E1 through E4, K, T, V, W and/or J.

IDP10-abcdef-g. Pressure Transmitter.
IS/I,II,III/1/ABCDEFG/T4A; T4 Ta = 85°C - MI020-427; Entity; NI/I/2/ABCD/T4A; T4 Ta = 85°C; S/II,III/2/FG/T4A; T4 Ta = 85°C; Type 4X; IP66/IP68
Entity Parameters:
When a = D, Vmax = 36.1V, Imax = 110mA, Ci = 3nF, Li = 0mH.
a = Communication: A or D. (A for NI only)
b = Structure: 10 through 13, 16, 17, 20 through 27, 2G, 34, 35, 46 through 49, 78, 79, LL, LM, LC, LD, CC, CD, S1 through S6, SA through SF, F1, F2, F3 or F4.
c = Span: A, B, C, D or E.
d = Process connection: 0, 1, 2, 3, 4, 6 or 7.
e = Conduit connection and housing material: 1 or 3.
f = Electrical Certification: F or O
g = Optional features: 1 through 5, FA through FH, FJ through FM, R1 through R9, RA through RH, RJ through RN, RP, RQ, RR, RT, RY, M1, M2, L1, L2, D1 through D8, S1 through S9, S0, SA through SF, SJ through SN, SP through SV, X1, X2, X3, B1, B2, A3, C1, C2, Z1, Z2, Z3, E1 through E4, K, T, V, W, Y and/or J.

IGPa-bcdeF-f. Pressure Transmitter.
IS/I,II,III/1/ABCDEFG/T4A; T4 Ta = 85°C - MI020-427; Entity; NI/I/2/ABCD/T4A; T4 Ta = 85°C; S/II,III/2/T4A; T4 Ta = 85°C;Type 4X; IP66/IP68
Entity Parameters:
When b = D, Vmax = 36.1 V, Imax = 110mA, Ci = 3nF, Li = 0mH.
a = Model: 25 or 50.
b = Communication: D.
c = Structure: 22, 23, 50-53, 60-63, D1, D2, D5, D6, S3, S4, S5, S6, SC, SD, SH, SJ, TA, TB, T2, T3, T4, T5, M1, M6, M9, PX, PZ, PA, PB, PC, PD, PE, PF, PG, PH or PJ.
d = Span: D or E.
e = Conduit connection and housing material: 1 or 3.
f = Electrical Certification: F or O
g = Optional features: M1, M2, M3, M4, L1, X1, X2, A3, C1, C2, C3, Z1, Z2, Z3, K, K1, K4, T, V1, V2, V3, V4, W and/or J.

IDPa-bcdefg-h. Pressure Transmitter.
IS/I,II,III/1/ABCDEFG/T4A; T4 Ta = 85°C -MI020-427; Entity; NI/I/2/ABCD/T4A; T4 Ta = 85°C;

S/II,III/2/FG/T4A; T4 Ta = 85°C; Type 4X; IP66/IP68
Entity Parameters:
When b = D: Vmax = 36.1V, Imax = 110 mA, Ci = 3nF, Li = 0mH.
a = Model: 25 or 50.
b = Communication: D.
c = Structure: 22, 23, 26, 27, 46, 47, LL, LM, LC, LD, CC, CD, S1, S2, S3, S4, S5, S6, SA, SB, SC, SD, SE, SF, F1, F2, F3 or F4.
d = Span: B or C.
e = Process connection: 0, 1, 2, 3, 4 or 6.
f = Conduit connection and housing material: 1 or 3.
g = Electrical Certification: F or O
h = Optional features: M2, L1, D1 through D8, X1, X2, X3, B1, B2, A3, C1, C2, Z1, Z2, Z3, E1 through E4, K1, K4, T, V, W and/or J.

Equipment Ratings:

Intrinsically Safe (Entity) for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F and G; Temperature Class T4A; T4 Ta = 85°C; in accordance with Control Drawing No. MI-020-427; Nonincendive for use in Class I, Division 2, Groups A, B, C, and D; Temperature Class T4A; T4 Ta = 85°C; Suitable for use in Class II and III, Division 2, Groups F and G; Temperature Class T4A; T4 Ta = 85°C; indoor and outdoor, Type 4X; IP66/IP68, Hazardous (Classified) Locations.

IPI10-abcd-e. Pneumatic to Current Converter.
NI/I/2/ABCD/T4A; T4 Ta = 85°C; S/III/2/T4A; T4 Ta = 85°C;Type 4X; IP66/IP68
Entity Parameters:
Vmax = 36.1V, Imax = 110 mA, Ci =3nF, Li=0mH.
a = Communication: A.
b = Input signal: 2, 3, 4, 5, or 6.
c = Conduit connection and housing material: 1 or 3.
d = Electrical Certification: F or O
e = Optional features: L3, A3, Z1, Z2, Z3, K, T, W and/or Y.

Equipment Ratings:

Nonincendive for use in Class I, Division 2, Groups A, B, C, and D; Temperature Class T4A; T4 Ta = 85°C; Suitable for use in Class II and III, Division 2, Groups F and G; Temperature Class T4A; T4 Ta = 85°C; indoor and outdoor, Type 4X; IP66/IP68, Hazardous (Classified) Locations.

Approved for:

FM Approved for:

Invensys Systems Incorporated
Foxboro, MA 02035

FM Approvals

Member of the FM Global Group

This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

Class 3600	1998
Class 3610	1988
Class 3611	1986
Class 3615	2006
Class 3810	2005
IEC 60529	2004
ANSI/ISA-12.00.01	2002
ANSI/ISA-12.22.01	2002
ANSI/NEMA 250	1991

Original Project ID: 0Z2A3.AE Approval Granted: June 28, 1995

Subsequent Revision Reports / Date FM Approval Amended

Report Number	Date	Report Number	Date
0Z5A3.AX	July 24, 1995	040929	October 20, 2004
0B2A7.AX	February 16, 1996	3021296	March 2, 2005
5B7A1.AX	January 22, 1997	3023377	April 1, 2005
2D7A1.AE	October 7, 1997	080520	June 23, 2008
3000037	March 24, 1998	3034825	November 19, 2008
3003729	April 16, 1999	091119	November 30, 2009
3004604	June 22, 1999		
3006120	November 23, 1999		
3005978	January 4, 2000		
3006744	March 6, 2000		
3007693	May 4, 2000		
3009339	November 1, 2000		
3011976	August 17, 2001		
3011365	October 24, 2001		
3013415	February 26, 2002		
3018002	August 7, 2003		
3018510	November 13, 2003		
3018555	March 19, 2004		
3021119	June 17, 2004		

FM Approvals LLC

J.E. Marquedant
Group Manager

30 November 2009
Date

invensys
Operations Management

CERTIFICATE OF ORDER COMPLIANCE
CERTIFICATE 9766
ACCORDING TO DIN 50 049-2.1

Milan, 21 March 2011

CUSTOMER:	DESMET BALLESTRA
PURCHASE ORDER:	101589
INVENSYS REF:	10ITA9766
SUBJECT:	TRANSMITTERS

We certify that the above mentioned instruments are in compliance with all the requirements of the specifications included in the relevant Customer Order; moreover we certify that the items in this order comply with the requirements of Invensys Systems standard inspection procedures and Quality Assurance program, and are in agreement with the specifications as shown in Invensys Systems Product Specification Sheets and have been prepared for shipment in accordance with commercial standards for packing and shipping.

We certify that Invensys Systems Quality Assurance program conforms to ISO 9001 and is certified by Det Norske Veritas. This program provides for the selection, evaluation, approval, maintenance and control of all measurement standards, gauges, measuring and test equipment necessary to determine compliance with specifications and drawings.

All measurement standards are calibrated at scheduled intervals by the National Institute of Standards and Technology (NIST), or against certified standards, which are traceable to the National Institute of Standards and Technology, formerly National Bureau of Standards (NBS)

INVENSYS SYSTEMS / QUALITY ASSURANCE

FOXBORO
A SIEBE COMPANY

EC DECLARATION OF CONFORMITY

We, Manufacturer:

The Foxboro Company
33 Commercial Street
Foxboro, Massachusetts 02035
U.S.A.

Authorized Representative based within EU:

Foxboro Nederland N.V.
Baarnsche dijk 10
3741 LS Baarn
The Netherlands

declare under our sole responsibility that the

I/A Series Pressure Transmitters

are in conformity with the protection requirements of Council Directive:

89/336/EEC as amended by 92/31/EEC and 93/68/EEC on the approximation of the laws of the Member States relating to Electromagnetic Compatibility.

Attestation is provided according to article 10 (2) of the Directive by a Technical Construction File.

Technical File Number: 95-9063

The following standards are referenced in the file:

EN 50081-1:1992, Electromagnetic Compatibility - Generic Emission Standard, Part 1: Residential, Commercial and Light Industry
EN 50081-2:1993, Electromagnetic Compatibility - Generic Emission Standard, Part 2, Industrial Environment
EN 50082-2:1994, Electromagnetic Compatibility - Generic Immunity Standard, Part 2: Industrial Environment

A Technical Certificate No: C198FOX1.DWS has been issued by UK appointed Competent Body

Interference Technology International Limited
41-42 Shrivenham, Hundred Business Park
Swindon, Wiltshire
England SN6 8TZ

We, the undersigned , hereby declare that the products specified above conform to the listed directives.

Manufacturer

Signature: Normand E Provost

Name: Normand E. Provost
Title: Manager Product Qualification
Date: March 22, 1996

Authorized Representative based within the EU

Signature:

Name: Lubbo Winkel
Title: Director European Quality
Date: March 22, 1996

Model IDP10
I/A Series® Electronic Differential Pressure Transmitters with 4 to 20 mA Analog Output

IDP10
LOW PROFILE
STRUCTURE LP1

IDP10
TRADITIONAL
STRUCTURE

IDP10
LOW PROFILE
STRUCTURE LP2

The Foxboro® brand Model IDP10 is an analog output, two-wire d/p Cell® Transmitter that provides precise, reliable, measurement of differential pressure, and transmits a 4 to 20 mA analog output signal. Contact Foxboro for Intelligent IDP10 Transmitters with remote digital communications.

HIGH DEPENDABILITY AND VALUE

- Available with traditional or low profile structures.
- Superior Performance and long term stability from microprocessor-based technology.
- Industry standard 316L ss, Co-Ni-Cr, Hastelloy C, Monel, or Tantalum sensor materials, depending on transmitter structure.
- Durable aluminum or 316 ss housing available; both meet NEMA 4X and IP66 ratings.
- Optional mounting bracket sets allow pipe, surface, or manifold mounting of transmitter.
- Dual Seal certified to meet ANSI/ISA 12.27.01-2003 requirements.
- CE marked; complies with applicable EMC, ATEX, and PED European Directives.
- Designed for hazardous area installations. Versions available to meet Agency flameproof and zone requirements.
- Standard 5-year warranty.

INTELLIGENT TRANSMITTER FEATURES AT AN ECONOMICAL PRICE

When you want the flexibility and performance of a configurable, intelligent transmitter but you don't need a digital output signal, these transmitters provide exceptional benefits at a very affordable price:

- Liquid Crystal Display (LCD) digital indicator with on-board pushbuttons
- Pushbutton configuration and calibration:
  - Linear or square root output
  - Adjustable damping
  - Forward or reverse output
  - Failsafe output; upscale or downscale
  - Reranging without applying pressure
- Easily upgradeable to fully intelligent version (FoxCom™, HART, or FOUNDATION Fieldbus)

I/A Series PRESSURE TRANSMITTER FAMILY

This complete family of d/p Cell®, gauge, absolute, multirange, multivariable, and premium performance transmitters, as well as transmitters with remote or direct connect pressure seals, all using field-proven silicon strain gauge sensors and common topworks.

MODULAR ELECTRONICS

Select the electronics module you need to provide just the right level of intelligence for your application and budget. If your needs change, the modular design allows easy migration to other protocols — including FoxCom, HART FOUNDATION Fieldbus, and 1 to 5 V dc versions.

ELECTRONICS VERSION -A TRANSMITTER

This transmitter uses the -A electronics module. It is a very economical analog output transmitter that provides full configuration capability. It represents an IPS advancement in providing the greatest functionality for the largest number of applications at the least possible cost to you. It even provides the ability to rerange to new calibrated ranges, using the standard LCD Indicator, without the need to apply calibration pressure.

It is designed for use in Division 1 hazardous areas, and complies with Division 2 requirements. Also versions are available to meet Agency flameproof and zone requirements. See Electrical Safety Specifications section.

WIDE MEASUREMENT RANGE WITH A MINIMUM OF SENSORS

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

STANDARD LCD DIGITAL INDICATOR

A two-line digital indicator, shown in Figure 17, is provided as standard with this transmitter. The indicator displays the measurement with a choice of units. Two on-board pushbuttons allow zero and span adjustments, as well as local configuration, without the need for a PC-Based Configurator.

SENSOR CORROSION PROTECTION

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

For low profile structures LP1 and LP2, 316L ss and Hastelloy C are offered as sensor materials. Refer to Transmitter Structures section that follows for description and application of traditional and low profile (LP1 and LP2) structures.

HIGH PERFORMANCE

These transmitters utilize microprocessor-based correction to achieve both excellent accuracy and ambient temperature compensation.

EASE OF INSTALLATION

Rotatable Topworks allows transmitter installation in tight places, allows indicator to be positioned in preferred direction, and eases field retrofit.

Two Conduit Entrances offer a choice of entry positions for ease of installation and self-draining of condensation regardless of mounting position and topworks rotation.

Wiring Guides and Terminations provide ease of wire entry and support, plenty of space to work and store excess wire, and large, rugged screw terminals for easy wire termination.

PROCESS CONNECTORS

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

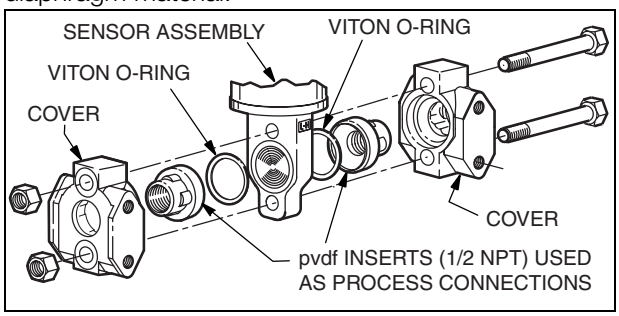


Figure 1. Bottomworks Shown with 1/2 NPT pvdf Inserts Installed in HI- and LO-Side Covers with Traditional Structure

OPTIONAL MOUNTING BRACKET SETS

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

UNIQUE PROCESS COVER AND CELL BODY DESIGN

Biplanar Construction (Figure 2) maintains the traditional horizontal process connections and vertical mounting by providing a cell body contained between two process covers, while still achieving light weight, small size, and high standard static pressure rating of 25 MPa (3625 psi). This provides easy retrofit of any conventional differential pressure transmitter, and also is easily mounted in the horizontal position with vertical process connections, when required.

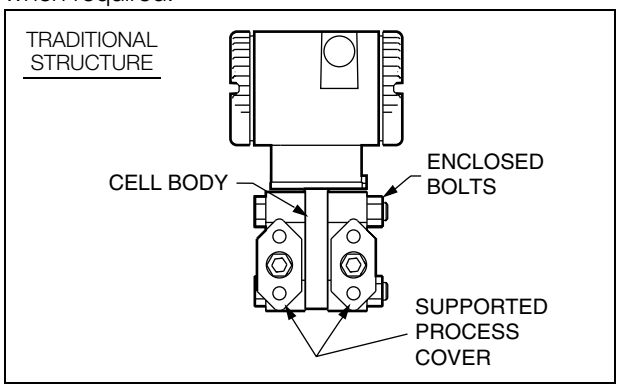


Figure 2. Biplanar Construction Shown with Traditional Horizontal Process Connections

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

Process Cover Bolts (Figure 2) are enclosed to minimize corrosion and to minimize early elongation with rapid temperature increases. The design makes it less likely for the transmitter to release process liquid during a fire.

Process Cover Gaskets are ptfe as standard; ptfe provides nearly universal corrosion resistance, and eliminates the need to select and stock various elastomers to assure process compatibility.

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

TRANSMITTER STRUCTURES

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

Traditional Structure

The traditional structure (Figure 3) utilizes the right angle design common to most differential pressure transmitters in use throughout the world. Process connections are oriented 90 degrees from the transmitter centerline.

This traditional structure makes it easy to retrofit any transmitters of similar design.

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

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

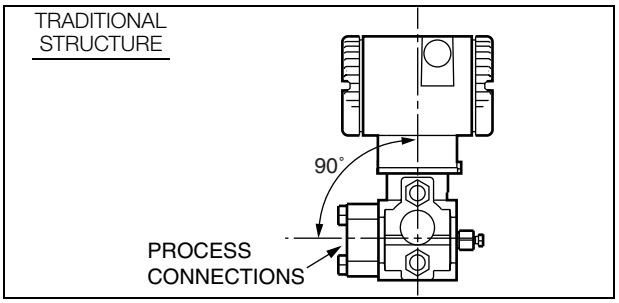


Figure 3. Vertical Mounting Showing Process Connections at 90 degrees

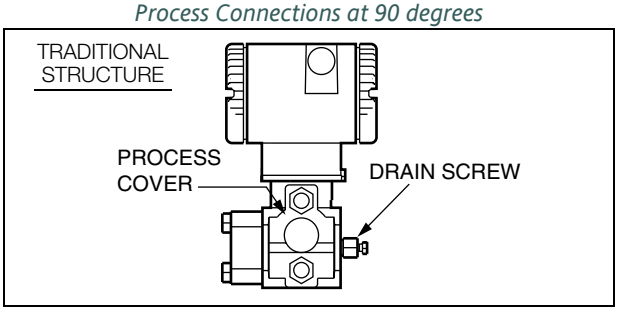


Figure 4. Vertical Mounting - Cavity Draining

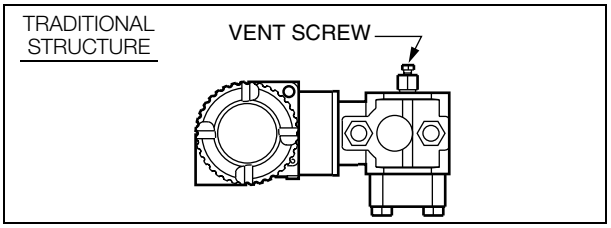


Figure 5. Horizontal Mounting - Cavity Venting, and Self-Draining into Process Line

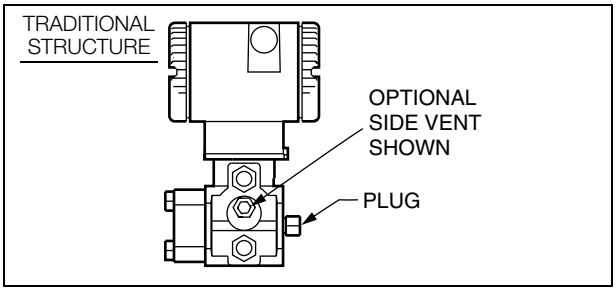


Figure 6. Vertical Mounting - Cavity Venting, and Self-Draining into Process Line

Low Profile Structures

The low profile structures utilize an in-line design, placing the process connections in line with the transmitter centerline (Figure 7 and Figure 8). This allows mounting of the transmitter in the upright position with the process connections facing downward, for connection to vertical process piping or for mounting directly to a three- or five-valve manifold.

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

Transmitters with the low profile structure can be attached directly to existing, installed Coplanar manifolds, such as the Rosemount Model 305RC or Anderson Greenwood Models MC3, MC5G, MC5P, and MT3 by use of an optional adapter plate (Figure 9). Also, when assembled to the same process piping or manifold as a Coplanar transmitter, one of the electrical conduit connections is located within ± one inch of the similar conduit connection on the competitive transmitter, assuring ease of retrofit or conformance with installation design drawings.

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

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

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

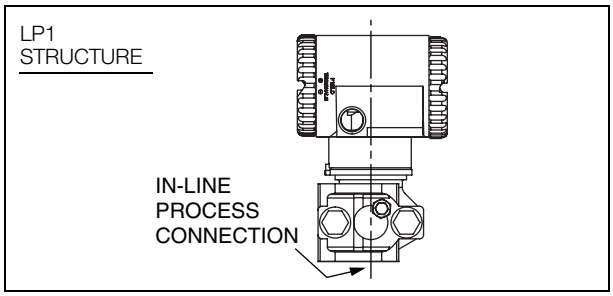


Figure 7. Low Profile Structure - LP1 Shown

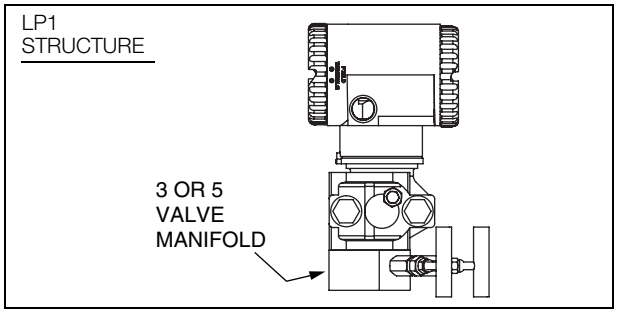


Figure 8. LP1 Shown Directly Mounted to Manifold

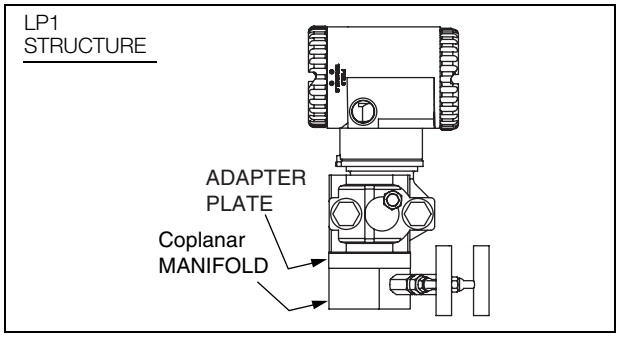


Figure 9. LP1 Shown Mounted to a Coplanar Manifold using an Optional Intermediate Adapter Plate

Low Profile Structure LP1 – Direct Mount

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

They are supplied as standard with a single vent/drain screw in the side of each process cover. In conjunction with the standard tangential venting and draining design, they are suitable for mounting either vertically (Figure 10) or horizontally, and are suitable for nearly all applications, including liquids, gases, and steam. For horizontal installation, they can simply be “turned over” (rotated 180 degrees - Figures 11 and 12) to orient the high and low pressure sides in the preferred locations. There is no need to unbolt process covers. The topworks housing can also be rotated, as shown, to orient the conduit connections in the desired position.

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

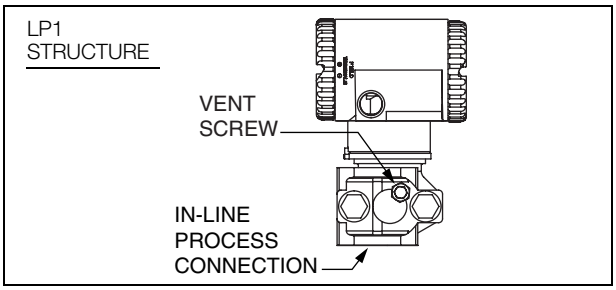


Figure 10. Upright Mounting

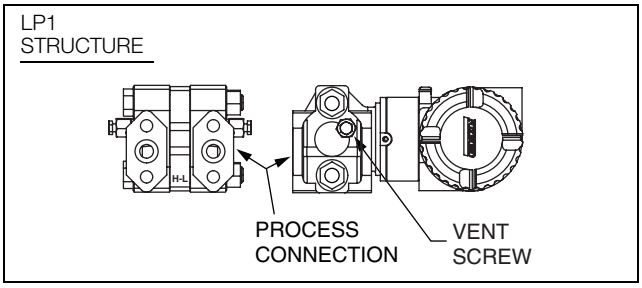


Figure 11. Horizontal Mounting with Vent Screw

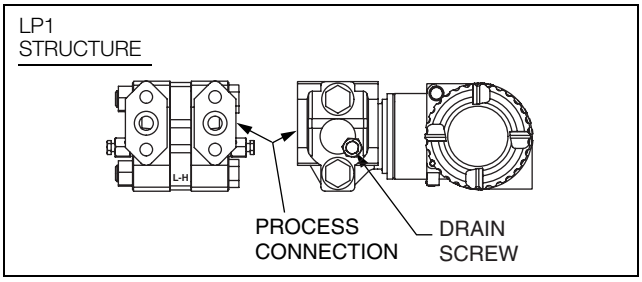


Figure 12. Horizontal Mounting with Drain Screw

Low Profile Structure LP2 - Bracket or Direct Mount

Low Profile Structure LP2 is a universal design for either bracket or direct mounting. Drilled and tapped mounting holes facilitate mounting to either new or existing Foxboro brackets (Options -M1, -M2, and -M3), as well as standard brackets supplied with existing Coplanar transmitters. See Figures 13 and 14.

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

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

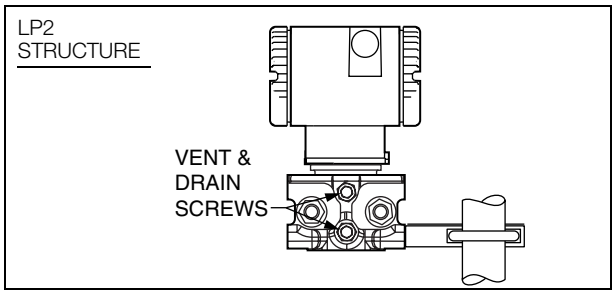


Figure 13. Shown on Foxboro Universal Bracket

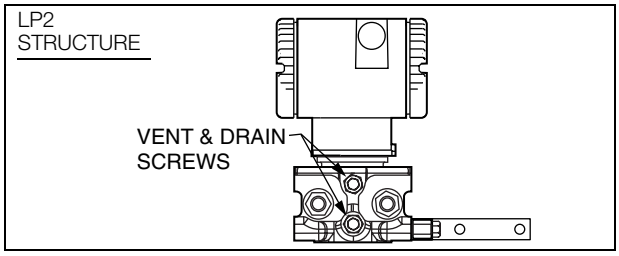


Figure 14. Shown on Coplanar Bracket

PRESSURE SEALS

Pressure seals are used with transmitters having a traditional structure (see Transmitter Structures section above) when it is necessary to keep the transmitter isolated from the process. A sealed system is used for a process fluid that may be corrosive, viscous, subject to temperature extremes, toxic, sanitary, or tend to collect and solidify.

Table 1 lists the various pressure seals that can be used with an IDP10 Transmitter. To order a transmitter with seals, both a Transmitter Model Number and Seal Model Number are required. For a complete listing of pressure seal models and specifications, see PSS 2A-1Z11 A. Also see Figure 16 for typical pressure seal configurations.

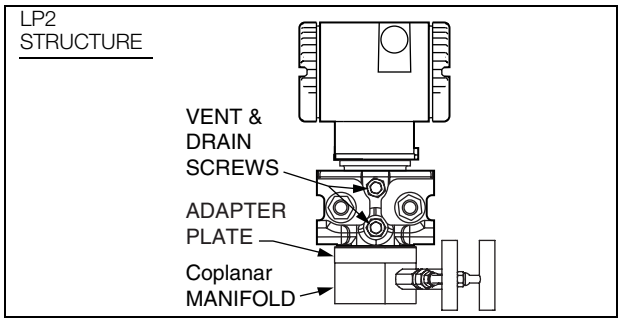


Figure 15. Adapter Mount to Existing Coplanar Manifold

Table 1. Pressure Seals Used with IDP10 Transmitters

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

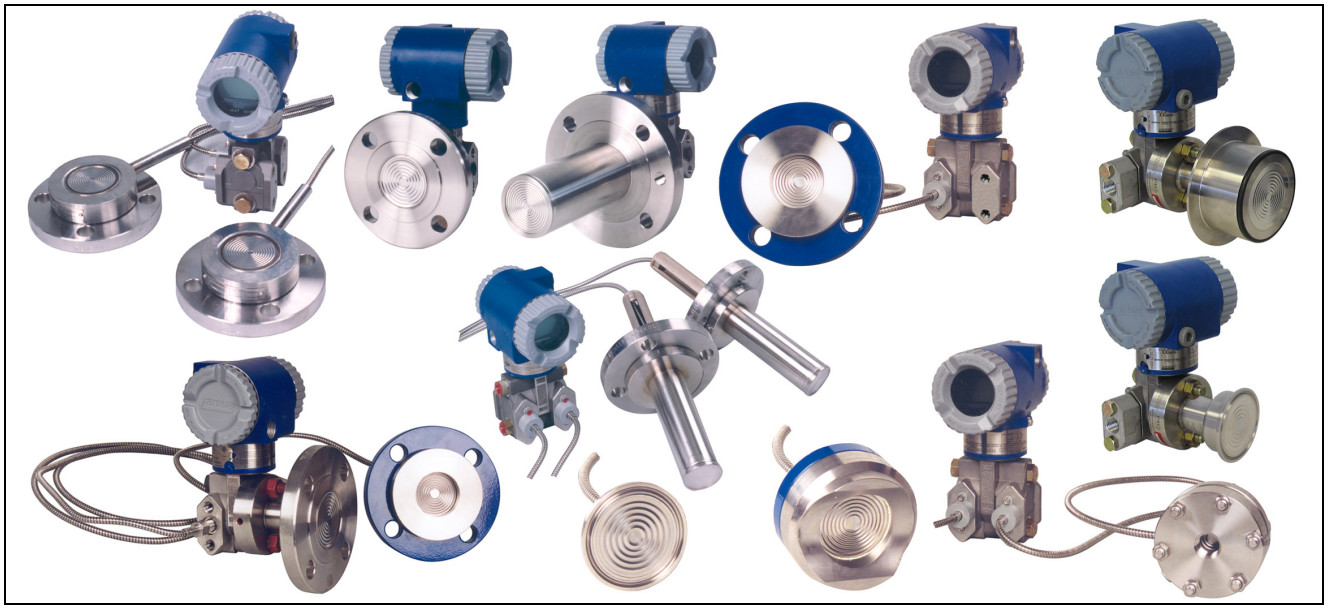


Figure 16. Typical IDP10 Pressure Seals

FUNCTIONAL SPECIFICATIONS

Span Limits for IDP10 d/p Cell Transmitters

Span Code	kPa	psi	mbar	mmHg	mmH_2O	inH_2O
A (a)	0.12 and 7.5	0.018 and 1.1	1.2 and 75	0.93 and 56	12 and 750	0.5 and 30
B	0.87 and 50	0.125 and 7.2	8.7 and 500	6.5 and 375	87 and 5000	3.5 and 200
C	7 and 210	1 and 30	70 and 2100	50 and 1500	700 and 21 000	28 and 840
Span Code	**MPa**	**psi**	**bar or kg/cm^2**	**mHg**	**mH_2O**	**ftH_2O**
D	0.07 and 2.1	10 and 300	0.7 and 21	0.5 and 15	7 and 210	23 and 690
E (b)	0.7 and 21(b)	100 and 3000 (b)	7 and 210 (b)	5 and 150 (b)	70 and 2100 (b)	230 and 6900 (b)

(a) Span Limit Code "A" not available when pressure seals are selected.

(b) When certain options are specified, the upper span and range limits are reduced as shown in the "Options Impact" table below.

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

Span Code	kPa	psi	mbar	mmHg	mmH_2O	inH_2O
A (b)	-7.5 and +7.5	-1.1 and +1.1	-75 and +75	-56 and +56	-750 and +750	-30 and +30
B	-50 and +50	-7.2 and +7.2	-500 and +500	-375 and +375	-5000 and +5000	-200 and +200
C	-210 and +210	-30 and +30	-2100 and +2100	-150 and +150	-21 000 and +21 000	-840 and +840
Span Code	**MPa**	**psi**	**bar or kg/cm^2**	**mHg**	**mH_2O**	**ftH_2O**
D	-0.21 and +2.1	-30 and +300	-2.1 and +21	-1.5 and +15	-21 and +210	-69 and +690
E (c)	-0.21 and 21 (c)	-30 and +3000 (c)	-2.1 and +210 (c)	-1.5 and +150 (c)	-21 and +2100 (c)	-69 and +6900 (c)

(a) Positive values indicate HI side of sensor at the high pressure, and negative values indicate LO side of sensor at the high pressure.

(b) Span Limit Code "A" not available when pressure seals are selected.

(c) When certain options are specified, the upper span and range limits are reduced as shown in the "Options Impact" table below.

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

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

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

FUNCTIONAL SPECIFICATIONS (CONT.)

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

Transmitter Configuration (See Model Code for Description of Options)	Static Pressure Rating			Proof Pressure Rating (b)		
	MPa	psi	bar or kg/cm^2	MPa	psi	bar or kg/cm^2
With Option -D9 or -Y	40	5800	400	100	14500	1000
Standard or with Option -B2, -D3, or -D7	25	3625	250	100	14500	1000
With Option -B3	20	2900	200	70	11150	700
With Option -D1	16	2320	160	64	9280	640
With Option -B1 or -D5	15	2175	150	60	8700	600
With Option -D2, -D4, -D6, or -D8	10	1500	100	40	6000	400
With Structure Codes 78 and 79 (pvdf insert)	2.1	300	21	8.4	1200	84

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

(b) Proof pressure ratings meet ANSI/ISA Standard S82.03-1988. Unit may become nonfunctional after application of proof pressure.

Output Signal

4 to 20 mA, Linear or Square Root (Configurable)

Electrically Adjustable Damping

Response time is normally 0.75 s, or setting of 0 (none), 2, 4, or 8 seconds, whichever is greater, for a 90% recovery from an 80% input step per ANSI/ISA S51.1. (For 63.2% recovery, 0.50 s with sensors B to E, and 0.60 s with sensor A.)

Suppressed Zero and Elevated Zero

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

Field Wiring Reversal

No transmitter damage.

Zero and Span Adjustments (Figure 17)

Zero and span adjustments can be accomplished using the pushbuttons on the LCD indicator.

Optional External Zero Adjustment (Figure 17)

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

Standard Liquid Crystal Display (LCD) Indicator with On-Board Pushbuttons (Figure 17)

Indicator Provides:

- Two Lines; four numeric characters on top line and seven alphanumeric characters on bottom line.
- Measurement Readout; value on top line and units label on bottom line.
- Configuration and Calibration Prompts.

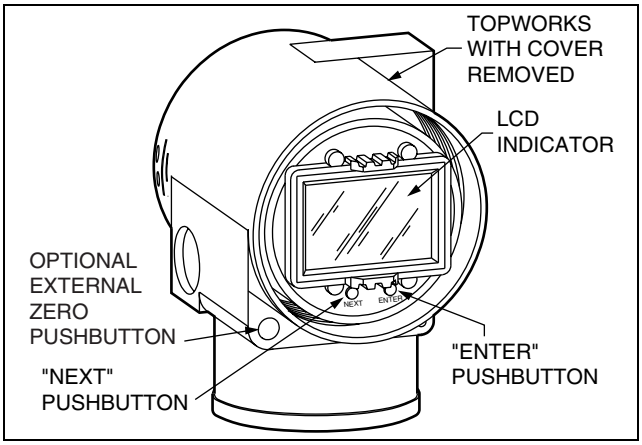


Figure 17. LCD Indicator with Pushbuttons

FUNCTIONAL SPECIFICATIONS (CONT.)

European Union Directives

- Complies with Electromagnetic Compatibility Requirements of European EMC Directive 2004/108/EC by conforming to the following EN and IEC Standards: EN 61326-1, and IEC 61000-4-2 through 61000-4-6.
- Complies with NAMUR NE 21 Interference Immunity Requirement.
- Analog output complies with NAMUR NE 43 overrange and underrange annunciations.
- Conforms to Applicable European Union Directives ("CE" Logo marked on product).

Supply Voltage Requirements and External Loop Load Limitations (Figure 18)

Nominal minimum voltage shown in Figure 18 is 11.5 V dc. This can be reduced to 11 V dc using a plug-in jumper across the test receptacles in the field wiring compartment terminal block. An optional plug-in shorting bar (Figure 21) is offered for this purpose.

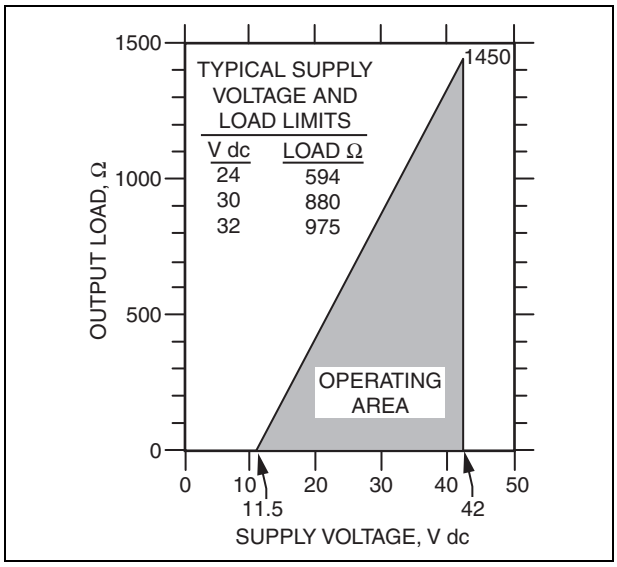


Figure 18. Supply Voltage vs. Output Load

Square Root Low Flow Cutoff

User configurable to provide:

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

Minimum Allowable Absolute Pressure vs. Transmitter Temperature

WITH SILICONE FILL FLUID

Full vacuum: up to 121°C (250°F)

WITH INERT FILL FLUID

Refer to Figure 19.

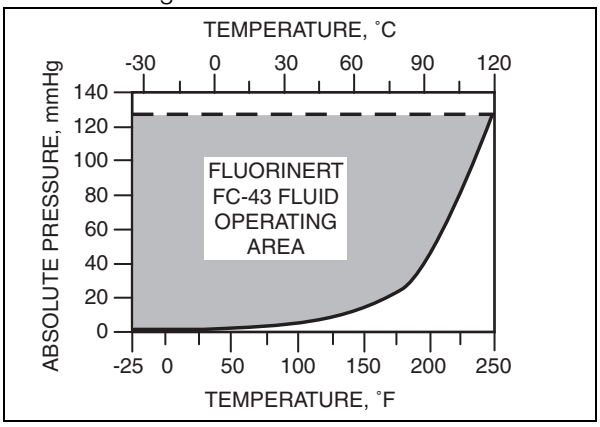


Figure 19. Minimum Allowable Absolute Pressure vs. Transmitter Temperature, Inert FC-43, 2.6 cSt at 25°C (77°F)

FUNCTIONAL SPECIFICATIONS (CONT.)

Configuration and Calibration Data, and Electronics Upgradeability

Factory characterization, user configuration, and calibration data are stored in the sensor (see Figure 20). Therefore the electronics module can be replaced or changed from one type to another.

A module may be replaced without the need for reconfiguration or recalibration. Although module replacement can affect accuracy up to 0.20% of span, this error can be removed by an mA trim without application of pressure.

Changing module types may require reconfiguration and recalibration, as well as a different terminal block, if applicable, but all factory characterization data is retained.

Optional Custom Configuration (Option -C2)

For the transmitter to be custom configured by the factory, the user must fill out a data form. If this option is not selected, a standard (default) configuration will be provided; see Table 2 for allowable pressure units, and Table 3 for an example of custom Configuration Option -C2.

Table 2. Allowable Pressure Units for Calibrated Range (a)

inH_2O	psi	Pa	atm	g/cm^2
ftH_2O	inHg	kPa	bar	kg/cm^2
mmH_2O	mmHg	MPa	mbar	torr

(a) Displayed in upper case only on transmitter.

Table 3. Example of Configuration Option -C2

Parameter	Standard (Default) Configuration	Example of Configuration Option -C2
Calibrated Range • Pressure Units • LRV • URV	 per S.O.(a) per S.O. per S.O.	 INH2O (a) 0 100
Output Mode	Linear	Square Root
Output Direction	Forward	Forward
Damping	None	2
Failsafe Action	Upscale	Downscale
Ext. Zero Option	Enabled	Disabled
Other: If Linear: • Label (2nd line) • Display LRV • Display URV If Square Root: • Label (2nd line) • Display LRV • Display URV	 (b) (c) (c) % 0 100	 INH2O (b) 0 (c) 100 (c) GPM (d) 0 500 (e)

(a) Select from list in Table 2.
(b) Same as units selected for calibrated range, or percent.
(c) Same as calibrated range, or 0 and 100 for percent.
(d) Up to 7 letters (upper case), numbers, or available symbols.
(e) Any value between and including -9999 and 9999.

NOTE

There is a maximum of 4 digits for entering range values.

FUNCTIONAL SPECIFICATIONS (CONT.)

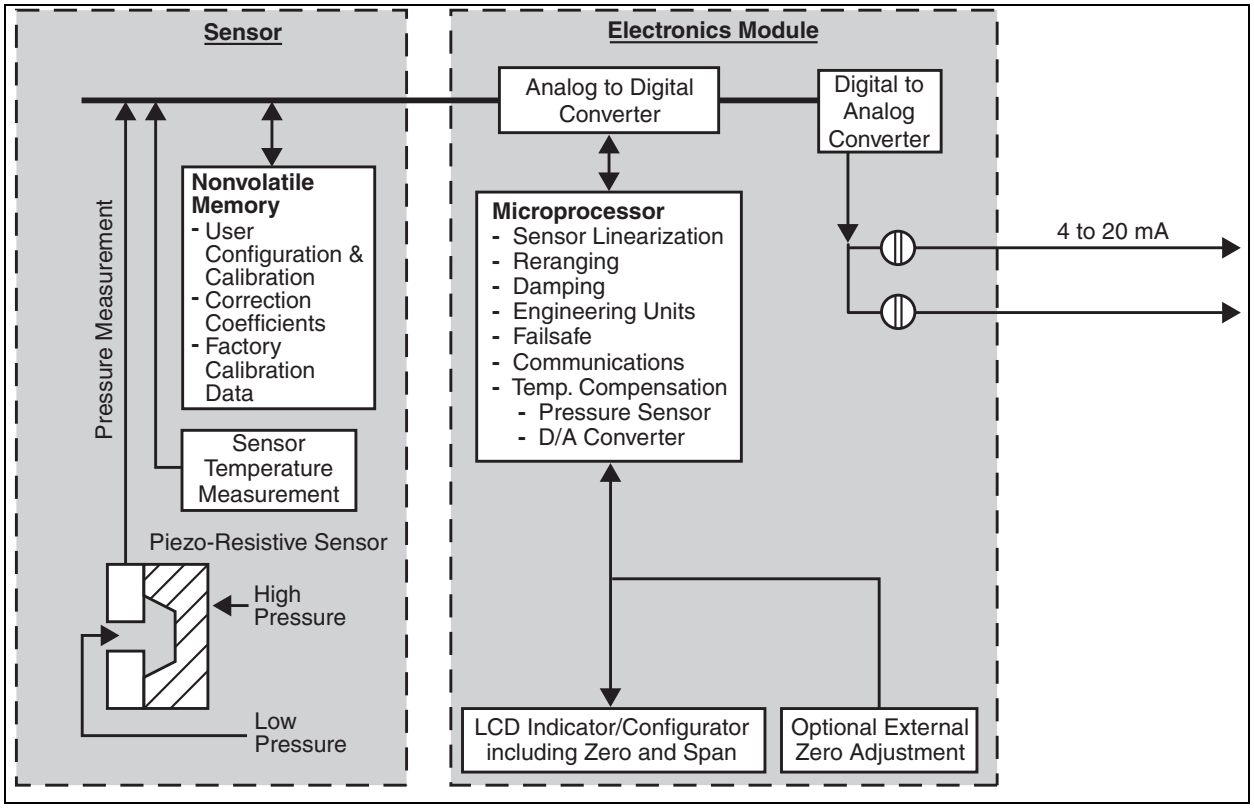


Figure 20. Transmitter Functional Block Diagram

OPERATING, STORAGE, AND TRANSPORTATION CONDITIONS

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

(a) When Structure Codes 78/79 (pvdf inserts) are used, maximum overrange is 2.1 MPa (300 psi), and temperature limits are -7 and +82°C (20 and 180°F); when DIN Construction Options D2/D4/D6/D8 are used, temperature limits are 0 and 60°C (32 and 140°F).

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

(c) The operative limits of the standard LCD Indicator are -29 and +85°C (-20 and +185°F), and the normal operating conditions are -20 to +82°C (-4 to +180°F). Although the LCD Indicator will not be damaged at any temperature within the “Storage and Transportation Limits”, updates will be slowed and readability decreased at temperatures outside the “Normal Operating Conditions”.

(d) With topworks cover on and conduit entrances sealed.

(e) 11.5 V dc can be reduced to 11 V dc by using a plug-in shorting bar; see “Supply Voltage Requirements” section and Figure 18.

(f) Sensor process wetted diaphragms in a vertical plane.

(g) Refer to the Electrical Safety Specifications section for a restriction in ambient temperature with certain electrical certifications.

PERFORMANCE SPECIFICATIONS

(Zero-Based Calibrations; Co-Ni-Cr or 316L ss Sensor with Silicone Fluid; Under Reference Operating Conditions unless otherwise specified; URL = Upper Range Limit; Span = Calibrated Span.)

Accuracy (includes Linearity, Hysteresis, and Repeatability)

±0.20% of Span. See Table 4 for Small Span Accuracy.

Table 4. Accuracy with Small Spans

For Span Code	If Span is:	Then Small Span Accuracy in % of Span is:
B	<5% of URL	$\pm\left[(0.10)+(0.005)\left(\frac{\text{URL}}{\text{Span}}\right)\right]$
A, C, D, E	<6.7% of URL	$\pm\left[(0.10)+(0.0067)\left(\frac{\text{URL}}{\text{Span}}\right)\right]$

Stability

Long term drift is less than ±0.05% of URL per year over a 5-year period.(1)

Calibration Frequency

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

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

Vibration Effect

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

(1) Add an additional 0.05% to stability specification for Span Code A.
(2) Can be calibrated out by zeroing at nominal line pressure.

Static Pressure Effect

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

ZERO SHIFT(2)

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

(a) Per 3.5 MPa (500 psi) for Span Codes A and D.

SPAN SHIFT

±0.25% of Reading (±0.30% for Span Code A)

Switching and Indirect Lightning Transients

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

Ambient Temperature Effect

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

Span Code	Specification
A(a)	±(0.18% URL + 0.15% Span)
B and C	±(0.03% URL + 0.20% Span)
D	±(0.05% URL + 0.18% Span)
E	±(0.08% URL + 0.15% Span)

(a) Span Code A specifications apply to a transmitter with a stainless steel sensor only.

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

PERFORMANCE SPECIFICATIONS (CONT.)

Supply Voltage Effect

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

Position Effect

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

RFI Effect

The output error is less than 0.1% of span for radio frequencies in the range of 27 to 1000 MHz and field intensity of 30 V/m when the transmitter is properly installed with shielded conduit and grounding, and housing covers are in place. (Per IEC Std. 61000-4-3.)

PHYSICAL SPECIFICATIONS

Process Cover and Connector Material (Process Wetted)

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

Process Cover and Process Connection Gaskets

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

Process Cover Bolts and Nuts

ASTM A193, Grade B7 high strength alloy steel for bolts, and ASTM A194 Grade 2H high strength alloy steel for nuts are standard. Options include NACE Class B7M bolting, 17-4 ss bolting, and 316 ss bolting.

Sensor Material (Process Wetted)

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

Sensor Fill Fluids

Silicone Oil or Inert (FC-43)

Environmental Protection

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

Electronics Housing and Housing Covers

Housing has two compartments to separate the electronics from the field connections. The housing and covers are made from low copper, die-cast aluminum alloy with an epoxy finish, or from 316 ss. Buna-N O-ring seals are used to seal the threaded housing covers, housing neck, and terminal block.

Electrical Connections

Field and RTD sensor wires enter through 1/2 NPT, PG 13.5, or M20 threaded entrances, as specified, on either side of the electronics housing. Wires terminate under screw terminals and washers on terminal block in the field terminal compartment. Unused entrance is plugged to insure moisture and RFI/EMI protection. See Figure 21.

Electronics Module

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

PHYSICAL SPECIFICATIONS (CONT.)

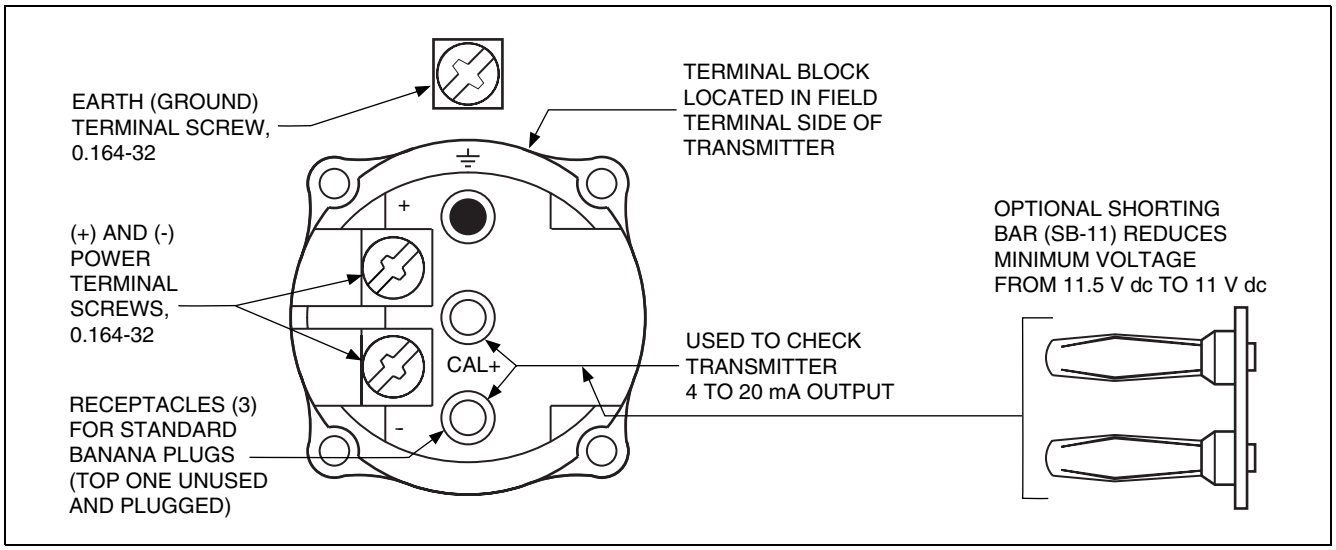


Figure 21. Field Terminal Block

Mounting Position

The transmitter may be mounted in any orientation.

Dimensions

See “Dimensions - Nominal” section and Dimensional Print DP 020-446.

Approximate Mass (with Process Connectors)

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

ELECTRICAL SAFETY SPECIFICATIONS

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
ATEX flameproof: II 2 GD, EEx d IIC, Zone 1.	Temperature Class T6, Ta = -40 to +80°C.	D
CSA explosionproof for Class I, Division 1, Groups B, C, and D; dust-ignitionproof for Class II, Division 1, Groups E, F, and G; Class III, Division 1.	Maximum Ambient Temperature 85°C.	C
CSA for Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; Class III, Division 2.	Temperature Class T6 at 40°C and T4A at 85°C maximum ambient.	
CSA field device zone certified flameproof Ex d IIC. Also, all certifications of Code C above.	Maximum Ambient Temperature 85°C.	B
FM explosionproof for Class I, Division 1, Groups B, C, and D; dust-ignitionproof for Class II, Division 1, Groups E, F, and G; Class III, Division 1.	Temperature Class T6 at 80°C and T5 at 85°C maximum ambient.	F
FM nonincendive for Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; Class III, Division 2.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient.	
FM field device zone approved flameproof AEx d IIC. Also, all certifications of Code F above.	Temperature Class T6 at 80°C and T5 at 85°C maximum ambient.	G
IECEx flameproof: Ex d IIC.	T6, Ta = 80°C; T5, Ta = 85°C; Ambient Temperature -20 to +85°C.	V

MODEL CODE

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

Model Code continued on next page

MODEL CODE (CONT.)

4. Transmitter prepared for Foxboro Model Coded Remote Mount Seals (b)(c)	
Transmitter prepared for Remote Seals on Both HI and LO Sides, Silicone Fill in Sensor	S1
Transmitter prepared for Remote Seals on Both HI and LO Sides, Inert Fill in Sensor	S2
Transmitter prepared for Remote Seal HI Side, 1/2 NPT Connector LO Side, Silicone Fill in Sensor	S3
Transmitter prepared for Remote Seal HI Side, 1/2 NPT Connector LO Side, Inert Fill in Sensor	S4
Transmitter prepared for Remote Seal LO Side, 1/2 NPT Connector HI Side, Silicone Fill in Sensor	S5
Transmitter prepared for Remote Seal LO Side, 1/2 NPT Connector HI Side, Inert Fill in Sensor	S6
5. Transmitter Prepared for Foxboro Model Coded Direct Connect Seals (b)	
PSFLT, PSSCT, or PSSST Direct Connect Seal on HI Side; 1/2 NPT Process Connector LO Side; Silicone Fill	F1
PSFLT, PSSCT, or PSSST Direct Connect Seal on HI Side; 1/2 NPT Process Connector LO Side; Inert Fill	F2
PSFLT, PSSCT, or PSSST Direct Connect Seal on HI Side; Remote Seal with Capillary LO Side; Silicone Fill	F3
PSFLT, PSSCT, or PSSST Direct Connect Seal on HI Side; Remote Seal with Capillary LO Side; Inert Fill	F4
6. Transmitter Prepared for non-Foxboro Seals	
Remote Seals on High and Low Sides; Silicone Fill in Sensor	SA
Remote Seals on High and Low Sides; Inert Fill in Sensor	SB
Remote Seal on High Side and 1/2 NPT Connector on Low Side, Silicone Fill in Sensor	SC
Remote Seal on High Side and 1/2 NPT Connector on Low Side, Inert Fill in Sensor	SD
Remote Seal on Low Side and 1/2 NPT Connector on High Side, Silicone Fill in Sensor	SE
Remote Seal on Low Side and 1/2 NPT Connector on High Side, Inert Fill in Sensor	SF
Span Limits (Differential Pressure Units)	
kPa / **inH_2O** / **mbar**	
0.12 and 7.5 / 0.5 and 30 / 1.2 and 75	A (e)
0.87 and 50 / 3.5 and 200 / 8.7 and 500	B
7 and 210 / 28 and 840 / 70 and 2100	C
MPa / **psi** / **bar or kg/cm^2**	
0.07 and 2.1 / 10 and 3000 / .7 and 21	D
0.7 and 21 / 100 and 3000 / 7 and 210	E (f)
Process Connector Type (Material Same as Process Cover Material) (g)	
See below: • For d/p: No connectors; both covers tapped for 1/4 NPT (316 ss only, no side vents) • Flange Mount Hi Side: 1/2 NPT, 316 ss Process Connector on Lo Side (F1 and F2 only) • Flange Mount Hi Side: No connectors; both sides prepared for seals (F3 and F4 only) • Two Remote Seals: No connectors; both covers tapped for capillary connection (S1, S2, SA, SB only) • One Remote Seal: 1/2 NPT, 316 ss Process Connector on side opposite seal (S3 to S6, SC to SF only)	0
1/4 NPT, Not with Structure Codes 46 to 49, 78, 79; or pressure seals	1
1/2 NPT, Not with Structure Codes 78 or 79, or pressure seals	2
Rc 1/4, Not with Structure Codes 46 to 49, 78, 79; or pressure seals	3
Rc 1/2, Not with Structure Codes 78 or 79, or pressure seals	4
1/2 Schedule 80 Welding Neck, Not with Structure Codes 46 to 49, 78, 79; or pressure seals	6
None; pvdf Insert tapped for 1/2 NPT/Process Inlet on Side of 316 ss Process Covers (only with 78/79 above)	7

Model Code continued on next page

MODEL CODE (CONT.)

Conduit Connection and Housing Material	
1/2 NPT Conduit Connection, Aluminum Housing	1
PG 13.5 Conduit Connection, Aluminum Housing (With Electrical Safety Code D only)	2
1/2 NPT Conduit Connection, 316 ss Housing	3
PG 13.5 Conduit Connection, 316 ss Housing (With Electrical Safety Code D only)	4
M20 Conduit Connection, Both Sides, Aluminum Housing (With Electrical Safety Code D only)	5
M20 Conduit Connection, Both Sides, 316 ss Housing (With Electrical Safety Code D only)	6
Electrical Safety (Also see Electrical Safety Specifications section)	
ATEX II 2 GD, EEx d IIC, Zone 1 (d)	D
CSA Certified Division 1 explosionproof, dust-ignitionproof; and Division 2, Classes I, II, and III	C
CSA zone certified Ex d IIC; also all certifications of Code C above (d)	B
FM approved, Division 1 explosionproof, dust-ignitionproof; and Division 2 nonincendive	F
FM zone approved AEx d IIC; also all approvals of Code F above (d)	G
IECEx flameproof: Ex d IIC	V
Optional Selections (Refer to Optional Selections below.)	
Mounting Bracket Set (h)	
Standard Style Painted Steel Bracket with Plated Steel Bolts (not available with LP1 structure)	-M1
Standard Style Stainless Steel Bracket with Stainless Steel Bolts (not available with LP1 structure)	-M2
Universal Style Stainless Steel Bracket with Stainless Steel Bolts (not with Structure Codes LL, LM, LC, or LD)	-M3
Blind (Solid) Cover over Standard LCD Indicator	
Blind (Solid) Cover replaces Window Cover	-L2
DIN 19213 Construction used with Process Connector Code 0 and 316 ss Covers with no side vents (not available when remote or direct connect seals are specified)	
Single Ended Process Cover with M10, B7 Steel Bolting (j)(s)	-D1
Double Ended Process Cover with M10, B7 Steel Bolting (Blind Kidney Flange on Back) (j)(k)(l)	-D2
Single Ended Process Cover with 7/16 in, B7 Steel Bolting; standard pressure rating 25 MPa (3625 psi) (s)	-D3
Double Ended Process Cover with 7/16 in, B7 Steel Bolting (Blind Kidney Flange on Back) (j)(k)(l)	-D4
Single Ended Process Cover with 7/16 in, 316 ss Bolting (j)(s)	-D5
Double Ended Process Cover with 7/16 in, 316 ss Bolting (Blind Kidney Flange on Back) (j)(k)(l)	-D6
Single Ended Process Cover with 7/16 in, 17-4 ss Bolting; standard pressure rating 25 MPa (3625 psi) (s)	-D7
Double Ended Process Cover with 7/16 in, 17-4 ss Bolting (Blind Kidney Flange on Back) (j)(k)(l)	-D8
Single Ended Process Cover with 7/16 in, 17-4 ss Bolting; pressure rating 40 MPa (5800 psi) (s) Not available with Span Codes A, D, or E; or Option Codes -V, -B1, -B2, -B3, or -Y	-D9
Cleaning and Preparation - Not Available with Gold-Plated Sensor, Structure 2G or Pressure Seals	
Unit Degreased - for Silicone Filled Sensors Only (Not for Oxygen/Chlorine/Other Fluids that may react with Silicone)	-X1
Cleaned and Prepared for Oxygen Service - for Inert Filled Sensors Only (Not Available with Carbon Steel Covers or with Silicone Filled Sensors)	-X2
Cleaned and Prepared for Chlorine Service - for Inert Filled Sensors Only (m) (Not Available with Carbon Steel Covers or with Silicone Filled Sensors)	-X3

Model Code continued on next page

MODEL CODE (CONT.)

Bolting for Process Covers/Connectors - Not with DIN 19213 Construction or Structure Codes 78 and 79 (n)	
316 ss Bolts and Nuts (Pressure Derated; Not Available with -Y Option) (j)	-B1
17-4 ss Bolts and Nuts (m)	-B2
B7-M Bolts and Nuts (NACE)(Pressure Derated) (j)	-B3
Conduit Thread Adapters (Not available with Conduit Connection Codes 5 and 6)	
Hawke-Type 1/2 NPT Cable Gland for use with Conduit Connection Codes 1 and 3 (p)	-A1
M20 Conduit Thread Adapter for use with Conduit Connection Codes 1 and 3 (p)	-A3
Electronics Housing Features	
External Zero Adjustment	-Z1
Custody Transfer Lock and Seal	-Z2
External Zero Adjustment and Custody Transfer Lock/Seal	-Z3
Custom Factory Configuration	
Full Factory Configuration (Requires Configuration Form to be Filled Out)	-C2
Tubing Connectors - Not available with Structure Codes 78 and 79; also not with Pressure Seals	
Steel, Connecting 6 mm Tubing to 1/4 NPT Process Connector Only with Structure Codes 10 to 13; and Process Connector Codes 0 and 1	-E1
Steel, Connecting 12 mm Tubing to 1/2 NPT Process Connector Only with Structure Codes 10 to 13; and Process Connector Code 2	-E2
316 ss, Connecting 6 mm Tubing to 1/4 NPT Process Connector Only with Structure Codes 10 to 13 and 20 to 23; and Process Connector Codes 0 and 1	-E3
316 ss, Connecting 12 mm Tubing to 1/2 NPT Process Connector Only with Structure Codes 10 to 13 and 20 to 23; and Process Connector Code 2	-E4
Vent Screw in Process Cover	
Supply Vent Screw in Side of Each Process Cover (Available only on Traditional Process Cover Structure Codes 10 to 49)	-V
Omit Vent Screw in Side of Each Process Cover (Available only on Type LP1 Low Profile Process Cover Structures Codes LL, LM, LC, and LD)	-V1
Adapter Plate, Bolts, and Gaskets for Direct Mount to Competitive Manifolds (t)	
See inside pages for manifold compatibility.	
Adapter Set for MC Coplanar Manifolds, B7 Bolts (not with options -B1, -B2, or -B3)	-P1
Adapter Set for MC Coplanar Manifolds, 316 ss Bolts (requires -B1 option)	-P2
Adapter Set for MC Coplanar Manifolds, 17-4 ss Bolts (requires -B2 option)	-P3
Adapter Set for MC Coplanar Manifolds, B7M Bolts (requires -B3 option)	-P4
Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, B7 Bolts (not with options -B1, -B2, or -B3)	-P5
Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, 316 ss Bolts (requires -B1 option)	-P6
Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, 17-4 ss Bolts (requires -B2 option)	-P7
Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, B7M Bolts (requires -B3 option)	-P8
Gaskets	
Gasket for Vacuum Service with Pressure Seals (r)	-G1
Instruction Books (Common MI, Brochure, and Full Documentation Set on CD-ROM is Standard)	
Without Instruction Book and CD; only “Getting Started” brochure is supplied.	-K1

Model Code continued on next page

MODEL CODE (CONT.)

Miscellaneous Optional Selections	
Low Temperature Operative Limit of Electronics Housing Extended Down to -50°C (-58°F) Not available with sensors and seals with Inert fill; Structure Codes 78 and 79; and DIN Options -D2, -D4, -D6, and -D8	-J
Supplemental Customer Tag (Stainless Steel Tag wired onto Transmitter)	
Static Pressure Rating to 40 MPa (5800 psi); Only with Span Codes B and C Not available with: – Options -B1, -B2, and -B3 (q) – Options -D1 to -D9 – Structure Codes 34, 35, 78, 79, S1 to S6, SA to SF, F1 to F4	-T -Y

Model Code continued on next page

(a) Maximum static pressure rating is 2.1 MPa (300 psi); temperature limits are -7 and +82°C (20 and 180°F).

(b) Both Transmitter and Pressure Seal Model Numbers are required. See PSS 2A-1Z11 A for the various pressure seal Model Codes.

(c) Remote Seal Models that may be specified are PSFPS, PSFES, PSFAR, PSTAR, PSISR, PSSCR, and PSSSR.

(d) Cover lock provided as standard with Electrical Safety Codes D, B, and G.

(e) Span Limit Code A is not available with pressure seals, except for Sanitary Spud Seals Models PSSSR-.4 and PSSST-.4.

(f) Span Limit Code E is not available with Structure Codes 78 and 79 above (pvdf insert in HI side cover).

(g) Select Code "0" if a pressure seal is specified. Otherwise select Codes 1 through 7.

(h) Mounting sets not offered with direct connect (flange mount) seals.

(j) See Functional Specifications section for pressure deratings when certain DIN 19213 versions and Bolting Options -B1 and -B3 are specified.

(k) Temperature limits derated to 0 and 60°C (32 and 140°F). Also not available with Structure Codes 52 to 57, and LL, LM, LC, and LD.

(l) Mounting Bracket Set options are not available with Options -D2, -D4, -D6, and -D8.

(m) When -X3 is specified, the standard bolting is replaced with 17-4 ss bolts and nuts. Therefore, there is no need to specify Option -B2 when selecting the Chlorine Service Option -X3.

(n) Not available with DIN construction options. For stainless steel bolts with DIN construction, specify -D5 to -D9, as required.

(p) Available with Electric Safety Code D only.

(q) -B2 Bolt Option (17-4 ss) is not available with the -Y option because 17-4 ss bolts and nuts are supplied as part of the -Y option.

(r) -G1 is a required option when pressure seal will be used in vacuum applications. This option substitutes vacuum service metal gasket for standard ptfe process cover gasket.

(s) Not available with Low Profile Structure Codes 52 to 67.

(t) Adapter plate options -P1 to -P8 are not available with:
– Pressure Seal Structure Codes.
– Process Connector Codes 1-7.
– DIN Construction Options -D1, -D2, -D4, -D5, -D6, -D7, -D8, -D9.

SUGGESTED RFQ SPECIFICATIONS

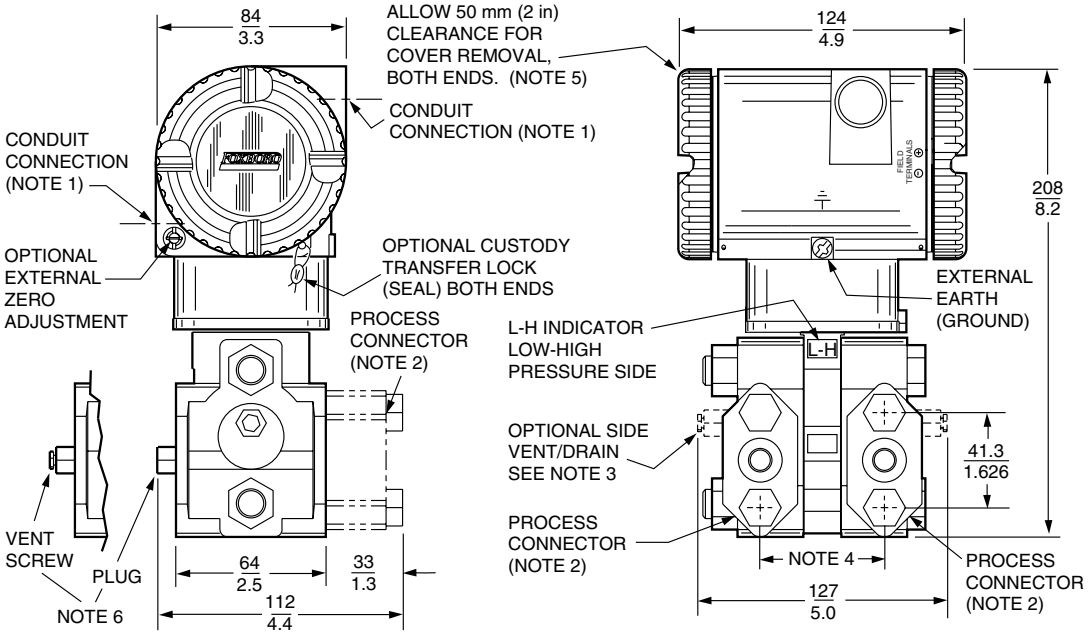
The manufacturer shall provide two-wire, 4 to 20 mA dc analog output, differential pressure transmitter(s) suitable for field mounting. They are offered with traditional or low profile structures. Transmitters with a traditional structure can also be provided (as required) with direct connect seals, or remote capillary connected seals. The specifications for these transmitters are:

Accuracy:	±0.20% of calibrated span.
Linear or Square Root Output:	Pushbutton configurable to set linear or square root output.
Static Pressure Rating:	25 MPa (3625 psi) for standard transmitter.
Ambient Temperature Effect:	For transmitter only (without pressure seals). Total effect for a 55°C (100°F) change within normal operating conditions is less than ±0.5% of calibrated span at maximum span (less than ±0.7% with 30 inH_2O URL sensor).
Damping:	Settable for a range of none to 8 seconds.
Proof Pressure:	14 500 psi for standard transmitter
Span Limits:	0.5 and 30 inH_2O, 3.5 and 200 inH_2O, 28 and 840 inH_2O, 10 and 300 psi, or 100 and 3000 psi, as specified; or SI and metric equivalents.
LCD Indicator:	Standard Liquid Crystal Display (LCD) Indicator with on-board pushbuttons for calibration and configuration.
Mounting:	On process piping, on a manifold, or optional mounting bracket
Input Connection:	With process connectors to accept 1/4 NPT, 1/2 NPT, Rc 1/4 or Rc 1/2, 1/2 Schedule 80 welding neck; or 1/2 NPT pvdf inserts installed in 316 ss covers; or prepared for a direct connect seal; or prepared for a single remote capillary connected seal, or two remote capillary connected seals.
Electronics Housing:	316 ss, or aluminum housing with epoxy finish
Modular Electronics:	Easily replaceable modular electronics in a NEMA 4X (IEC IP66) housing sealed with O-rings for protection against moisture or other contaminants.
Process Cover:	Traditional Structures: Steel, 316 ss, Monel, Hastelloy C, or pvdf insert Low Profile Structures: 316 ss
Sensor Materials:	Traditional Structure: 316L ss, Hastelloy C, Co-Ni-Cr, Monel, Tantalum, or Gold-Plated 316L ss Low Profile Structures: 316L ss or Hastelloy C
Approvals and Certifications:	Must be suitable for Division 1 hazardous locations, and conform to all applicable European Union Directives. Also versions available to meet Agency flameproof and zone requirements.
Approximate Mass: (with Process Connectors)	4.2 kg (9.2 lb), with Traditional Structures; Add 0.1 kg (0.2 lb) with Low Profile Structure LP1; Add 0.8 kg (1.8 lb) with Low Profile Structure LP2; Add 1.1 kg (2.4 lb) with 316 ss housing; Add 0.2 kg (0.4 lb) with optional LCD indicator.
Model Codes:	I/A Series IDP10-A Electronic d/p Cell Transmitter, with or without pressure seals, or equivalent.

DIMENSIONS-NOMINAL

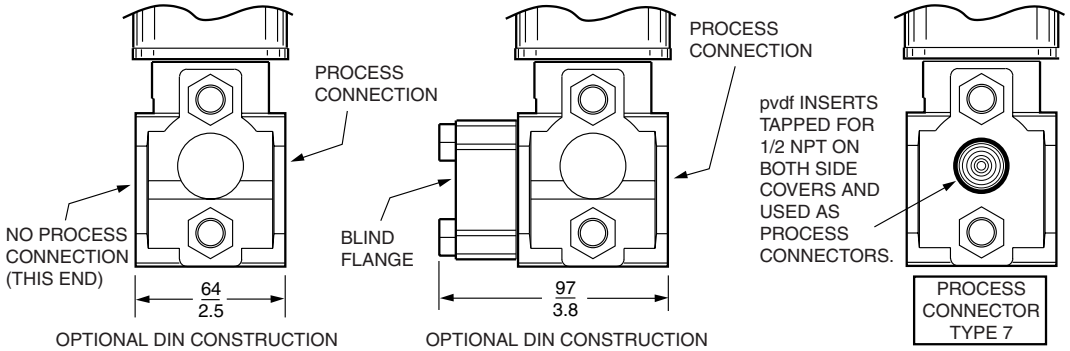
mm
in

TRANSMITTER WITH TRADITIONAL STRUCTURE



NOTES:

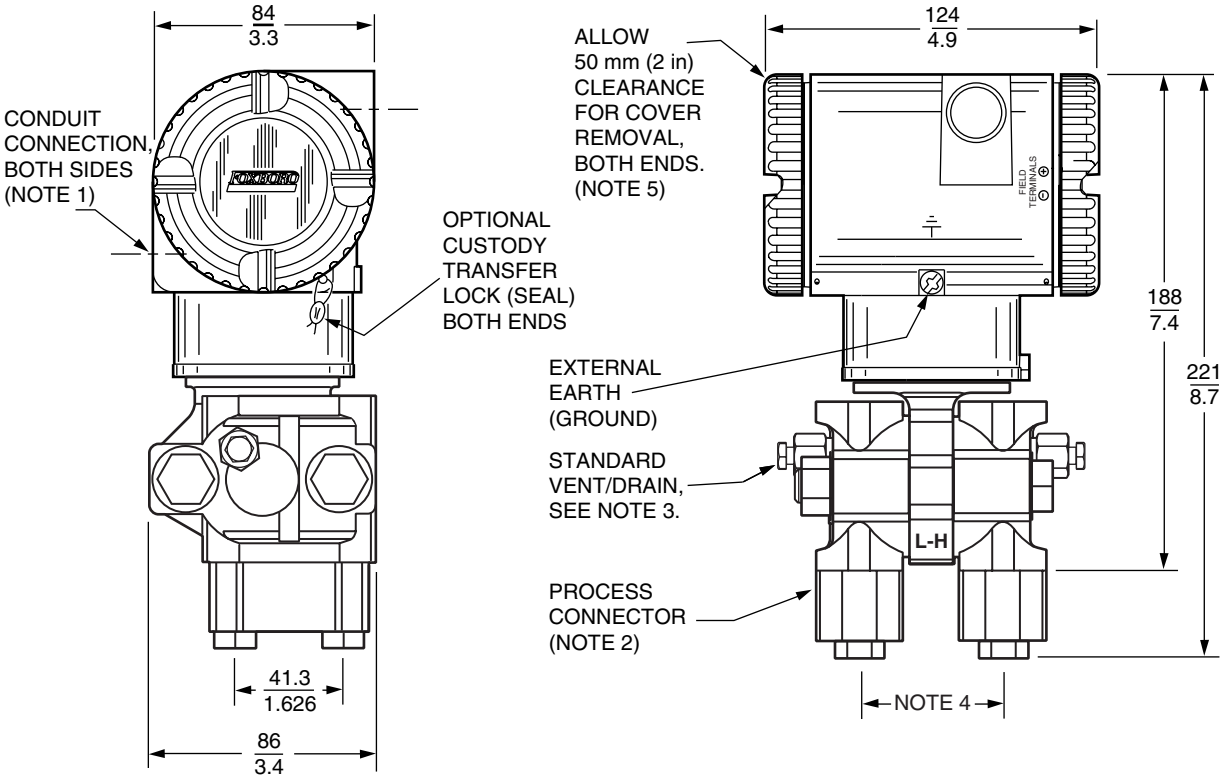
1. CONDUIT CONNECTION 1/2 NPT OR PG 13.5, BOTH SIDES: PLUG UNUSED CONNECTION WITH METAL PLUG (SUPPLIED).
2. PROCESS CONNECTORS MAY BE REMOVED AND TRANSMITTER MOUNTED DIRECTLY ON A MANIFOLD, OR CONNECTIONS MADE DIRECTLY TO PROCESS COVER USING 1/4 NPT INTERNAL THREAD IN PROCESS COVER.
3. PROCESS COVER CAN BE INVERTED MAKING OPTIONAL SIDE VENTS OR SIDE DRAINS
4. PROCESS CONNECTORS CAN BE INVERTED TO GIVE EITHER 51, 54, OR 57 mm (2.0, 2.125, OR 2.25 in) CENTER-TO-CENTER DISTANCE BETWEEN HIGH AND LOW PRESSURE CONNECTIONS.
5. TOPWORKS CAN BE ROTATED TO ANY POSITION WITHIN ONE TURN COUNTERCLOCKWISE OF THE FULLY TIGHTENED POSITION.
6. PROCESS COVER END PLUGS ARE SUBSTITUTED FOR VENT SCREWS WHEN OPTIONAL SIDE VENTS (NOTE 3) ARE SPECIFIED.



DIMENSIONS-NOMINAL (CONT.)

mm
in

TRANSMITTER WITH LOW PROFILE STRUCTURE LP1

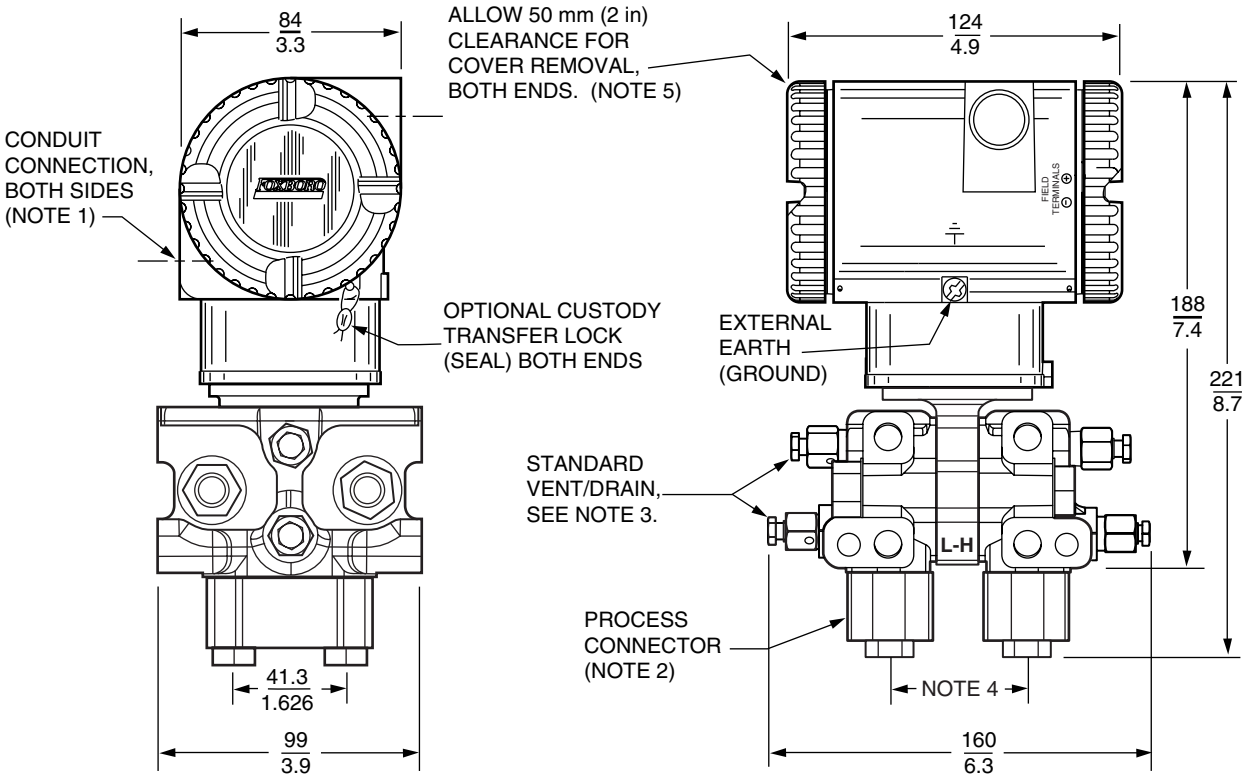


NOTES:
1. CONDUIT CONNECTION 1/2 NPT, PG 13.5, OR M20, BOTH SIDES: PLUG UNUSED CONNECTION WITH METAL PLUG (SUPPLIED).
2. PROCESS CONNECTORS MAY BE REMOVED AND TRANSMITTER MOUNTED DIRECTLY ON A MANIFOLD, OR CONNECTIONS MADE DIRECTLY TO PROCESS COVER USING 1/4 NPT INTERNAL THREAD IN PROCESS COVER.
3. THE TRANSMITTER'S LOW PROFILE STRUCTURE LP1 IS SHOWN IN THE VERTICALLY UPRIGHT POSITION. NOTE THE LOCATION OF THE STANDARD VENT/DRAIN SCREW. IN THIS CONFIGURATION THE TRANSMITTER CAN BE VENTED OR IS SELF-DRAINING. ALSO RECOMMENDED IS A HORIZONTAL INSTALLATION WHERE THE INSTALLED ORIENTATION CAN BE SET TO ALLOW FOR VENTING OR DRAINING.
4. PROCESS CONNECTORS CAN BE INVERTED TO GIVE EITHER 51, 54, OR 57 mm (2.0, 2.125, OR 2.25 in) CENTER-TO-CENTER DISTANCE BETWEEN HIGH AND LOW PRESSURE CONNECTIONS.
5. TOPWORKS CAN BE ROTATED TO ANY POSITION WITHIN ONE TURN COUNTERCLOCKWISE OF THE FULLY TIGHTENED POSITION.

DIMENSIONS-NOMINAL (CONT.)

mm
in

TRANSMITTER WITH LOW PROFILE STRUCTURE LP2



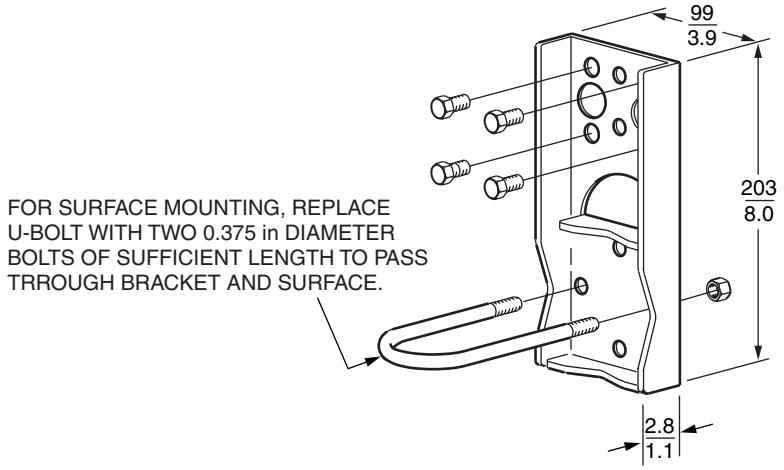
NOTES:

1. CONDUIT CONNECTION 1/2 NPT, PG 13.5, OR M20, BOTH SIDES: PLUG UNUSED CONNECTION WITH METAL PLUG (SUPPLIED).
2. PROCESS CONNECTORS MAY BE REMOVED AND TRANSMITTER MOUNTED DIRECTLY ON A MANIFOLD, OR CONNECTIONS MADE DIRECTLY TO PROCESS COVER USING 1/4 NPT INTERNAL THREAD IN PROCESS COVER
3. THE TRANSMITTER'S LOW PROFILE STRUCTURE LP2 IS SHOWN IN THE RECOMMENDED VERTICAL UPRIGHT POSITION. NOTE THE STANDARD VENT OR DRAIN SCREWS. HORIZONTAL INSTALLATIONS ARE NOT RECOMMENDED.
4. PROCESS CONNECTORS CAN BE INVERTED TO GIVE EITHER 51, 54, OR 57 mm (2.0, 2.125, OR 2.25 in) CENTER-TO-CENTER DISTANCE BETWEEN HIGH AND LOW PRESSURE CONNECTIONS.
5. TOPWORKS CAN BE ROTATED TO ANY POSITION WITHIN ONE TURN COUNTERCLOCKWISE OF THE FULLY TIGHTENED POSITION.

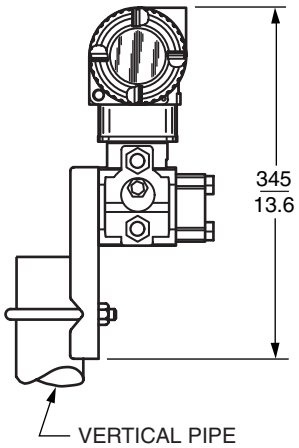
DIMENSIONS-NOMINAL (CONT.)

mm
in

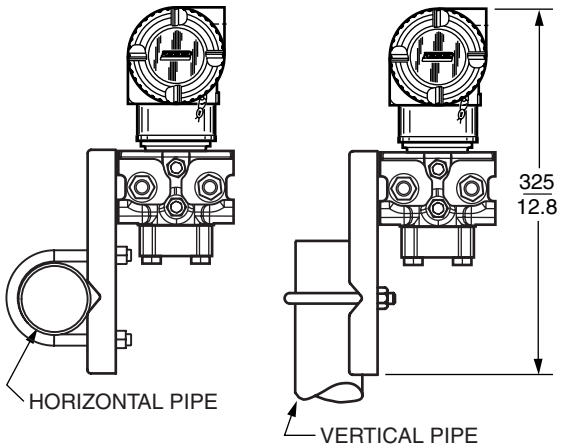
TRANSMITTER WITH STANDARD STYLE MOUNTING BRACKET KIT (Options -M1 and -M2)



TRANSMITTER WITH TRADITIONAL STRUCTURE



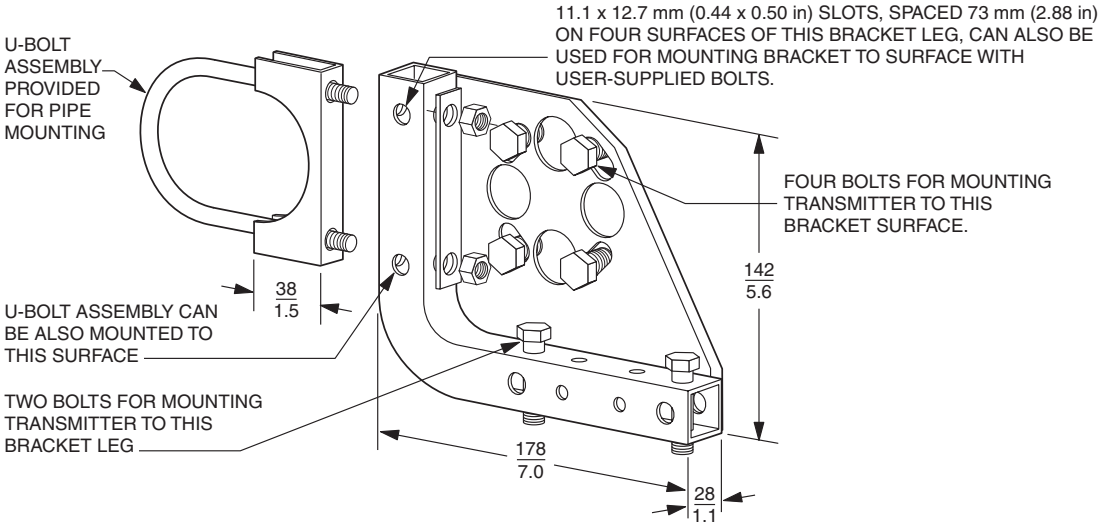
TRANSMITTER WITH LOW PROFILE STRUCTURE LP2



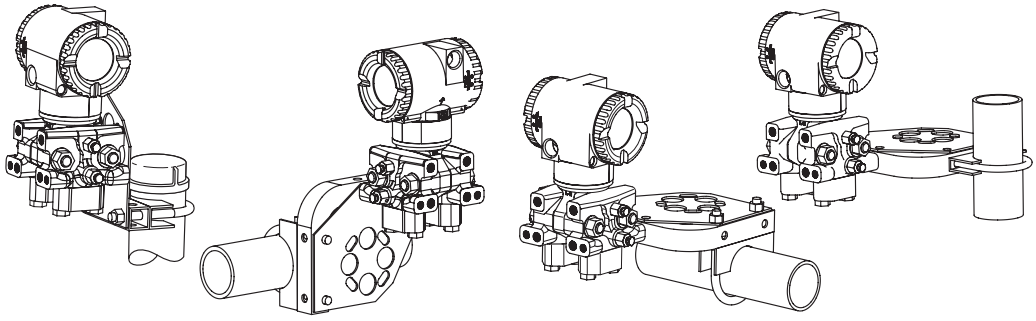
DIMENSIONS-NOMINAL (CONT.)

mm
in

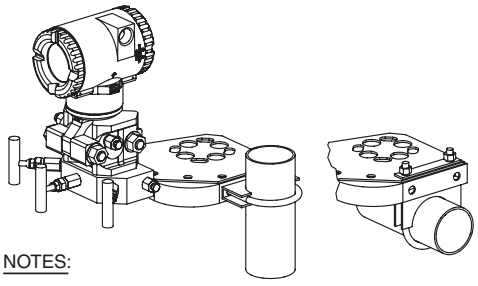
TRANSMITTER WITH UNIVERSAL STYLE MOUNTING BRACKET KIT (Option -M3)



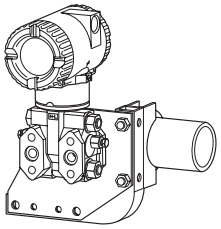
TYPICAL PIPE MOUNTING WITH LOW PROFILE STRUCTURE LP2



TYPICAL PIPE MOUNTING
LOW PROFILE STRUCTURE LP1



TYPICAL PIPE MOUNTING
WITH TRADITIONAL STRUCTURE



NOTES:

1. FOR SURFACE MOUNTING CONFIGURATIONS, USE THE U-BOLT MOUNTING HOLES FOR ATTACHING THE BRACKET TO A SURFACE RATHER THAN TO THE U-BOLT ASSEMBLY. SURFACE MOUNTING BOLTS FOR ATTACHING THE BRACKET TO A SURFACE ARE USER SUPPLIED.
2. REFER TO DIMENSIONAL PRINT DP 020-446 FOR FURTHER IPD10 MOUNTING CONFIGURATIONS, INCLUDING MOUNTING WITH -P OPTIONAL MOUNTING PLATES.

ORDERING INSTRUCTIONS

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

inH_2O	inHg	Pa	mbar	psia
ftH_2O	mmHg	kPa	bar	atm
mmH_2O	cmHg	MPa	g/cm^2	
cmH_2O	dy/cm^2	torr	kg/cm^2	

3. Configuration Data Form when Factory Calibration Option -C2 is specified.
4. For options and Accessories not in Model Code, refer to PSS 2A-1Z9 E.
5. User Tag Data - Data Plate; 32 characters maximum. For additional tag data, specify Optional Supplemental Tag -T.

OTHER M&I PRODUCTS

IPS provides a broad range of measurement and instrument products, including solutions for pressure, flow, analytical, positioners, temperature, controlling and recording. For a listing of these offerings, visit the IPS web site at:

www.ips.invensys.com

Invensys Operations Management
5601 Granite Parkway Suite 1000
Plano, TX 75024
United States of America
http://www.iom.invensys.com

Global Client Support
Inside U.S.: 1-866-746-6477
Outside U.S.: 1-508-549-2424 or contact your local Invensys representative.
Email: support@invensys.com
Website: http://support.ips.invensys.com

FIELD DEVICES - PRESSURE

Product Specifications

INVENSYS PROCESS SYSTEMS

PSS 2A-1C13 C

Models IAP10, IGP10, IAP20, and IGP20
I/A Series® Electronic Absolute and Gauge Pressure Transmitters with 4 to 20 mA Analog Output

IAP20/IGP20 TRANSMITTER

IAP10/IGP10 TRANSMITTER STRUCTURE CODES 52, 53, 60-63, D5, D6, S5, S6, SH, AND SJ

IAP10/IGP10 TRANSMITTER STRUCTURE CODES 20-23, 30, 31, D1, D2, S3, S4, SC, AND SD

The Foxboro® brand Models IAP10, IGP10, IAP20, and IGP20 are available from Invensys Process Systems (IPS). These electronic analog output, two-wire transmitters provide precise, reliable measurement of absolute or gauge pressure, and transmit a 4 to 20 mA output signal.

HIGH DEPENDABILITY

- Simple, elegant sensor packaging uses very few parts to achieve exceptionally high reliability
- NEMA 4X and IEC IP66 durable epoxy-coated aluminum, or 316 ss housings.
- Co-Ni-Cr, 316L ss, and Hastelloy sensor materials for all transmitters; additional materials available for IAP20/IGP20 Transmitters.
- Can be provided with numerous configurations of direct connect or remote mount seals.
- Integral process connections for sanitary, and pulp/paper installations with IAP10/IGP10.
- Meet numerous Agency requirements for hazardous locations. Versions available to meet Agency flameproof and zone requirements.
- CE marked; complies with applicable EMC, ATEX, and PED European Union Directives.
- Standard 5-year warranty.

FOXBORO

INTELLIGENT TRANSMITTER FEATURES AT AN ECONOMICAL PRICE

When you want the flexibility and performance of a configurable, intelligent transmitter but you do not need a digital output signal, these transmitters provide exceptional benefits at a very affordable price:

- Liquid Crystal Display (LCD) digital indicator with on-board pushbuttons
- Pushbutton configuration and calibration:
  - Zero and Span Settings
  - Adjustable Damping
  - Forward or Reverse Output
  - Failsafe Output; Upscale or Downscale
  - Reranging without applying pressure
- Easily upgradeable to FoxCom™, HART, FOUNDATION fieldbus, or PROFIBUS fully intelligent versions

I/A Series® PRESSURE TRANSMITTER FAMILY

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

MODULAR ELECTRONICS

A common 4 to 20 mA output module is used with these transmitters. Also, because all configuration and calibration data is stored in the sensor, you can replace this module with another like module without transmitter reconfiguration or recalibration.

Furthermore, if your needs change, the transmitter modular design allows easy migration to other standards, including FoxCom, HART, FOUNDATION Fieldbus, and 1 to 5 V dc.

ELECTRONICS VERSION -A TRANSMITTER

This 4 to 20 mA analog output transmitter is a very cost effective analog output transmitter. It provides full configuration capability and represents Invensys Foxboro advancements in providing the greatest functionality for the largest number of applications at the least possible cost to you.

The transmitter even provides the ability to rerange to new calibrated ranges, using the LCD Indicator, without the need to apply calibration pressure.

These transmitters are explosionproof for use in Division 1 hazardous areas and comply with Division 2 requirements. They also provide the flameproof certification for use in Zone 1 hazardous areas.

HIGH PERFORMANCE

Both direct-connected and bracket-mounted transmitters utilize microprocessor-based correction to achieve excellent accuracy and ambient temperature compensation.

EASE OF INSTALLATION

Rotatable Topworks allows transmitter installation in tight places, allows indicator to be positioned in preferred direction, and eases field retrofit.

Two Conduit Entrances offer a choice of entry positions for ease of installation and self-draining of condensation regardless of mounting position and topworks rotation.

Wiring Guides and Terminations provide ease of wire entry and support, plenty of space to work and store excess wire, and large, rugged, rugged screw terminals for easy wire termination.

STANDARD LCD DIGITAL INDICATOR

A two-line digital indicator with on-board pushbuttons displays the measurement with a choice of units. The pushbuttons allow zero and span adjustments as well as local configuration without the need for a PC-based Configurator.

When local process indication is not required or desired, an optional blind (solid) cover can be substituted for the standard window cover.

CHOOSE MOUNTING CONFIGURATION NEEDED

Direct Connected Transmitter (Figure 1)

Light weight and easy-to-install. Uses 316L ss or Hastelloy C process connections and a choice of either 316L ss, Cobalt-Nickel-Chrome, or Hastelloy C for the sensing diaphragm. See Direct-Connected Transmitters section that follows.

Bracket-Mounted Transmitter (Figure 2)

A large selection of corrosion resistant materials; suitable for applications requiring low spans, vacuum service, and high overrange pressure. See Bracket-Mounted Transmitters section that follows.

Figure 1. Direct Connected Transmitter (Flameproof Version on Left)

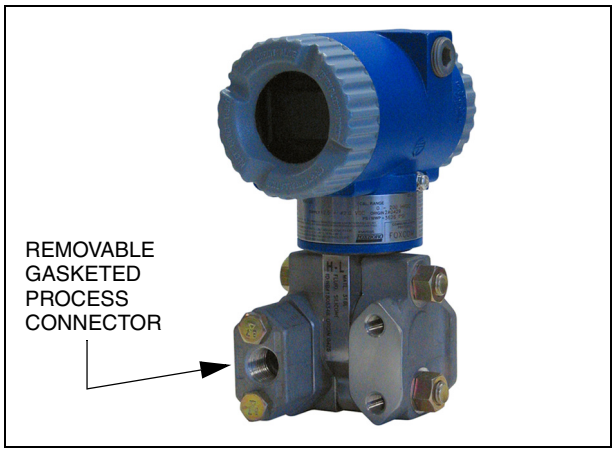


Figure 2. Bracket-Mounted Transmitter with Conventional Process Connector

DIRECT-CONNECTED TRANSMITTERS — IAP10 AND IGP10 (SEE FIGURE 1)

EXCEPTIONAL VALUE

The combination of small size, light weight, direct mounting, standard materials, and wide measurement capability with high performance makes these transmitters an exceptionally cost effective solution for process pressure measurement.

DIRECT PROCESS MOUNTING

Because of their light weight and external threaded connection, these transmitters can be installed directly on process piping without mounting brackets. However, for unique requirements, an optional bracket is offered and connection can be made to the standard 1/4 NPT internal thread.

WIDE RANGEABILITY

Three absolute pressure versions are offered to allow spans from 7 to 21 000 kPa (1 to 3000 psi), and four gauge pressure versions are offered to allow spans from 7 to 42 000 kPa (1 to 6000 psi). Refer to the IGP20 Transmitter section below for gauge pressure vacuum service.

316L ss, HASTELLOY C, AND Co-Ni-Cr PROCESS WETTED PARTS

With process connection of 316L ss or Hastelloy C, and sensor diaphragm available in either 316L ss, Hastelloy C, or highly corrosion resistant Co-Ni-Cr, this transmitter is an excellent choice for the vast majority of process pressure measurements.

HIGH GAUGE PRESSURE VERSIONS

Three high gauge pressure versions with URLs of 52, 105, and 210 MPa (7500, 15 000, and 30 000 psi) are available in the IGP10 line. See PSS 2A-1C13 F.

SANITARY AND PULP AND PAPER VERSIONS

These transmitters are also available with integral process connections for use in sanitary and pulp and paper installations. See PSS 2A-1C13 K and PSS 2A-1C13 L, respectively.

FLAMEPROOF DESIGN

The transmitters are designed to meet Agency flameproof and zone requirements.

BRACKET-MOUNTED TRANSMITTERS — IAP20 AND IGP20 (SEE FIGURE 2)

SENSOR CORROSION PROTECTION

Choice of Co-Ni-Cr, 316L ss, Gold-Plated 316L ss, Hastelloy C, Monel, or Tantalum materials. High corrosion resistance of Co-Ni-Cr (TI 037-038) means long service life in many difficult applications without the extra cost for exotic materials. Also see TI 37-75b for process application with Co-Ni-Cr and other wetted parts materials.

WIDE RANGEABILITY

Gauge pressure measurement spans may be as low as 0.12 kPa (0.5 inH_2O) to as high as 35 MPa (5000 psi) by choosing one of only six sensors, and absolute pressure spans may be as low as 0.87 kPa (3.5 inH_2O) to as high as 21 MPa (3000 psi) by choosing one of only four sensors. This provides exceptional measurement range capability with a minimum of versions.

EASE OF MOUNTING TWO-VALVE MANIFOLD

Optional two-valve manifold, to isolate transmitter and to vent pressure, is easily mounted directly to the transmitter.

VACUUM SERVICE

A lower range limit of -100 kPa (-14.7 psi, -1 bar or kg/cm^2) means that vacuum measurements are easily handled with the versatile IGP20 Gauge Pressure transmitter.

FLAMEPROOF DESIGN

The transmitters are designed to meet Agency flameproof and zone requirements.

PROCESS CONNECTOR

Removable, gasketed process connector (Figure 3) allows a wide range of selections, including 1/4 NPT, 1/2 NPT, Rc 1/4, Rc 1/2, and weld neck connections.

For highly corrosive chemical processes, a 1/2 NPT pvdf (Kynar) insert is installed in the HI-side 316 ss cover and is used as the process connector. In these applications, tantalum is used as the sensor diaphragm material.

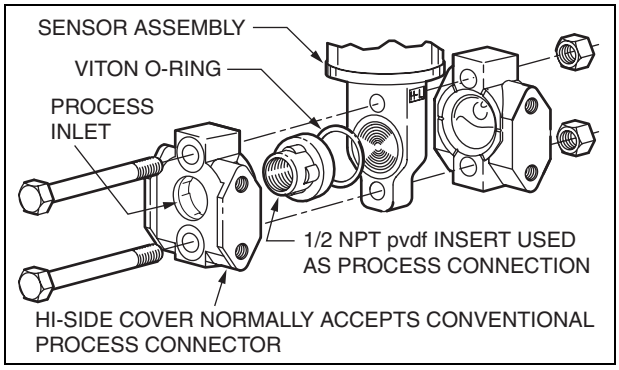


Figure 3. Bracket-Mounted Transmitter Shown with 1/2 NPT pvdf Insert Installed in HI-Side Cover

PRESSURE SEALS

Pressure seals are used with the IAP10, IGP10, IAP20, and IGP20 Series Transmitters when it is necessary to keep the transmitter isolated from the process. A sealed system is used for a process fluid that may be corrosive, viscous, subject to temperature extremes, toxic, sanitary, or tend to collect and solidify.

Tables 1 and 2 list the various seals that can be used with these transmitters. To order a transmitter with seals, both a Transmitter Model Number and Seal Model Number are required. See PSS 2A-1Z11 A for a complete listing of pressure seal models and specifications.

Table 1. Pressure Seals Used with IAP10, IGP10, IAP20, and IGP20 Transmitters

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

PRESSURE SEALS (CONT.)

Table 2. I/A Series Pressure Transmitters and Applicable Pressure Seals

Transmitter Model	Used with Pressure Seal Model: (a)												
	FLT	FAD	TAD	ISD	SCT	SST	FPS	FES	FAR	TAR	ISR	SCR	SSR
IAP10	–	✓	✓	✓	–	–	✓	✓	✓	✓	✓	✓	✓
IGP10	–	✓	✓	✓	–	–	✓	✓	✓	✓	✓	✓	✓
IAP20	–	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓
IGP20	✓	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓

(a) Pressure Seal models are shown with an abbreviated code; all seal codes have a PS prefix; for example, FLT is really PSFLT.

FUNCTIONAL SPECIFICATIONS

Span and Range Limits for IAP10 and IGP10 Transmitters

Span Code	Span Limits			Range Limits (Absolute or Gauge Units)		
	MPa	psi	bar or kg/cm^2	MPa	psi	bar or kg/cm^2
C	0.007 and 0.21	1 and 30	0.07 and 2.1	0 and 0.21	0 and 30	0 and 2.1
D	0.07 and 2.1	10 and 300	0.7 and 21	0 and 2.1	0 and 300	0 and 21
E	0.7 and 21	100 and 3000	7 and 210	0 and 21	0 and 3000	0 and 210
F (a)	14 and 42	2000 and 6000	140 and 420	0 and 42	0 and 6000	0 and 420

(a) Span Limit Code F is applicable to IGP10 Transmitter only.

Maximum Overrange and Proof Pressure Ratings for IAP10 and IGP10 Transmitters

Span Code	Maximum Overrange Pressure Rating (a)			Proof Pressure Rating (a)(b)		
	MPa	psi	bar or kg/cm^2	MPa	psi	bar or kg/cm^2
C	0.31	45	3.15	0.827	120	8.27
D	3.1	450	31.5	8.27	1200	82.7
E	31	4500	315	79.3	11500	793
F (c)	59	8400	588	152	22000	1517

(a) Values listed are in absolute or gauge pressure units, as applicable. Maximum overrange pressure is the maximum pressure that may be applied without causing damage to the transmitter.
(b) Proof pressure ratings meet ANSI/ISA Standard S82.03-1988. Unit may become nonfunctional after application of proof pressure.
(c) Span Limit Code F is applicable to IGP10 Transmitter only.

FUNCTIONAL SPECIFICATIONS (CONT.)

Span and Range Limits for IAP20 and IGP20 Transmitters

Span Code	Span Limits			Range Limits (Absolute or Gauge Units) (a)		
	kPa	inH_2O	mbar	kPa	inH_2O	mbar
A (b)	0.12 and 7.5	0.5 and 30	1.2 and 75	-7.5 and +7.5	-30 and +30	-75 and +75
B	0.87(c) and 50	3.5(c) and 200	8.7(c) and 500	-50(a) and +50	-200(a) and +200	-500(a) and +500
	MPa	psi	bar or kg/cm^2	MPa	psi	bar or kg/cm^2
C	0.007 and 0.21	1 and 30	0.07 and 2.1	-0.1(a) and 0.21	-14.7(a) and +30	-1(a) and +2.1
D	0.07 and 2.1	10 and 300	0.7 and 21	-0.1(a) and 2.1	-14.7(a) and +300	-1(a) and +21
E (d)	0.7 and 21	100 and 3000	7 and 210	-0.1(a) and 21	-14.7(a) and +3000	-1(a) and +210
F (b)	1.38 and 35	200 and 5000	13.8 and 350	-0.1 and +35	-14.7 and +5000	-1 and +350

(a) For absolute pressure transmitters (IAP20), the lower range limit is 0.
(b) Span Codes A and F applicable to IGP20 Transmitter only. Also, Span Code A is not available when pressure seals are specified.
(c) For IAP20, the minimum span for factory calibration is 1.2 kPa (5 inH_2O, 12.4 mbar). Can be field reranged within limits shown in table.
(d) When certain options are specified, the upper span and range limit values are reduced as shown in the "Options Impact" table.

Maximum Overrange and Proof Pressure Ratings for IAP 20 and IGP20 Transmitters (a)

Transmitter Configuration (See Model Code for Description of Options)	Overrange Pressure Rating			Proof Pressure Rating (b)		
	MPa	psi	bar or kg/cm^2	MPa	psi	bar or kg/cm^2
Standard with IGP20 Span Code F only	51.8	7500	518	100	14500	1000
Standard (c) or with Option -B2, -D3, or -D7	25	3625	250	100	14500	1000
With Option -B3	20	2900	200	70	11150	700
With Option -D1	16	2320	160	64	9280	640
With Option -B1 or -D5	15	2175	150	60	8700	600
With Option -D2, -D4, -D6, or -D8	10	1500	100	40	6000	400
With Structure Codes 78 and 79 (pvdf insert)	2.1	300	21	8.4	1200	84

(a) Refer to Model Code section for application and restrictions related to the items listed in the table.
(b) Proof pressure ratings meet ANSI/ISA Standard S82.03-1988. Unit may become nonfunctional after application of proof pressure.
(c) Standard with IAP20/IGP20 Span Codes A to E.

Impact of Certain Options on IAP20/IGP20 Span and Range Limits (a)

Option	Description (Also see Model Code)	Span and Range Limits Derated to:
-B3	B7-M Bolts and Nuts (NACE)	20 MPa (2900 psi, 200 bar, or kg/cm^2)
-D1	DIN Construction	16 MPa (2320 psi, 160 bar or kg/cm^2)
-D5 or -B1	DIN Construction or 316 ss Bolting	15 MPa (2175 psi, 150 bar or kg/cm^2)
-D2, -D4, -D6, or -D8 (a)	DIN Construction (a)	10 MPa (1500 psi, 100 bar or kg/cm^2) (a)

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

FUNCTIONAL SPECIFICATIONS (CONT.)

Output Signal

4 to 20 mA, Linear

Field Wiring Reversal

No transmitter damage

Supply Voltage Requirements and External Loop Load Limitations (Figure 4)

Minimum voltage of 11.5 V can be reduced to 11 V using a plug-in jumper in the terminal block shown in the "Physical Specifications" section.

Suppressed Zero and Elevated Zero

Suppressed or elevated zero ranges are acceptable as long as the Span and Range Limits are not exceeded (elevated zero applicable to IGP20 only).

Zeroing for Nonzero-Based Ranges

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

Zero and Span Adjustments (Figure 7)

Zero and span adjustments can be accomplished using the pushbuttons on the LCD indicator.

Optional External Zero Adjustment (Figure 7)

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

Write Protect Jumper

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

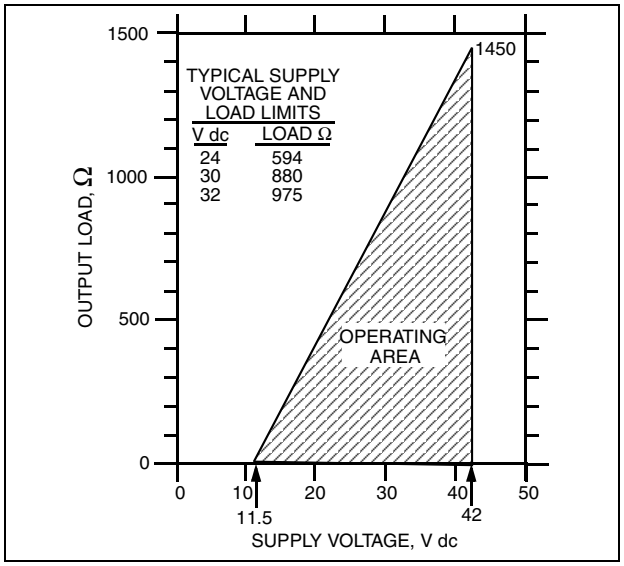


Figure 4. Supply Voltage vs. Output Load

Adjustable Damping

Transmitter response time is normally 0.75 s, or the electronically adjustable setting of 0 (none), 2, 4, or 8 seconds, whichever is greater, for a 90% recovery from an 80% input step per ANSI/ISA S51.1. (For 63.2% recovery, 0.5 s with sensors B to F, and 0.6 s with sensor A.)

European Union Directives

- Complies with Electromagnetic Compatibility Requirements of European EMC Directive 89/336/EEC by conforming to the following CENELEC and IEC Standards: EN 50081-2, EN 50082-2, and IEC 61000-4-2 through 61000-4-6.
- Complies with NAMUR NE21 Interference Immunity Requirement (EMC).
- Complies with NAMUR 105 overrange and underrange annunciations.
- Conforms to Applicable European Union Directives ("CE" Logo marked on product).

FUNCTIONAL SPECIFICATIONS (CONT.)

Minimum Allowable Absolute Pressure vs. Transmitter Temperature

WITH SILICONE FILL FLUID

Full vacuum: up to 121°C (250°F)

WITH INERT FILL FLUID (FIGURE 5.)

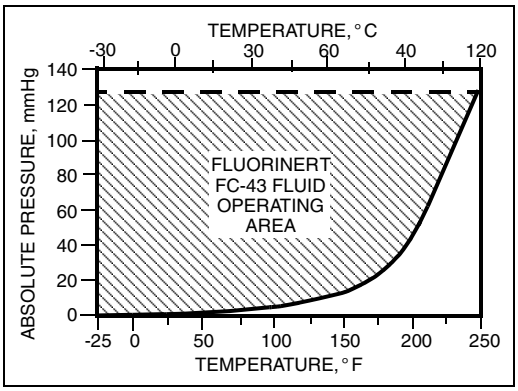


Figure 5. Minimum Allowable Absolute Pressure vs. Transmitter Temperature, Inert FC-43, 2.6 cSt at 25°C (77°F)

Configuration and Calibration Data, and Electronics Upgradeability

All factory characterization data and user configuration and calibration data are stored in the sensor (Figure 6). This means that the electronics module may be replaced, with one of like type, without the need for reconfiguration or recalibration.

Although module replacement can affect accuracy by a maximum of 0.20% of span, this error can be removed by an mA trim without application of pressure.

Changing module types (e.g., from one protocol to another protocol) may require reconfiguration and recalibration, as well as a different terminal block, but all factory characterization data is retained.

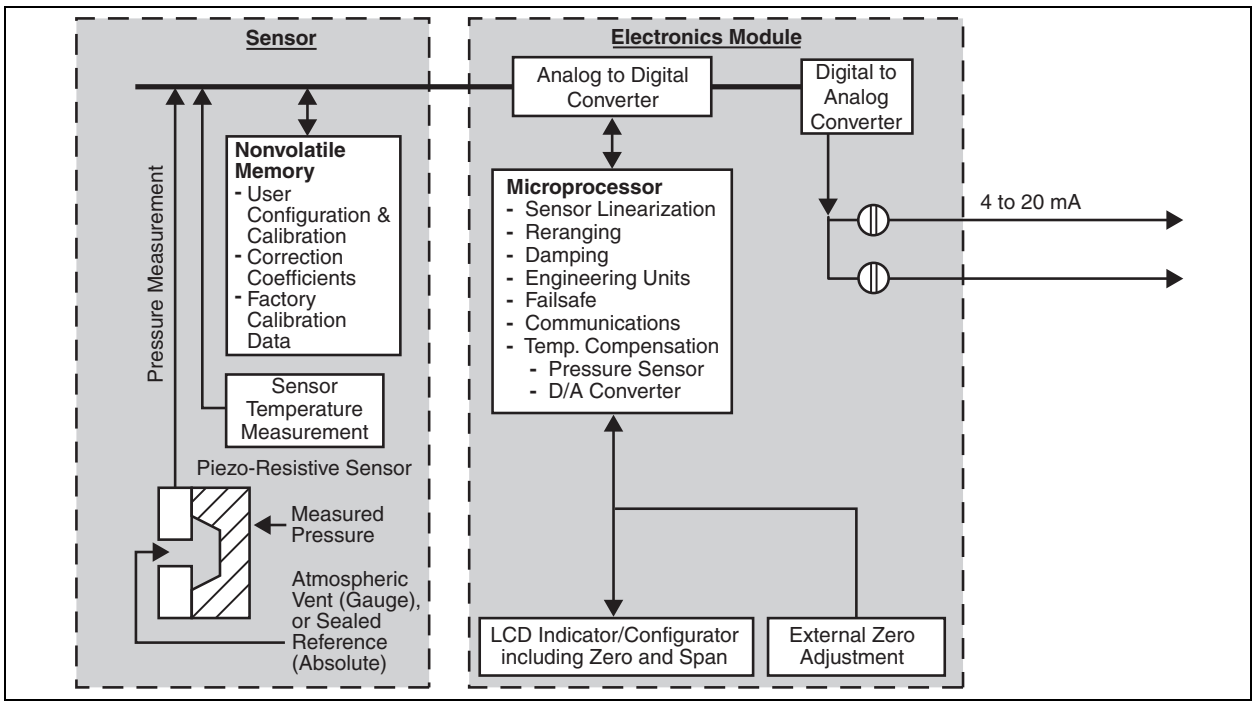


Figure 6. Transmitter Functional Block Diagram

FUNCTIONAL SPECIFICATIONS (CONT.)

Standard LCD Indicator with On-Board Pushbuttons (Figure 7) Provides:

- Two lines; four numeric characters on top line, and seven alphanumeric characters on bottom line.
- Measurement Readout; value on top line and units label on bottom line.
- Configuration and Calibration Prompts.

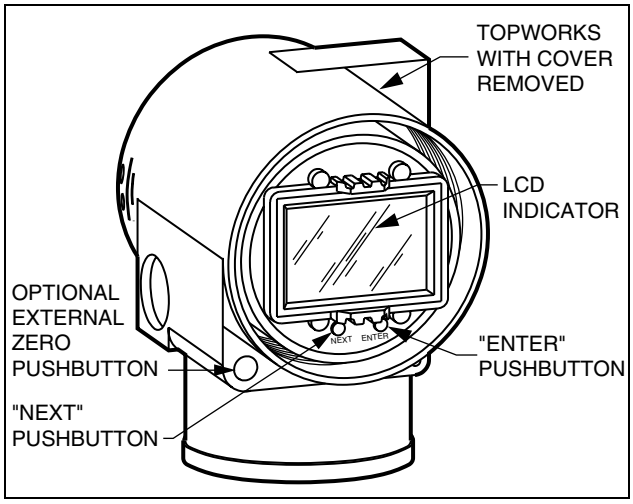


Figure 7. Standard LCD Indicator with Pushbuttons

Optional Custom Configuration (Option -C2)

For the transmitter to be custom configured by the factory, the user must fill out a data form. If this option is not selected, a standard default configuration will be provided. See Tables 3 and 4.

Table 3. Example of Option -C2

Parameter	Standard (Default) Configuration	Example of Custom Configuration Option -C2
Calibrated Range • Pressure EGU • LRV • URV	 per S.O.(a) per S.O. per S.O.	 KG/CM2 (a) 0 1
Output Direction	Forward	Forward
Damping	None	2
Failsafe Action	Upscale	Downscale
Ext. Zero Option	Enabled	Disabled
Other • Label (2nd line) • Display LRV • Display URV	 (b) (c) (c)	 KG/CM2 (b) 0 (c) 1 (c)

(a) Select from list in Table 4 below.
(b) Same as pressure units used for calibrated range, or percent.
(c) Same as calibrated range or 0 and 100 for percent.

Table 4.
Available Pressure Units in Calibrated Range (a)

inH_2O	inHg	kPa	mbar	kg/cm^2
ftH_2O	mmHg	MPa	bar	psi
mmH_2O	Pa	torr	g/cm^2	atm

(a) Absolute or gauge pressure units, as applicable.

NOTE

There is a maximum of 4 digits for entering range values.

OPERATING, STORAGE, AND TRANSPORTATION CONDITIONS

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

(a) Temperature limits are derated as follows:
IAP20 and IGP20 Transmitters:
to -7 and +82°C (20 and 180°F) when Structure Codes 78/79 (pvdf inserts) are used, and
to 0 and 60°C (32 and 140°F) when DIN Construction Options D2/D4/D6/D8 are used.
(b) Selection of Option -J extends the low temperature limit of transmitters with silicone filled sensors down to -50°C (-58°F).
(c) Although the LCD will not be damaged at any temperature within the “Storage and Transportation Limits”, updates will be slowed and readability decreased at temperatures outside the “Normal Operating Conditions”.
(d) With topworks covers on and conduit entrances sealed.
(e) 11.5 V dc can be reduced to 11 V dc by using a plug-in shorting bar; see “Physical Specifications” sections.
(f) Sensor process wetted diaphragms in a vertical plane for IAP20 and IGP20 Transmitter.
(g) Refer to the Electrical Safety Specifications section for a restriction in ambient temperature with certain electrical certifications.

PERFORMANCE SPECIFICATIONS

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

Accuracy (includes Linearity, Hysteresis, and Repeatability)

±0.20% of Span

Small Span Accuracy for Spans <5% and <6.7% of URL

See Table 5 below.

Table 5. Accuracy with Small Spans

For Span Code (a)	If Span is:	Then Small Span Accuracy in % of Span is:
B	<5% of URL	$\pm\left[(0.10)+(0.005)\left(\frac{\text{URL}}{\text{Span}}\right)\right]$
A, C, D, E, and F	<6.7% of URL	$\pm\left[(0.10)+(0.0067)\left(\frac{\text{URL}}{\text{Span}}\right)\right]$

(a) See Model Code for Span Codes applicable to each transmitter.

Stability

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

Calibration Frequency

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

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

Power-Up Time

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

Supply Voltage Effect

The output changes less than 0.005% of span for each 1 V change within the specified supply voltage requirements. See Figure 4.

Position Effect

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

RFI Effect

The output error is less than 0.1% of span for radio frequencies in the range of 27 to 1000 MHz and field intensity of 30 V/m when the transmitter is properly installed with shielded conduit and grounding, and housing covers are in place. (Per IEC Std. 801-3.)

Vibration Effect

Total effect: ±0.2% of URL per “g” for vibrations in the frequency range of 5 to 500 Hz; with double amplitudes of 6.35 mm (0.25 in) in the range of 5 to 15 Hz, or accelerations of 3 “g” in the range of 15 to 500 Hz, whichever is smaller, for transmitters with aluminum housings; and with double amplitudes of 6.35 mm (0.25 in) in the range of 5 to 9 Hz, or accelerations of 1 “g” in the range of 9 to 500 Hz, whichever is smaller, for transmitters with 316 ss housings.

PERFORMANCE SPECIFICATIONS (CONT.)

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. 801-5.)

Ambient Temperature Effect

Total effect for a 28°C (50°F) change within Normal Operating Condition limits is shown in the adjacent tables:

NOTE

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

FOR THE IAP10 AND IGP10 TRANSMITTERS

Span Code (a)	Ambient Temperature Effect
C, D, E, and F	±(0.08% URL + 0.1% Span)

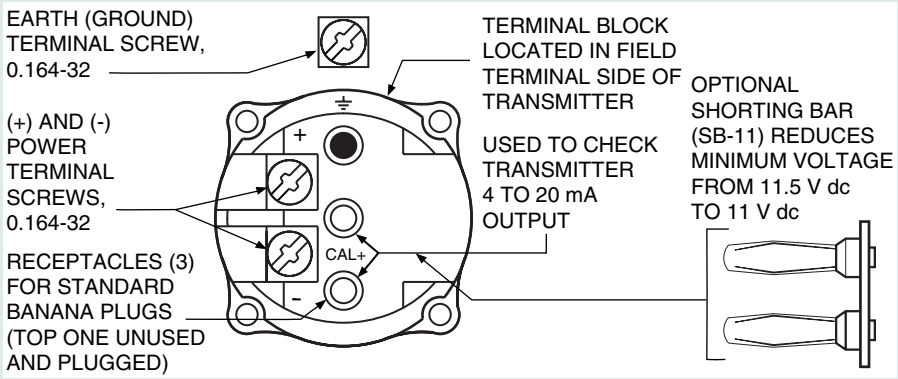
(a) Span Limit Code F applicable to IGP10 Transmitter only.

FOR THE IAP20 AND IGP20 TRANSMITTERS

Span Code	Ambient Temperature Effect
A (a)	±(0.18% URL + 0.15% Span)
B and C	±(0.03% URL + 0.20% Span)
D	±(0.05% URL + 0.18% Span)
E and F (a)	±(0.08% URL + 0.15% Span)

(a) Span Limit Codes A and F applicable to IGP20 Transmitter only

PHYSICAL SPECIFICATIONS

Description	Absolute and Gauge Pressure Transmitters IAP10 and IGP10	Absolute and Gauge Pressure Transmitters IAP20 and IGP20
Process Wetted Parts Mat'ls. (High Pressure Side) ▸ Process Connection ▸ Gaskets ▸ Sensor Diaphragm	▸ 316L ss or Hastelloy C ▸ Not Applicable ▸ 316L ss, Co-Ni-Cr, or Hastelloy C	▸ cs, 316 ss, Hastelloy C, Monel, or pvdf ▸ Glass-filled ptfe (Chemloy), Viton ▸ Co-Ni-Cr, 316L ss, Gold-plated 316L ss, Monel, Hastelloy C, or Tantalum
Reference Side Materials (Atmospheric Pressure Side)	IGP10 Transmitter: ▸ Silicon, Pyrex, RTV, and 316 ss IAP10 Transmitter: ▸ N/A	Sensor Diaphragm: ▸ Same as for High Pressure side above Cover: ▸ 316 ss
Sensor Fill Fluid	Silicone or Fluorinert	Silicone or Fluorinert
Bolts and Nuts for Process Cover and Connector	N/A	Standard Bolting: ▸ ASTM A193, Grade B7 Bolts ▸ ASTM A194, Grade 2H Nuts Optional Bolting: ▸ 316 ss, Type 17-4 ss, or B7M (NACE)
Electrical Housing and Housing Covers	Two compartments to separate electronics from field connections. Material is low copper (1% maximum) die-cast aluminum alloy with epoxy finish; or 316 ss.	
Environmental Protection	Dusttight and weatherproof per IEC IP66 and NEMA 4X.	
Electronics Module	Printed wiring assemblies are conformally coated for moisture and dust protection.	
Electrical Connections	Two 1/2 NPT, PG 13.5, or M20 holes on sides of housing. Unused hole must be plugged to ensure moisture and RFI protection (plug supplied by IPS.	
Mounting Position	The transmitter may be mounted in any orientation.	
Approximate Mass (a)	Standard Transmitter 1.5 kg (3.3 lb) With 316 ss Housing Add 1.1 kg (2.4 lb)	With Process Connectors 4.2 kg (9.2 lb) Without Process Connectors 3.5 kg (7.8 lb) With 316 ss Housing Add 1.1. kg (2.4 lb)
Field Terminal Connections		

(a) LCD Indicator is standard with these transmitters. For approximate mass with pressure seals, see PSS 2A-1Z11 A.

ELECTRICAL SAFETY SPECIFICATIONS

IAP10 and IGP10 Transmitters

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
ATEX flameproof; II 2 GD EEx d IIC, Zone 1.	Temperature Class T6, T85°C, Ta = -40°C to +75°C.	D
CSA explosionproof for Class I, Division 1, Groups B, C, and D; and dust-ignitionproof for Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	Maximum Ambient Temperature 85°C.	C
CSA Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.	Temperature Class T6 at 40°C and T4A at 85°C maximum ambient.	C
CSA field device zone certified flameproof Ex d IIC. Also, all certifications of Code C above.	Maximum Ambient Temperature 85°C.	B
FM explosionproof for Class I, Division 1, Groups B, C, and D; and dust-ignitionproof for Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	Temperature Class T6 at 80°C and T5 at 85°C maximum ambient.	F
FM nonincendive for Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G, and Class III, Division 2.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient.	F
FM field device zone certified flameproof AEx d IIC. Also, all certifications of Code F above.	Temperature Class T6 at 75°C maximum ambient.	G
IECEx flameproof, Ex d IIC, Zone 1.	Temperature Class T6, Ta = -40°C to +75°C.	V

NOTE

1 Transmitter has been designed to meet the electrical safety descriptions listed. Contact IPS for information or status of testing laboratory approvals or certifications.

2 See Model Codes section for availability of Electrical Safety Design Codes with particular Transmitter Models and Structures.

3 Refer to applicable Instruction Manual for application conditions and connectivity requirements.

ELECTRICAL SAFETY SPECIFICATIONS (CONT.)

IAP20 and IGP20 Transmitters

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
ATEX flameproof; II 2 GD EEx d IIC, Zone 1.	Temperature Class T6, T85°C, Ta = -40°C to +75°C.	D
CSA explosionproof for Class I, Division 1, Groups B, C, and D; and dust-ignitionproof for Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	Maximum Ambient Temperature 85°C.	C
CSA Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.	Temperature Class T6 at 40°C and T4A at 85°C maximum ambient.	C
CSA field device zone certified flameproof Ex d IIC. Also, all certifications of Code C above.	Maximum Ambient Temperature 85°C.	B
FM explosionproof for Class I, Division 1, Groups B, C, and D; and dust-ignitionproof for Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	Temperature Class T6 at 80°C and T5 at 85°C maximum ambient.	F
FM nonincendive for Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient.	F
FM field device zone certified flameproof AEx d IIC. Also, all certifications of Code F above.	Temperature Class T6 at 75°C maximum ambient.	G
IECEx flameproof, Ex d IIC, Zone 1.	Temperature Class T6, Ta = -40°C to +75°C	V

NOTE

1 Transmitter has been designed to meet the electrical safety descriptions listed. Contact IPS for information or status of testing laboratory approvals or certifications.

2 See Model Codes section for availability of Electrical Safety Design Codes with particular Transmitter Models and Structures.

3 Refer to applicable Instruction Manual for application conditions and connectivity requirements.

MODEL CODES

IAP10 and IGP10 Transmitters

Description				Model
I/A Series, Electronic, Direct Connected Absolute Pressure Transmitter				IAP10 (a)
I/A Series, Electronic, Direct Connected Gauge Pressure Transmitter				IGP10 (a)
Electronics Versions and Output Signal				
Analog; 4 to 20 mA dc Output (Version -A)				-A
Structure Code - Select from one of the following six groups:				
1. Transmitter Only (no seals)				
Process Connection	**Sensor**	**Sensor Fill Fluid**	**Connection Type**	
316L ss	Co-Ni-Cr	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	20
316L ss	Co-Ni-Cr	Fluorinert	1/2 NPT External Thread, 1/4 NPT Internal Thread	21
316L ss	316L ss	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	22
316L ss	316L ss	Inert	1/2 NPT External Thread, 1/4 NPT Internal Thread	23
316L ss	Hastelloy C	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	30
316L ss	Hastelloy C	Inert	1/2 NPT External Thread, 1/4 NPT Internal Thread	31
2. Transmitter Prepared for Foxboro Model Coded Seals (b)				
Transmitter Prepared for Foxboro Direct Connect Seal; Silicone Fill in Sensor (c)				D1
Transmitter Prepared for Foxboro Direct Connect Seal; Inert Fill in Sensor (IGP10 only) (c)				D2
Transmitter Prepared for Foxboro Remote Mount Seal; Silicone Fill in Sensor (d)				S3
Transmitter Prepared for Foxboro Remote Mount Seal; Inert Fill in Sensor (IGP10 only) (d)				S4
3. Transmitters Prepared for non-Foxboro Seals				
Transmitter Prepared for Remote Seal; Silicone Fill in Sensor (e)				SC
Transmitter Prepared for Remote Seal; Inert Fill in Sensor (f)				SD
4. Flameproof Transmitter Only (no seals)				
Process Connection	**Sensor**	**Sensor Fill Fluid**	**Connection Type**	
316L ss	316L ss	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	52
316L ss	316L ss	Inert	1/2 NPT External Thread, 1/4 NPT Internal Thread	53
316L ss	Hastelloy C	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	60
316L ss	Hastelloy C	Inert	1/2 NPT External Thread, 1/4 NPT Internal Thread	61
Hastelloy C	Hastelloy C	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	62
Hastelloy C	Hastelloy C	Inert	1/2 NPT External Thread, 1/4 NPT Internal Thread	63
5. Flameproof Transmitter Prepared for Foxboro Model Coded Seals (b)				
Flameproof Transmitter Prepared for Direct Connect Seal; Silicone Fill in Sensor (c)				D5
Flameproof Transmitter Prepared for Direct Connect Seal; Inert Fill in Sensor (IGP10 only) (c)				D6
Flameproof Transmitter Prepared for Remote Mount Seal; Silicone Fill in Sensor (d)				S5
Flameproof Transmitter Prepared for Remote Mount Seal; Inert Fill in Sensor (IGP10 only) (d)				S6
6. Flameproof Transmitter Prepared for non-Foxboro Seals				
Flameproof Transmitter Prepared for Remote Seal; Silicone Fill in Sensor (e)				SH
Flameproof Transmitter Prepared for Remote Seal; Inert Fill in Sensor (f)				SJ
Span Limits - Absolute or Gauge Pressure Units, as Applicable				
MPa	**psi**	**bar or kg/cm^2**		
0.007 and 0.21	1 and 30	0.07 and 2.1		C
0.07 and 2.1	10 and 300	0.7 and 21		D
0.7 and 21	100 and 3000	7 and 210		E
14 and 42	2000 and 6000	140 and 420 (IGP10 only)		F

Model Code continued on next page

MODEL CODES (CONT.)

IAP10 and IGP10 Transmitters (Cont.)

Description (Cont.)	Model
Conduit Connection and Housing Material	
1/2 NPT Conduit Connection, Aluminum Housing	1
PG 13.5 Conduit Connection, Aluminum Housing (With Electrical Safety Code D only)	2
1/2 NPT Conduit Connection, 316 ss Housing	3
PG 13.5 Conduit Connection, 316 ss Housing (With Electrical Safety Code D only)	4
M20 Conduit Connection, Both Sides, Aluminum Housing (With Electrical Safety Code D only)	5
M20 Conduit Connection, Both Sides, 316 ss Housing (With Electrical Safety Code D only)	6
Electrical Safety (Also see Electrical Safety Specifications Section)	
ATEX II 2 GD, EEx d IIC, Zone 1 (g)(j)	D
CSA Certifications: Division 1 explosionproof and dust-ignitionproof (h) Division 2, Classes I, II, and III	C
CSA zone certified flameproof, Ex d IIC. Also all certifications of Code C above. (g)(j)	B
FM Approvals: Division 1 explosionproof and dust-ignitionproof (h) Division 2 nonincendive, Classes I, II, and III	F
FM zone approved flameproof, AEx d IIC. Also all certifications of Code F above. (g)(j)	G
IECEx flameproof, Ex d IIC, Zone 1 (g)(j)	V
Optional Selections See descriptions below.	
Mounting Bracket Set (k)	
Painted Steel Bracket with Plated Steel Bolts, 1/2 NPT (with Conduit Connection Codes 1 and 3 only)	-M1
Stainless Steel Bracket with Stainless Steel Bolts, 1/2 NPT (with Conduit Connection Codes 1 and 3 only)	-M2
Painted Steel Bracket with Plated Steel Bolts, PG 13.5 (with Conduit Connection Codes 2 and 4 only)	-M3
Stainless Steel Bracket with Stainless Steel Bolts, PG 13.5 (with Conduit Connection Codes 2 and 4 only)	-M4
Painted Steel Bracket with Plated Steel Bolts, M20 (with Conduit Connection Codes 5 and 6 only)	-M5
Stainless Steel Bracket with Stainless Steel Bolts, M20 (with Conduit Connection Codes 5 and 6 only)	-M6
Blind (Solid) Cover over Standard LCD Indicator	
Blind (Solid) Cover replaces Window Cover	-L2
Vent Screw and Block & Bleed Valve	
316 ss Vent Screw in Process Connection (Not with Structure Codes 32 or 33, or Pressure Seals)	-V1
Block and Bleed Valve, Carbon Steel (Not with Pressure Seals)	-V2
Block and Bleed Valve, 316 ss (Not with Pressure Seals)	-V3
Block and Bleed Valve, 316 ss w/Monel Trim (Not with Pressure Seals)	-V4
Conduit Thread Adapters	
Hawke-Type 1/2 NPT Cable Gland for use with Conduit Connection Codes 1 and 3 only (l)	-A1
M20 Connector for use with Conduit Connection Codes 1 and 3 only (l)	-A3
Electronics Housing Features	
External Zero Adjustment	-Z1
Custody Transfer Lock and Seal	-Z2
External Zero Adjustment and Custody Transfer Lock and Seal	-Z3

Model Code continued on next page

MODEL CODES (CONT.)

IAP10 and IGP10 Transmitters (Cont.)

Description (Cont.)	Model
Custom Factory Configuration	
Full Factory Configuration (Requires Configuration Form to be filled out)	-C2
Cleaning and Preparation	
Unit Degreased - for Silicone Filled Sensors Only Not for Oxygen/Chlorine Service, Option -V1, or Pressure Seals	-X1
Cleaned and Prepared for Oxygen Service - for Inert Filled Sensors Only Not with Option -V1, or Pressure Seals	-X2
Cleaned and Prepared for Chlorine Service - with Structure Code 33 Only Not with Option -V1, or Pressure Seals	-X3
Instruction Books (Common MI, Brochure, and Full Documentation Set on CD-ROM is Standard)	
Without Instruction Book and CD - Only "Getting Started" Brochure is supplied	-K1
Miscellaneous Optional Selections	
G 1/2 B Manometer Process Connection (Not Available with Option -V1 or Pressure Seals)	-G
Low Temperature Operative Limit of Electronics Housing Extended Down to -50°C (-58°F) (m)	-J
R 1/2 Process Connection (1/2 NPT to R 1/2 Adapter) (n)	-R
Supplemental Customer Tag (Stainless Steel Tag wired onto Transmitter)	-T

(a) Refer to PSS 2A-1C13 F for very high GP versions with upper range limits of 52, 105, and 210 MPa (7500, 15000, and 30000 psi). Refer to PSS 2A-1C13 K and PSS 2A-1C13 L for AP and GP versions for sanitary and pulp/paper industries, respectively.
(b) Both transmitter and pressure seal Model Numbers are required. Refer to PSS 2A-1Z11 A for pressure seal Model Codes.
(c) Direct Connect Seal Models that may be specified are PSTAD, PSFAD, and PSISD.
(d) Remote Mount Seal Models that may be specified are PSFPS, PSFES, PSFAR, PSTAR, PSISR, PSSCR, and PSSSR.
(e) For transmitters with Silicone fill prepared for remote seal by others, specify Structure Code 22 or 52.
(f) For transmitters with Inert fill prepared for remote seal by others, specify Structure Code 23 or 53.
(g) Electrical Safety Codes D, B, G and V are only available with flameproof Structure Codes 52, 53, D5, D6, S5, S6, SH, and SJ.
(h) Electrical Safety Codes C and F are not available with flameproof Structure Codes 52, 53, D5, D6, S5, S6, SH, and SJ.
(j) A cover lock is standard construction with Electrical Safety Codes D, B, G and V.
(k) Mounting sets not offered with direct mounted seals. However, if a direct mounted PSTAD threaded seal with a 1/4 NPT process connection is used, then a mounting set is recommended.
(l) Available with Electrical Safety CodeD only.
(m) Not available with Inert fill in sensor or seal.
(n) Not available with pressure seals, or Hastelloy C sensors.

MODEL CODES (CONT.)

IAP20 and IGP20 Transmitters

Description			Model
I/A Series, Electronic, Bracket-Mounted Absolute Pressure Transmitter			IAP20
I/A Series, Electronic, Bracket-Mounted Gauge Pressure Transmitter			IGP20
Electronics Versions and Output Signal			
Analog; 4 to 20 mA dc Output (Version -A)			-A
Structure Code - Select from one of the following three groups:			
1. Transmitter			
Hi-Side Cover	Sensor	Sensor Fill Fluid	
Steel	Co-Ni-Cr	Silicone	10
Steel	Co-Ni-Cr	Inert	11
Steel	316L ss	Silicone	12
Steel	316L ss	Inert	13
Steel	Hastelloy C	Silicone	16
Steel	Hastelloy C	Inert	17
316 ss	Co-Ni-Cr	Silicone	20
316 ss	Co-Ni-Cr	Inert	21
316 ss	316L ss	Silicone	22
316 ss	316L ss	Inert	23
316 ss	316L ss, Gold Plated	Silicone	2G
316 ss	Monel	Silicone	24
316 ss	Monel	Inert	25
316 ss	Hastelloy C	Silicone	26
316 ss	Hastelloy C	Inert	27
Monel	Monel	Silicone	34
Monel	Monel	Inert	35
Hastelloy C	Hastelloy C	Silicone	46
Hastelloy C	Hastelloy C	Inert	47
Hastelloy C	Tantalum	Silicone	48
Hastelloy C	Tantalum	Inert	49
pvdf Insert (Kynar)	Tantalum	Silicone (Used with Process Connector Type 7 below)	78 (a)
pvdf Insert (Kynar)	Tantalum	Inert (Used with Process Connector Type 7 below)	79 (a)
2. Transmitter Prepared for Foxboro Model Coded Seals (b)			
Transmitter Prepared for Remote Seal on HI Side; Silicone fill in sensor			S3 (c)
Transmitter Prepared for Remote Seal on HI Side; Inert fill in sensor (IGP20 only)			S4 (c)
Transmitter Prepared for PSFLT, PSSCT, or PSSST Seal, HI Side; Silicone fill in sensor (IGP20 only)			F1
Transmitter Prepared for PSFLT, PSSCT, or PSSST Seal, HI Side; Inert fill in sensor (IGP20 only)			F2
3. Transmitter Prepared for non-Foxboro Seals			
Transmitter Prepared for Remote Seal; Silicone Fill in Sensor			SC
Transmitter Prepared for Remote Seal; Inert Fill in Sensor			SD

Model Code continued on next page

MODEL CODES (CONT.)

IAP20 and IGP20 Transmitters (Cont.)

Description (Cont.)			Model
Span Limits (Absolute or Gauge Pressure Units)			
kPa	**inH_2O**	**mbar**	
0.12 and 7.5	0.5 and 30	1.2 and 75 (IGP20 only)	A (d)
0.87 and 50	3.5 and 200	8.7 and 500	B
MPa	**psi**	**bar or kg/cm^2**	
0.007 and 0.21	1 and 30	0.07 and 2.1	C
0.07 and 2.1	10 and 300	0.7 and 21	D
0.7 and 21	100 and 3000	7 and 210	E (e)
1.38 and 35	200 and 5000	13.8 and 350 (IGP20 only)	F (e)
Process Connector Type (Material Same as Process Cover Material)			
None; connect directly to process cover (not available with Structure Codes 78 and 79)			0
1/4 NPT (not available with Structure Codes 46, 47, 48, 49, 78, 79)			1
1/2 NPT (not available with Structure Codes 78, 79)			2
Rc 1/4 (not available with Structure Codes 46, 47, 48, 49, 78, 79)			3
Rc 1/2 (not available with Structure Codes 78, 79)			4
1/2 Schedule 80 Welding Neck (not available with Structure Codes 46, 47, 48, 49, 78, 79)			6
None; pvdf (Kynar) insert tapped for 1/2 NPT on side of 316 ss Process Cover (only with Codes 78/79)			7
Conduit Connection and Housing Material			
1/2 NPT Conduit Connection, Aluminum Housing			1
PG 13.5 Conduit Connection, Aluminum Housing (With Electrical Safety Code D only)			2
1/2 NPT Conduit Connection, 316 ss Housing			3
PG 13.5 Conduit Connection, 316 ss Housing (With Electrical Safety Code D only)			4
M20 Conduit Connection, Both Sides, Aluminum Housing			5
M20 Conduit Connection, Both Sides, 316 ss Housing			6
Electrical Safety (Also see Electrical Safety Specifications section for descriptions and approval status)			
ATEX II 2 GD, EEx d IIC, Zone 1 (h)			D
CSA Certifications: Division 1 explosionproof and dust-ignitionproof Division 2, Classes I, II, and III			C
CSA zone certified flameproof, Ex d IIC. Also all certifications of Code C above. (h)			B
FM Approvals: Division 1 explosionproof and dust-ignitionproof (h) Division 2 nonincendive, Classes I, II, and III			F
FM zone approved flameproof, AEx d IIC. Also all approvals of Code F above. (h)			G
IECEx flameproof, Ex d IIC, Zone 1 (h)			V
Optional Selections **Refer to Optional Selection descriptions below.**			
Mounting Bracket Set - Not available with Direct Connect Seals, Structure Codes F1 and F2			
Standard Style Painted Steel Bracket with Plated Steel Bolts			-M1
Standard Style Stainless Steel Bracket with Stainless Steel Bolts			-M2
Universal Style Stainless Steel Bracket with Stainless Steel Bolts			-M3
Blind (Solid) Cover over Standard LCD Indicator			
Blind (Solid) Cover replaces Window Cover			-L2

Model Code continued on next page

MODEL CODES (CONT.)

IAP20 and IGP20 Transmitters (Cont.)

Description (Cont.)	Model
Optional Selections (Cont.)	
DIN 19213 Construction (with Process Connector Code 0 and 316 ss Process Covers Only) (h)	
Process Cover Type / **Cover Screw Material** / **Connector Screw Size** / **Connector Screw Material**	
Single Ended (f) — Steel — M10 (by User) — N/A	-D1
Double Ended (f)(g) (Blind Kidney Flange on back) — Steel — M10 — Steel	-D2
Single Ended — Steel — 7/16 (by User) — N/A	-D3
Double Ended (f)(g) (Blind Kidney Flange on back) — Steel — 7/16 — Steel	-D4
Single Ended (f) — 316 ss — 7/16 (by User) — N/A	-D5
Double Ended (f)(g) (Blind Kidney Flange on back) — 316 ss — 7/16 — 316 ss	-D6
Single Ended — 17-4 ss — 7/16 (by User) — N/A	-D7
Double Ended (f)(g) (Blind Kidney Flange on back) — 17-4 ss — 7/16v — 17-4 ss	-D8
Cleaning and Preparation - Not Available w/Gold-Plated Sensor, Structure 2G (h)	
Unit Degreased - for Silicone Filled Sensors Only (Not for Oxygen/Chlorine/Other Fluids that may react with Silicone)	-X1
Cleaned and Prepared for Oxygen Service - for Inert Filled Sensors Only (Not available with Carbon Steel Covers or with Silicone Filled Sensors)	-X2
Cleaned and Prepared for Chlorine Service - for Inert Filled Sensors Only (j) (Not available with Carbon Steel Covers or with Silicone Filled Sensors)	-X3
Bolting for Process Covers/Connectors (k)	
316 ss Bolts and Nuts (Pressure Derated) (f)	-B1
17-4 ss Bolts and Nuts (j)	-B2
B7M Bolts and Nuts (NACE)(Pressure Derated) (f)	-B3
Conduit Thread Adapters	
Hawke-Type 1/2 NPT Cable Gland for use with Conduit Connection Codes 1 and 3 (l)	-A1
M20 Connector for use with Conduit Connection Codes 1 and 3 (l)	-A3
Electronics Housing Features	
External Zero Adjustment	-Z1
Custody Transfer Lock and Seal	-Z2
External Zero Adjustment and Custody Transfer Lock and Seal	-Z3
Custom Factory Configuration	
Full Factory Configuration (Requires Configuration Form to be filled out)	-C2
Tubing Connectors - Specify Only One (Only 316 ss process covers; no side vents on cover) (h)	
Steel, Connecting 6 mm Tubing to 1/4 NPT Process Connector	-E1
Steel, Connecting 12 mm Tubing to 1/2 NPT Process Connector	-E2
316 ss, Connecting 6 mm Tubing to 1/4 NPT Process Connector	-E3
316 ss, Connecting 12 mm Tubing to 1/2 NPT Process Connector	-E4
Gaskets	
Gasket for Vacuum Service with Pressure Seals (m)	-G1

Model Code continued on next page

MODEL CODES (CONT.)

IAP20 and IGP20 Transmitters (Cont.)

Description (Cont.)	Model
Optional Selections (Cont.)	
Instruction Books (Common MI, Brochure, and Full Documentation Set on CD-ROM is Standard)	
Without Instruction Book and CD - Only "Getting Started" Brochure is supplied	-K1
Miscellaneous Optional Selections	
Low Temperature Operative Limit of Electronics Housing Extended Down to -50°C (-58°F) Not available with sensors and seals with Inert fill, Structure Codes 78 and 79, or DIN Options -D2, -D4, -D6, and -D8	-J
Vent Screw in side of Process Cover (with 316 ss process covers only) Not available with seals, DIN construction options, or Structure Codes 78 and 79	-V (h)
Supplemental Customer Tag (Stainless Steel Tag wired onto Transmitter)	-T
Examples: IGP20-A20B21F-M1Z2; IAP20-AS3C11F-T	

(a) Maximum overrange pressure is 2.1 MPa (300 psi); temperature limits are -7 and +82°C (20 and 180°F).
(b) Transmitter and Pressure Seal Model Codes are both required. See PSS 2A-1Z11 A for the various pressure seal model codes.
(c) Remote Seal Models that may be specified are PSFPS, PSFES, PSFAR, PSTAR, PSISR, PSSCR, and PSSSR.
(d) Span Limit Code A is not available with pressure seals (Structure Codes F1, F2, S3, S4, SC, SD).
(e) Span Limit Codes E and F are not available with Structure Codes 78 and 79 (pvdf insert in HI Side Cover).
(f) Pressure derated. See derating table in specifications section.
(g) Temperature limits derated to 0 and 60°C (32 and 140°F). Also Mounting Sets -M1 and -M2 not available.
(h) Not available when Remote Mount or Direct Connect Pressure Seals are specified.
(j) When -X3 is specified, the standard bolting is replaced with 17-4 ss bolts and nuts. Therefore, there is no need to specify Option -B2 when selecting the Chlorine Service Option -X3.
(k) Not available with DIN construction options. For stainless steel bolts with DIN construction, specify -D5 to -D8, as required.
(l) Available with Electrical Safety Code D only.
(m) Standard offering with IAP20 Transmitters with pressure seals. However, -G1 is a required option with IGP20 Transmitters when pressure seal (Structure Codes S3, S4, F1, F2, SC, and SD) will be used in vacuum applications. This option substitutes vacuum service metal gasket for standard ptfe process cover gasket.
(n) A cover lock is standard construction with Electrical Safety Codes D, B, G, and V.

SUGGESTED RFQ SPECIFICATIONS

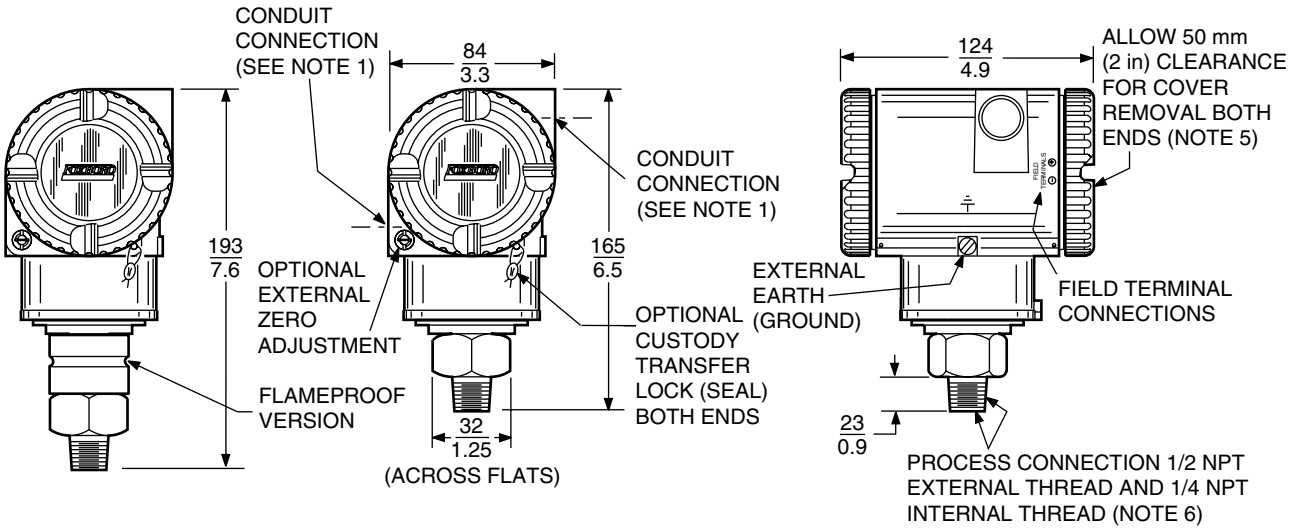
The manufacturer shall provide two-wire, 4 to 20 mA dc analog output pressure transmitter(s) suitable for field mounting. These transmitters shall also be provided (as required) with direct connect pressure seals, or remote capillary connected pressure seals. The specifications for these transmitters are as follows:

Accuracy:	±0.20% of calibrated span.
Span Limits:	From 1 to 6000 psi for standard direct-connected transmitters, and from 0.5 inH_2O to 5000 psi for standard bracket-mounted transmitters, as specified; or SI and Metric equivalents.
Damping:	Settable for a range of none to 8 seconds.
RFI Protection:	The maximum error shall be no more than an additional ±0.1% of calibrated span for 30 V/m field intensity between 27 and 1000 MHz.
Electronics Housing:	IEC IP66 (NEMA 4X); 316 ss or aluminum housing with Epoxy finish; two compartments (field wiring and electronics); housing sealed with O-rings for double protection against moisture or other contaminants.
Modular Electronics:	Easily replaceable modular electronics standard.
LCD Indicator:	Liquid Crystal Display (LCD) Indicator, with on-board pushbuttons for calibration and configuration, is standard.
Mounting:	Direct to process or bracket mounted to pipe or surface.
Process Connection:	IAP10/IGP10 Transmitters: Direct to process piping or pressure seal with 1/2 NPT; optional Rc 1/2 or G 1/2 B external threads to process piping. Internal 1/4 NPT thread also provided as plumbing connection to process; or prepared for a direct connect seal or capillary connected seal. IAP20/IGP20 Transmitters: Used with process connectors to accept 1/4 NPT, 1/2 NPT, Rc 1/4, Rc 1/2, Schedule 80 welding neck; or a pvdf insert (tapped for 1/2 NPT) in HI side process cover is used as process connection. Process connection can also be prepared to accept a direct connect seal; or prepared for a remote capillary connected seal.
Process Cover Materials Available:	Applicable to IAP20/IGP20 transmitters only. Industry Standard 316 ss, Carbon Steel, Monel, and Hastelloy C.
Sensor Materials:	Co-Ni-Cr, 316L ss, and Hastelloy C for IAP10/IGP10 transmitters; and Co-Ni-Cr, 316L ss, Hastelloy C, Monel, Tantalum, and Gold-Plated 316L ss for IAP20/IGP20 transmitters.
Electrical Classification:	Nonincendive for Class I and Class II, Division 2 locations, and explosionproof for Class I and Class II, Division 1 locations. Versions available to meet Agency flameproof and zone requirements; comply with applicable European Union Directives.
Approximate Mass:	Direct Connected Transmitter: 1.5 kg (3.3 lb) Bracket-Mounted Transmitter: 3.5 kg (7.8 lb) w/o process connector 4.2 kg (9.2 lb) w/process connector With 316 ss Electronics Housing: Add 1.1 kg (2.4 lb) With Pressure Seals: See PSS 2A-1Z11 A
Model Codes:	I/A Series IAP10-A or IGP10-A, Direct Connected Absolute or Gauge Pressure Transmitters; or IAP20-A or IGP20-A Bracket Mounted Absolute or Gauge Pressure Transmitters; with or without pressure seals; or equivalent.

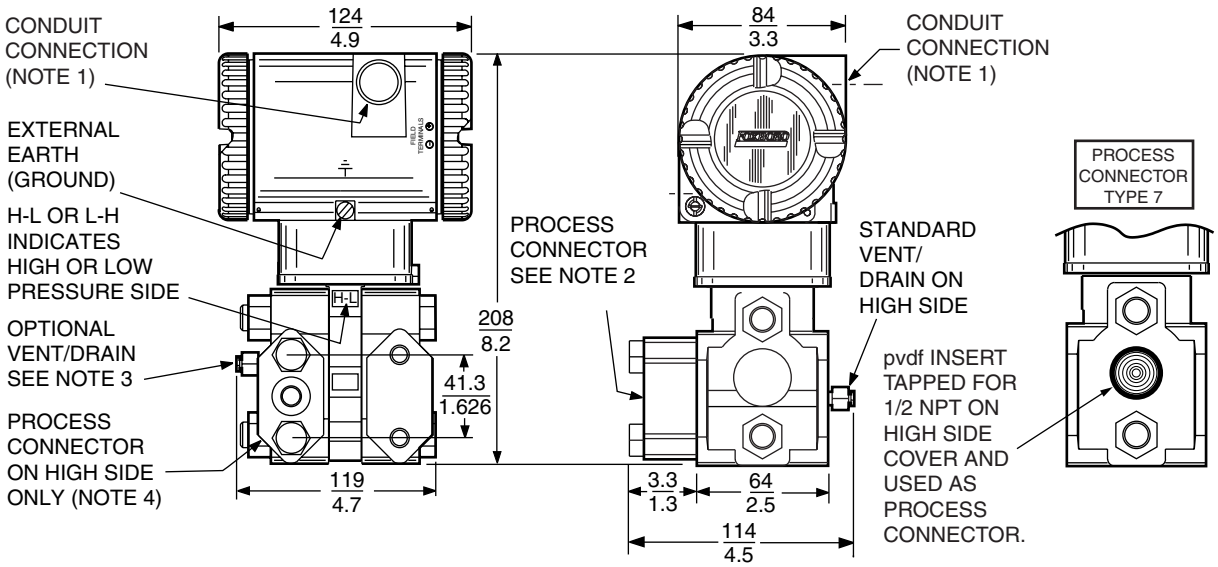
DIMENSIONS-NOMINAL

IAP10 AND IGP10 DIRECT CONNNECTED TRANSMITTERS

mm
in



IAP20 AND IGP20 BRACKET MOUNTED TRANSMITTERS



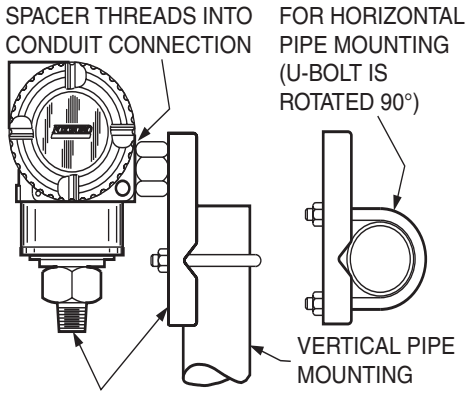
NOTES

1. CONDUIT CONNECTION 1/2 NPT, PG 13.5, OR M20, BOTH SIDES : PLUG UNUSED CONNECTION WITH METAL PLUG (SUPPLIED).
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, MERELY ROTATE TRANSMITTER 180˚ AND RELOCATE PROCESS CONNECTOR SHOWN TO THE RIGHT SIDE.
5. TOPWORKS ROTATABLE TO ANY POSITION WITHIN ONE TURN COUNTERCLOCKWISE OF FULLY TIGHTENED POSITION.
6. DO NOT USE THE 1/4 NPT INTERNAL THREAD TO DIRECT-CONNECT THE TRANSMITTER.

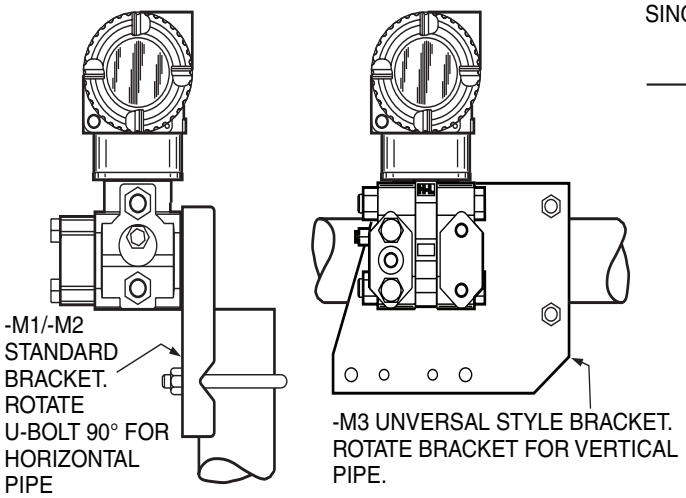
DIMENSIONS-NOMINAL (CONT.)

mm
in

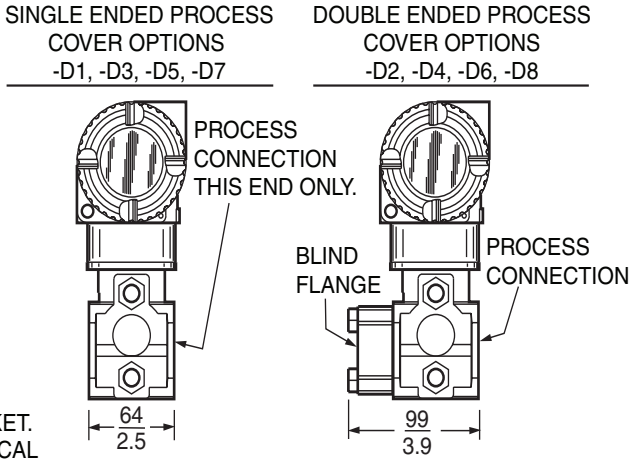
IAP10/IGP10 WITH OPTIONS -M1 TO -M6



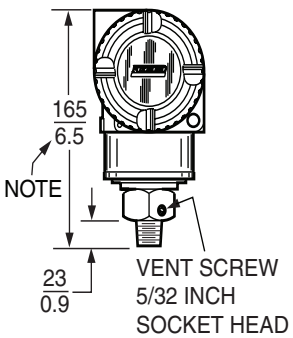
IAP20/IGP20 WITH OPTIONS -M1, -M2, AND -M3



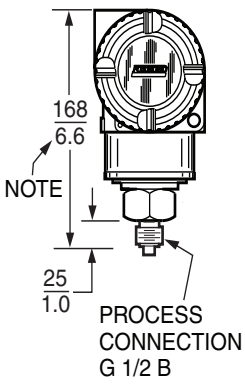
IAP20/IGP20 WITH DIN CONSTRUCTION OPTIONS



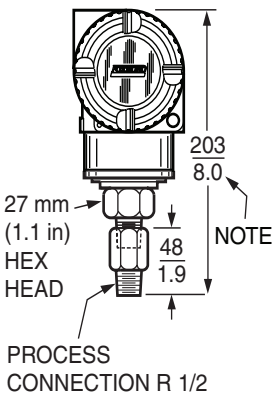
IAP10/IGP10 OPTION -V1



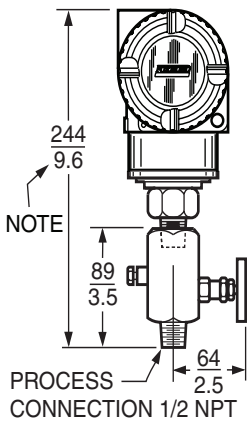
IAP10/IGP10 OPTION -G



IAP10/IGP10 OPTION -R



IAP10/IGP10 -V2, -V3, -V4



NOTES

1. FOR FLAMEPROOF TRANSMITTERS, ADD 28 mm (1.1in) TO OVERALL HEIGHT DIMENSION.
2. REFER TO DIMENSIONAL PRINT DP 020-447 FOR FURTHER INFORMATION.

ORDERING INSTRUCTIONS

1. Model Number(s) as follows:
   - Transmitter only if pressure seals are not selected
   - Both transmitter and pressure seal if pressure seal is selected.

   See PSS 2A-1Z11 A for pressure seal models.
2. Calibrated Pressure Range (using Allowable Pressure Units from the table below).

inH_2O	inHg	kPa	mbar	kg/cm^2
ftH_2O	mmHg	MPa	bar	psi
mmH_2O	Pa	torr	g/cm^2	atm

(a) Absolute or gauge pressure units, as applicable.

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

OTHER M&I PRODUCTS

IPS provides a broad range of measurement and instrument products, including solutions for pressure, flow, analytical, positioners, temperature, controlling and recording. For a listing of these offerings, visit the IPS web site at:

www.ips.invensys.com

IPS Corporate Headquarters
5601 Granite Parkway Suite 1000
Plano, TX 75024
www.ips.invensys.com

Foxboro Global Client Support
Inside U.S.: 1-866-746-6477
Outside U.S.: 1-508-549-2424 or contact your local Foxboro representative.
Facsimile: 1-508-549-4999

MB 010 Printed in U.S.A. 0409

Instruction

MI 020-359
August 2010

Universal Instruction Manual

I/A Series® Pressure Transmitters Models IAP10, IAP20, IGP10, IGP20, IGP25 and IGP50, IDP10, IDP25, IDP50

Configuration, Calibration, Installation, and Operation

Safety information in many languages is available on our website. For help downloading this information, contact our Global Customer Support Center.

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Contents

Figures

Tables

Preface

This Universal Instruction Manual is designed to provide the user with a single, concise, easy-to-use manual that covers the key points needed for configuration, calibration, installation, and operation of I/A Series Pressure Transmitters.

It covers all models of single variable pressure transmitters in the I/A Series family, including absolute, gauge, and differential pressure transmitters, with FoxCom, HART, FOUNDATION fieldbus, or analog output electronics.

This universal manual, along with a CD containing detailed information, is provided free of charge with every I/A Series Pressure Transmitter, unless the purchaser requests that these two items be omitted.

For additional detailed information about each model, including dimensional prints, parts lists, and more detailed instructions, please refer to the standard CD supplied or the optional paper instruction book that is available from Invensys for each model in the line.

- Standard Documentation Shipped with every I/A Series Pressure Transmitter
  - A brief "Getting Started" Pocket-Sized Bulletin
  - This Universal Instruction Manual
  - A CD that contains the complete documentation set for I/A Series Pressure Transmitters
- When Optional Feature K1 is specified in the Model Code when the transmitter is ordered:

  A brief "Getting Started" Pocket-Sized Bulletin only is supplied

  Optional Feature K1 is offered for those users who want Invensys to omit the documentation shipped with every transmitter. This may be specified when multiple identical transmitters are ordered and the user does not want multiple sets of documentation.

1. Safety Information

Transmitter Identification

A typical data plate is shown in Figure 1.

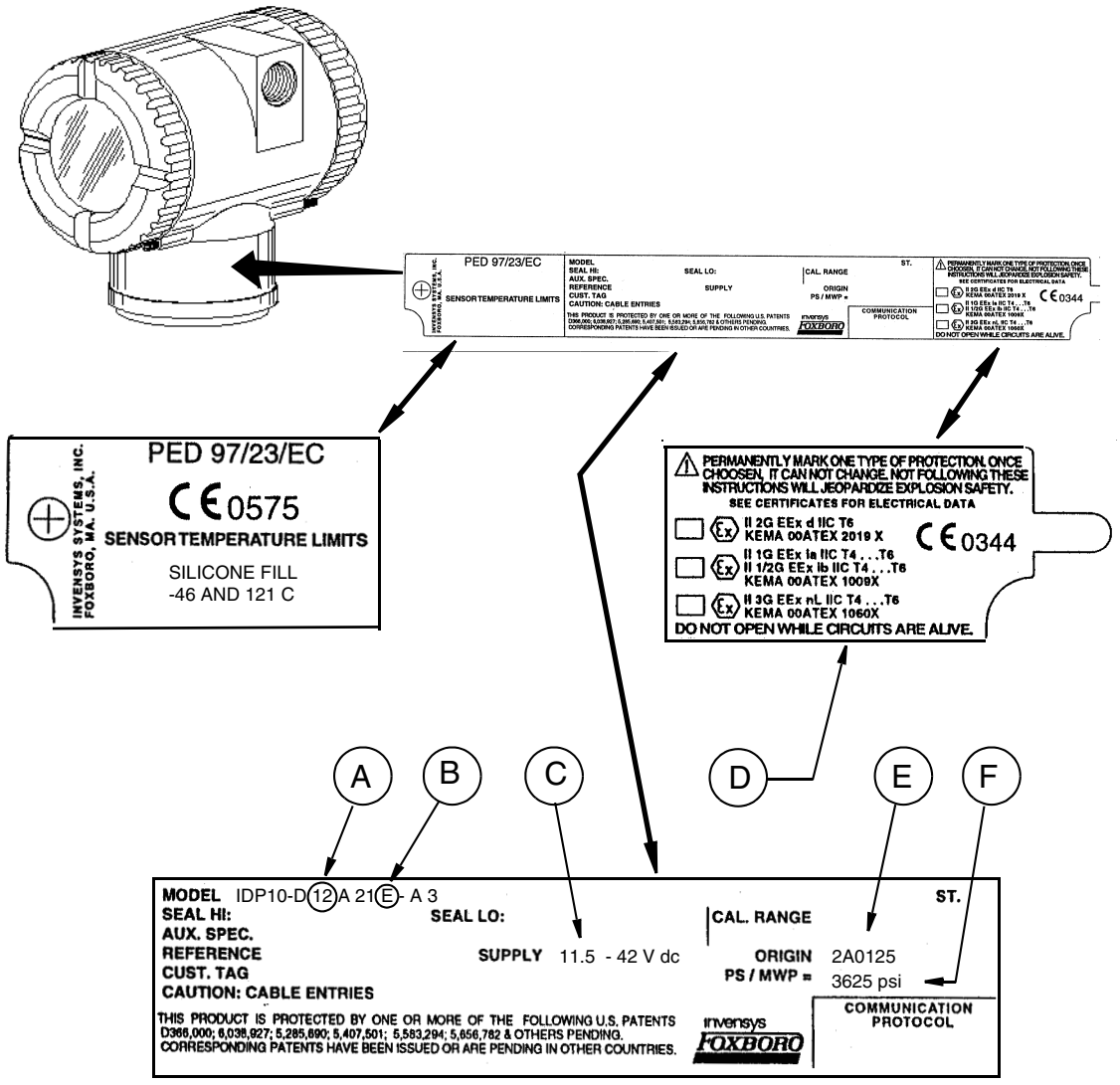


Figure 1. Sample Transmitter Identification

Review the model code on the data plate attached to your transmitter to determine its electrical, pressure, and hazardous location ratings.

Supply Voltage

The proper supply voltage is printed on the data plate. See Item C on the example shown in Figure 1. Ensure that the proper electrical source is connected to the transmitter.

Electrical Certification Rating

The electrical safety design code is printed on the data plate as part of the model code. See Item B on the example shown in Figure 1. See the "Product Safety Specifications" section of the instruction pertaining to your instrument on the enclosed CD-ROM to identify this code. The type of protection is also marked on the data plate. See Item D on the example shown in Figure 1.

PED Certification

Invensys offers the PED (Harmonized Pressure Equipment Directive for the European Community) certification only with transmitters ordered with ATEX Electrical Safety Design Code selections. Transmitters with PED certification have a CE marking on the data plate that also carries the PED number 0575.

Pressure Rating

The maximum working pressure (PS or MWP) for the transmitter is printed on the data plate. See Item F on the example shown in Figure 1.

The data plate of flanged level transmitters and transmitters with flanged pressure seals are stamped with the MWP **if the transmitter pressure range is the limiting factor**. It is stamped "Flange Rate" **if the flange rating is the limiting factor**. The MWP of the flanged seal is stamped on the seal data plate. See Figure 2.

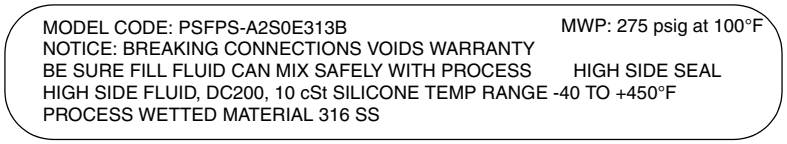


Figure 2. Sample Seal Data Plate

When using transmitters with threaded, in-line saddle weld, or sanitary pressure seals, compare the MWP of the transmitter on the transmitter data plate and the MWP of the seals on the seals data plates and **use the lesser value as the system MWP**.

The MWP on the seal data plates may not be given at your process temperature. Use the following information and industry standards as required to determine the actual pressure limits for your application.

Pressure Seal PSFLT

Table 1. Pressure Seal PSFLT Pressure Limits

Process Connections Flange	Process Temperature[c]	Maximum Working Pressure	
		Carbon Steel [d]	316L Stainless Steel [e]
ANSI Class 150 [a]	100°F	285 psig	275 psig
	200°F	260 psig	240 psig
	300°F	230 psig	215 psig
	450°F	185 psig	183 psig
ANSI Class 300 [a]	100°F	740 psig	720 psig
	200°F	675 psig	620 psig
	300°F	655 psig	560 psig
	450°F	618 psig	498 psig
ANSI Class 600 [a]	100°F	1480 psig	1440 psig
	200°F	1350 psig	1240 psig
	300°F	1315 psig	1120 psig
	450°F	1235 psig	993 psig
DIN PN 10/16 [b]	50°C	16 bar	16 bar
	100°C	16 bar	16 bar
	150°C	14.5 bar	14 bar
	250°C	11 bar	10.5 bar
DIN PN 10/40 and PN 25/40 [b]	50°C	40 bar	40 bar
	100°C	40 bar	35 bar
	150°C	37.5 bar	33.5 bar
	250°C	32 bar	30 bar

(a)ANSI flanges per ASME/ANSI B16.5-1988

(b)DIN flanges per BS4504.

(c)Flange temperature/pressure ratings only; seal temperature ratings may be lower; refer to Table 8.

(d)ASME/ANSI Material Group 1.1; linear interpolation acceptable.

(e)ASME/ANSI Material Group 2.2; linear interpolation acceptable.

Pressure Seals PSFPS and PSFES

Table 2. Pressure Seal PSFPS and PSFES Pressure Limits

Process Connection Flange	Process Temperature[c]	Maximum Working Pressure	
		Carbon Steel [d]	316L Stainless Steel [e]
ANSI Class 150 [a]	100°F	285 psig	275 psig
	200°F	230 psig	240 psig
	400°F	200 psig	195 psig
	500°F	170 psig	170 psig
	600°F	140 psig	140 psig
ANSI Class 300 [a]	100°F	740 psig	720 psig
	200°F	675 psig	620 psig
	400°F	635 psig	515 psig
	500°F	600 psig	480 psig
	600°F	550 psig	450 psig
ANSI Class 600 [a]	100°F	1480 psig	1440 psig
	200°F	1350 psig	1240 psig
	400°F	1270 psig	1030 psig
	500°F	1200 psig	955 psig
	600°F	1095 psig	905 psig
DIN PN 10/16 [b]	50°C	16 bar	16 bar
	100°C	16 bar	16 bar
	150°C	14.5 bar	14 bar
	200°C	13 bar	12 bar
	300°C	9 bar	9 bar
DIN PN 10/40 and PN 25/40 [b]	50°C	40 bar	40 bar
	100°C	40 bar	35 bar
	150°C	37.5 bar	33.5 bar
	200°C	35 bar	32 bar
	300°C	28 bar	28 bar

(a)ANSI flanges per ASME/ANSI B16.5-1988

(b)DIN flanges per BS4504.

(c)Flange temperature/pressure ratings only; seal temperature ratings may be lower; refer to Table 8.

(d)ASME/ANSI Material Group 1.1; linear interpolation acceptable.

(e)ASME/ANSI Material Group 2.2; linear interpolation acceptable.

Pressure Seals PSFAR and PSFAD

Table 3. Pressure Seals PSFAR and PSFAD Pressure Limits

Process Connection Flange	Process Temperature[b]	Pressure Rating in psig[a]			
		Class 150	Class 300	Class 600	Class 1500
ANSI Carbon Steel	-20°F	285	740	1480	3705
	100°F	285	740	1480	3705
	200°F	260	675	1350	3375
	300°F	230	655	1315	3280
	400°F	200	635	1270	3170
	500°F	170	600	1200	2995
	580°F	146	560	1120	2785
ANSI Stainless Steel	-20°F	275	720	1440	3600
	100°F	275	720	1440	3600
	200°F	240	620	1240	3095
	300°F	215	560	1120	2795
	400°F	195	515	1030	2570
	500°F	170	480	955	2390
	580°F	146	456	915	2280

(a) The maximum working pressure with the nonmetallic ptfe and PVC lower housings is 150 psig regardless of the higher allowable flange pressure range.

(b) Flange temperature/pressure ratings only; seal temperature rating may be lower depending on mounting and fill fluid; refer to Table 8.

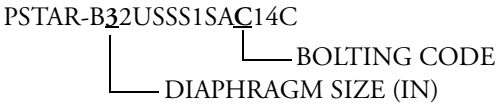
Pressure Seals PSTAR and PSTAD

Table 4. Pressure Seals PSTAR and PSTAD Pressure Limits

Process Temperature	Bolting Code "S"		Bolting Code "C"	
	2 and 3 inch	4 inch	2 and 3 inch	4 inch
20°F	1250	750	2500	1500
100°F	1250	750	2500	1500
200°F	1075	645	2150	1290
300°F	975	585	1950	1170
400°F	900	540	1800	1080
500°F	835	500	1670	1000
580°F	803	481	1606	963

Seal temperature rating may be lower depending on mounting and fill fluid; refer to Table 8.

The pressure rating is dependent on the diaphragm size and the bolting material. The diaphragm size and bolting material are identified in the pressure seal model number which is located on the pressure seal. See following example:



Pressure Seals PSISR and PSISD

The maximum working pressure is equivalent to a nominal 3- or 4-inch Schedule 40 pipe as defined by ASME/ANSI standards.

Pressure Seals PSSCR and PSSCT

The maximum working pressure of the seal process connection varies with the clamping device used. Refer to Tri-Clover Tri-Clamp standards to determine the pressure limits of the clamping system that you are using.

PSSSR and PSSST (Sanitary Tank Spud) Seals

The maximum working pressure of mini tank spud seal is 1.55 MPa at 120°C (225 psi at 250°F). That of the standard tank spud seal is 1.38 MPa at 120°C (200 psi at 250°F).

Origin Code

The origin code identifies the area of manufacture and the year and week of manufacture. See Item E on the example shown in Figure 1. In the example, 2A means the product was manufactured in the Measurement and Instrument Division, 01 identifies the year of manufacture as 2001, and 25, the week of manufacture in that year.

Operating Temperature Limits

The operating temperature limits of the electronics are -40°C and +85°C (-40°F and +185°F). The limits are -40°C and +75°C (-40°F and +167°F) for IAP10, IGP10, IGP25, and IGP50 Transmitters with ATEX flameproof certification. Ensure that the transmitter is operated within this range.

The sensor body operating temperature limits are determined by the sensor fill fluid. The cover material, sensor diaphragm material and fill fluid are specified by two characters in the model code on the data plate. See Item A on the example shown in Figure 1. Also see Table 5 and Table 6 to interpret this part of the code and Table 7 to determine the sensor body temperature limits. In the example IDP10-D**12**A21E-A3, the number 12 identifies the fill fluid in Table 5 as silicone. Table 7 identifies silicone as having temperature limits of -46 and +121°C (-50 and +250°F).

Table 5. Interpretation of Model Code for IDP10, IAP20, IGP20, IDP25, and IDP50 Transmitters

Code	Cover Material	Sensor Diaphragm Material	Fill Fluid
10	Steel	Co-Ni-Cr	Silicone
11	Steel	Co-Ni-Cr	Fluorinert
12	Steel	316 ss	Silicone
13	Steel	316 ss	Fluorinert
16	Steel	Hastelloy C	Silicone
17	Steel	Hastelloy C	Fluorinert

Table 5. Interpretation of Model Code for IDP10, IAP20, IGP20, IDP25, and IDP50 Transmitters (Continued)

Code	Cover Material	Sensor Diaphragm Material	Fill Fluid
20	316 ss	Co-Ni-Cr	Silicone
21	316 ss	Co-Ni-Cr	Fluorinert
22	316 ss	316 ss	Silicone
23	316 ss	316 ss	Fluorinert
2G	316 ss	316 ss, gold-plated	Silicone
24	316 ss	Monel	Silicone
25	316 ss	Monel	Fluorinert
26	316 ss	Hastelloy C	Silicone
27	316 ss	Hastelloy C	Fluorinert
34	Monel	Monel	Silicone
35	Monel	Monel	Fluorinert
46	Hastelloy C	Hastelloy C	Silicone
47	Hastelloy C	Hastelloy C	Fluorinert
48	Hastelloy C	Tantalum	Silicone
49	Hastelloy C	Tantalum	Fluorinert
78	pvdf Insert	Tantalum	Silicone
79	pvdf Insert	Tantalum	Fluorinert
F1	N/A - Used with pressure seal		Silicone
F2			Fluorinert
F3			Silicone
F4			Fluorinert
S1			Silicone
S2			Fluorinert
S3			Silicone
S4			Fluorinert
S5			Silicone
S6			Fluorinert
SA			Silicone
SB			Inert
SC			Silicone
SD			Inert
SE			Silicone
SF			Inert

Table 6. Interpretation of Model Code for IAP10, IGP10, IGP25, and IGP50 Transmitters

Code	Process Connector Material	Sensor Diaphragm Material	Fill Fluid
20	316L ss	Co-Ni-Cr	Silicone
21	316L ss	Co-Ni-Cr	Fluorinert
22	316L ss	316L ss	Silicone
23	316L ss	316L ss	Fluorinert
24	15-5 ss	15-5	None
26	Inconel X-750	Inconel X-750	None
28	13-8Mo ss	13-8Mo ss	None
30	316L ss	Hastelloy C	Silicone
31	316L ss	Hastelloy C	Fluorinert
32	Hastelloy C	Hastelloy C	Silicone
33	Hastelloy C	Hastelloy C	Fluorinert
TA	316L ss	316L ss	Neobee
T2	316L ss	316L ss	Neobee
T3	316L ss	316L ss	Neobee
TB	316L ss	Hastelloy C	Neobee
T4	316L ss	Hastelloy C	Neobee
T5	316L ss	Hastelloy C	Neobee
M1	316L ss	316L ss	Neobee
M6	316L ss	316L ss	Neobee
M9	316L ss	316L ss	Neobee
PX	316L ss	316L ss	Neobee
PZ	316L ss	316L ss	Neobee
PA	316L ss	316L ss	Silicone
PB	316L ss	316L ss	Silicone
PC	316L ss	316L ss	Silicone
PD	316L ss	316L ss	Silicone
PE	316L ss	Hastelloy C	Silicone
PF	316L ss	Hastelloy C	Silicone
PG	316L ss	Hastelloy C	Silicone
PH	316L ss	Hastelloy C	Silicone
PJ	316L ss	Hastelloy C	Silicone
D1	N/A - Used with pressure seal		Silicone
D2			Fluorinert
S3			Silicone
S4			Fluorinert
SC			Silicone
SD			Inert

Table 7. Sensor Body Operating Temperature Limits for Models Listed in Tables 5 and 6

Limiting Factor	Temperature Limits
Silicone Fill Fluid	-46 and +121°C (-50 and +250°F)
Fluorinert Fill Fluid	-29 and +121°C (-20 and +250°F)
Neobee Fill Fluid	-18 and +204°C (0 and 400°F)[a] [b]
pvdf Inserts	-7 and +82°C (20 and 180°F)

(a) At process connection

(b) PSSSR, PSSST, IGP10, IAP10, IGP25-.M with the EPDM O ring supplied are limited to a maximum temperature of 121°C (250°F).

For transmitters with pressure seals, the temperature limits at the seals are shown in Table 8. The pressure seal fill fluid code is found in the pressure seal model code as shown in the following examples (fill fluid code position is underlined and bolded):

PSFLT	PSFLT-B2S015**3**
PSFPS and PSFES	PSFPS-A2S013**3**4E
PSFAR	PSFAD-D232SSS2SBC**1**3M
PSFAD	PSFAD-D232SSS2SBC**1**
PSTAR	PSTAR-B32USSS1BCC**3**4F
PSTAD	PSTAR-B32USSS1BCC**3**
PSISR	PSISR-A23JSSS1SC**1**4M
PSISD	PSISD-A23JSSS1SC**1**
PSSCR	PSSCR-D21S3**5**4H
PSSCT	PSSCT-B21S**5**5
PSSSR	PSSSR-B4S23**5**4H
PSSST	PSSST-B4S2**5**5

Table 8. Seal Fill Fluid and Operating Temperature Limits

Code	Fill Fluid	Temperature Limits	
		Direct Connected[a,b] PSFLT, PSFAD, PSTAD, PSISD, PSSCT, PSSST	Remote Connected[b] PSFPS, PSFES, PSFAR, PSTAR, PSISR, PSSCR, PSSSR
1	DC200, 10cS, Silicone	-40 and +204°C (-40 and +400°F)	-40 and +232°C (-40 and +450°F)
2	FC77 Fluorinert	-59 and +82°C (-75 and +180°F)	-59 and +82°C (-75 and +180°F)
3	DC200, 3cS, Silicone	-40 and +149°C (-40 and +300°F)	-40 and +149°C (-40 and +300°F)
4	DC704 (HTF) Silicone	0 and +204°C (32 and 400°F)	0 and +304°C (32 and 580°F)
5	Neobee[c]	-18 and +204°C (0 and 400°F)	-18 and +204°C (0 and 400°F)[c]

(a) Limited to 204°C (400°F) maximum regardless of fill fluid due to transmitter maximum temperature limits.
(b)PSFAR, PSFAD, PSTAR, PSTAD, PSISR, and PSISD seals with ptfe gaskets are limited to 60°C (140°F).
(c) PSSSR, PSSST, IGP10, IAP10, IGP25-.M with the EPDM O ring are limited to a maximum temperature of 121°C (250°F).

Process Wetted Materials

Refer to Table 5 to determine if the process cover and sensor diaphragm material are suitable for the process. For transmitters with pressure seals, the seal wetted material is as follows:

Pressure Seals PSFLT, PSFPS, and PSFES

Table 9. Pressure Seal PSFLT, PSFPS, and PSFES Wetted Materials

Material Code	Material
S	316L ss
C	Hastelloy C
T	Tantalum

The process wetted material code is found in the pressure seal model number which is located on the pressure seal. See following example:

PSFLT-B2S0153
└ SEAL WETTED MATERIAL

Pressure Seals PSFAR, PSFAD, PSTAR, PSTAD, PSISR, and PSISD

Table 10. Pressure Seal Lower Housing Materials

Material Code	Material
S	316 ss
K	Carbon Steel
C	Hastelloy C
T	Tantalum Plate
E	Titanium Grade 4

Table 10. Pressure Seal Lower Housing Materials

Material Code	Material
L	Inconel 600
M	Monel 400
N	Nickel 200
G	Glass Filled ptfe
P	Polyvinyl Chloride

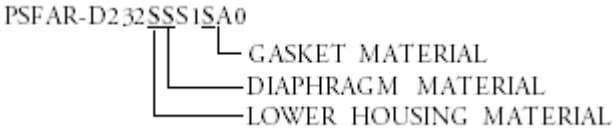
Table 11. Pressure Seal Diaphragm Materials

Material Code	Material
S	316L ss
C	Hastelloy C276
T	Tantalum
E	Titanium Grade 2
L	Inconel 600
M	Monel 400
N	Nickel 200

Table 12. Pressure Seal Gasket Materials

Material Code	Material
S	Organic Fiber with Nitrile Binder
3	Silver Plated 316 ss
T	ptfe
B	Buna N
V	Viton
G	Grafoil
T	Silver Plated Hastelloy C

The material codes are found in the pressure seal model number which is located on the pressure seal. See following example:



Pressure Seals PSSCR

Table 13. Pressure Seal PSSCR Diaphragm Materials

Material Code	Material
S	316L ss
C	Hastelloy C276

The diaphragm material code is found in the pressure seal model number which is located on the pressure seal. See following example:

PSSCR-D21S354H
└ DIAPHRAGM MATERIAL

The housing material is 316 ss.
The gasket is provided by the user.

Pressure Seals PSSCT

The housing material is 316 ss.
The diaphragm material is 316L ss.
The gasket is provided by the user.

Pressure Seals PSSSR and PSSST

The housing material is 316 ss.
The diaphragm material is 316L ss.
The gasket material is EPDM.

Warnings

General Warning

⚠ WARNING

1. Transmitters must be installed to meet all applicable local installation regulations, such as hazardous location requirements, electrical wiring codes, and mechanical piping codes. Persons involved in the installation must be trained in these code requirements to ensure that the installation takes maximum advantage of the safety features designed into the transmitter.
2. A plug is supplied with each transmitter with 1/2 NPT conduit connection. It is intended to provide moisture ingress protection of the unused housing conduit entry. The plug must be wrench tight to achieve this level of protection. Thread sealant is required. Explosion-proof applications may require a certified plug.
Housings with M20 / PG 13.5 threaded conduit connections are provided with an ATEX certified plug. Thread sealant is required to provide moisture ingress protection.

ATEX Warnings

WARNING

Apparatus marked as Category 1 equipment and used in hazardous areas requiring this category must be installed in such a way that, even in the event of rare incidents, the versions with an aluminum alloy enclosure can not be an ignition source due to impact and friction.

WARNING

Install ATEX certified transmitters in accordance with the requirements of standard EN 60079-14.

WARNING

To install a transmitter labeled with multiple approvals, select and permanently mark the certification label in the tick block to distinguish the installed approval type from the unused approval types. Once installed, the transmitter **cannot** be reinstalled using any other approval type. Not following these instructions will jeopardize explosion safety.

On IGPxx and IAPxx Transmitters with IECEx certification, the maximum constructional gap (I_c) is less than that required by IEC 60079-1:2003 as detailed in the table below:

Flamepath	Maximum Gap (mm)
Transducer / Plug Low	0.04
Lid / Window Spigot (flat part)	0.04

Explosionproof/Flameproof and Enclosure Warning

WARNING

1. To prevent possible explosion and to maintain explosionproof/flameproof and dust-ignitionproof protection, plug unused openings with a certified metal pipe plug. For 1/2 NPT connections, both the plug and conduit must be engaged a minimum of five full threads. For M20 and PG 13.5 connections, the certified plug provided and the conduit must be engaged a minimum of seven full threads.
2. The threaded housing covers must be installed. Turn covers to seat O-ring into the housing and then continue to hand tighten until the cover contacts the housing metal-to-metal.
3. If the electronics housing is removed for any reason, it must be hand tightened fully. Then engage the set screw until it bottoms out and **back it off 1/8th turn**. Fill the set screw recess with red lacquer (Foxboro Part Number X0180GS or equivalent). The housing then may be rotated up to one full turn in a counterclockwise direction for optimum access to adjustments.

Intrinsically Safe and Type n Warning

WARNING

Since Invensys does not specify live maintenance, to prevent ignition of flammable atmospheres, disconnect power before servicing unless the area is certified to be nonhazardous.

Type n Warning

WARNING

On transmitters certified for ATEX protection n, CSA Class I, Division 2, or FM nonincendive for Class I, Division 2, the threaded housing covers must be installed.

Pressure Warnings

WARNING

When installing your transmitter, tighten process connector bolts to a torque of 61 N•m (45 ft•lb) and drain plugs and optional vent screws to 20 N•m (15 ft•lb). See Figure 3.

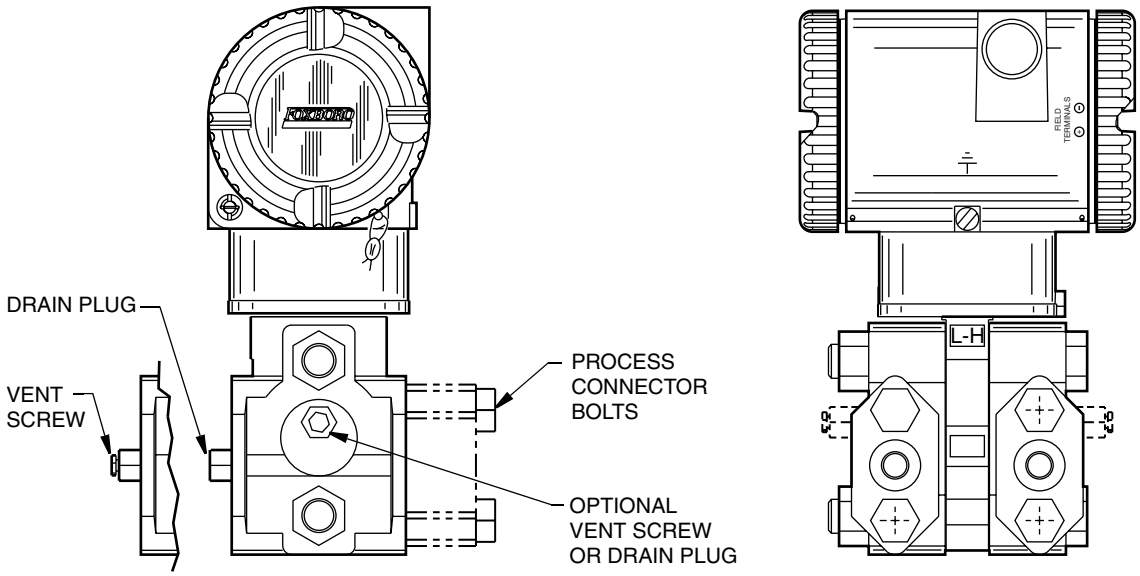


Figure 3. Pressure Connections

WARNING

If a sensor is replaced or process covers are rotated for venting, replace the gaskets and torque cover bolts (see Figures 4 and 5) to 100 N•m (75 ft•lb) in several even increments. Torque values are 66 N•m (50 ft•lb) when optional 316 ss bolts are specified (option B1). A pressure test is required. Perform a hydrostatic test with a liquid following proper hydrostatic test procedures. Pressure test the process cover

assembly by applying a hydrostatic pressure of 150% of the maximum static and overrange pressure rating 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.

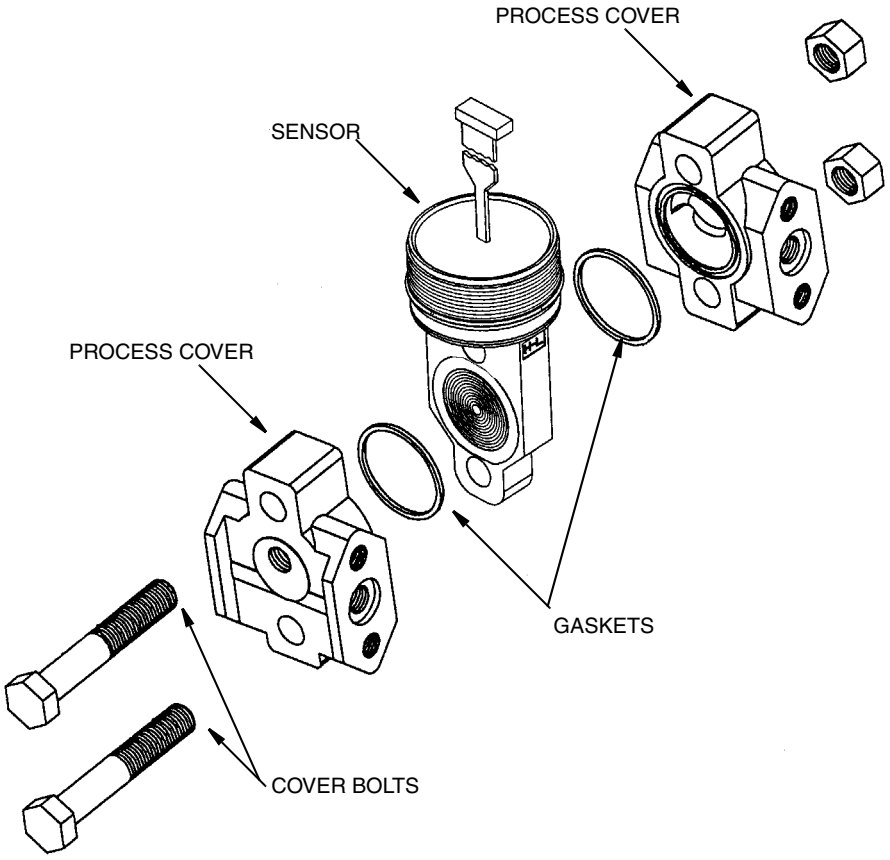


Figure 4. Sensor Replacement

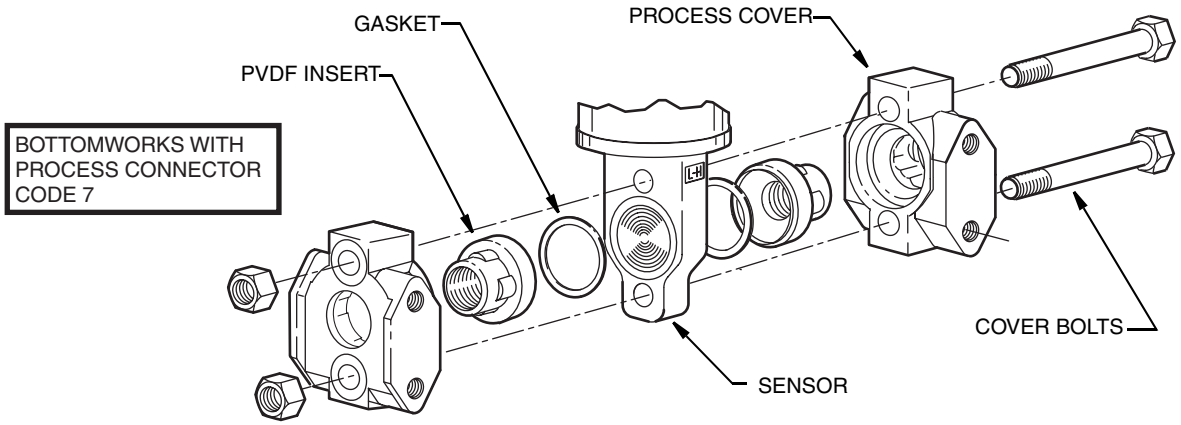


Figure 5. Sensor Replacement (pvdf Inserts)

Process Fluid Warning

WARNING

If process containing parts are to be disassembled:

1. Make sure that process fluid is not under pressure or at high temperature.
2. Take proper precautions concerning leakage or spillage of any toxic or otherwise dangerous fluid. Follow any Material Safety Data Sheet (MSDS) recommendations.

Seal or Sensor Fill Fluid Warning

WARNING

Even though the volume of fill fluid is small, be sure that the fill fluid can mix safely with the process fluid.

Parts Replacement Warning

WARNING

This product contains components that have critical safety characteristics. Do **not** substitute components. Replace components only with identical factory supplied components. Component substitution may impair the electrical safety of this equipment and its suitability for use in hazardous locations.

EC Declaration of Conformity

We, Manufacturer:

Invensys Systems, Inc.
33 Commercial Street
Foxboro, Massachusetts 02035
U.S.A.

declare under our sole responsibility that the

I/A Series Pressure Transmitters IGP, IAP, IDP, IPI, IMV

are in conformity with the protection requirements of Council Directives:

- 2004/108/EC on the approximation of the laws of the Member States relating to Electromagnetic Compatibility
- 94/9/EC on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres
- 97/23/EC on the approximation of the laws of the Member States concerning pressure equipment

The basis on which Conformity is being declared:

- EN 61326-1:2006, Electrical equipment for measurement, control and laboratory use EMC requirements, Class A emission limits, and immunity requirements according to Table 2 for Industrial locations.
- EN50014 1997 A1 1999 A2 1999 Electrical apparatus for potentially explosive atmospheres 'General Requirements'.
- EN50018 2000 Electrical apparatus for potentially explosive atmospheres 'Flameproof enclosures 'd''.
- EN50020 1995 Electrical apparatus for potentially explosive atmospheres 'Intrinsic safety 'I''.
- EN50021 1999 Electrical apparatus for potentially explosive atmospheres 'Type of protection 'n''.
- EN50284 1999 Special requirements for construction, test and marking of electrical apparatus of group II Category 1 G.
- EN 50281-1-1 1999 Electrical apparatus for use in the presence of combustible dust.
- EN 60079-15 2003 Electrical apparatus for explosive gas atmospheres - Part 15: Electrical apparatus with type of protection "n"

For compliance with ATEX, products are in accordance with EC Type Examination Certificates KEMA 00ATEX 1060X, KEMA 00ATEX 2019X and KEMA 00ATEX 1009X, issued by KEMA Quality B.V., Ultrechtseweg 310, 6812 AR Arnhem, The Netherlands, Notified Body number 0344, and with EC Type Examination Certificates SIRA 04ATEX1349, SIRA 04ATEX2335X, SIRA 06ATEX4056X, SIRA 06ATEX2055X, and SIRA 06ATEX4019X, issued by Sira Certification Service, Rake Lane, Eccleston, Chester, CH4 9JN, England, Notified Body number 0518. The authorized markings for each certificate are shown below. The actual ATEX markings

on the product vary according to model code. Refer to Product Specification Sheet and marking on product for details pertaining to individual model codes.

KEMA 00ATEX1060X II 3 G EEx nL IIC T4 … T6

II 1 GD EEx nL IIC T4 … T6 T 135°C

KEMA 00ATEX1009X II 1 G EEx ia IIC T4 … T6

II 1/2 G EEx ib IIC T4 … T6

II 1 GD EEx ia IIC T4 … T6 T 135°C

II 1/2 GD EEx ib IIC T4 … T6 T 135°C

KEMA 00ATEX2019X II 2 G EEx d IIC T6

II 2 GD EEx d IIC T6 T 85°C

SIRA 04ATEX1349 II 2 GD EEx d IIC T6 T 85°C

SIRA 04ATEX2335X II 1G EEx ia IIC T4

SIRA 06ATEX4056X II 3 GD EEx nL IIC T4

SIRA 06ATEX2055X II 1 GD EEx ia IIC T4

SIRA 06ATEX4019X II 3 G EEx nL IIC T4

For the Pressure Equipment Directive, conformity is based on a certificate issued by Det Norske Veritas AS, Veritasveien 1, 1322 HOVIK, Norway, Notified Body number 0575, based on Maximum Working Pressure (MWP). Conformity Assessment Module "H" is applied for Models IGP, IAP, IMV and IDP where the MWP is greater than 200 bar. Conformity Assessment Module "A" is applied for Model IGP where the MWP is greater than 1000 bar. The applicable design standards are ANSI / ISA S82.03 and ASME Boiler Code, Section VIII.

2. Installation

! CAUTION

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

NOTE

1. The transmitter should be mounted so that any moisture condensing or draining into the field wiring compartment can exit through one of the two threaded conduit connections.
2. Use a suitable thread sealant on all connections.
3. If the transmitter is not installed in the vertical position, readjust zero output to eliminate the position zero effect.

Mechanical Installation

Differential Pressure Transmitter

The IDP10, IDP25, and IDP50 differential pressure transmitters can be supported by the process piping (Figure 6), on a bypass manifold (Figures 7 through 10), or mounted to a vertical or horizontal pipe or surface using an optional mounting bracket (Figures 11 through 16). For dimensional information, refer to DP 020-446.

NOTE

1. The IDP25 and IDP50 transmitters are only available in the Traditional Structure at this time.
2. If the transmitter is not installed in the vertical position, readjust zero output to eliminate the position zero effect.
3. When pvdf inserts (structure codes 78/79) are used, the process connection must be made directly to the pvdf inserts in the Hi and Lo side process covers.
4. The transmitter should be mounted so that any moisture condensing or draining into the field wiring compartment can exit through one of the two threaded conduit connections.

Process-Mounted Transmitter

Figure 6 shows the transmitter mounted to and supported by the process piping.

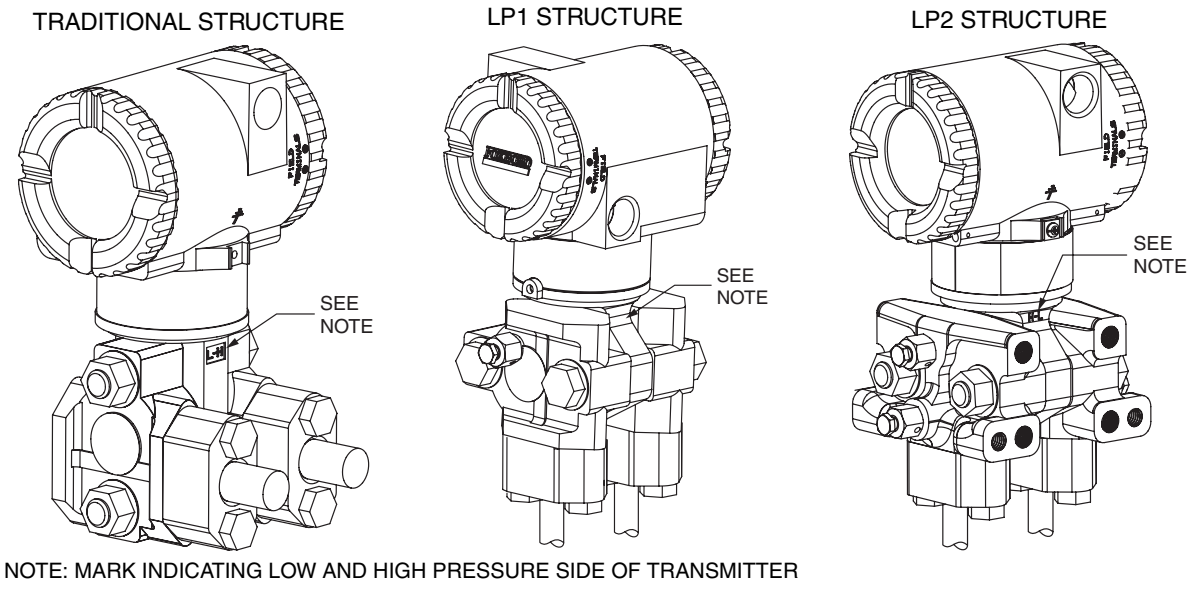


Figure 6. Typical Mounting of an IDP Transmitter Supported by Process Piping

Manifold Mounted Transmitter

Figure 7 shows the transmitter mounted to and supported by a bypass manifold. Figures 8 and 9 show a bypass manifold mounted to a DN50 (2 inch) pipe with an optional mounting bracket.

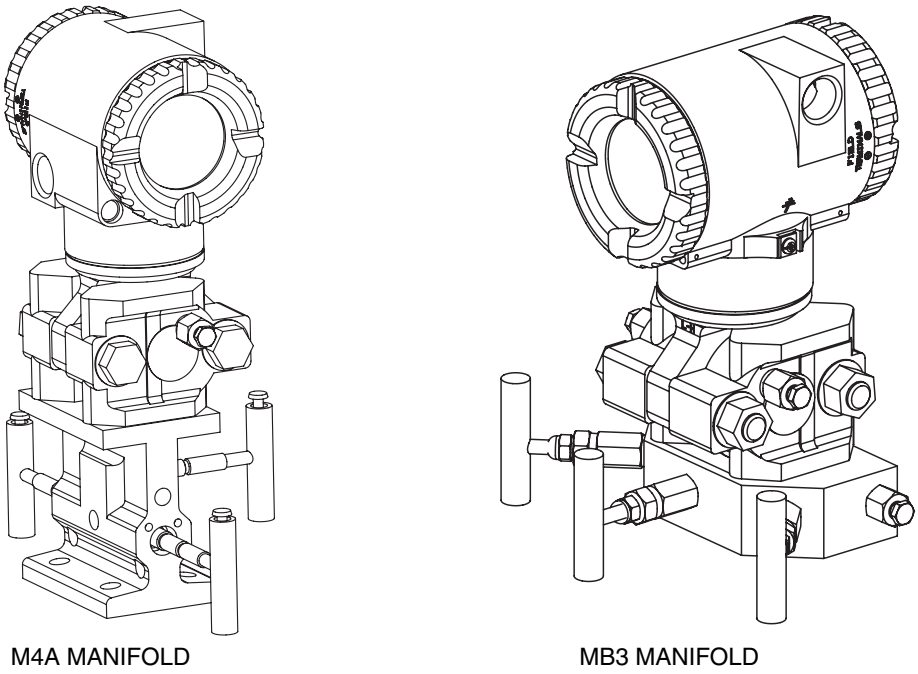


Figure 7. Typical Mounting of an IDP Transmitter Supported by a Bypass Manifold

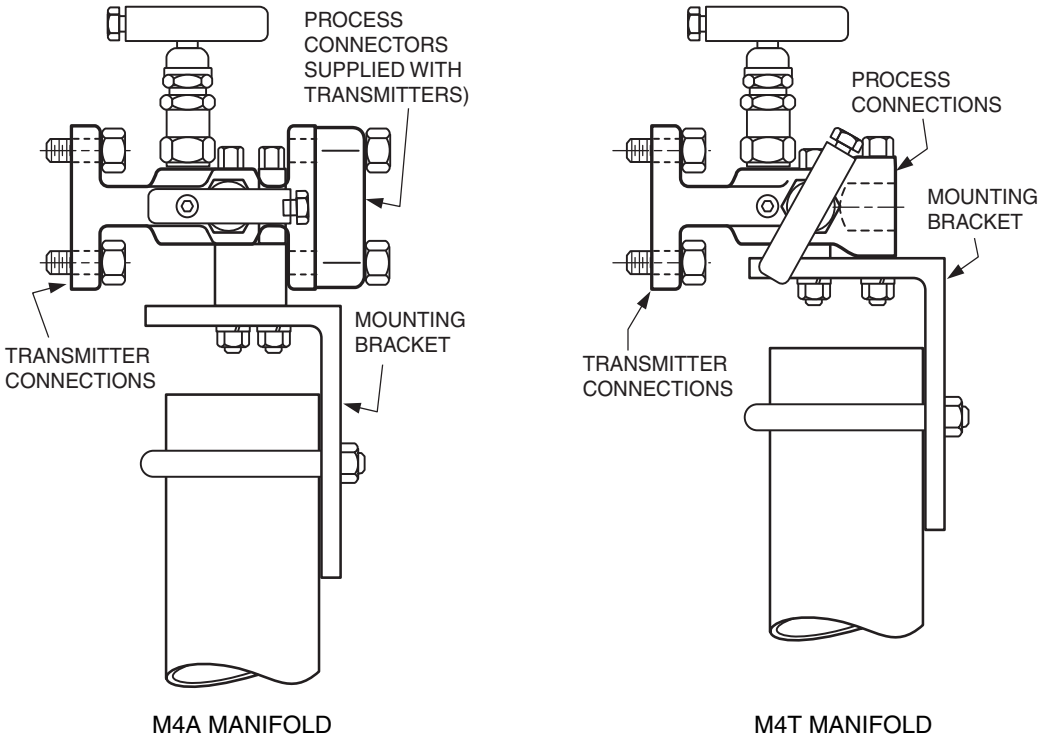


Figure 8. Typical Mounting of M4A and M4T Manifold with -AM Bracket

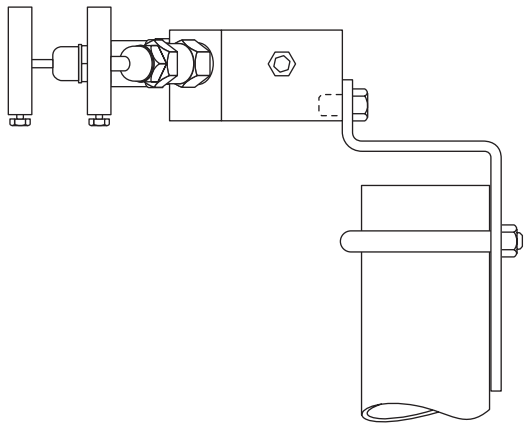


Figure 9. Typical Mounting of MB3 Manifold with -AM Bracket

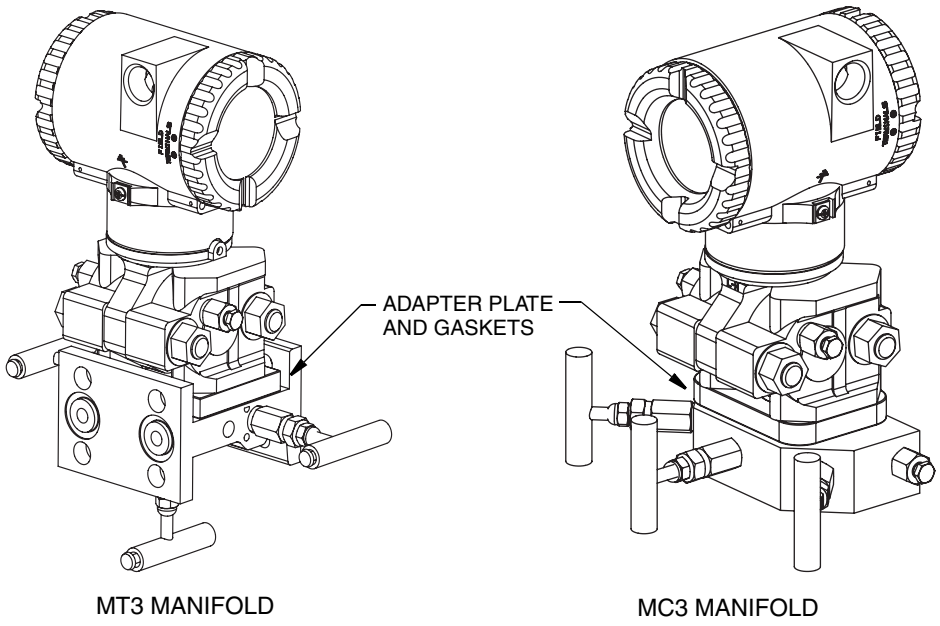


Figure 10. Typical Mounting of IMV25 Transmitter on Coplanar™ Manifold

Pipe- or Surface-Mounted Transmitter

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

Standard Mounting Bracket

The transmitter (with either traditional or LP2 low-profile structures) can be mounted to a vertical or horizontal, DN 50 or 2-in pipe using a standard bracket. See Figure 11 for details and Figure 12 for examples of different situations. Secure the mounting bracket to the transmitter using the four screws provided. Mount the bracket to the pipe. To mount to a horizontal pipe, turn the U-bolt 90° from the position shown in Figure 11. The mounting bracket can also be used for wall mounting by securing the bracket to a wall using the U-bolt mounting holes.

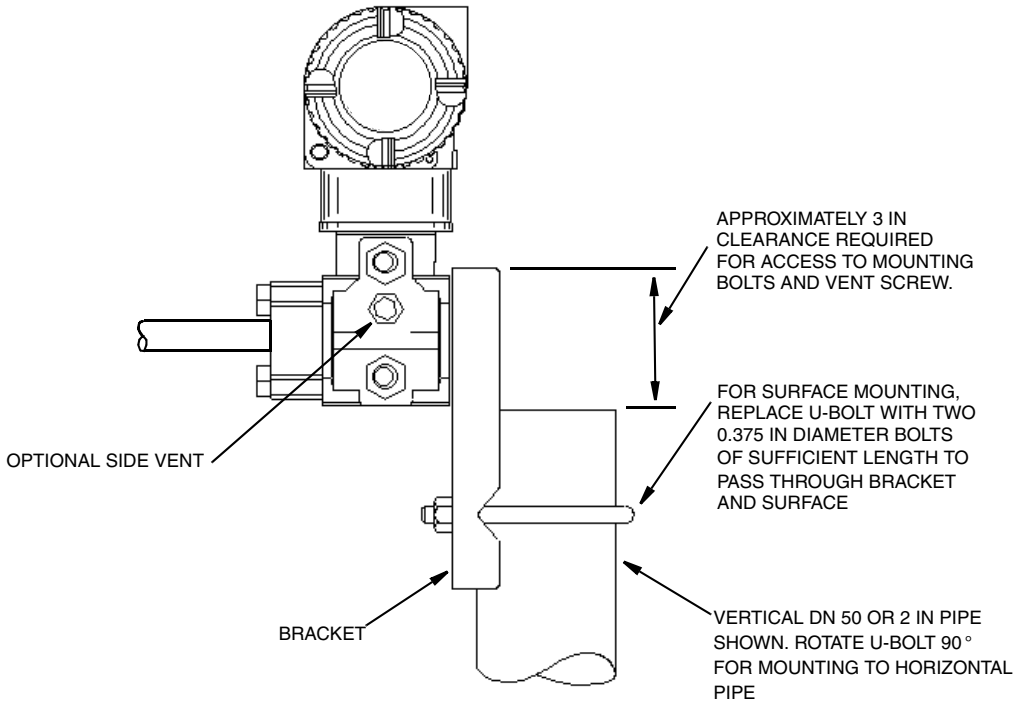


Figure 11. Pipe or Surface Mounted Transmitter Using a Standard Bracket

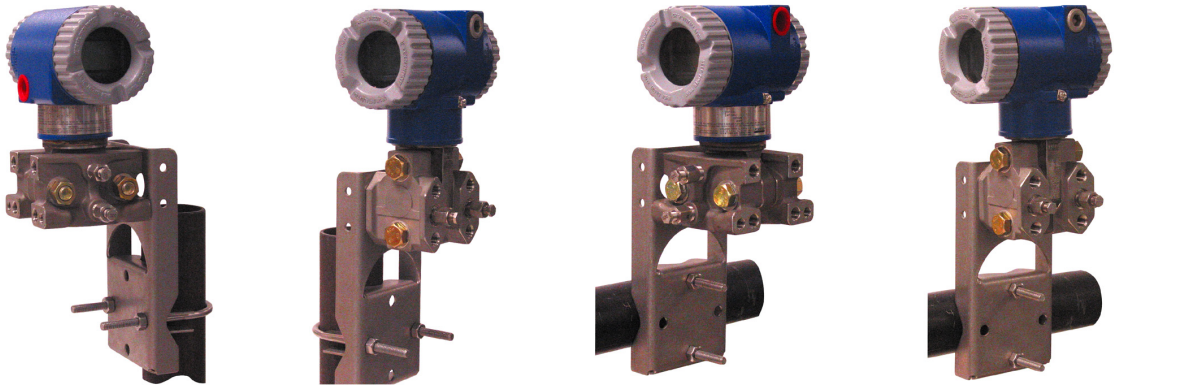


Figure 12. Examples of Mounting With a Standard Bracket

Universal Mounting Bracket

The 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 Figure 13 for details of a universal bracket and Figure 14 through Figure 16 for examples of different mounting situations. 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.

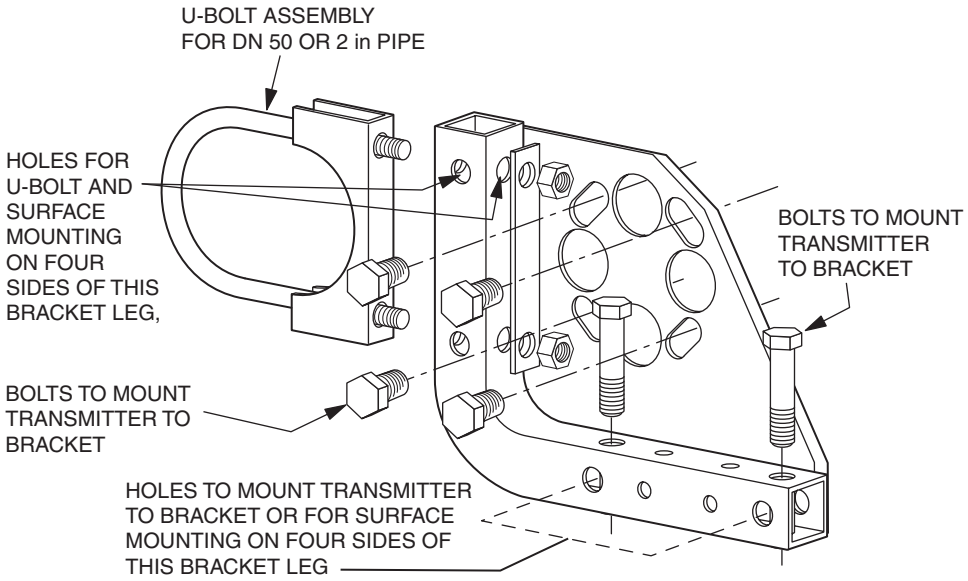


Figure 13. Details of a Universal Bracket

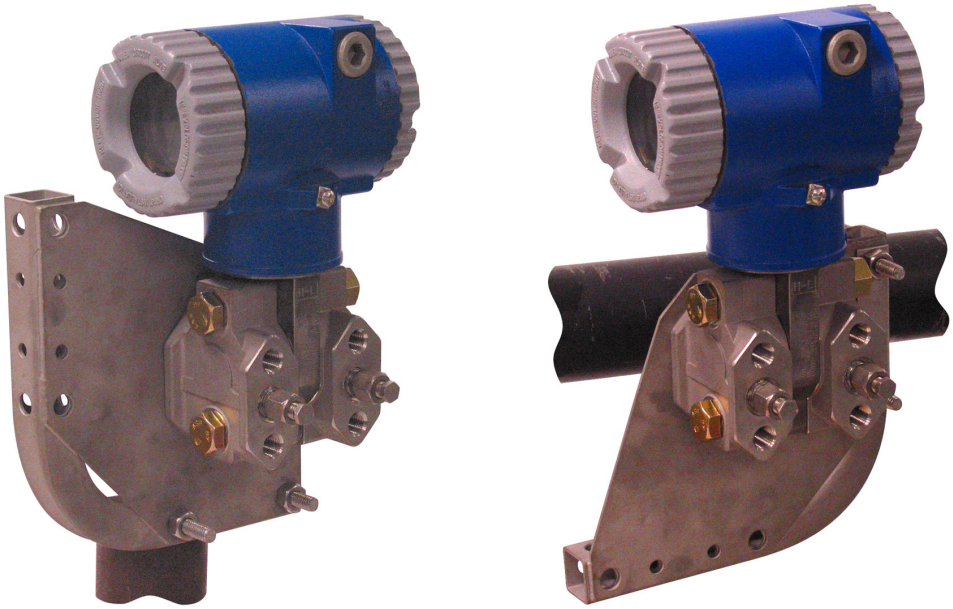


Figure 14. Mounting a Transmitter with Traditional Structure Using a Universal Bracket

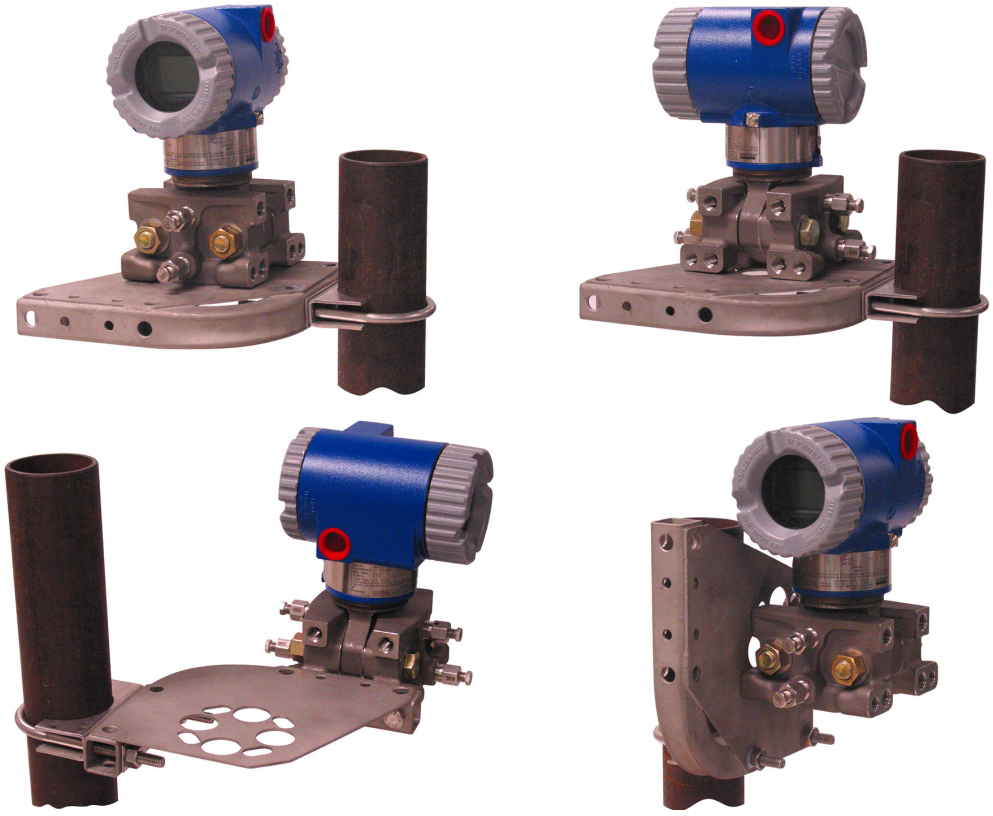


Figure 15. Vertical Pipe Mounting a Transmitter with LP2 Structure Using a Universal Bracket

Figure 16. Horizontal Mounting a Transmitter with LP2 Structure Using a Universal Bracket

Venting and Draining

Traditional Structure

Sensor cavity venting and draining is provided for both vertical and horizontal mounting. For vertical mounted units, draining is via a drain screw shown in Figure 17 and venting is possible with side vents (Option Code -V) shown in Figure 18. For horizontal mounted units, the unit is self draining and venting is via a vent screw shown in Figure 19.

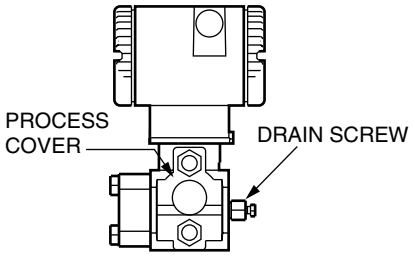


Figure 17. Vertical Mounting - Cavity Draining

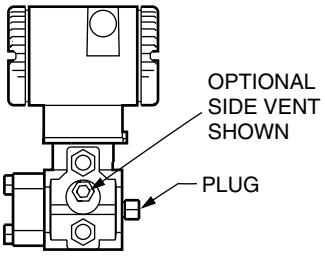


Figure 18. Vertical Mounting - Cavity Venting

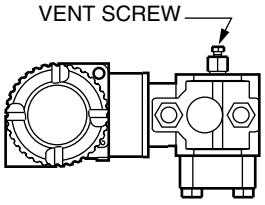


Figure 19. Horizontal Mounting - Cavity Venting

LP1 Low Profile Structure

Sensor cavity venting and draining is provided for both vertical and horizontal mounting. For vertical mounted units, the transmitter is self draining and venting is via a vent screw shown in Figure 20. For horizontal mounted units, the transmitter can simply be 'turned over' (rotated 180 degrees) as shown in Figure 21 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 and down for liquid applications.

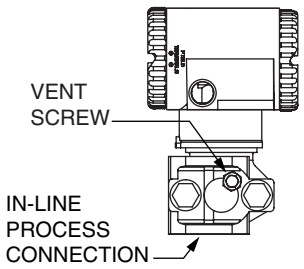


Figure 20. Vertical Mounting - Cavity Venting

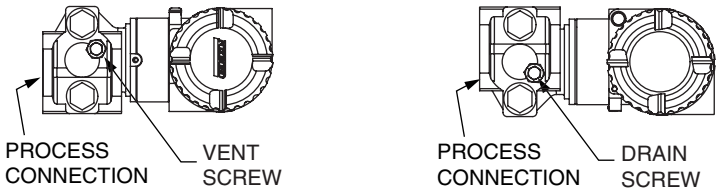


Figure 21. Horizontal Mounting - Cavity Venting and Draining

LP2 Low Profile Structure

The transmitter with LP2 low profile structure had 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 when installed in the upright position. See Figure 22.

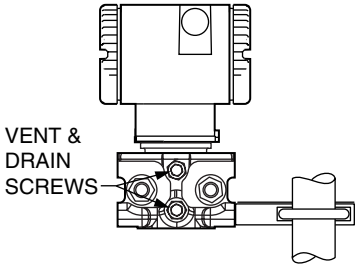


Figure 22. Cavity Venting and Draining

Installation of Flow Measurement Piping

Figure 23 and Figure 24 show 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 in contact with the transmitter, the transmitter lines must be filled with a suitable seal liquid (see procedure in next section). In such a case, the

transmitter must be mounted below the level of the pressure connections at the pipe. With steam flow, the lines are filled with water to protect the transmitter from the hot steam. The seal liquid (or water) is added to the lines through the filling tees. To prevent unequal heads on the transmitter, the tees must be at the same elevation (as shown in Figure 23) 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 lb·ft). Tighten the four process connector bolts to a torque of 61 N·m (45 lb·ft).

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

With medium-viscosity seal liquids and/or long transmitter lines, larger valve sizes should be used.

NOTE

1. 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.
2. With a **vertical** line, flow should be upwards.
3. For **liquid** or **steam** flow, the transmitter should be mounted **lower** than the pressure connections at the pipe.
4. For **gas** flow **without** a seal liquid, the transmitter should be mounted **above** the pressure connections at the pipe; for **gas** flow **with** a seal liquid, the transmitter should be mounted **below** the pressure connections.
5. Invensys recommends the use of snubbers in installations prone to high levels of fluid pulsations.

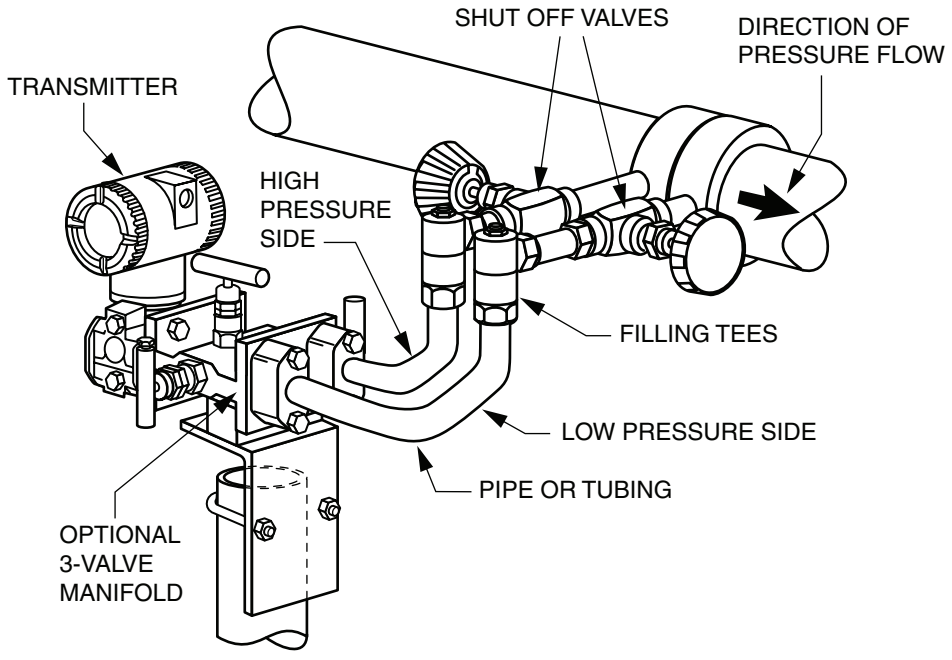


Figure 23. Example of Horizontal Process Line Installation

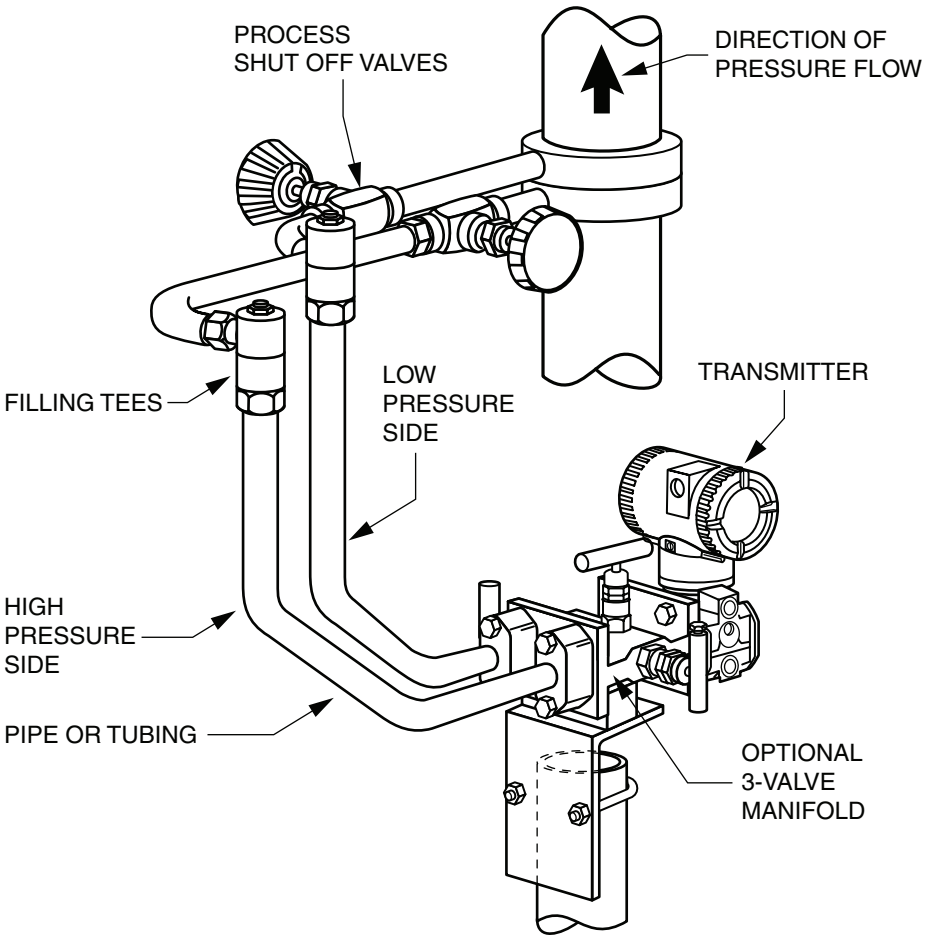


Figure 24. Example of Vertical Process Line Installation

Filling System with Seal Liquid

If the process fluid being measured must not come in contact with the transmitter, the transmitter lines must be filled with a suitable seal liquid. The procedure to do this is as follows:

1. If the transmitter is in service, follow the procedure for "Taking a Differential Pressure Xmtr Out of Operation" on page 50.
2. Close both process shutoff valves.
3. Open all three valves on 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 for "Putting a Differential Pressure Xmtr Into Operation" on page 50.

CAUTION

To 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.

Absolute and Gauge Pressure Transmitter

CAUTION

For 3-A compliant sanitary applications (Models IGP10, IAP10, IGP25-..T, -...M....)

Process wetted surface (diaphragm convolutions) should be installed so that process does not pool between convolutions when the vessel is empty.

The transmitter should be mounted in such a way that nonprocess wetted surfaces are self draining. It should be installed horizontal to vertical, so that the crevice at the feature where the housing is attached to the sensor (neck) is self draining.

The design of these devices does not comply with paragraph D10.1.2 for 3-A standard 74-03 compliance.

IAP10, IGP10, IGP25 and IGP50 Transmitters

These pressure transmitters can be directly connected to the process using the 1/2 NPT external thread or mounted to a vertical or horizontal pipe or a surface using the Optional Mounting Set (Model Code Option -M1 through -M6) as shown in Figure 25.

NOTE

1. Do **not** direct mount these transmitters to the process using the 1/4 NPT internal thread. This thread should only be used to connect to the process when the transmitter is mounted with the optional mounting set.
2. Do **not** mount these transmitters using the conduit connection and optional mounting set when vibration conditions exceed 20 m/s^2 (2 “g”).

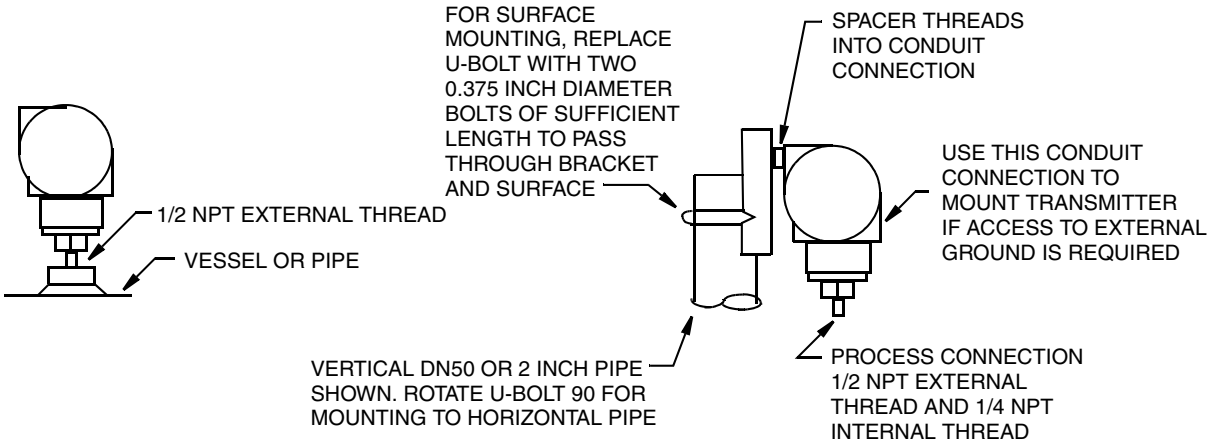


Figure 25. IAP10, IGP10, IGP25, and IGP50 Transmitter Mounting

IAP20 and IGP20 Transmitters

To mount these transmitter to a pipe or surface, use the Optional Mounting Set (Model Code Option -M1 or -M2). Referring to Figure 26, secure the mounting bracket to the transmitter using the two screws provided. Mount the transmitter with the mounting bracket to a vertical or horizontal DN50 or 2-inch pipe. To mount to a horizontal pipe, turn the U-bolt 90° from the position shown in Figure 26. The mounting bracket can also be used for wall mounting by securing the bracket to a wall using the U-bolt mounting holes.

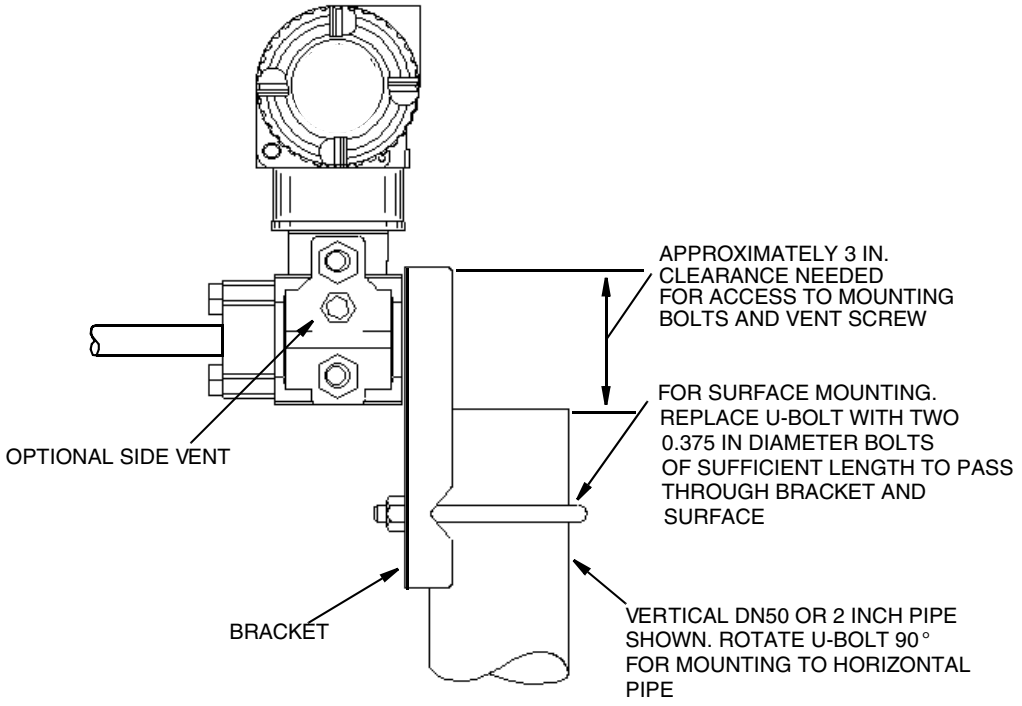


Figure 26. IAP20 and IGP20 Transmitter Mounting

— NOTE

When structure codes 78/79 are used (pvdf insert), the process connection must be made directly to the pvdf insert in the process cover.

Typical Transmitter Piping

Figure 27 shows a typical piping application. Calibration supply pressure can be applied via a calibration tee or calibration screw. The lower conduit port can be used as a drain for moisture buildup in terminal compartment. For Model IAP20, IGP20, IGP25, and IGP50 Transmitters, tighten the process connector bolts to a torque of 61 N·m (45 lb·ft) and drain plugs and vent screws to a torque of 20 N·m (15 lb·ft).

NOTE

1. Invensys recommends the use of snubbers in installations prone to high levels of fluid pulsations.
2. IAP10, IGP10, IGP25, and IGP50 Transmitters mounted directly to process piping or a pressure vessel as shown in Figure 27, could 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.

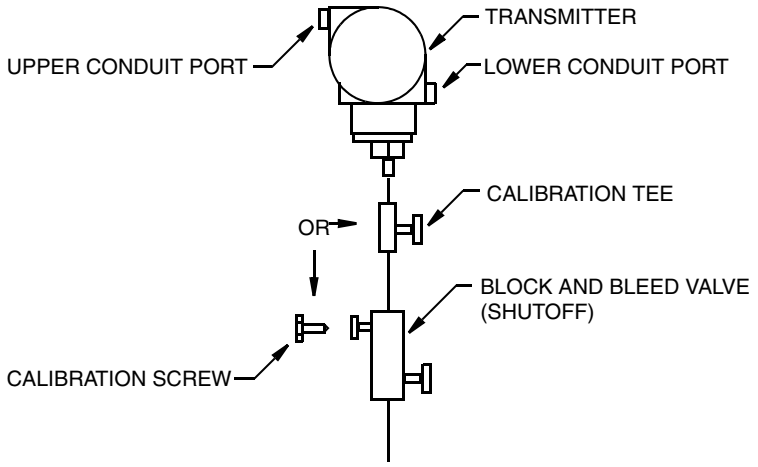


Figure 27. Typical Transmitter Piping (IGP10 shown)

For hot process applications above the operative limits of your transmitter [121°C (250°F)], such as steam, additional piping is required to protect the transmitter from the hot process. See Figure 28. 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.

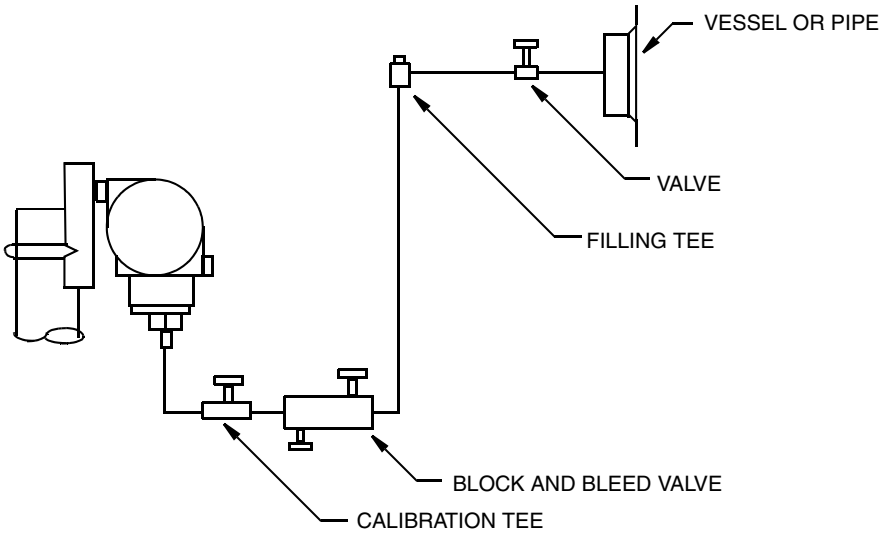


Figure 28. Hot Process Piping

Transmitter with Seals

For information on transmitters with seals, refer to MI 029-369 on your CD-ROM.

Capillary fill fluid specific gravities are given in Table 14 for your convenience.

Table 14. Capillary Fill Fluid Specific Gravities

Fill Fluid Code	Fill Fluid	Specific Gravity at 21°C (70°F)
1	DC200, 10cS, Silicone	0.94
2	FC77 Fluorinert	1.78
3	DC200, 3cS, Silicone	0.90
4	DC704 (HTF) Silicone	1.07
5	Neobee	0.92

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. Housings have either an anti-rotation screw or a retention clip that prevent the housing from being rotated beyond a safe depth of housing/sensor thread engagement.

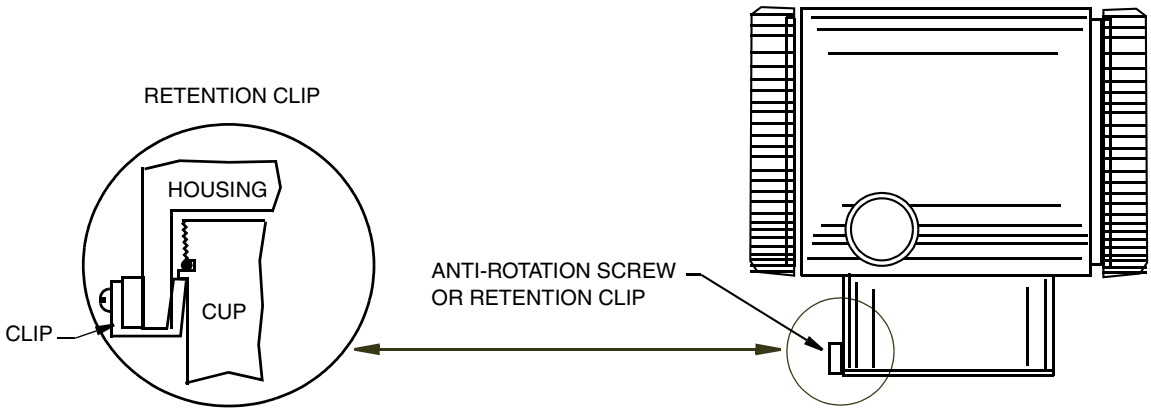


Figure 29. Housing Screw or Clip Location

Positioning the Display

The display (optional in some models) can be rotated within the housing to any of four positions at 90° increments. To do this with the optional removable display, grasp the two tabs on the display and rotate it about 10° in a counterclockwise direction. Pull out the display. Ensure that the O-ring is fully seated in its groove in the display housing. Turn the display to the desired position, reinsert it in the electronics module, aligning the tabs on the sides of the assembly, and twist it in the clockwise direction. With electronics versions -A and -V, the display is a standard part of the electronics module and can be rotated by repositioning the entire module, using the mounting screws.

! CAUTION

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

Setting the Write Protect Jumper

NOTE

This feature only applies to transmitters with FoxCom (Code -D), HART (Code -T), and FOUNDATION fieldbus (Code -F) electronics.

If your transmitter has write protection capability, it means that the external zero, local display, and remote communications can be prevented from writing to the electronics. Write protection is set by moving a jumper that is located in the electronics compartment behind the optional

display. To activate write protection, remove the display as described in the previous section, then remove the jumper or move it to the lower position as shown on the exposed label. Replace the display.

Cover Locks

Electronic housing cover locks, shown in Figure 30, 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.

Wiring

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

— NOTE

Although surge protection is standard, Invensys recommends the use of transient/surge protection in installations prone to unusually high levels of electrical transients and surges.

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 in Figure 30. Note that the embossed letters **FIELD TERMINALS** identify the proper compartment.

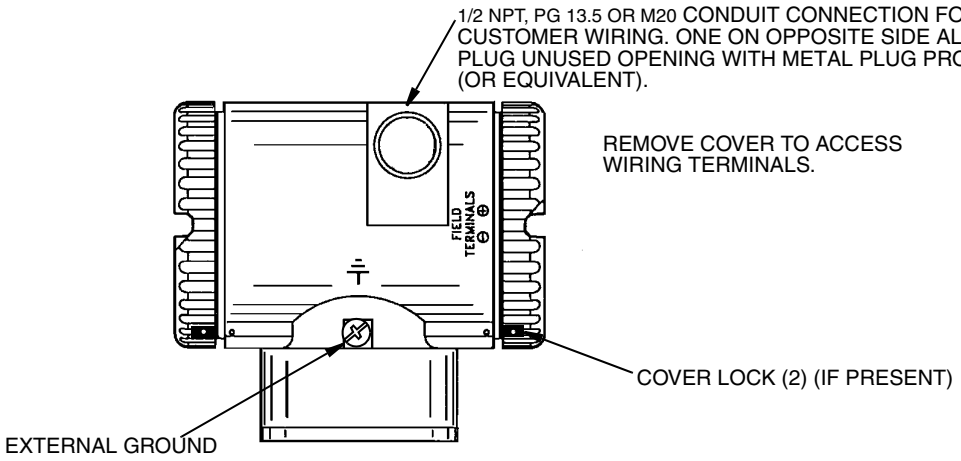


Figure 30. Accessing Field Terminals

4 to 20 mA Output Signal (Model Codes -A, -D, and -T)

The field terminals on a transmitter with a 4 to 20 mA output signal are shown in Figure 31.

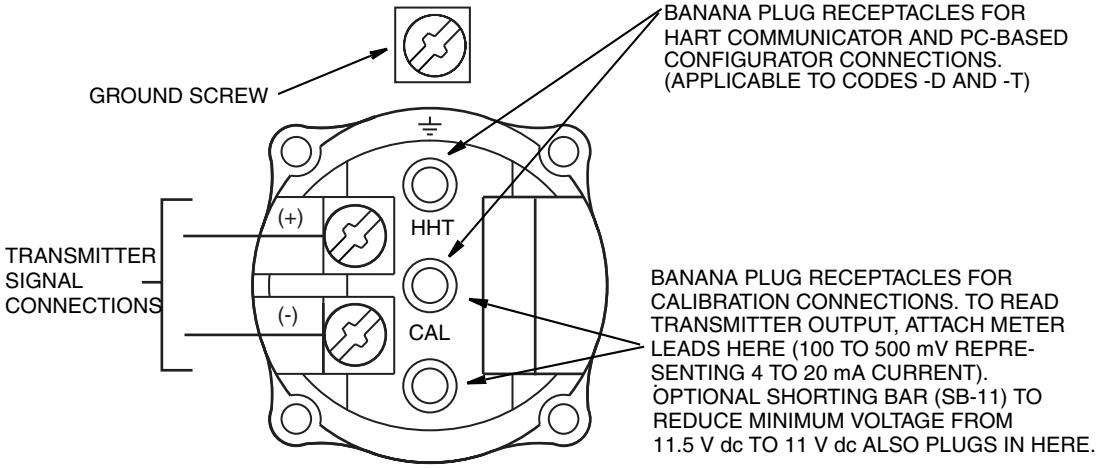


Figure 31. Identification of Field Terminals

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 loose washer on the external ground screw.

When wiring a transmitter with 4 to 20 mA output signal, the supply voltage and loop load must be within specified limits. The supply output load vs. voltage relationship is:

$R_{MAX} = 47.5 (V - 11.5)$ and is shown in Figure 32.

NOTE

The relationship when the optional shorting bar is used is:

$R_{MAX} = 46.8 (V - 11)$.

Any combination of supply voltage and loop load resistance in the shaded area can be used. To determine the loop load resistance (transmitter output load), add the series resistance of each component in the loop, excluding the transmitter. The power supply must be capable of supplying 22 mA of loop current.

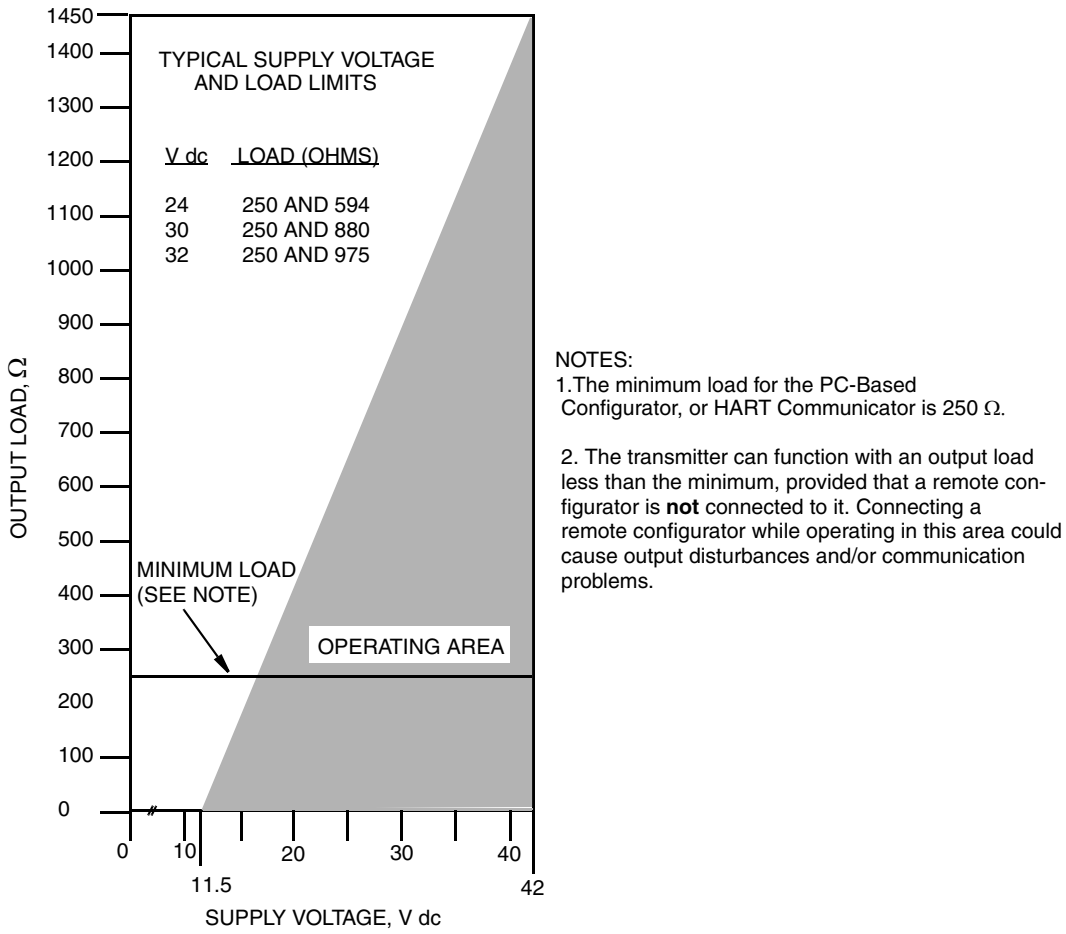


Figure 32. Supply Voltage and Loop Load

Examples:

1. For a loop load resistance of 880 Ω, the supply voltage can be any value from 30 to 42 V dc.
2. For a supply voltage of 24 V dc, the loop load resistance can be any value from 250 to 594 Ω with remote communications and zero to 594 Ω without remote communications.

To wire one or more transmitters to a power supply, proceed with the following steps.

1. Remove the cover from the transmitter field terminals compartment.
2. Run signal wires (0.50 mm^2 or 20 AWG, typical) through one of the transmitter conduit connections as shown in Figure 30. Use twisted pair to protect the 4 to 20 mA output and/or remote communications from electrical noise. Maximum recommended length for signal wires is 1800 m (6000 ft)

— NOTE

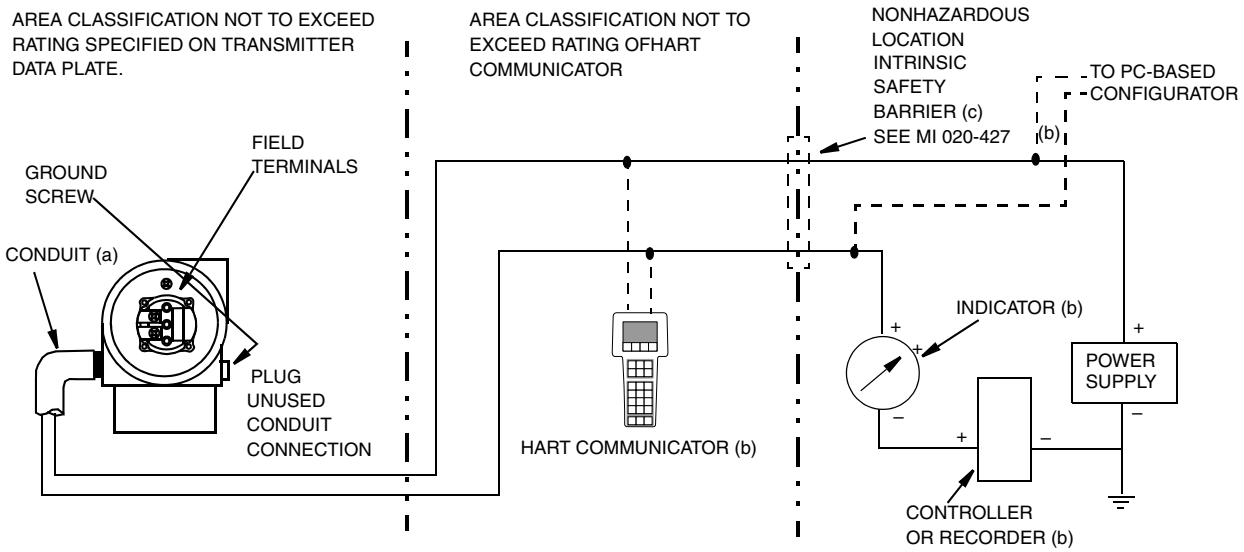
Do not run transmitter wires in same conduit as mains (ac power) wires.

3. If shielded cable is used, ground (earth) the shield at the receiver **only**. Do not ground the shield at the transmitter. Cut or tape the shield so that it cannot contact the metal housing.
4. Plug the unused conduit connection with the metal plug provided (or equivalent). To maintain specified explosionproof and dust-ignitionproof protection, the plug must engage a **minimum** of five full threads.
5. Connect a ground wire to the ground terminal in accordance with local practice.

! CAUTION

If the signal circuit must be grounded, it is preferable to do so at the negative terminal of the dc power supply. 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.

6. Connect the power supply and receiver loop wires to the "+" and "–" terminal connections shown in Figure 31.
7. Connect receivers (such as controllers, recorders, indicators) in series with power supply and transmitter as shown in Figure 33.
8. Install the cover onto the transmitter. Turn covers to seat O-ring into the housing and then continue to hand tighten until the cover contacts the housing metal-to-metal. If cover locks are present, refer to "Cover Locks" on page 36.
9. If wiring additional transmitters to the same power supply, repeat Steps 1 through 8 for each additional transmitter. The setup with multiple transmitters connected to a single power supply is shown in Figure 34.
10. The PC-Based Configurator can be connected in the loop between the transmitter and the power supply as shown in Figure 33 and Figure 34 (not applicable with Version -A). Note that a minimum of 250 Ω must separate the power supply from the PC-Based Configurator or HART Communicator).



(a) RUN CONDUIT DOWN TO AVOID MOISTURE BUILDUP IN TERMINALS COMPARTMENT.
(b) THERE MUST BE AT LEAST 250 Ω TOTAL RESISTANCE BETWEEN THE PC-BASED CONFIGURATOR OR HART COMMUNICATOR AND THE POWER SUPPLY).
(c) TRANSMITTERS WITH -A ELECTRONICS ARE NOT DESIGNED FOR USE WITH INTRINSIC SAFETY BARRIERS.

WARNING

DIFFERENT VERSIONS OF THE HART COMMUNICATOR MAY BE SUITABLE FOR DIFFERENT CLASSIFICATIONS (FOR EXAMPLE, DIVISION 1 OR DIVISION 2). CHECK THE RATING OF THE VERSION YOU HAVE BEFORE USING IT IN A HAZARDOUS AREA. LOCATING OR CONNECTING A HART COMMUNICATOR IN A HAZARDOUS AREA FOR WHICH IT IS NOT CERTIFIED COULD RESULT IN AN EXPLOSION.

Figure 33. Loop Wiring 4 to 20 mA Output Transmitters

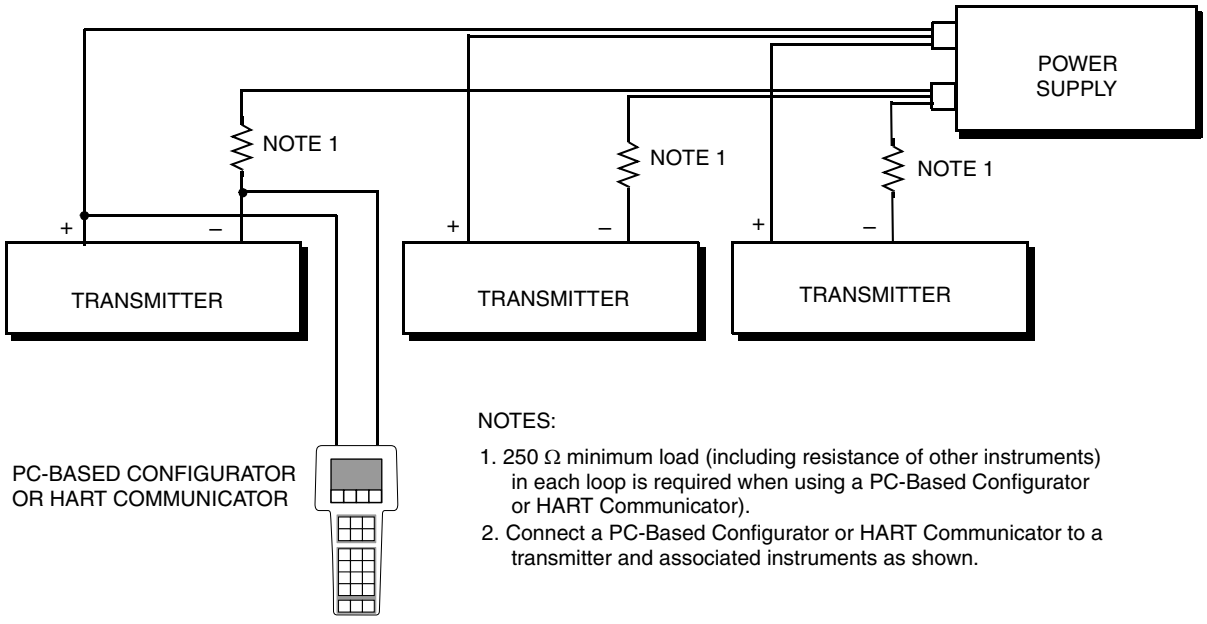


Figure 34. Wiring Several 4 to 20 mA Transmitters to a Common Power Supply

The transmitters with FoxCom (-D) and HART (-T) communications also communicate digitally with the PC-Based Configurator and the HART Communicator respectively at distances up to 1800 m (6000 ft). Communication between the remote configurator and the transmitter does not disturb the 4 to 20 mA output signal.

HART Multidrop Wiring (Model Code -T)

"Multidropping" refers to the connection of several transmitters to a single communications transmission line. Communications between the host computer and the transmitters takes place digitally with the analog output of the transmitter deactivated. With the HART communications protocol, up to 15 transmitters can be connected on a single twisted pair of wires or over leased telephone lines.

The application of a multidrop installation requires consideration of the update rate necessary from each transmitter, the combination of transmitter models, and the length of the transmission line. Multidrop installations are not recommended where intrinsic safety is a requirement. Communication with the transmitters can be accomplished with any HART compatible modem and a host implementing the HART protocol. Each transmitter is identified by a unique address (1-15) and responds to the commands defined in the HART protocol.

Figure 35 shows a typical multidrop network. Do not use this figure as an installation diagram. Contact the HART Communications Foundation (telephone 512-794-0369 in the U.S.) with specific requirements for multidrop applications.

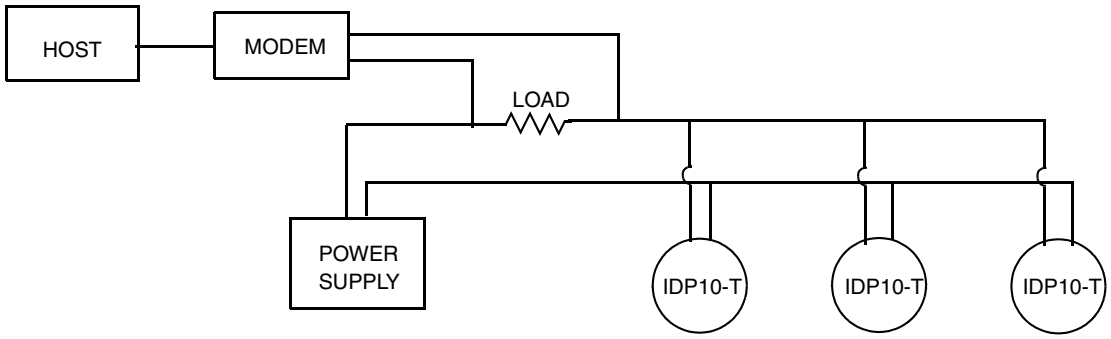


Figure 35. Typical Multidrop Network

The HART Communicator can operate, configure, and calibrate transmitters with HART communication protocol in the same way as it can in a standard point-to-point installation.

— NOTE

Transmitters with HART communication protocol are set to poll address 0 (**POLLADR 0**) at the factory, allowing them to operate in the standard point-to-point manner with a 4 to 20 mA output signal. To activate multidrop communication, the transmitter address must be changed to a number from 1 to 15. Each transmitter must be assigned a unique number on each multidrop network. This change deactivates the 4 to 20 mA analog output.

1 to 5 V dc Output Signal (Model Code -V)

The field terminals on a transmitter with a 1 to 5 V dc output signal are shown in Figure 36.

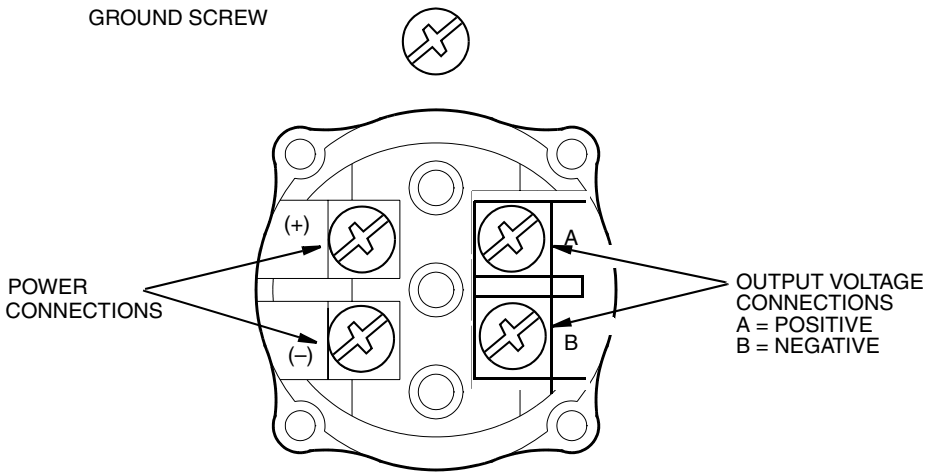


Figure 36. Identification of Field Terminals

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 loose washer on the external ground screw.

Power Supply Voltage and Current

The power supply voltage across the transmitter input terminals can be any value between 9 and 15.5 V dc and the power supply must be capable of supplying 3 mA of 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 10 MΩ

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 as shown in Figure 37 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.

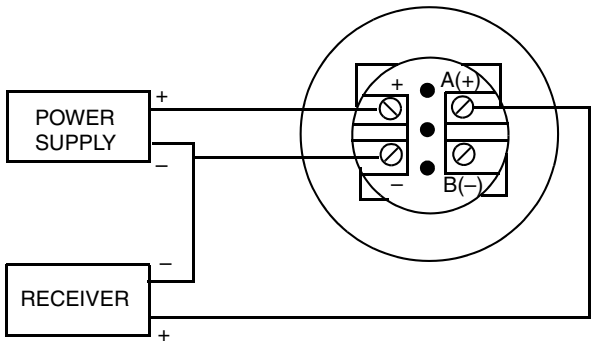


Figure 37. Three-wire Connection

For wiring runs with high resistance due to long lengths or other reasons) or for maximum accuracy, a four-wire connection as shown in Figure 38 can be used to provide input-output isolation. With four-wire configuration, voltage drop in the power supply loop does not affect measurement accuracy.

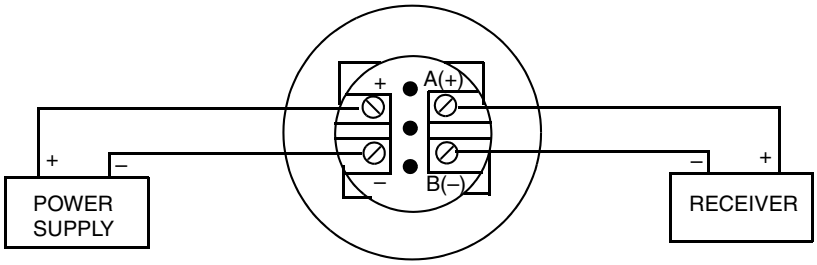


Figure 38. Four-wire Connection

To wire a transmitter, proceed with the following steps.

1. Screw in cover lock (if present) and remove the field terminals compartment cover by rotating it counterclockwise.
2. Run the supply voltage and output wires (0.50 mm^2 or 20 AWG, typical) through one of the transmitter conduit connections as shown in Figure 30. If four-wire connection is used, use twisted single pair on the output side to protect the 1 to 5 V dc output from electrical noise.

— NOTE

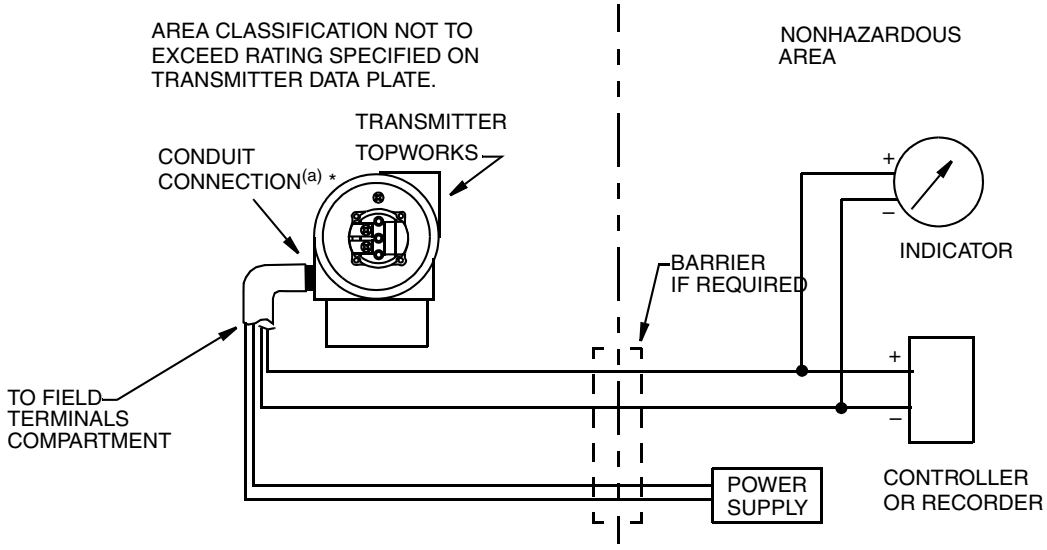
Do not run transmitter wires in same conduit as mains (ac power) wires.

3. 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 it cannot contact the metal housing.
4. Plug unused conduit connection with the metal plug provided (or equivalent). To maintain specified explosionproof and dust-ignitionproof protection, plug must engage a **minimum** of five full threads. Thread sealant is recommended.
5. Connect an ground wire to the ground terminal in accordance with local practice.

CAUTION

If the output circuit must be grounded, it is preferable to do so 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.

6. Connect the power supply and receivers (such as controllers, recorders, indicators) as shown in Figure 37 or Figure 38. Typical loop wiring is shown in Figure 39.
7. Install the cover onto the transmitter. Turn covers to seat O-ring into the housing and then continue to hand tighten until the cover contacts the housing metal-to-metal. If cover locks are present, refer to "Cover Locks" on page 36.
8. If wiring additional transmitters to the same power supply, repeat Steps 1 through 7 for each additional transmitter. The setup with multiple transmitters connected to a single power supply is shown in Figure 40.
9. For installations with long runs, Invensys recommends using two twisted pair with one pair connected to the power supply terminals and one pair connected to the output terminals. The two twisted pair can be in individual shields or a common shield with the shield connected to the receiver. The shield must **not** be connected to the transmitter.



(a) RUN CONDUIT DOWN TO AVOID MOISTURE BUILDUP IN FIELD TERMINALS COMPARTMENT.

Figure 39. Loop Wiring (four-wire connection shown)

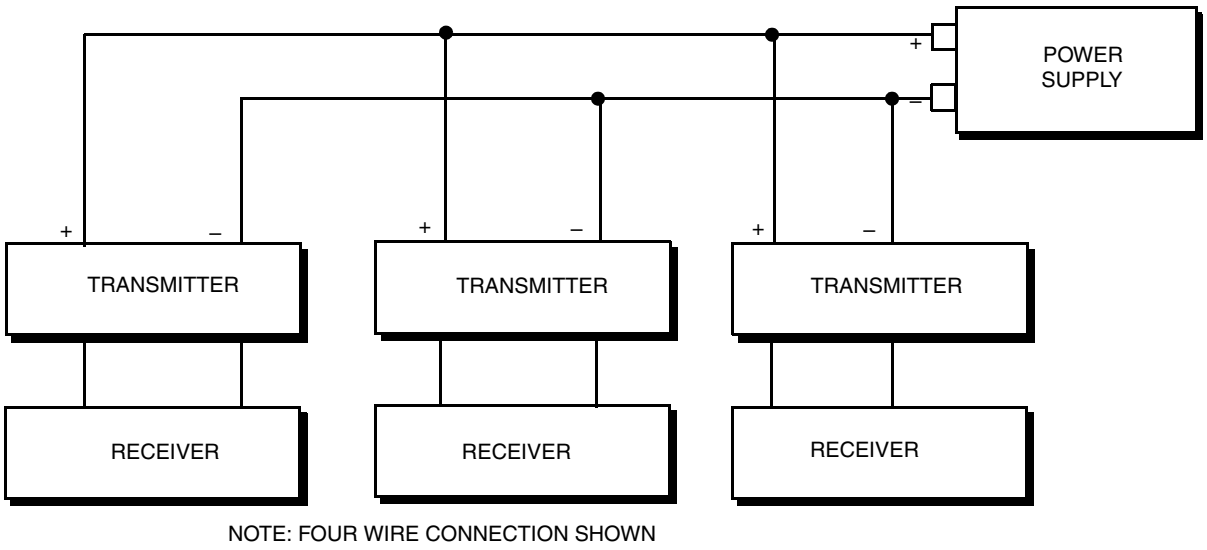


Figure 40. Wiring Several Transmitters to a Common Power Supply

FoxCom Communications Protocol (Model Code -D)

The transmitter can be configured to send its pressure measurement to the I/A Series system as a digital signal using FoxCom protocol. Remote communication between the transmitter and the PC-Based Configurator or any I/A Series system console can be accommodated up to 600 m (2000 ft) away from the FBM.

— NOTE

Ensure that the transmitter output is configured for "digital output" before attaching it to an FBM that will be communicating in only the digital mode. Also, make sure that Device Name is the same as the letterbug used for that channel in the I/A Series System, or verify that the transmitter device name is set to its default description, DevNam, before installation.

Transmitters with FoxCom digital output signal connect to an I/A Series system. This procedure identifies wire terminations in the transmitter and in the I/A Series system enclosure. For other system wiring details, refer to the Installation Instructions provided with the I/A Series system.

The maximum total resistance for each transmitter loop is 420 Ω. For example, if an intrinsically safe barrier with a resistance of 340 Ω is used, the maximum wire resistance is 80 Ω. Maximum recommended length for field wire is 600 m (2000 ft). Transmitter power is supplied by the I/A Series FBM.

1. Remove the cover from the transmitter field terminal compartment.
2. Run signal wires (0.50 mm^2 or 20 AWG, typical) through one of the transmitter conduit connections as shown in Figure 41. Use twisted pair to protect the digital output and/or remote communications from electrical noise. Screened (shielded) cable may be required in some locations.

— NOTE

Do not run transmitter wires in same conduit as mains (ac power) wires.

3. If shielded cable is used, ground the shield at the field enclosure **only**. Do not ground the shield at the transmitter.
4. Plug unused conduit connection with the PG 13.5 or 1/2 NPT metal plug provided (or equivalent). To maintain specified explosionproof and dust-ignitionproof protection, plug must engage a **minimum** of five full threads.

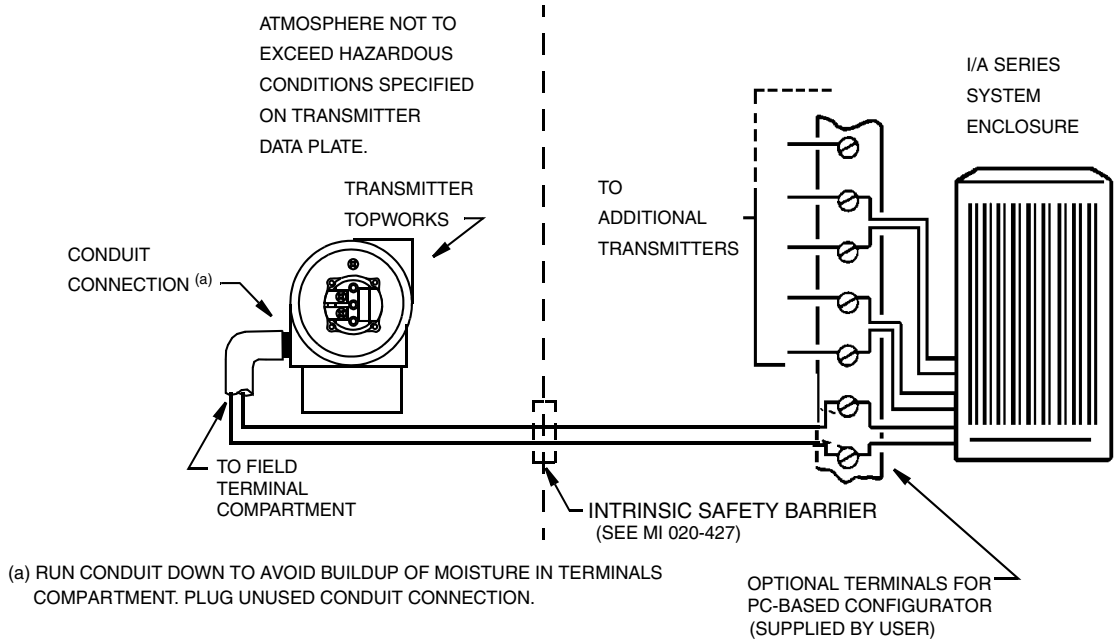


Figure 41. Typical Transmitter Wiring to an I/A Series System

5. Connect an ground wire to the ground terminal in accordance with local practice. Ground terminal is shown in Figure 31.

! CAUTION

To avoid errors resulting from ground loops or the possibility of short-circuiting groups of instruments in a loop, use only one ground in a loop.

6. Connect the signal wires to the transmitter "+" and "–" terminal connections shown in Figure 31.
7. The PC-Based Configurator can be connected via banana plugs to the top two receptacles (designated **HHT**) on the terminal block in the field terminal compartment as shown in Figure 31 or any other convenient location in the loop (subject to hazardous location restrictions). For example, to communicate with several transmitters from a single location, connect each pair of signal wires to a separate pair of terminals. The PC-Based Configurator can then be easily disconnected from one loop and connected to another.
8. Reinstall the cover on the transmitter. Turn the cover to seat the O-Ring into the housing and continue to hand tighten until the cover contacts the housing metal-to-metal.

FOUNDATION Fieldbus Communication (Model Code -F)

Do not run transmitter wires in the same conduit as mains (ac power) wires.

Use FOUNDATION fieldbus approved cable (multi-core, shielded, twisted pair cable) to protect remote communications from electrical noise. Refer to MI 020-360 or FOUNDATION fieldbus Application Guide AG-140, Rev 1.0 or later.

Power supply (a FOUNDATION fieldbus Power Supply Module) must be capable of providing at least 14 mA for each transmitter connected.

A summary of the voltage requirements is listed in Table 15.

Table 15. Minimum Supply Voltage Requirements

Minimum Supply Voltage	9 V
Recommended Supply Voltage	24 V
Maximum Supply Voltage	32 V

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 loose washer on the external ground screw. Ground the shield at one place per segment **only**.

Refer to Figure 42 for wiring diagram.

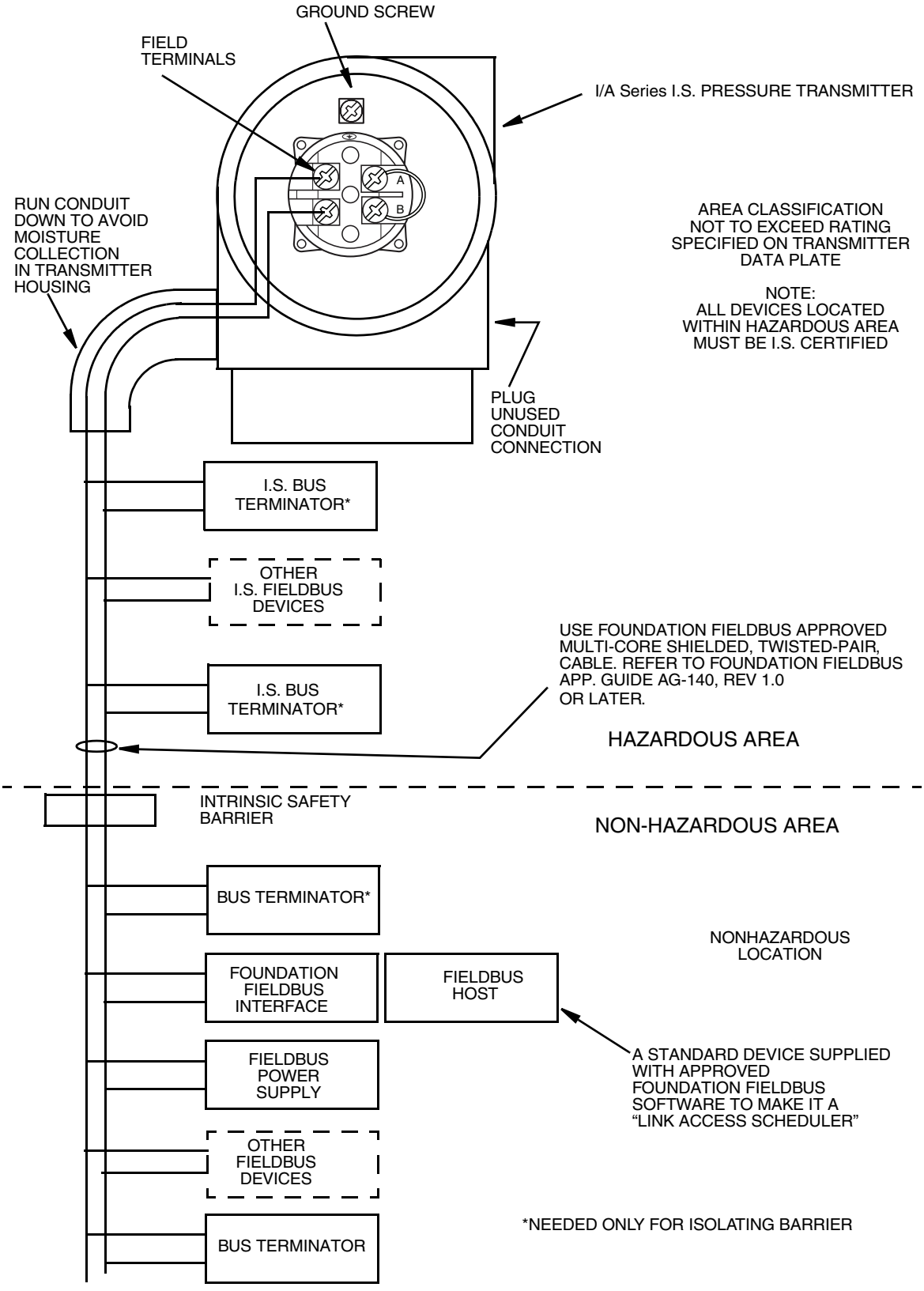


Figure 42. Wiring Diagram of Typical FOUNDATION Fieldbus Transmitter Installation

Installing Fieldbus Software (Model Code -F)

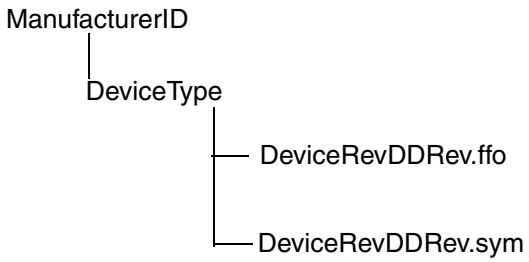
Device descriptions for I/A Series Foundation fieldbus transmitters are available for downloading from the website

http://ips.invensys.com/en/products/measurement/Pages/downloads-P076.aspx

The files are:

Filename	Description
xxyy.ffo where	DD binary file xx = Device Rev. (Parameter 12 in Resource Block) yy = DD Rev. (Parameter 13 in Resource Block)
xxyy.sym	DD symbol file
xxyyzz.cff	Capability file (zz = cff rev)

Set up the following directory structure for the DD files of a device on the host computer. According to the FOUNDATION specification, the device description files must be present in the appropriate directories as described below.



where *.ffo is the DD binary file and *.sym is the symbol file.

The Manufacturer ID for Foxboro is 385884 and the Device Type for this transmitter is BA30.

Putting a Differential Pressure Xmtr Into Operation

The following procedure explains how to sequence the valves in your flow measurement piping or optional bypass manifold to ensure that your transmitter is not overranged and that seal liquid is not lost. Refer to Figure 23 or Figure 24.

NOTE

Procedure assumes that Process shutoff valves are open.

1. Make sure that both upstream and downstream manifold valves are closed.
2. Make sure that bypass valve is open.
3. Slowly open the upstream manifold valve.
4. Close the bypass valve.
5. Slowly open the downstream manifold valve.

Taking a Differential Pressure Xmtr Out of Operation

The following procedure explains how to sequence the valves in your flow measurement piping or optional bypass manifold to ensure that your transmitter is not overranged and that seal liquid is not lost. Refer to Figure 23 or Figure 24.

NOTE

Procedure assumes that Process shutoff valves are open.

1. Close the downstream manifold valve.
2. Close the upstream manifold valve.
3. Open the bypass valve.
4. Carefully open the vent screw to release any residual pressure before disconnecting lines.

! WARNING

When venting pressure from the transmitter, wear suitable protective equipment to prevent possible injury from process material, temperature, or pressure.

3. Operation Using Local Display

— NOTE

For analog output versions (electronics codes -A or -V), all configuration must be done from the optional local display. For intelligent versions (electronics codes -D, -T, and -F), you can configure most parameters using the local display. However, for more complete configuration capability, use a PC-Based Configurator or HART Communicator.

A local display, as shown in Figure 43, has two lines of information. The upper line is a 5-digit numeric display (4-digit when a minus sign is needed and 4-digit for electronics versions -A and -V); the lower line is an 7-digit alphanumeric display. The display provides local indication of measurement information. The primary (M1) measurement is normally displayed. To view the secondary (M2) measurement on intelligent versions, press the **Enter** button while in normal operating mode. Press the **Next** or **Enter** button to return to the primary measurement. If left in M2 display, an M2 message blinks in the lower right of the display. If power to the transmitter is interrupted, the display reverts to the M1 display.

— NOTE

With HART communication, the display can be configured to meet your specific needs. If configured **Show 1**, M1 is displayed. If configured **Show 2**, M2 is displayed. To temporarily view the alternate measurement, press the **Enter** button. After showing this measurement for a brief period, the display reverts to the configured display. If configured **Toggle**, the display toggles between M1 and M2. When M2 is displayed, an M2 message blinks in the lower right of the display. If power to the transmitter is interrupted, the display reverts to the configured display.

The display also provides a means for performing calibration and configuration, viewing the database, and testing the display via the 2-button keypad. You can access these operations by means of a multi-level menu system. Entry to the Mode Select menu is made (from normal operating mode) by pressing the **Next** button. You can exit this menu, restore your prior calibration or configuration, and return to the normal operating mode at any time by going to **Cancel** and pressing the **Enter** button.

— NOTE

During calibration or configuration, if an entry is **Enter**ed in error, use the **Cancel** feature to restore the transmitter to its starting configuration and begin again.

The following items can be selected from this menu: Calibration (**CALIB**). Configuration (**CONFIG**), Viewing the database (**VIEW DB**), and Testing the display (**TST DSP**). The top level structure diagram is shown in Figure 44.

— NOTE

VIEW DB is not applicable to Code -A and -V transmitters.

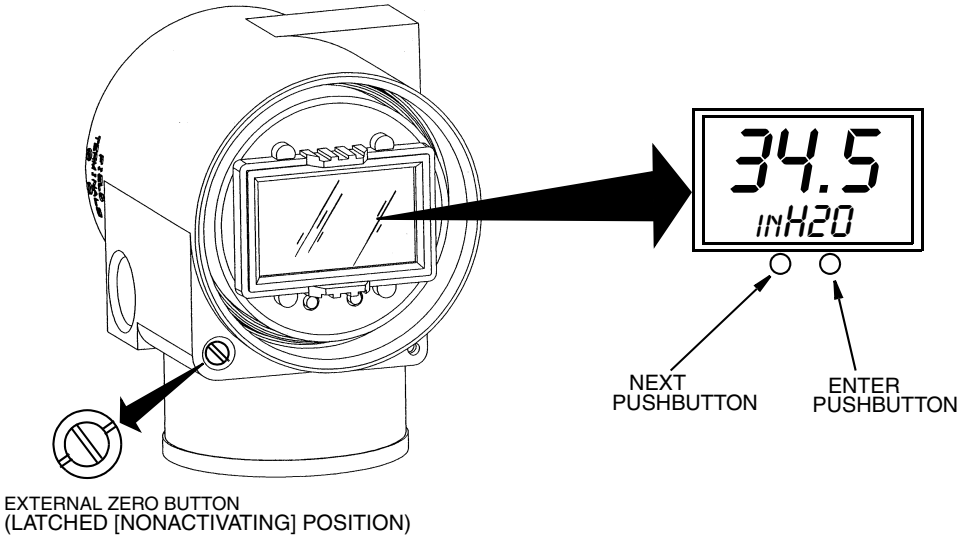


Figure 43. Local Display Module

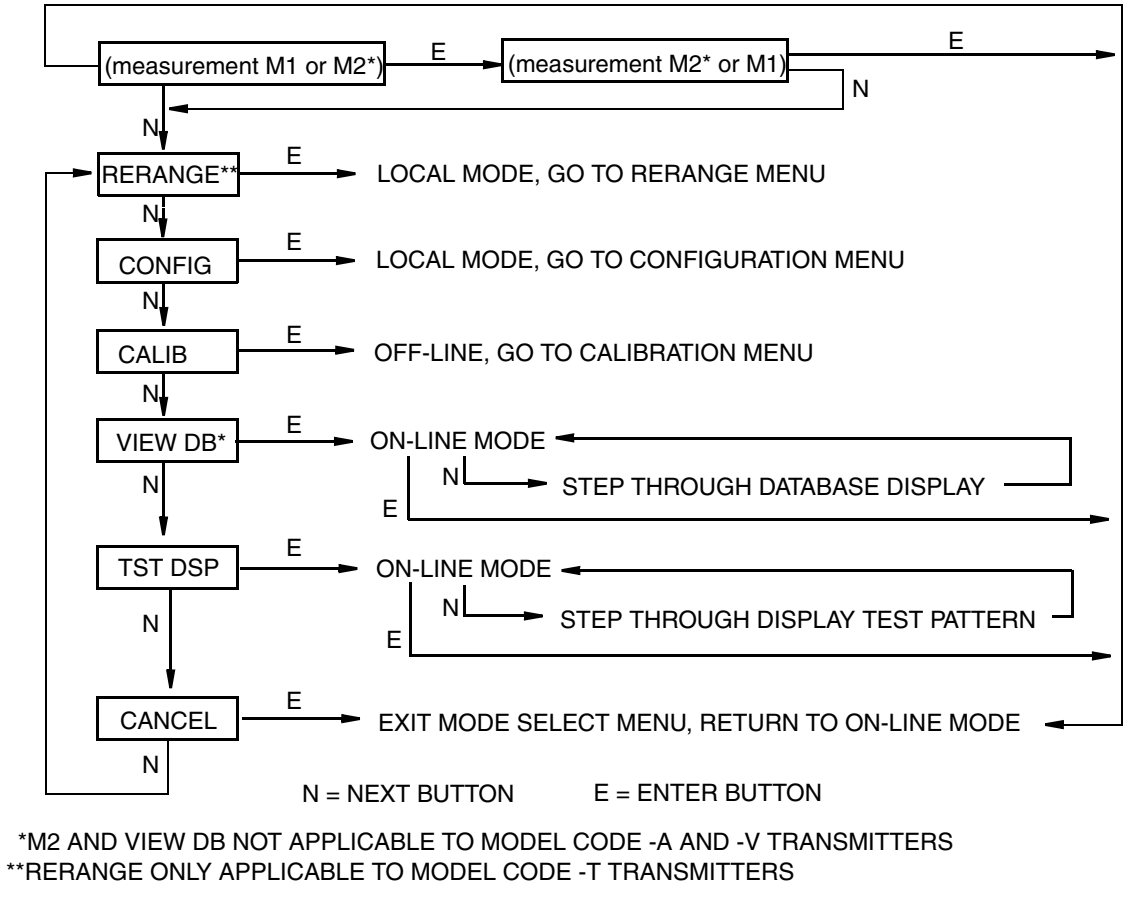


Figure 44. Top Level Structure Diagram

NOTE

In the Configuration menu and during adjustment of 4 and 20 mA (or 1 to 5 V dc) in the Calibration menu, the milliampere (or voltage) output does not reflect live measurement values. Also, during Calibration and Configuration menu operations, the I/A Series system identifies all transmitter measurements as **BAD** because the transmitter is not in the online mode.

Moving Through the Menu Structure

The general procedure for moving through the menu structure is to use the **Next** button to select an item and the **Enter** button to specify your selection. See Figure 45 for an example of a typical menu structure. The example used is the beginning of the Configuration menu for a transmitter with FoxCom Communications.

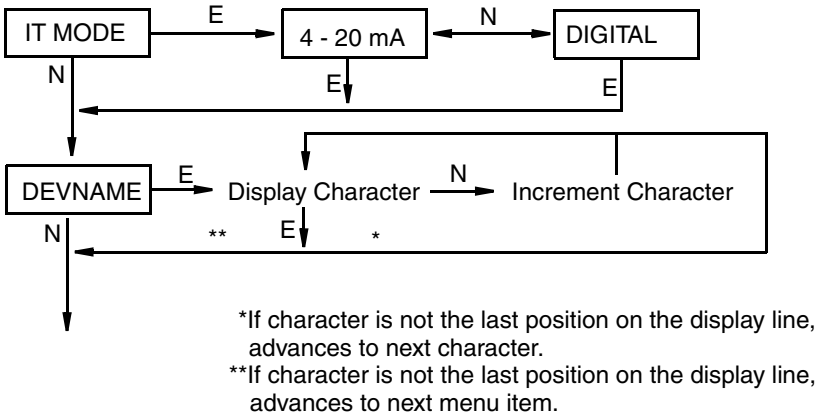


Figure 45. Typical Menu Structure

In Figure 45, at the display **IT MODE**, press **Enter**. Use the **Next** button to select **4-20 mA** or **Digital** and then **Enter** to specify your selection. The display advances to **DEVNAME**. Press **Enter**. Follow the general procedure below to select the letters for your device name. The procedure to enter letters is similar to that for entering numerical values.

Entering Numerical Values

The general procedure for entering numerical values in Calibration and Configuration is as follows:

1. At the appropriate prompt press the **Enter** button. The display shows the last (or default) value with the first digit flashing.
2. Use the **Next** button to select the desired first digit, then press the **Enter** button. Your selection is entered and the second digit flashes.
3. Repeat Step 2 until you have created your new value. If the number has less than five characters, use leading or trailing zeros for the remaining spaces. When you have configured the fifth space, the display prompts you to place the decimal point (**SET DP**).
4. Move the decimal point with the **Next** button until it is where you want it and press the **Enter** button.

5. The display advances to the next menu item.

NOTE

1. The decimal point may not be placed directly after the first digit. For example, you can not enter a value as 1.2300; you must enter it as 01.230.
2. The decimal position is identified by flashing except at the position after the fifth digit. At that position (representing a whole number), the decimal point is assumed.

Zeroing from the LCD Indicator Pushbuttons or Optional External Zero Button

Depending on the electronics version specified and whether or not the optional external zero adjust is specified, the transmitter can be zeroed with either the Lower Range Value pressure applied (CAL LRV) or zero pressure applied (CAL AT0).

The value of LRV pressure is settable and stored in the transmitter database. Apply a pressure equal to this value before activating CAL LRV.

CAL AT0 allows easy zeroing of transmitters with non-zero based ranges. Before activating CAL AT0, gauge pressure transmitters must be vented to atmosphere and differential pressure transmitters must have zero differential pressure applied. Do **not** use CAL AT0 with remote seal transmitters having seals at different elevations from the transmitter or with vented absolute pressure transmitters.

The following table shows the zeroing functions supported by each electronics version.

Interface Method	Electronics Versions	
	D, F, and T	A and V
LCD Pushbuttons[a]	CAL LRV and CAL AT0	CAL LRV and CAL AT0
External Zero Option[b]	CAL LRV and CAL AT0	CAL AT0

(a) Function selected from CALIB menu on LCD Indicator.

(b) On transmitters with Dual Function External Zero (Versions -D, -F, and -T), the zeroing is done by depressing the zero button:

< 3 seconds = CAL AT0
> 5 seconds = CAL LRV

Using the Optional External Zero Button:

An external zero adjustment mechanism in the electronics housing (see Figure 43) allows zeroing without removing the electronics compartment cover.

Zeroing is accomplished by depressing the zero button after it is unlatched.

Unlatch the zero button by turning the screw 90° counterclockwise so that the screwdriver slot lines up with the two holes in the face of the adjacent part. Do not push the button in with the screwdriver until ready to perform the zeroing operation.

Zeroing from a HART Communicator

The electronics version -T transmitter can be zeroed from a HART Communicator. The transmitter can be zeroed with any applied pressure by entering the value of the applied pressure (one-point calibration).

Also, using the Zero Trim function on the HART Communicator provides the same function as a CAL AT0. To do this, the following requirements apply:

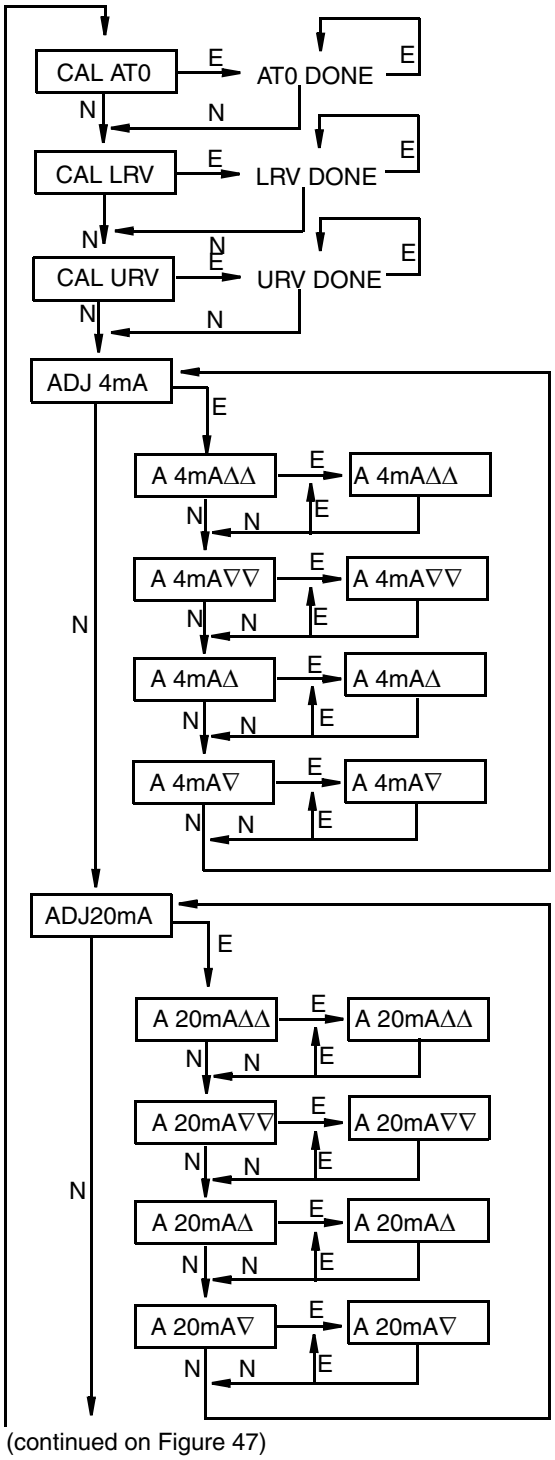
- Differential Pressure Transmitter — H and L sides must be equalized
- Gauge Pressure Transmitter — Must be vented to atmosphere
- Absolute Pressure Transmitter — Full vacuum must be applied

— NOTE

Do **not** perform a Zero Trim procedure on an absolute pressure transmitter unless full vacuum is applied. The more common procedure for zeroing an absolute pressure transmitter is to vent it to atmosphere and do a one-point calibration, entering the current value of barometric pressure.

4. Calibration

Calibration Diagram



(continued on Figure 47)

E = ENTER
N = NEXT

NOTES:

1. CAL AT0, CAL LRV, and CALURV apply to transmitters with FoxCom communications (Code -D), HART communications (Code -T), 4 to 20 mA Output (Code -A), and 1 to 5 V dc Output (Code -V).

2. For Code -V transmitters, substitute 1 V dc for 4 mA and 5 V dc for 20 mA throughout the diagram.

3. This diagram does **not** apply to transmitters with FOUNDATION fieldbus communication (Code -F). For calibration information on these transmitters, see the CD-ROM.

4. CAL AT0, CAL LRV, and CAL URV require application of appropriate pressure before pressing ENTER. <u>For reranging without pressure, see the next page.</u>

Figure 46. Calibration Structure Diagram

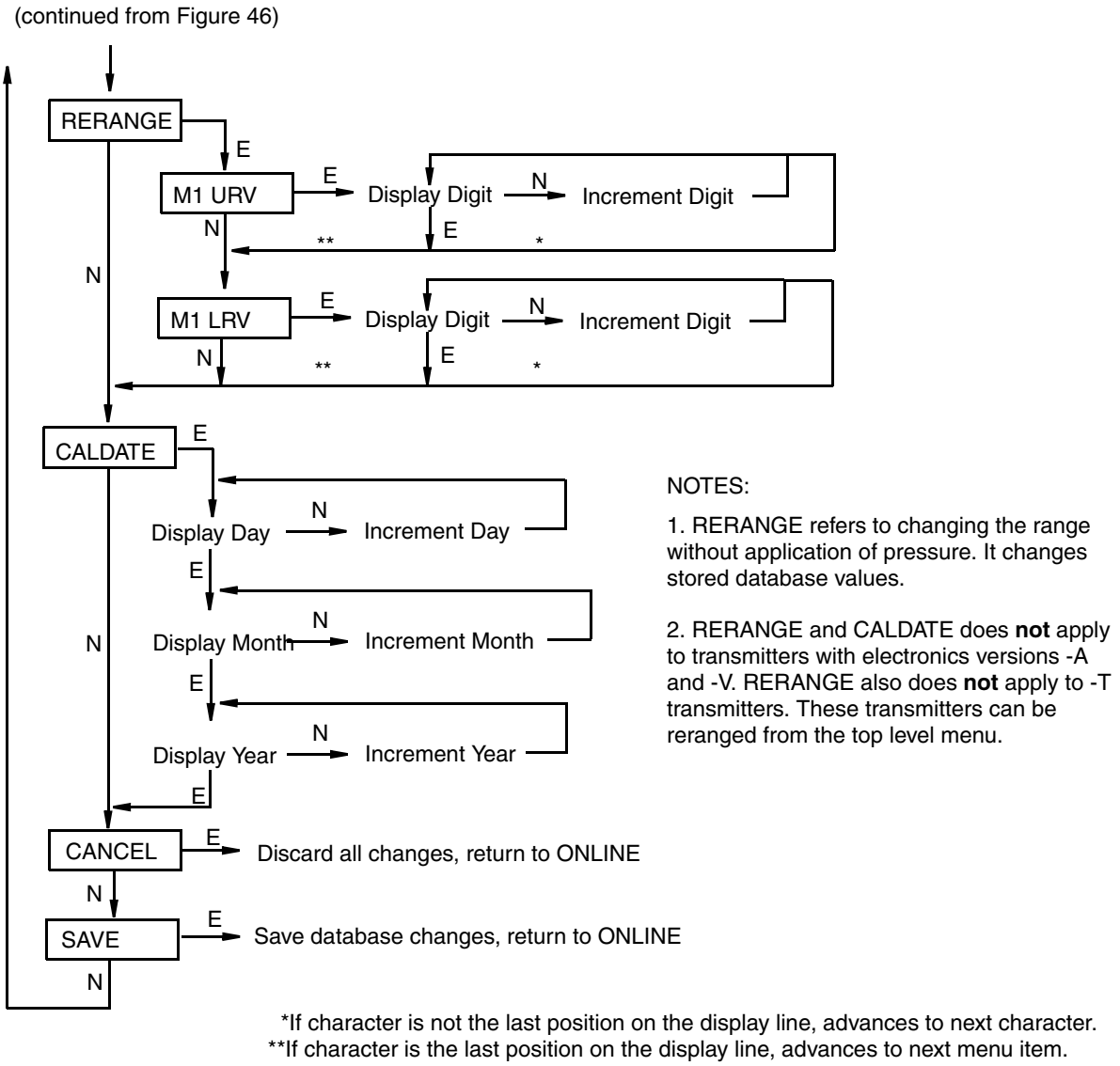


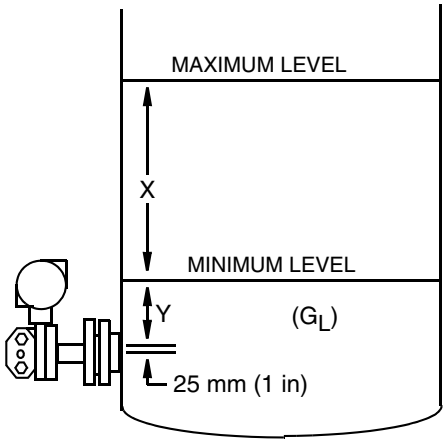
Figure 47. Calibration Structure Diagram (Continued)

Liquid Level Application Calibrated Range Values

Use the following to determine the upper and lower range values for Liquid Level applications. For similar information on Liquid Density or Liquid Interface Level applications, refer to MI 020-369 on the CD-ROM with your transmitter.

The level range is a function of measured liquid head. The measurement may be in equivalent head of water units, such as inH_2O or mmH_2O. However, the numerical value in level units may be very different from the numerical value in equivalent head of water units. For example, a wet leg application may have a transmitter measurement range of -140 to -20 inH_2O for a desired level measurement range of 0 to 150 inches.

The following illustrations show how to calculate the typical measurement ranges for various tank applications.

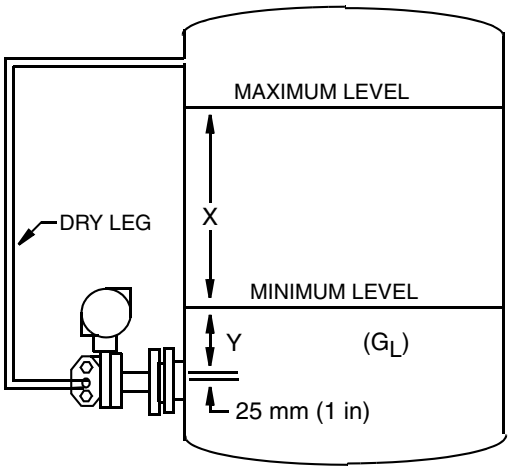


Span = $(X)(G_L)$
LRV = $(Y)(G_L)$
URV = $(X+Y)(G_L)$
Range = LRV to URV

where:

X and Y are in the same units, such as in or mm
G_L = Specific gravity of the tank liquid
LRV = Lower Range Value at minimum level
URV = Upper Range Value at maximum level
LRV and URV are in units of Equivalent Head of Water, such as inH_2O or mmH_2O

Figure 48. Transmitter Connected to Open Tank

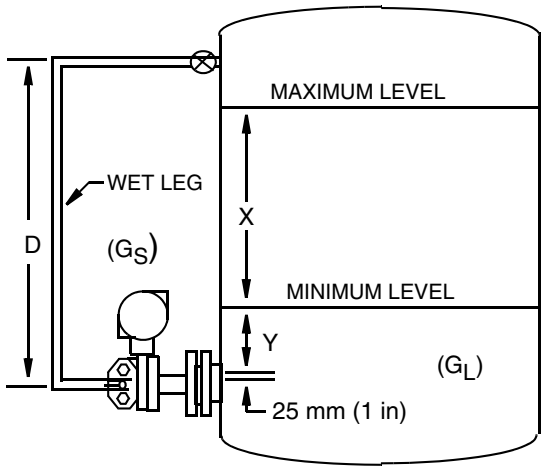


Span = $(X)(G_L)$
LRV = $(Y)(G_L)$
URV = $(X+Y)(G_L)$
Range = LRV to URV

where:

X and Y are in the same units, such as in or mm
G_L = Specific gravity of the tank liquid
LRV = Lower Range Value at minimum level
URV = Upper Range Value at maximum level
LRV and URV are in units of Equivalent Head of Water, such as inH_2O or mmH_2O

Figure 49. Transmitter Connected to Closed Tank with Dry Leg

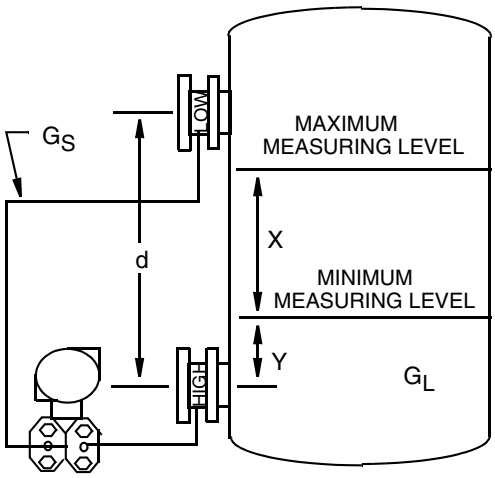


Span = $(X)(G_L)$
LRV = $Y(G_L) - D(G_S)$
URV = $(X+Y)(G_L) - D(G_S)$
Range = LRV to URV

where:

X, Y, and d are in the same units
LRV = Lower Range Value at minimum level
URV = Upper Range Value at maximum level
LRV and URV are in units of Equivalent Head of Water, such as inH_2O or mmH_2O
G_L = Specific gravity of the tank liquid
GS = Specific Gravity of the capillary fill fluid

Figure 50. Transmitter Connected to Closed Tank with Wet Leg



Span = $(X)(G_L)$
LRV = $(Y)(G_L) - (d)(G_S)$
URV = $(Y + X)(G_L) - (d)(G_S)$
Range = LRV to URV

where:

X, Y, and d are in the same units
LRV = Lower Range Value at minimum level
URV = Upper Range Value at maximum level
LRV and URV are in units of Equivalent Head of Water, such as inH_2O or mmH_2O
G_L = Specific gravity of tank liquid
G_S = Specific Gravity of capillary fill fluid

Silicone (DC200, 10 cSt): 0.94
Fluorinert (FC77): 1.76
Silicone (DC200, 3 cSt):0.89
Silicone (DC704): 1.07
Neobee: 0.92

Figure 51. Transmitter Connected to Closed Tank With Dual Seals

There are several methods that can be used to set up the transmitter for liquid level applications. These methods assume:

- The installation is complete, including any dry legs, wet legs (filled), and any seals are in place.
- The "zero level reference" is at or above the bottom pressure tap.
- The electronics have a 4 to 20 mA output (Analog) or 4 to 20 mA + digital output (HART or FoxCom).

Method #1 - Calculating the range values

- This method relies on calculations only, so it can be used when there is no liquid in the tank yet or if there is liquid but at an unknown level.
- The 4 & 20 mA output points correspond to the calculated LRV and URV. Because the 4 to 20 mA signal is reranged to the entered LRV and URV, the transmitter calibration is unaffected.
- The local indicator, if present, can be set up to display 0 to 100%.
- If not configured for percent, the indicator will display the measured pressure, not the level. This is a drawback if you want to have the display read in level units (m, mm, in, or ft).
  - If you use a FoxCom transmitter, it supports custom units that can be used to display level.
  - If you have a HART or Analog transmitter, you can use a pressure unit such as mmH_2O or ftH_2O to simulate mm or ft, if the specific gravity of the liquid is 1 or close enough to 1 to meet the required accuracy for display. Also, this requires that the minimum level point correspond to the elevation of the transmitter and it only applies to open tanks and closed tanks with a dry leg.

Procedure for Method #1

Set LRV and URV equal to the calculated values.

Method #2 - Using the Transmitters to Determine the Range Values

- This method uses the transmitter to determine the LRV and URV rather than having to calculate the values. It also has the advantage of zeroing the transmitter to account for minor installation tilt. However it requires the ability to change the liquid level in the tank to known points (minimum level corresponding to LRV and maximum level corresponding to URV).
- If the level can be put at the point corresponding to LRV but cannot be brought up to the point corresponding to URV, this method can also be used to automatically determine the LRV. Then the span can be calculated from the equations shown above and added to the LRV to determine URV for manual entry into the transmitter database. This variation on Method #2 can also be used when there is no liquid in the tank if the minimum level point is to be at the elevation of the bottom tap.
- The local indicator, if present, can be set up to display 0 to 100%.
- If not configured for percent, the indicator will display the measured pressure, not the level. This is a drawback if you want to have the display read in level units (m, mm, in, or ft).
  - A FoxCom transmitter supports custom units that can be used to display level.
  - A HART or Analog transmitter can use a pressure unit such as mmH_2O or ftH_2O to simulate mm or ft, if the specific gravity of the liquid is 1 or close enough to 1 to meet

the required accuracy for display. However, this requires that the minimum level point correspond to the elevation of the transmitter and it only applies to open tanks and closed tanks with a dry leg.

Procedure for Method #2

- For HART transmitters, using a HART Communicator having the appropriate DD installed, use the function "Rerange with Applied Pressure" when the liquid is at the minimum level point.

  If the level can be raised to the maximum level, use "Rerange with applied pressure" for URV when the level is at the maximum point in the tank. If it is not practical or possible to raise the level to the maximum point, read the LRV that has been automatically entered and manually set URV = LRV + Span.
- For FoxCom and Analog transmitters, record the pressure reading at the minimum level point and enter it into the database for the LRV. Then, determine URV the same way or by adding the calculated span value to LRV.

Method #3 - Getting the Local Indicator and Transmitted Value to Indicate Level - HART Transmitters

- When using a pressure unit, for example inH_2O or mmH_2O, to indicate level (liquids with SG =1), if the transmitter is not at the elevation corresponding to minimum level or if there is a wet leg or dual seals, the offset function can be used to have "zero" correspond to any desired level point regardless of the liquid head on the high or low side of the transmitter at that point.
- This does not affect the calibration of the transmitter.
- This offset procedure may be used for FoxCom transmitters but it is not required because custom units can be used.

Procedure for Method #3

- Even if the calculated LRV is not 0, set LRV = 0 and set URV = Span (calculated).
- With the level at the minimum level measurement point in the tank, read and record the pressure value displayed on the local indicator (if present) or the pressure value read from a HART Communicator.
- Enter this value for the M1EOFF parameter (called PV Offset if using a HART Communicator). Maintain the sign; that is, if the value is negative, enter it as a negative value.
- This procedure zeroes the transmitter and sets the 4 and 20 mA points corresponding to minimum and maximum level, respectively. The 20 mA point is based on the calculated span.
- If the liquid has the same density as water, the equivalent head of water units such as inH_2O or mH_2O can be used to represent the level in inches or meters on the local display or HART Communicator.

Method #4 - Getting the Local Indicator and Transmitted Value to Indicate Level - Analog Output Transmitters

- The analog output transmitters do not have the offset function described above. Use this method if you want to use a pressure unit to indicate level when the pressure is not zero at minimum level, such as when a wet leg or dual seal is used. The liquid must have the same density as water in order to use equivalent head of water units such as inH_2O to indicate inches of level.

Procedure for Method #4

- Even if the calculated LRV is not 0, set LRV = 0 and set URV = Span (calculated).
- With the level at the minimum level measurement point in the tank, zero the transmitter as if it had zero pressure on it (CAL ATO) using the local display). This procedure zeroes the transmitter and sets the 4 and 20 mA points corresponding to minimum and maximum level, respectively. The 20 mA point is based on the calculated span.
- The measured and indicated pressure at the minimum level measurement point is zero.
- This method shifts the calibration and is not suitable if the offset is greater than 50% of the maximum span limit for the selected transmitter. For example, if the range is -140 to -20 inH_2O, the transmitter would have to be a 'C' span or greater for this method to work. The maximum span of a 'B' sensor is 200 inH_2O and 50% of that is 100 inH_20. Since the absolute value of the LRV in our example (140 inH_2O) is more than 100 inH2O. a 'B' sensor would not work. However since the maximum span of a 'C' sensor is 840 inH_2O and 50% of that is 420 inH_20, it would work.

5. Configuration Diagrams

FoxCom Communications (Code -D)

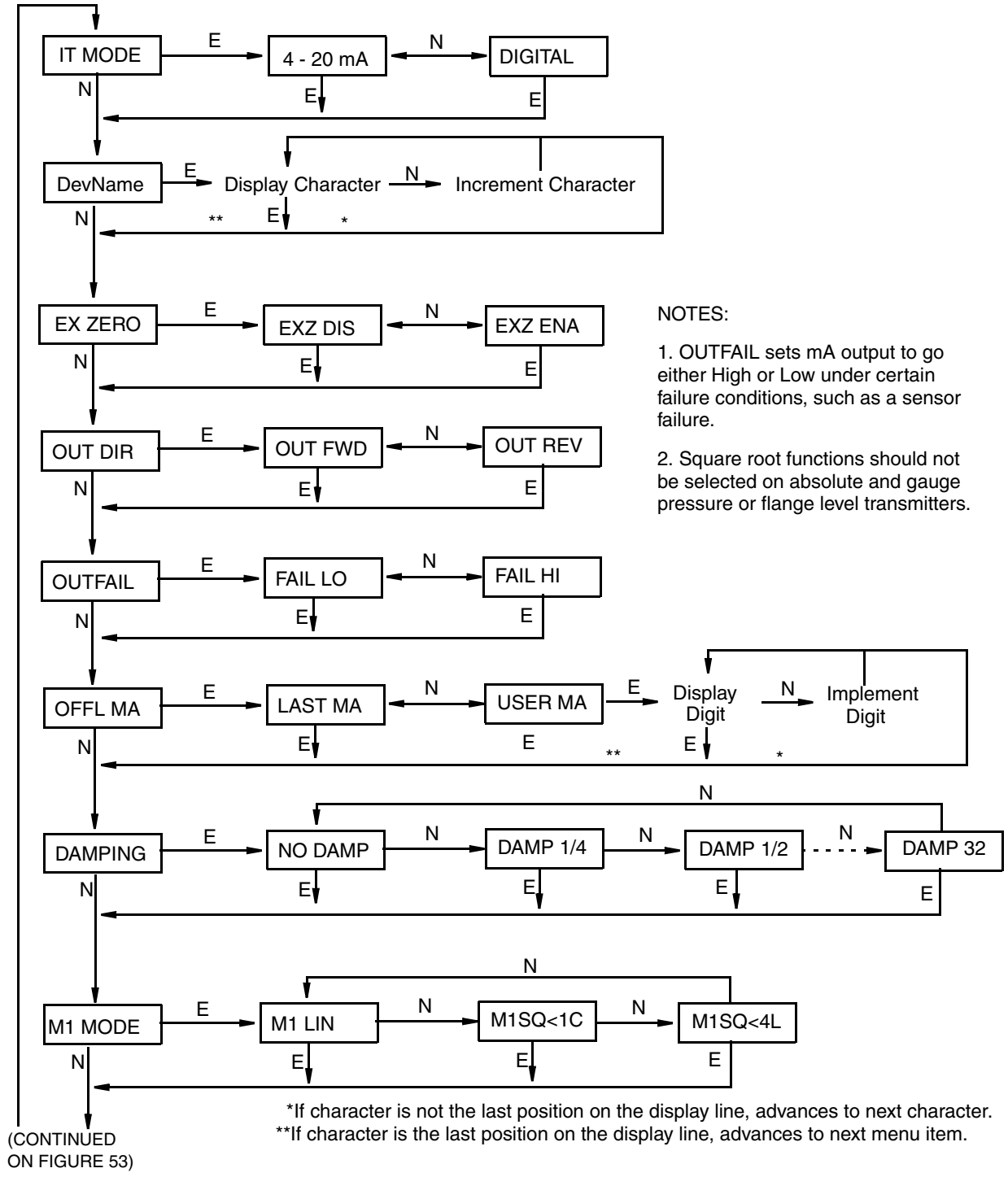
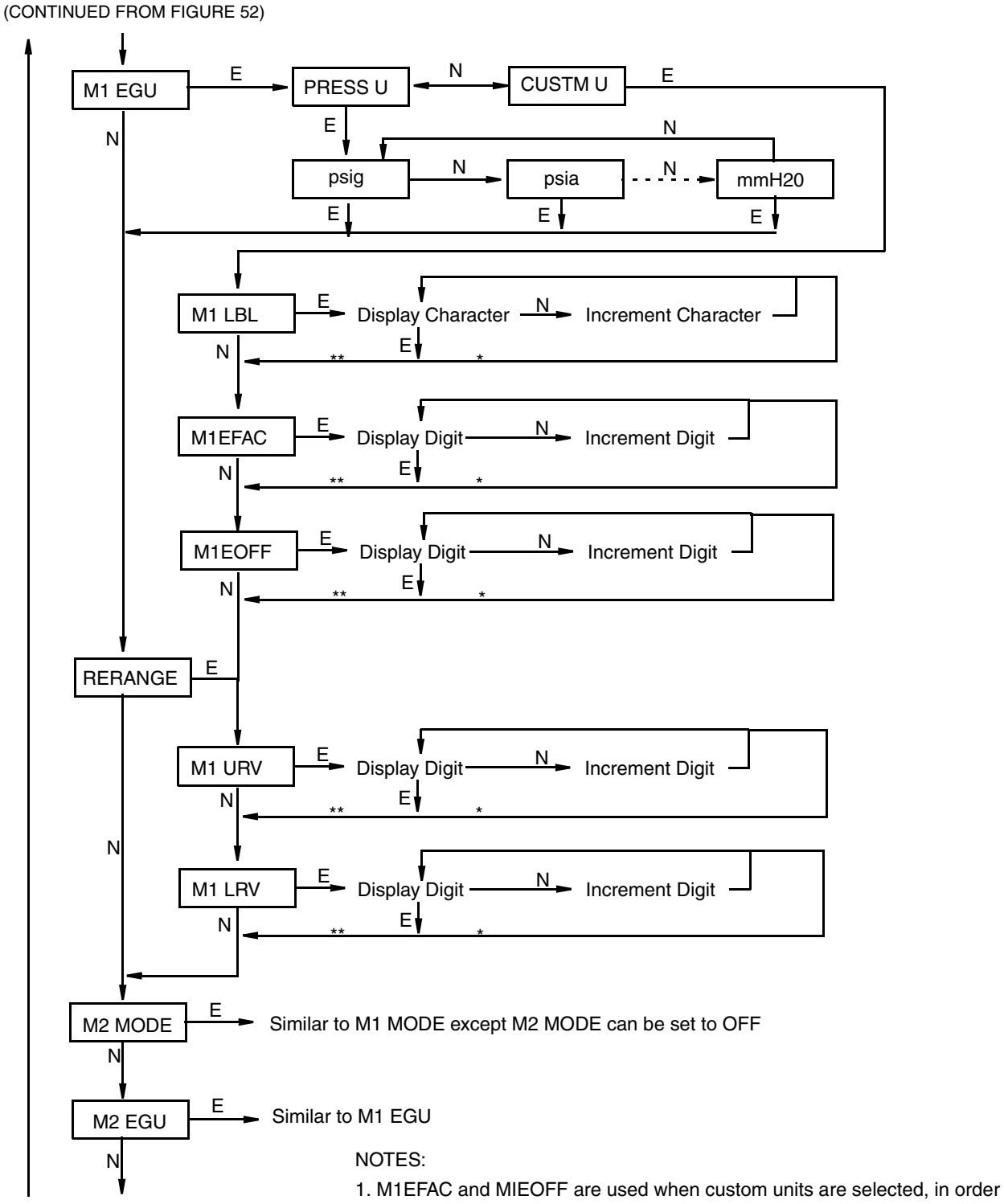


Figure 52. FoxCom Configuration Structure Diagram



NOTES:

1. M1EFAC and MIEOFF are used when custom units are selected, in order to establish the LRV and URV in the custom units.
2. Percent Output is selectable CUSTM U.

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

Figure 53. FoxCom Configuration Structure Diagram (Continued)

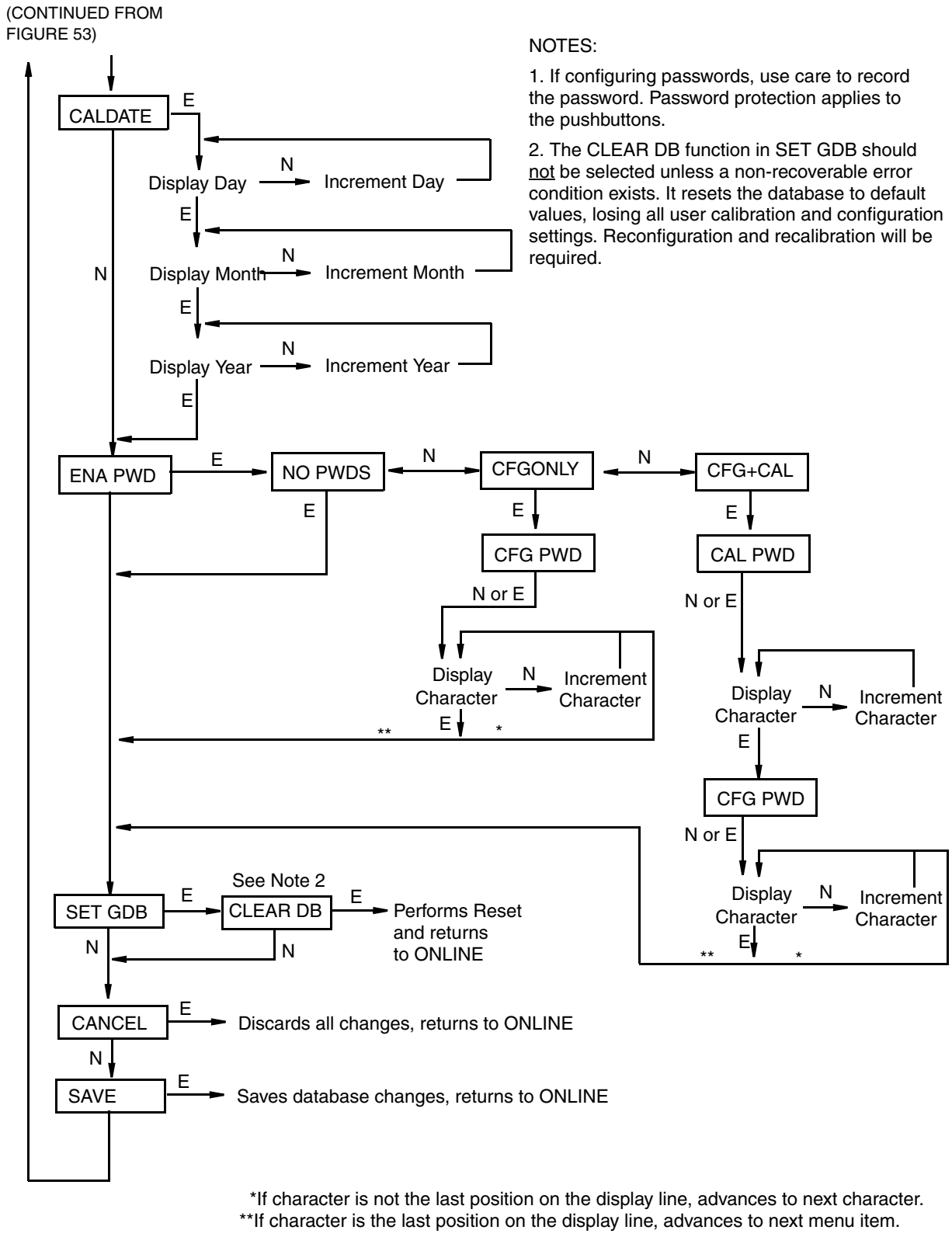


Figure 54. FoxCom Configuration Structure Diagram (Continued)

HART Communications (Code -T)

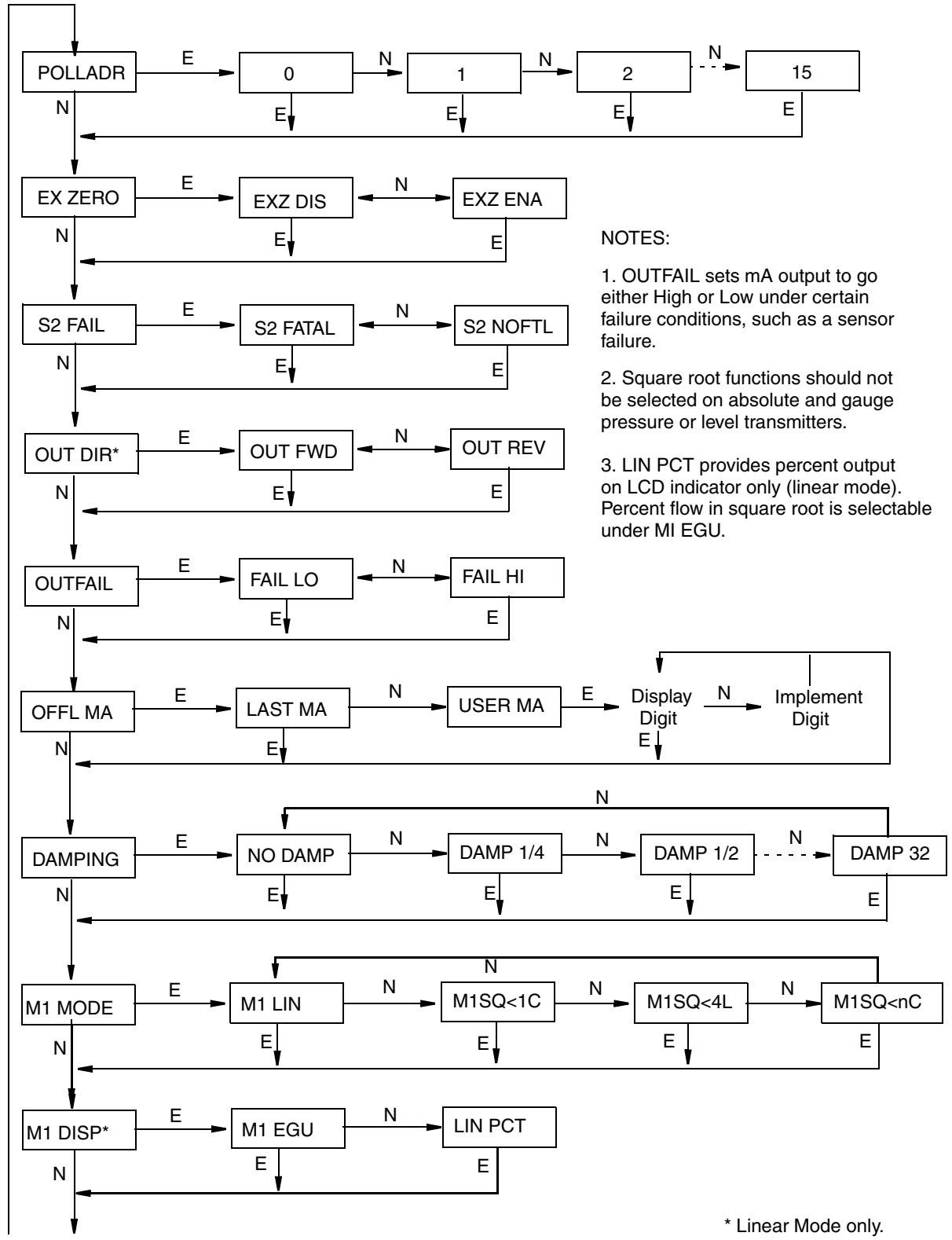


Figure 55. Configuration Structure Diagram

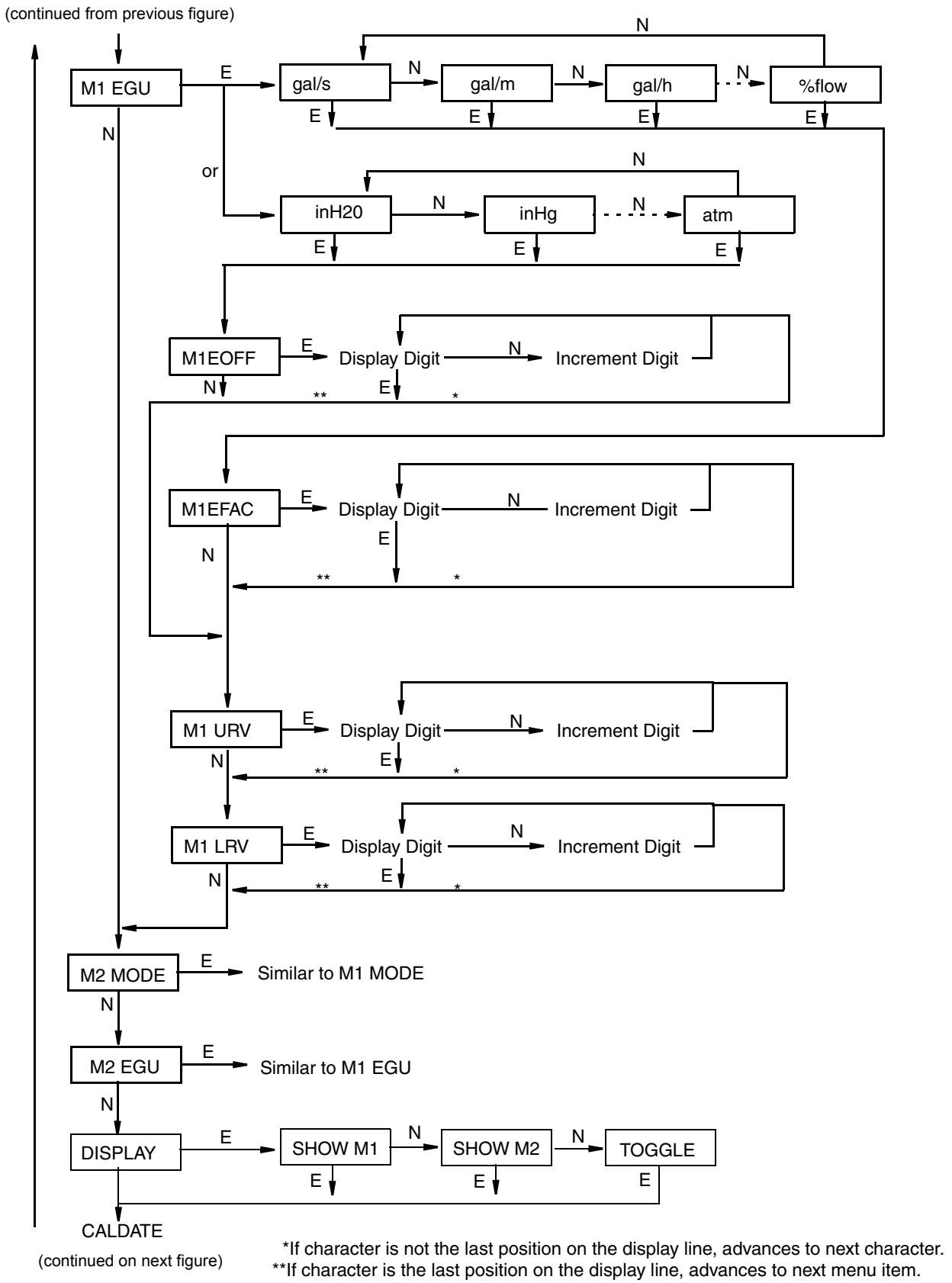


Figure 56. Configuration Structure Diagram (Continued)

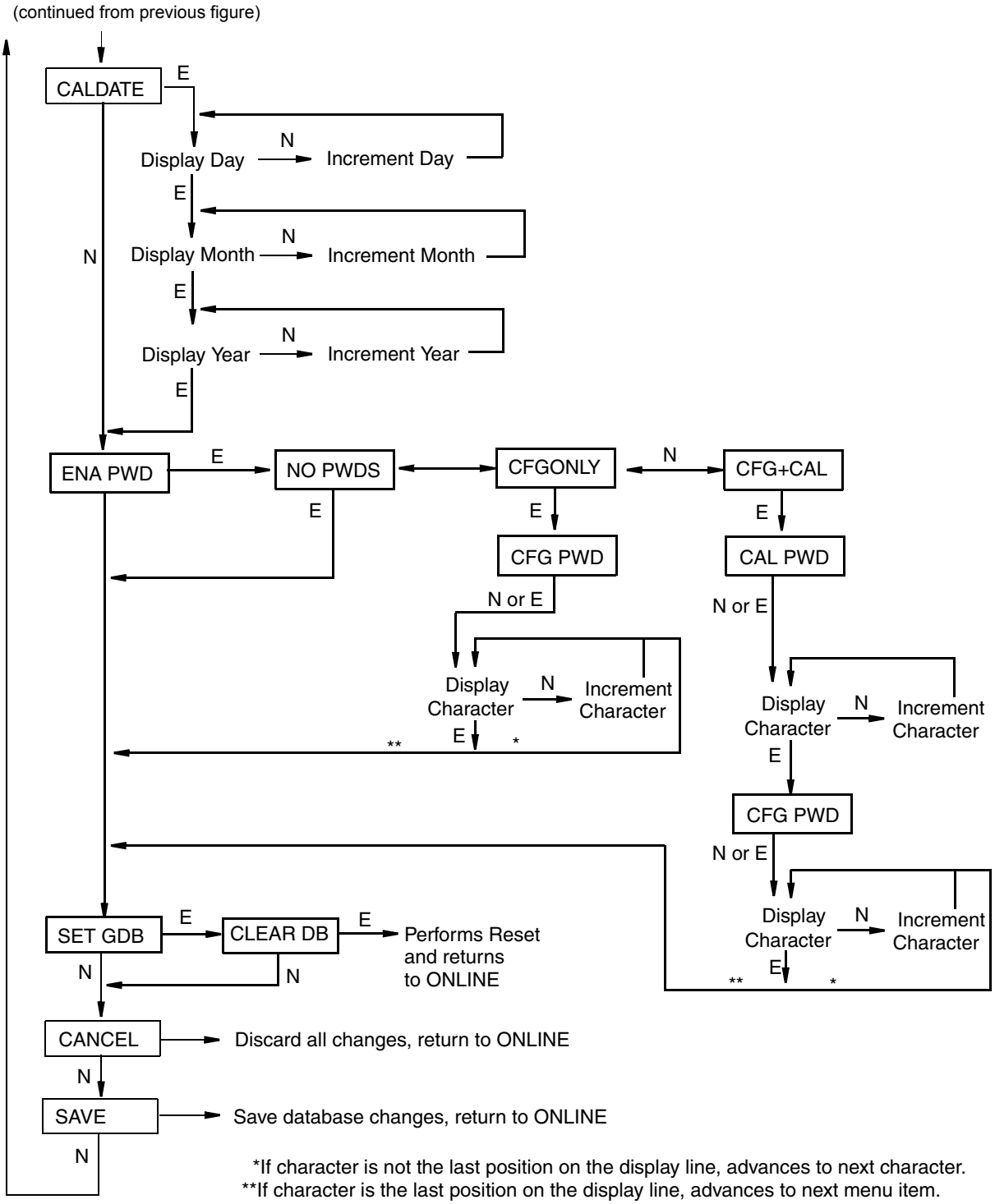
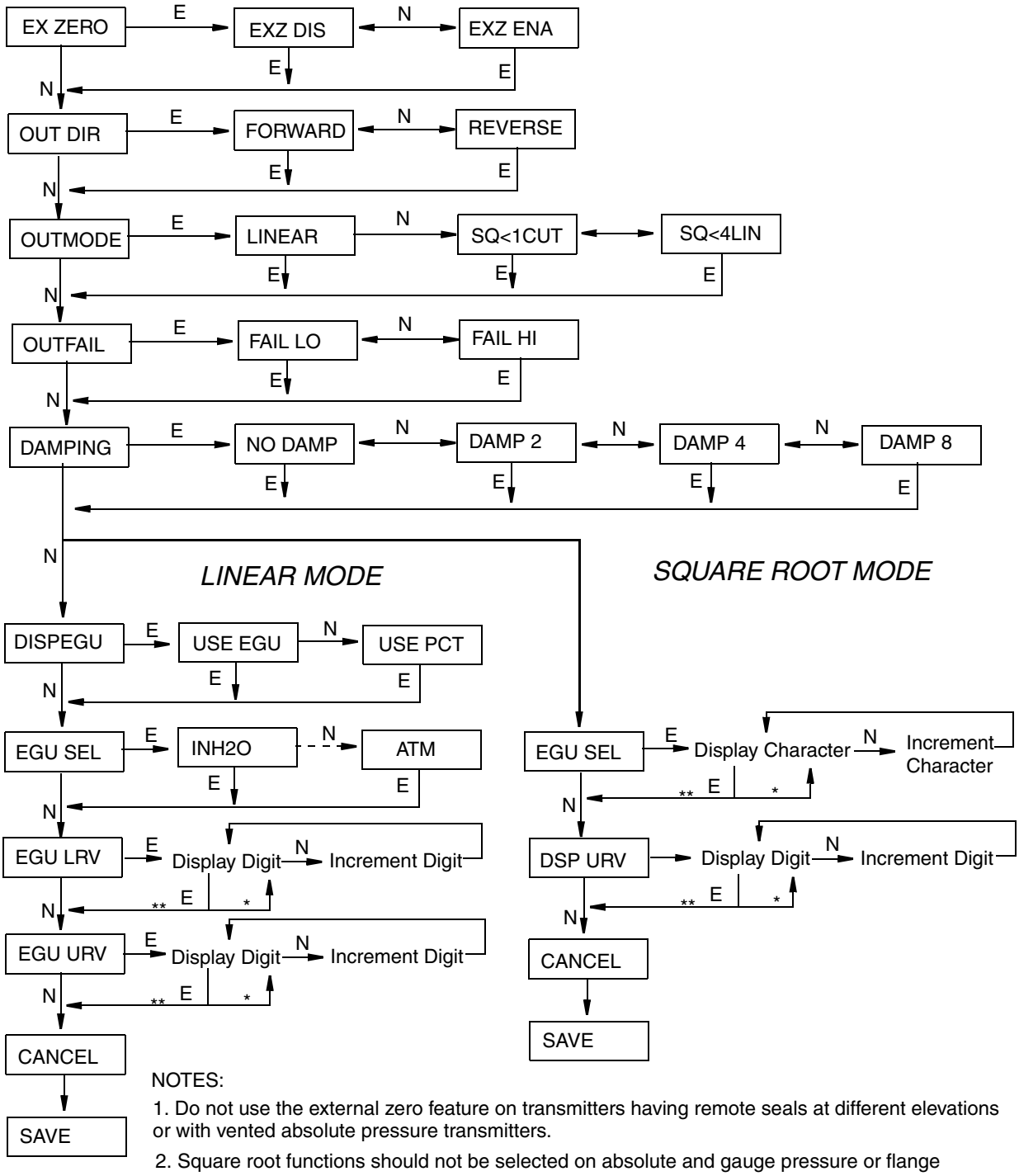


Figure 57. Configuration Structure Diagram (Continued)

FOUNDATION Fieldbus Communications (Code -F)

Refer to the CD-ROM with your transmitter.

4 to 20 mA (Code -A) and 1 to 5 V dc (Code -V)



NOTES:

1. Do not use the external zero feature on transmitters having remote seals at different elevations or with vented absolute pressure transmitters.
2. Square root functions should not be selected on absolute and gauge pressure or flange level transmitters.
3. Display in Linear Mode may be pressure units of calibrated range or percent (no custom units).
4. Display in Square Root Mode requires configuration of flow units or percent and allows user entry of URV in flow units.

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

Figure 58. Configuration Structure Diagram (Code -A and -V)

Index

P

S

W

Z

ISSUE DATES
JAN 2000 MAR 2007 AUG 2010
APR 2002 MAY 2009
SEP 2003 MAY 2010
NOV 2004 JUN 2010

Vertical lines to the right of text or illustrations indicate areas changed at last issue date.

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