Intelligent Electronic Transmitters

IMP10S Multivariable Transmitter with Temperature and HART Communication

MI 020-621

Instruction

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https://www.se.com

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Table of Contents

Important Safety Instructions

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

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

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

⚠DANGER

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

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

⚠WARNING

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

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

⚠CAUTION

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

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

NOTICE

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

Failure to follow these instructions can result in equipment damage.

Please Note

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

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

Introduction

The IMP10S Multivariable Transmitter is a single transmitter designed for multiple measuring applications. It measures absolute and differential pressure, sensor and electronics temperature, and process temperature from an external RTD. It also provides transmission of all the measured values.

HART and 4 to 20 mA Communication

The 4 to 20 mA or digital measurement signals are transmitted to remote receivers over the same two wires that supply power to the transmitter electronics. These wires also carry two-way data signals between the transmitter and remote communication devices.

The transmitter allows direct analog connection to common receivers, while still providing intelligent transmitter digital communication using a HART Communicator.

You can configure the transmitter locally or remotely. If your transmitter has an optional LCD display, pushbuttons allow you to easily configure the transmitter locally. To configure the transmitter remotely, use a HART Communicator or PC-based configurator.

Reference Documents

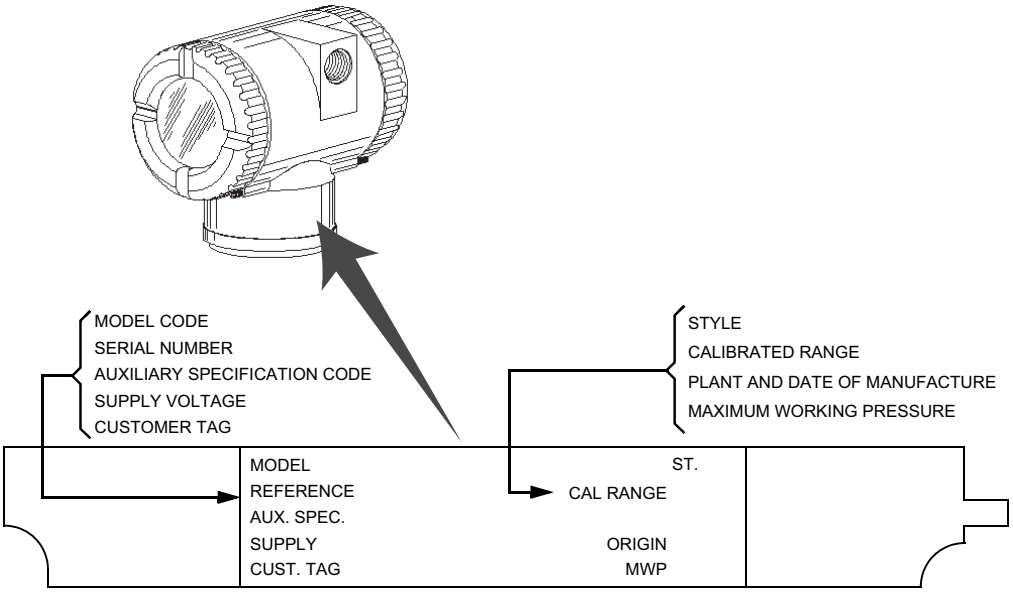
Document	Description
Instructions	
MI 020-329	High Accuracy Flow Measurement
MI 020-369	Diaphragm Seals
MI 020-501	PC50 Intelligent Field Device Tool Installation and Parts List
MI 020-520	PC50 Intelligent Field Device Tool with Advanced DTM Library
MI 020-543	FM/CSA Safety Information
MI 020-544	ATEX/UKEX/IECEx Safety Information
MI 022-138	Bypass Manifolds — Installation and Maintenance
TI 1-50a	Liquid Density Measurement
TI 001-051	Liquid Interface Measurement
TI 37-75b	Transmitter Material Selection Guide
TI 037-097	Process Sealing of Pressure Transmitters for Use in Class I, Zone 0, 1, and 2 Hazardous Locations

Transmitter Identification

The diagram shows a sample transmitter data plate.

- For a complete explanation of the model code, refer to Model Code, page 81.
- The firmware version is identified on the top line of the display when you select **VIEW DB** in the top level menu ().

Figure 1 - Data Plate Contents



Physical Specifications

Electronics Housing and Housing Covers

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

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

Process Covers and Process Connections (Process Wetted)

316 ss or nickel alloy[1]

Gaskets for Process Covers and Process Connections (Process Wetted)

Glass-filled PTFE

Process Cover Nuts and Bolts (Process Wetted)

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.

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

Sensor Diaphragm Material (Process Wetted)

316 ss or nickel alloy[2]

Sensor Fill Fluids

Silicone fluid (dodecamethylpentasiloxane)

3M™ Fluorinert™ Electronic Liquid FC-43 (perfluorotributylamine)

Environmental Protection

The transmitter is dust-tight and weatherproof per IEC IP66/IP67 and provides the environmental and corrosion resistant protection of NEMA Type 4X.

Electronics Module

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

Electrical Connections

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

⚠⚠DANGER

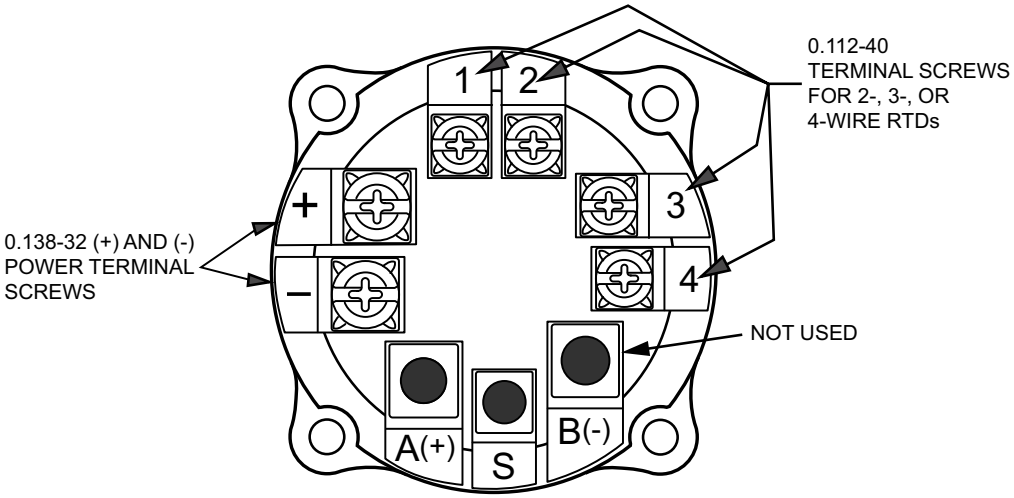
EXPLOSION HAZARD

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

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

2. Equivalent to Hastelloy® C. Hastelloy is a registered trademark of Haynes International, Inc.

Figure 2 - Field Terminal Connections



Electrical Ground Connections

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

If shielded cable is used, ground the shield at the field enclosure only.

Mounting Position

You can mount the transmitter in any position. You can rotate the housing up to one full turn to any desired orientation for access to adjustments, display, or conduit connections. You can also rotate the optional display in 90 degree increments within the housing.

NOTE:

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

Approximate Mass

Transmitter and Option(s)	Approximate Mass
Aluminum housing, traditional structure, without process connectors	3.5 kg (7.8 lb)
Substitute 316 ss housing	+1.1 kg (2.4 lb)
Add process connectors	+0.7 kg (1.4 lb)
Add optional display	+0.2 kg (0.4 lb)
Add low profile (LP1) structure	+0.1 kg (0.2 lb)

Dimensions

Refer to Nominal Dimensions, page 77.

Functional Specifications

Span and Range Limits

Table 1 - Span and Range Limits for Differential Pressure Measurement

Span Code	Span Limits			Range Limits		
	kPa	inH_2O	mbar	kPa	inH_2O	mbar
L	0.12 and 2.5	0.5 and 10	1.2 and 25	-2.5 and +2.5	-10 and +10	-25 and +25
A	0.75 and 7.5	3 and 30	7.5 and 75	-7.5 and +7.5	-30 and +30	-75 and +75
B	0.5 and 50	2 and 200	5 and 500	-50 and +50	-200 and +200	-500 and +500
C	2.5 and 210	10 and 840	25 and 2,100	-210 and +210	-840 and +840	-2,100 and +2,100

Table 2 - Span and Range Limits for Absolute Pressure Measurement

Span Code	Span Limits			Range Limits		
	MPaa	psia	bara	MPaa	psia	bara
D	0.02 and 2.1	3 and 300	0.21 and 21	0 and 2.1	0 and 300	0 and 21
G	0.07 and 3.5	10 and 500	0.7 and 35	0 and 3.5	0 and 500	0 and 35
E	0.21 and 10	30 and 1,500	2.1 and 100	0 and 10	0 and 1,500	0 and 100
H	0.42 and 21	60 and 3,000	4.2 and 200	0 and 20	0 and 3,000	0 and 200
F	3.4 and 36.5	500 and 5,300	34 and 365	0 and 36.5	0 and 5,300	0 and 365

⚠DANGER

HAZARD OF EXPLOSION

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

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

NOTICE

POTENTIAL EQUIPMENT DAMAGE

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

Failure to follow these instructions can result in equipment damage.

NOTE: The maximum static/working pressure for your transmitter is the *lower* value in the following two tables, based on your transmitter's model code.

Table 3 - Maximum Static and Working Pressure, and Maximum Overrange Pressure

Span Code	Maximum Static and Maximum Working Pressure		Maximum Overrange Pressure	
	MPaa	psia	MPaa	psia
LG	3.4	500	5.2	750
AG	3.4	500	5.2	750
BD	2.1	300	3.1	450
BE	10	1,500	15	2,250
BH	20	3,000	30	4,500
BF	36.5	5,300	52.3	7,579
CD	2.1	300	3.1	450
CE	10	1,500	15	2,250
CH	20	3,000	30	4,500
CF	36.5	5,300	52.3	7,579

Table 4 - Impact of Options on Maximum Static Pressure and Span and Range Limits

Option[3]	Maximum Static Pressure	Maximum Proof Pressure[4]	Maximum Overrange Pressure
-B2, -D3, -D7, -P3, -P7,	25 MPaa (3,626 psia, 250 bara)	100 MPaa (14,500 psia, 1,000 bara)	38 MPaa (5,439 psia, 375 bara)
-B3, -P4, -P8	20 MPaa (2,900 psia, 200 bara)	70 MPaa (11,150 psia, 700 bara)	30 MPaa (4,350 psia, 300 bara)
-D1	16 MPaa (2,320 psia, 160 bara)	64 MPaa (9,280 psia, 640 bara)	24 MPaa (3,480 psia, 240 bara)
-B1, -D5, -P2, -P6	15 MPaa (2,175 psia, 150 bara)	60 MPaa (8,700 psia, 600 bara)	22.5 MPaa (3,262 psia, 225 bara)
-D2, -D4, -D6, or -D8	10 MPaa (1,500 psia, 100 bara)	40 MPaa (6,000 psia, 400 bara)	15 MPaa (2,250 psia, 150 bara)
-D9	36.5 MPaa (5,300 psia, 365 bara)	91 MPaa (13,250 psia, 910 bara)	53.3 MPaa (7,579 psia, 533 bara)

Process Temperature Measurement and Limits

- Measurement: DIN/IEC, 2-, 3-, or 4-wire, 100 ohm, platinum RTD
- RTD range limits: -200 and +850°C (-328 and +1,562°F); but see Operating, Storage, and Transportation Limits, page 20 for transmitter limits

Output Signal and Configuration

One 4 to 20 mA linear or square root analog output with digital HART communication. When configured for multidrop applications, the mA signal is fixed at 4 mA. Configurable with a HART Communicator, PC-based configurator, or the optional LCD indicator with onboard pushbuttons.

3. Refer to Model Code, page 81 for application and restrictions related to the items listed in the table.
4. Meets ANSI/ISA Standard S82.03-1988.

NOTE: HART 7 allows the mA signal to be fixed or live when multidrop is enabled.

Communication

Configurable for either 4 to 20 mA or multidrop. Digital communication is provided in all modes based upon the FSK (Frequency Shift Keying) technique, which alternately superimposes one of two different frequencies on the uninterrupted current carried by the two power/signal wires.

Parameter	HART	
	Analog Mode	Multidrop Mode
Remote Configurator	HART Communicator	
Communication Rate	1,200 baud	
Communication Distance (Rated)[5]	3,050 m (10,000 ft)	1,525 m (5,000 ft)

Measured and Transmitted Outputs

- Absolute pressure (configurable for gauge pressure: $P_{GP} = P_{AP} - P_{atm}$, where P_{atm} is a user-entered barometric pressure constant)
- Differential pressure
- Sensor temperature (from internal sensor)
- Electronics temperature (from internal sensor)
- Process temperature (from external RTD)

Supply Voltage

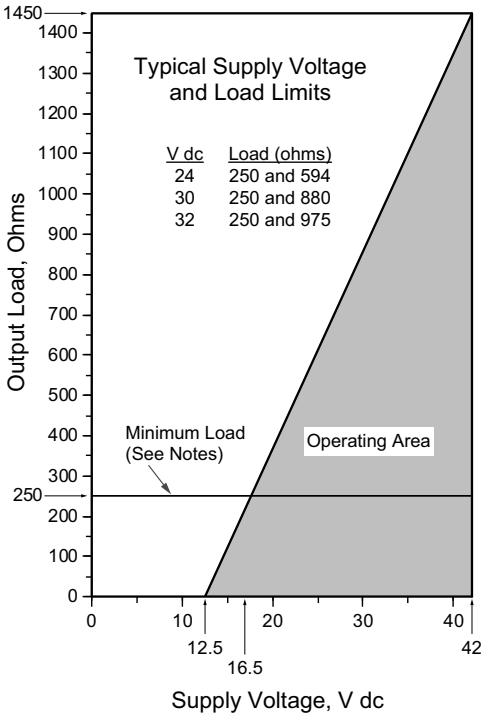
The power supply must be capable of providing 22 mA when the transmitter is configured for 4 to 20 mA output. Ripple of up to 2 V pp (50/60/100/120 Hz) is tolerable, but instantaneous voltage must remain within the specified range.

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

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

	HART Communication	No HART Communication
Minimum Resistance	250 ohms	0 ohms
Minimum Supply Voltage	16.5 V dc	12.5 V dc
Maximum Supply Voltage	42 V dc	

5. Total cable length includes spur length. Maximum spur length is 120 m (394 ft). Minimum spur length is 1 m (3.3 ft). For intrinsically safe installations, maximum spur length is 30 m (98 ft).



NOTES:
1. The minimum voltage for HART communication is 16.5 V dc.
2. The minimum load for the HART Communicator is 250 ohms.
3. The transmitter can function with an output load less than the minimum, but using a remote configurator while operating in this area will result in output and/or communication disturbances.

Zeroing for Nonzero-Based Ranges

You can zero the transmitter when it is open to atmosphere, even when there is a nonzero-based range. This simplifies position effect zeroing on many applications. To zero the transmitter, you can use the local display, a PC-based configurator, or remote configurator (HART Communicator or Modbus RTU host).

Zero and Span Adjustments

Zero and span adjustments are provided for differential pressure and absolute pressure. Zero adjustment is provided for temperature measurements.

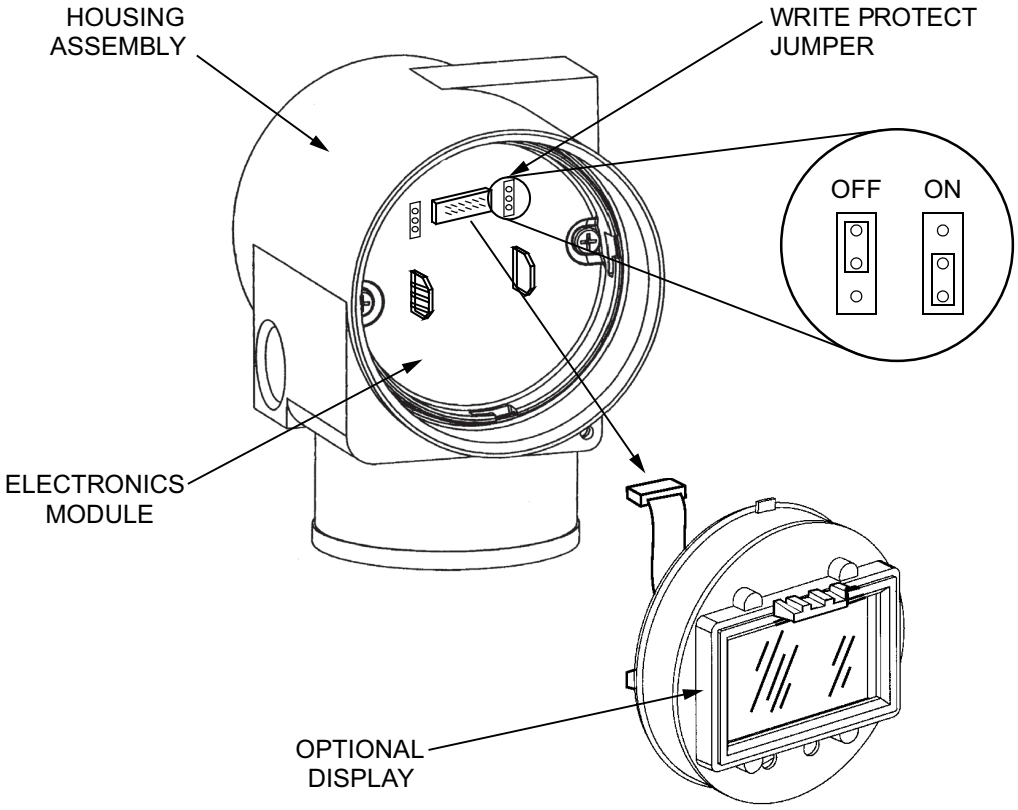
Suppressed Zero and Elevated Zero

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

Write Protect Jumper

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

Figure 3 - Write Protect Jumper



Current Outputs for Overrange, Fail, and Offline Conditions (HART)

Parameter	Value
Output for Low Alarm	up to 3.60 mA
Output for High Alarm	at least 21.00 mA
Output when underrange	3.80 mA
Output when overrange	20.50 mA
Output if the sensor is potentially bad	User configurable to either the high value or low value
Output when offline	User configurable between 3.6 mA and 21 mA

Square Root Low Flow Cutoff

The square root low flow cutoff is user-configurable to provide:

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

Adjustable Damping

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

Field Wiring Reversal

Reversing the field wiring does not damage the transmitter; the transmitter functions when wired either way. However, the transmitter itself is polarity-sensitive.

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

Configuration and Calibration Data

Factory characterization data, and user configuration and calibration data, are stored in the sensor. This means that you can replace the electronics module without reconfiguring or recalibrating.

Configuration Capability (HART)

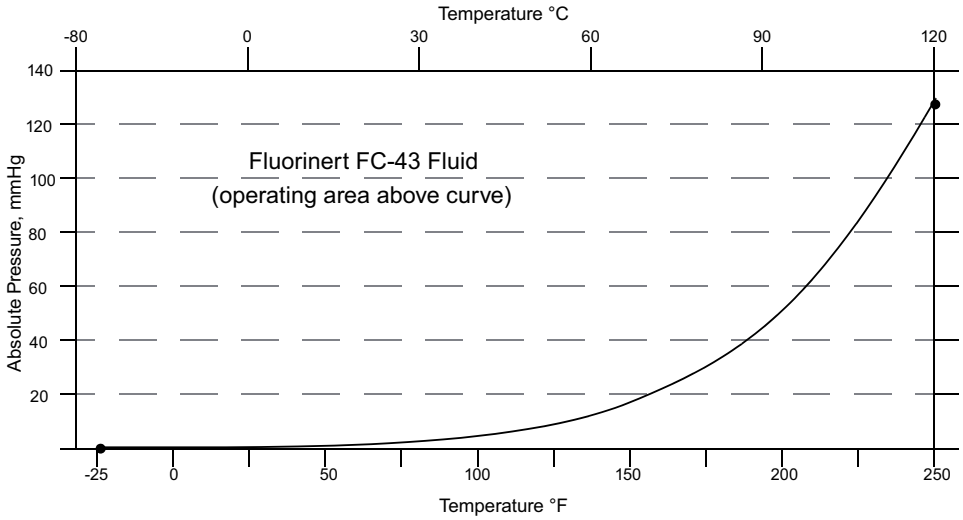
Variable	Measurement
Primary Variable	Differential Pressure
Secondary Variable	Absolute Pressure
Tertiary Variable	Process Temperature
Quaternary Variable	Electronics Temperature

Numerous parameters can be configured and/or displayed, such as electronic damping, transmitter calibration, tag data, etc. See configuration instructions for details.

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 the graph.



Available Units

- Pressure (linear): mmH_2O, cmH_2O, mH_2O, inH_2O, ftH_2O, mmHg, cmHg, inHg, Pa, kPa, MPa, torr, mbar, bar, psi, atm, g/cm^2, kg/cm^2
- Pressure (square root): % Flow
- Temperature: C, F, R, K

Performance Specifications

Zero-based calibrations; stainless steel sensor with silicone fill fluid; under reference operating conditions unless otherwise specified; URL = upper Range Limit; span = calibrated span

Accuracy (Includes Linearity, Hysteresis, and Repeatability)

Differential Pressure[6]	**Accuracy**
Span codes L and A, spans ≥10% of URL	±0.10% of span
Span codes L and A, spans <10% of URL	±(0.010) x (URL/span)% of span
Span codes B and C, spans ≥10% of URL	±0.05% of span
Span codes B and C, spans <10% of URL	±(0.005) x (URL/span)% of span
Absolute Pressure[7] [8]	**Accuracy**
Span code G, spans ≥5% of URL	±0.05% of span
Span code G, spans <5% of URL	±(0.0025) x (URL/span)% of span
Span codes D, E, F, H, spans ≥10% of URL	±0.05% of span

6. Add ±0.025% to the accuracy to determine the total analog output accuracy if the DP measurement is assigned to the 4 to 20 mA output signal.
7. For gauge pressure accuracy, add the anticipated variation from the user-entered barometric pressure.
8. Add ±0.025% to the accuracy to determine the total analog output accuracy if the AP measurement is assigned to the 4 to 20 mA output signal.

Span codes D, E, F, H, spans <10% of URL	±(0.005) x (URL/span)% of span
Process Temperature Accuracy	±0.28°C (0.5°F) within 140°C (250°F) of the normal operating point

Stability

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

Calibration Frequency

The rezero 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:

Calibration Frequency = Performance Margin/Stability = Months

Power-Up Time

Less than five seconds for output to reach the first valid measurement.

Vibration Effect

Per IEC 60770:

- For “field with high vibration level or pipeline with high vibration level”: 0.42 mm peak-to-peak displacement from 10 to 60 Hz, 3 “g” constant acceleration input over a frequency range of 60 to 1000 Hz.
- For “field with general application or pipeline with low vibration level”: 0.3 mm peak-to-peak displacement from 10 to 60 Hz, 2 “g” constant acceleration input over a frequency range of 60 to 1000 Hz.

RFI Effect

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

Supply Voltage Effect

Output changes less than 0.005% of span for each 1 V change within the specified supply voltage requirements. See Supply Voltage, page 12.

Static Pressure Effect on Differential Pressure

For a 0.7 MPa (100 psi) change in static pressure:

- Zero shift

Table 5 - Zero Shift

Span Codes		Zero Shift in % of URL
DP	AP	
L	G	±0.150
A	G	±0.050
B	D	±0.007
B	E	±0.010
B	H	±0.010
B	F	±0.010
C	D	±0.002
C	E	±0.004
C	H	±0.004
C	F	±0.004

- Span shift: ±0.01% of the reading

Position Effect

You can mount the transmitter in any position. If the mounting position causes a zero effect, you can remove the zero effect by rezeroing. There is no span effect.

Ambient Temperature Effect

Total effect for both absolute and differential pressure for a 28°C (50°F) change within normal operating condition limits is ±(0.03% URL + 0.06% span).

- For DP span code A or L, the effect on differential pressure is ±(0.18% URL + 0.025% span).
- For AP span code H, the effect on absolute pressure is ±(0.02% URL + 0.06% span).
- For AP span code F, the effect on absolute pressure is ±(0.15% URL + 0.06% span).

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. Output shift is <1.0% (per ANSI/IEEE C62.41-1980 and IEC Std. 61000-4-5).

Electromagnetic Compatibility

- Complies with NAMUR NE 21 Interference Immunity requirement.

- Complies with electromagnetic compatibility requirements of European EMC Directive 89/336/EEC by conforming to the following CENELEC and IEC Standards: EN 61326-1:2013, IEC 61326-1:2012, EN 61326-2-3:2013, and IEC 61326-2-3:2012.

Operating, Storage, and Transportation Limits

Table 6 - Operating Conditions/Limits

Description	Reference Operating Conditions	Normal Operating Conditions[9]	Operative Limits[9]
Sensor Body Temperature			
Silicone	24 ± 2°C (75 ± 5°F)	-29 to +82°C (-20 to +180°F)	-46 and +121°C (-50 and +250°F)[10]
Fluorinert	24 ± 2°C (75 ± 5°F)	-29 to +82°C (-20 to +180°F)	-29 and +121°C (-20 and +250°F)
Electronics Temperature[11]			
Without display	24 ± 2°C (75 ± 5°F)	-29 to +82°C (-20 to +180°F)	-40 and +85°C (-40 and +185°F)[12]
With display[13]	24 ± 2°C (75 ± 5°F)	-20 to +82°C (-4 to +180°F)	-40 and +85°C (-40 and +185°F)[12]
Relative Humidity[14]	50 ± 10%	0 to 100%	0 and 100%
Ambient Pressure	860 to 1060 mbar	Atmospheric	Atmospheric
Supply Voltage (HART)[15]	30 ± 0.5 V dc	16.5 to 42 V dc	12.5 V dc and 42 V dc
Supply Voltage (Modbus)[16]	24 ± 0.5 V dc	9 to 30 V dc	9 and 30 V dc
Output Load (HART)[17]	650 ohms	0 to 1,450 ohms	0 and 1,450 ohms
Mounting Position	Vertical or Horizontal[18]	Vertical or Horizontal[18]	No limit
Vibration	1 m/s² (0.1 “g”)	Per IEC 60770: • For “field with high vibration level or pipeline with high vibration level”: 0.42 mm peak-to-peak displacement from 10 to 60 Hz, 3 “g” constant acceleration input over a frequency range of 60 to 1000 Hz. • For “field with general application or pipeline with low vibration level”: 0.3 mm peak-to-peak displacement from 10 to 60 Hz, 2 “g” constant acceleration input over a frequency range of 60 to 1000 Hz.	

Table 7 - Storage and Transportation Limits

Description	Storage and Transportation Limits
Electronics Temperature	-50 and +85°C (-58 and +185°F)
Relative Humidity	0 to 100% (noncondensing)
Ambient Pressure	Atmospheric

9. Normal operating conditions and operative limits are defined per ANSI/ISA 51.1–1979 (R1993).
10. Selection of Option -J extends the low temperature operative limit of transmitters with silicone filled sensors down to -50°C (-58°F). Performance is not assured below -29°C. Sensor damage may occur if process is frozen. Contact Global Customer Support for availability of this option.
11. Refer to Electrical Certifications, page 21 for a restriction in ambient temperature limits with certain electrical approvals/certifications.
12. -40 and +75°C (-40 and +167°F) for transmitters with ATEX flameproof classification.
13. Although the LCD is not damaged by temperatures within the storage and transportation limits, updates are slowed and readability decreased at temperatures less than -20°C (-4°F).
14. Relative humidity refers to transmitters with housing covers installed and conduit entrances sealed. To maintain IEC IP66/IP67 and NEMA Type 4X protection, plug the unused conduit opening with the metal plug provided. Use a suitable thread sealant on both conduit connections. In addition, the threaded housing covers must be installed. Turn covers to seat the o-ring into the housing, then continue to hand-tighten until the cover contacts the housing metal-to-metal.
15. Refer to Supply Voltage, page 12.
16. Power supplied by an external Modbus power supply.
17. 250 ohm minimum load is required for communication with a HART Communicator.
18. Sensor process wetted diaphragms in a vertical plane.

Agency Certifications

⚠⚠WARNING

EXPLOSION HAZARD

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

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

⚠WARNING

RISK OF MOISTURE INGRESS

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

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

Wiring restrictions required to maintain electrical certification of the transmitter are provided in these instructions. Refer to Wiring, page 36.

Electrical Certifications

This equipment has been designed to meet the electrical safety descriptions listed in this table. Contact Global Customer Support for information or status of testing laboratory approvals or certifications.

Refer to Model Code, page 81 for availability of electrical safety design codes with each transmitter.

⚠⚠DANGER

When selecting an electrical certification code that ends in “M” or “P,” you must permanently mark (check off in the rectangular block on the data plate) one type of protection only. Do not change this mark once it has been applied.

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

Agency Certification, Types of Protection, and Area Classification	Application Conditions[19]	Model Code Option
ATEX and UKEX intrinsically safe	Temperature Class T4, Ta = -40°C to +80°C	AA
ATEX and UKEX flameproof	Temperature Class T6, T85°C, Ta = -40°C to +75°C	AD
ATEX and UKEX multiple certifications (includes ATEX codes AA and AN)	Applies to codes AA and AN	AM
ATEX and UKEX protection type n	Temperature Class T4, Ta = -40°C to +80°C	AN
ATEX and UKEX multiple certifications (includes ATEX codes AA, AD, and AN)	Applies to codes AA, AD, and AN	AP
INMETRO intrinsically safe	Temperature Class T4, Ta = -40°C to +80°C	BA
INMETRO flameproof	Temperature Class T6, T85°C, Ta = -40°C to +75°C	BD
INMETRO multiple certifications (includes INMETRO codes BA and BD)	Applies to codes BA and BD	BP
CSA intrinsically safe, Zone certified	Temperature Class T4A at 40°C and T3C at 85°C maximum ambient	CA
CSA zone certified flameproof, explosionproof, dust ignitionproof	Temperature Class T6, Maximum Ambient Temperature 75°C	CD
CSA multiple certifications (includes CSA codes CA and CN)	Applies to codes CA and CN	CM
CSA nonincendive, Zone certified	Temperature Class T4A at 40°C and T3C at 85°C maximum ambient	CN
CSA multiple certifications (includes CSA codes CA, CD, and CN)	Applies to codes CA, CD, and CN	CP
Multi-marked ATEX and IECEx intrinsically safe	Temperature Class T4, Ta = -40°C to +80°C	DA
Multi-marked ATEX and IECEx flameproof	Temperature Class T6, T85°C, Ta = -40°C to +75°C	DD
Multi-marked ATEX and IECEx multiple certifications (includes ATEX/ IECEx codes DA and DN)	Applies to codes DA and DN	DM
Multi-marked ATEX and IECEx protection type n	Temperature Class T4, Ta = -40°C to +80°C	DN
Multi-marked ATEX and IECEx multiple certifications (includes ATEX/ IECEx codes DA, DD, and DN)	Applies to codes DA, DD, and DN	DP
IECEx intrinsically safe	Temperature Class T4, Ta = -40°C to +80°C	EA
IECEx flameproof	Temperature Class T6, T85°C, Ta = -40°C to +75°C	ED
IECEx multiple certifications (includes IECEx codes EA and EN)	Applies to codes EA and EN	EM
IECEx protection type n	Temperature Class T4, Ta = -40°C to +80°C	EN
IECEx multiple certifications (includes IECEx codes EA, ED, and EN)	Applies to codes EA, ED, and EN	EP
FM Classes I, II, and III Division 1 intrinsically safe	Temperature Class T4, Ta = -40°C to +80°C	FA
FM Classes I, II, and III Division 1 explosionproof, dust ignitionproof, Zone approved	Temperature Class T6 at 75°C and T5 at 85°C maximum ambient	FD
FM multiple certifications (includes FM codes FA or FN)	Applies to codes FA or FN	FM
FM Classes I, II, and III Division 2 nonincendive, Zone appproved	Temperature Class T4, Ta = -40°C to +80°C	FN
FM multiple certifications (includes codes FA, FD, or FN)	Applies to codes FA, FD, or FN	FP
KOSHA flameproof	Temperature Class T6, T85°C, Ta = -40°C to +75°C	KD
Multi-marked for ATEX, CSA, and FM Intrinsically Safe Application	Applies to codes AA, CA, and FA	MA[20]

19. Selection of Option -J extends the low temperature operative limit of transmitters with silicone filled sensors down to -50°C (-58°F). Performance is not assured below -29°C. Sensor damage may occur if process is frozen. Contact Global Customer Support for availability of this option.
20. When selecting Electrical Safety Design Code MA, you must permanently mark (check off in the rectangular block on the data plate) intrinsically safe certifications for ATEX, CSA, or FM, as applicable. Do not change this mark once it has been applied.

Agency Certification, Types of Protection, and Area Classification	Application Conditions[21]	Model Code Option
NEPSI intrinsically safe	Temperature Class T4, Ta = -40°C to +80°C	NA
NEPSI flameproof	Temperature Class T6, T85°C, Ta = -40°C to +75°C	ND
EAC intrinsically safe	Temperature Class T4, Ta = -40°C to +80°C	RA
EAC flameproof	Temperature Class T4, Ta = -40°C to +75°C	RD
EAC protection type n	Temperature Class T4, Ta = -40°C to +80°C	RN
No extra certification		ZZ

21. Selection of Option -J extends the low temperature operative limit of transmitters with silicone filled sensors down to -50°C (-58°F). Performance is not assured below -29°C. Sensor damage may occur if process is frozen. Contact Global Customer Support for availability of this option.

Installation

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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

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

⚠⚠WARNING

RISK OF ELECTROSTATIC CHARGE AND DUST INGRESS

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

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

NOTICE

POTENTIAL EQUIPMENT DAMAGE

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

Failure to follow these instructions can result in equipment damage.

Transmitter Mounting

⚠⚠DANGER

HAZARD OF EXCESSIVE PRESSURE

Do not exceed the maximum process pressure indicated on the marking. Exceeding the marked pressure can cause poor performance of the transmitter, or cause irreparable damage to it. It could also cause a pressure burst failure.

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

⚠DANGER

HAZARD OF LEAKING FLUID

Do not mount the transmitter using the conduit connection and optional mounting bracket set when vibration conditions exceed 20 m/s² (2 “g”). The connector threads can become damaged, causing a leak. In an explosive environment, this could cause a explosion.

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

Transmitters can be mounted to a vertical or horizontal pipe or surface using the optional mounting set. See Pipe Mounting, page 25 and Surface Mounting, page 26. In addition, transmitters can be supported by the process piping; see Transmitter Supported by Process Piping, page 26.

See Nominal Dimensions, page 77 for dimensional information.

When mounting the transmitter, take these considerations into account:

- Mount the transmitter so that any moisture condensing or draining into the field wiring compartment can exit through one of the two threaded conduit connections.
- Use a suitable thread sealant on all connections.
- Do not mount the transmitter directly to the process using the 1/4 NPT internal thread. Use this thread only to connect to the process when the transmitter is mounted with a mounting bracket set.
- If the transmitter is not installed in the vertical position, readjust the zero output to help eliminate the position zero effect.
- Where necessary, intrinsically safe equipment may be connected and disconnected while the circuits are energized.
- When used in a dust zone with flammable dusts, fibers, and flyings in groups IIIA, IIB, or IIC, the layer auto-ignition temperature must be at least 75°C greater than the maximum surface temperature marked in the dust coding.
- The equipment is certified for use only in ambient temperatures marked on the equipment and should not be used outside this range.
- There are no special checking or maintenance conditions. Periodically inspect all explosion-protected equipment in accordance with the applicable code of practice.

Figure 4 - Pipe Mounting

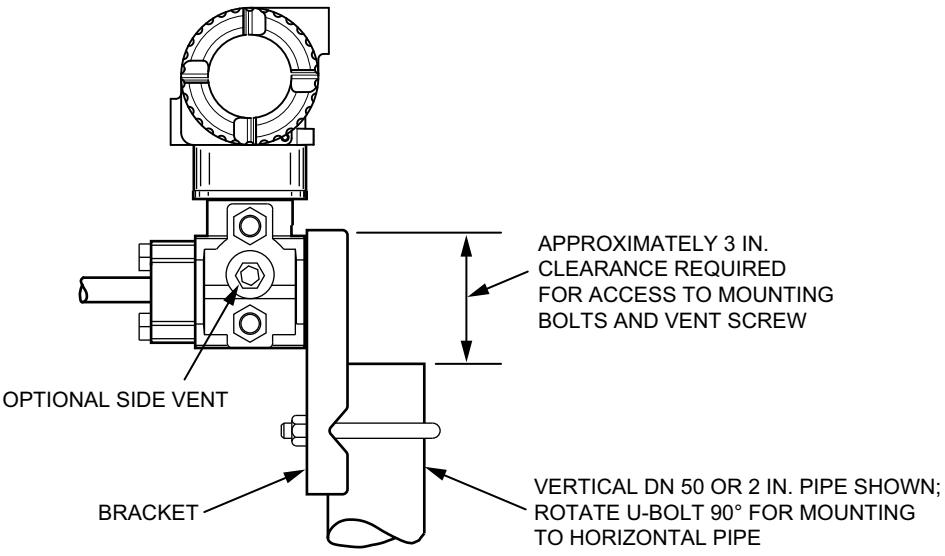


Figure 5 - Surface Mounting

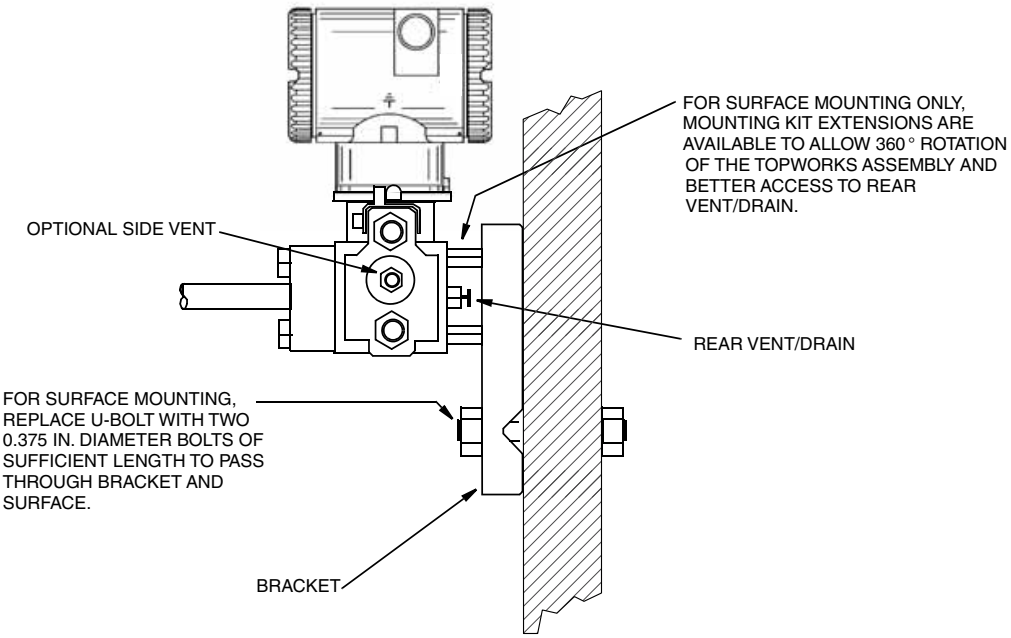
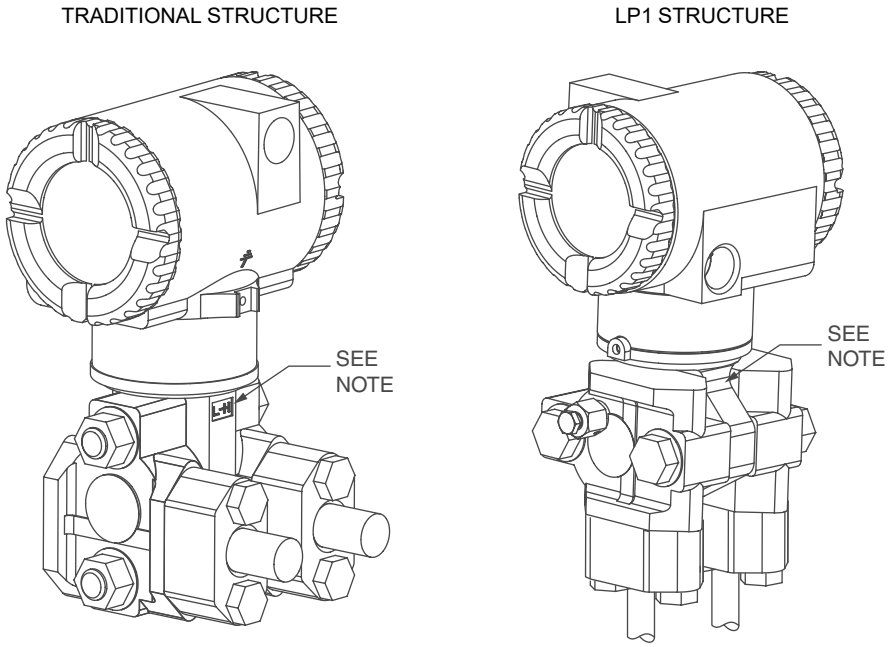


Figure 6 - Transmitter Supported by Process Piping

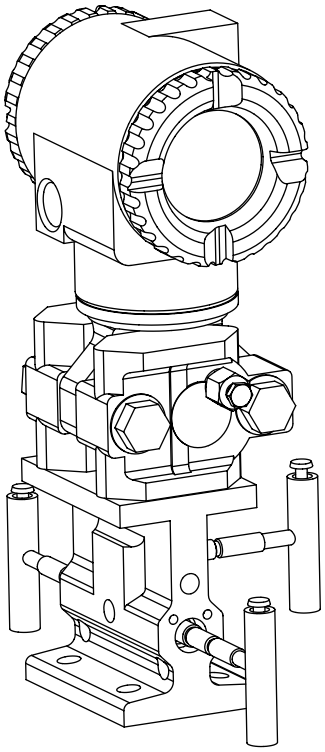


NOTE: MARK INDICATING LOW AND HIGH PRESSURE SIDES OF TRANSMITTER

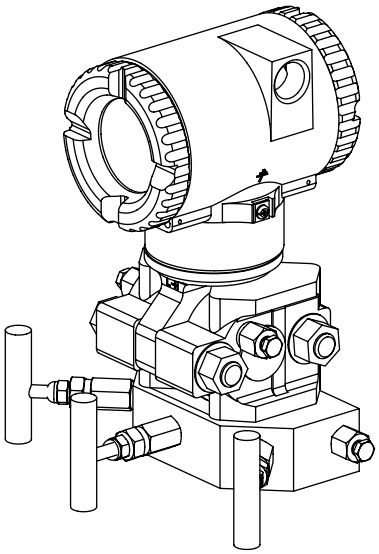
Manifold Mounting

With manifold mounting, the transmitter is mounted to and supported by a bypass manifold. The bypass manifold can be mounted to a DN 50 or 2 inch pipe with an optional mounting bracket. See MI 022-138.

Figure 7 - Typical Mounting Supported by a Bypass Manifold

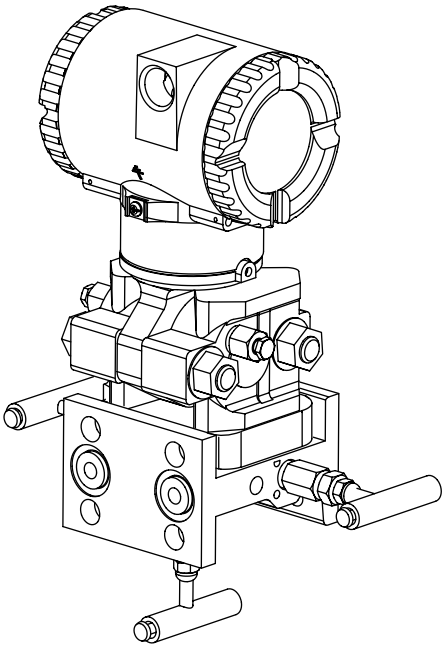


M4A MANIFOLD

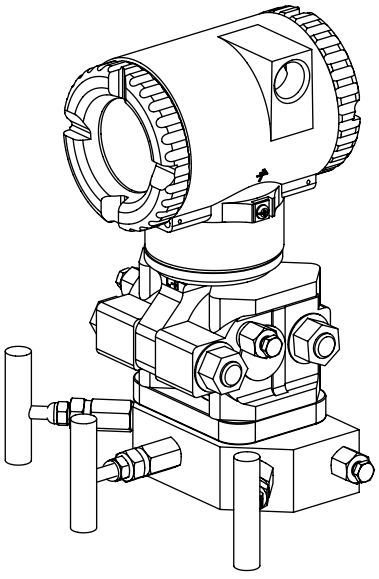


MB3 MANIFOLD

Figure 8 - Typical Mounting on a Coplanar™ Manifold



MT3 MANIFOLD



MC3 MANIFOLD

Bracket Mounting

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

Standard Mounting Bracket

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

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

Figure 9 - Pipe or Surface Mounted Transmitter Using a Standard Bracket

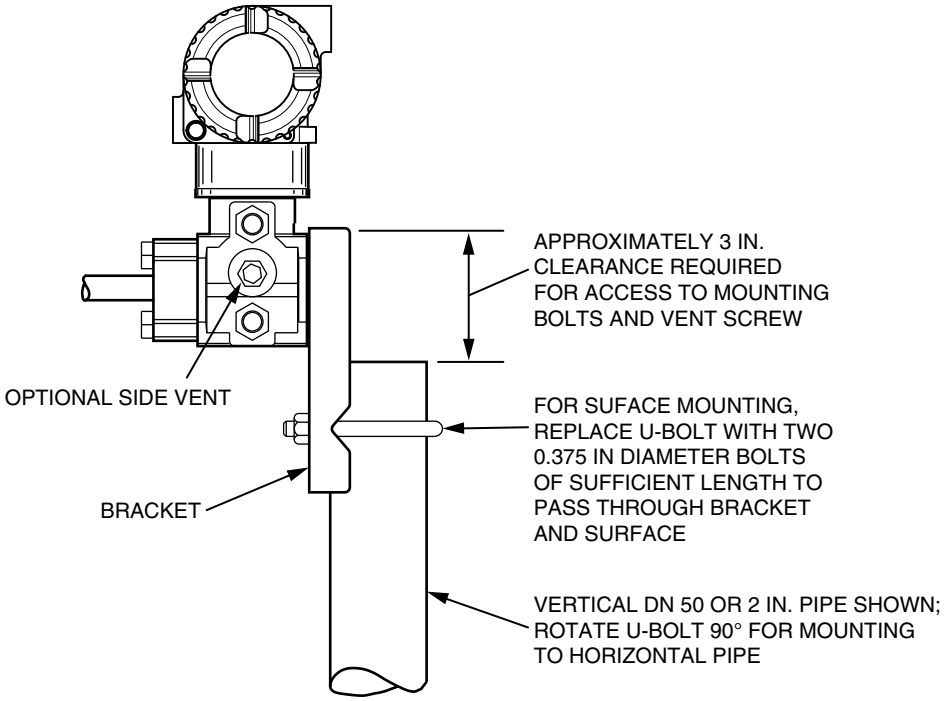
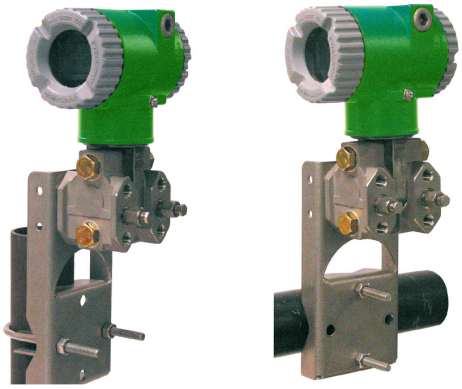


Figure 10 - Examples of Transmitters Mounted with a Standard Bracket



Universal Mounting Bracket

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

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

Figure 11 - Universal Bracket Detail

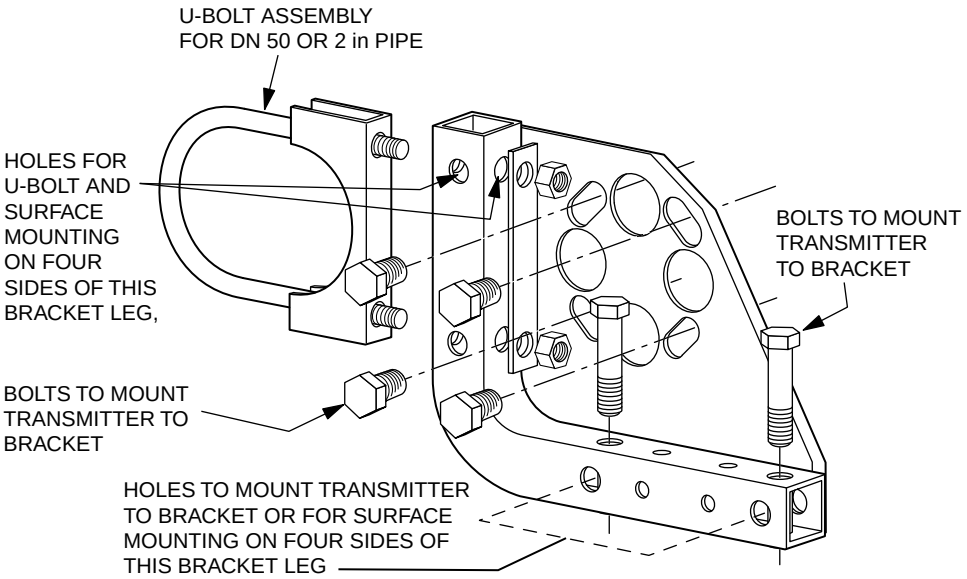
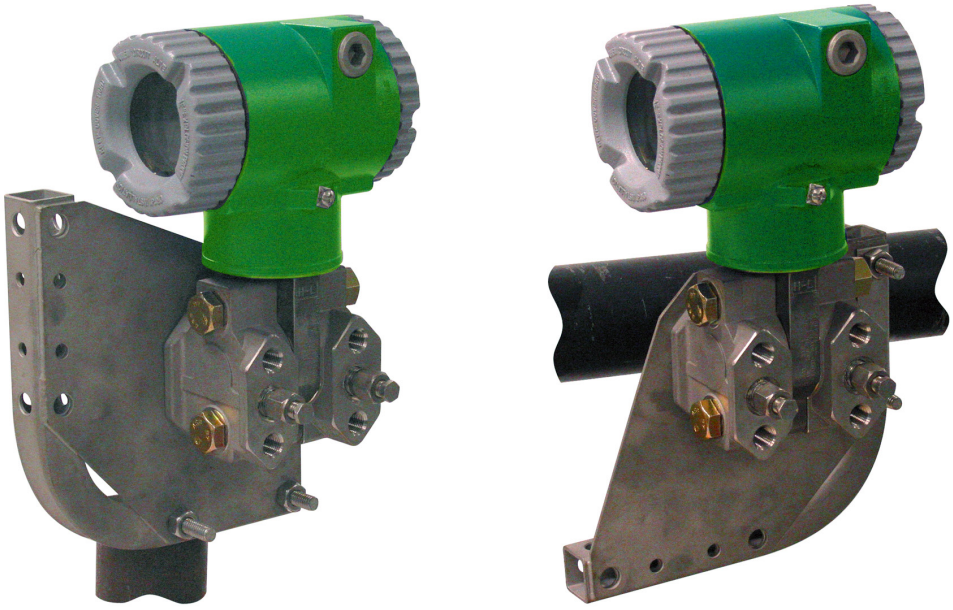


Figure 12 - Examples of Transmitters Mounted with a Universal Bracket



Venting and Draining — Traditional Structure

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

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

Figure 13 - Vertical Mounting — Cavity Draining

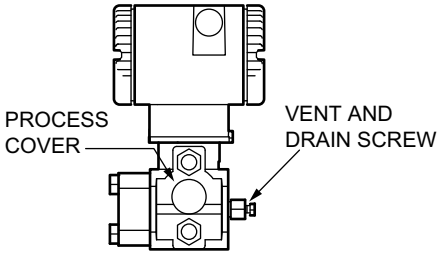


Figure 14 - Vertical Mounting — Cavity Venting

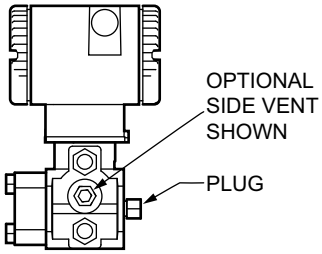
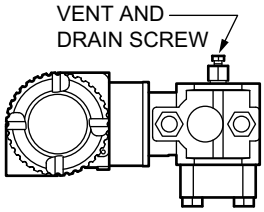


Figure 15 - Horizontal Mounting — Cavity Venting



Venting and Draining — LP1 Low Profile Structure

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

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

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

Figure 16 - Vertical Mounting — Cavity Venting

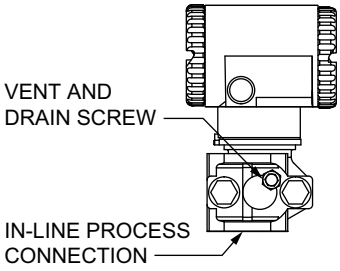
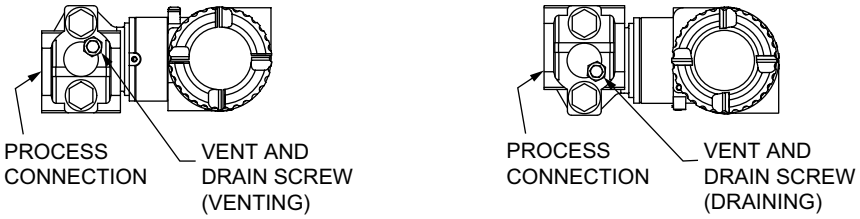


Figure 17 - Horizontal Mounting — Cavity Venting and Draining



Installation of Flow Measurement Piping

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

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

If the process fluid being measured must not come into contact with the transmitter, the transmitter lines must be filled with a suitable seal liquid as described in Filling the System with Seal Liquid, page 33. In such a case, mount the transmitter below the level of the pressure connections at the pipe. With steam flow, the lines are filled with water to help protect the transmitter from the hot steam. The seal liquid (or water) is added to the lines through the filling tees. To help prevent unequal heads on the transmitter, the tees must be at the same elevation, and the transmitter must be mounted vertically as shown. If a seal liquid is not required, elbows can be used in place of the tees.

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

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

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

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

Figure 18 - Example of Horizontal Process Line Installation

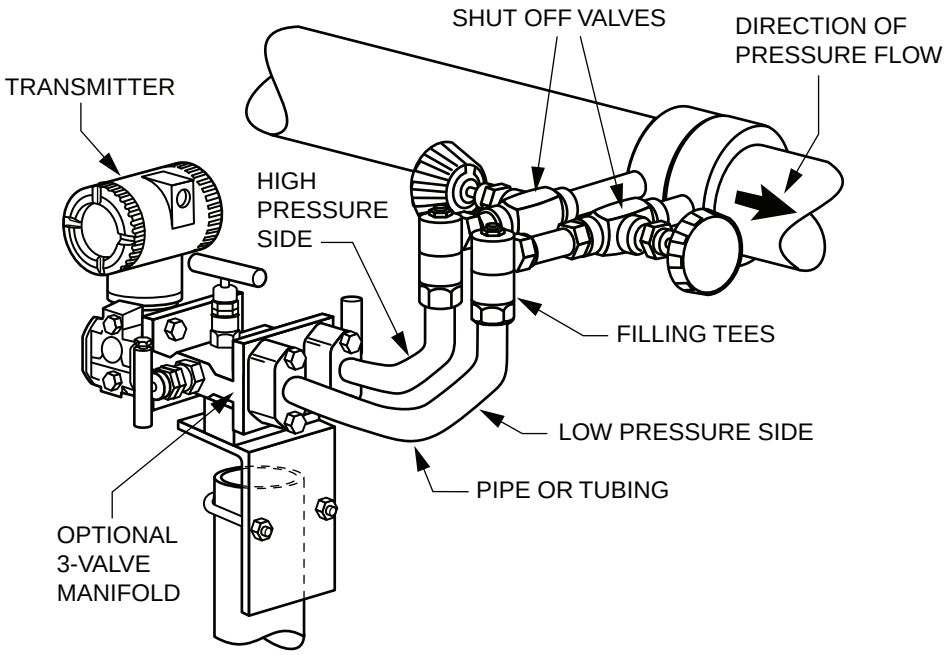
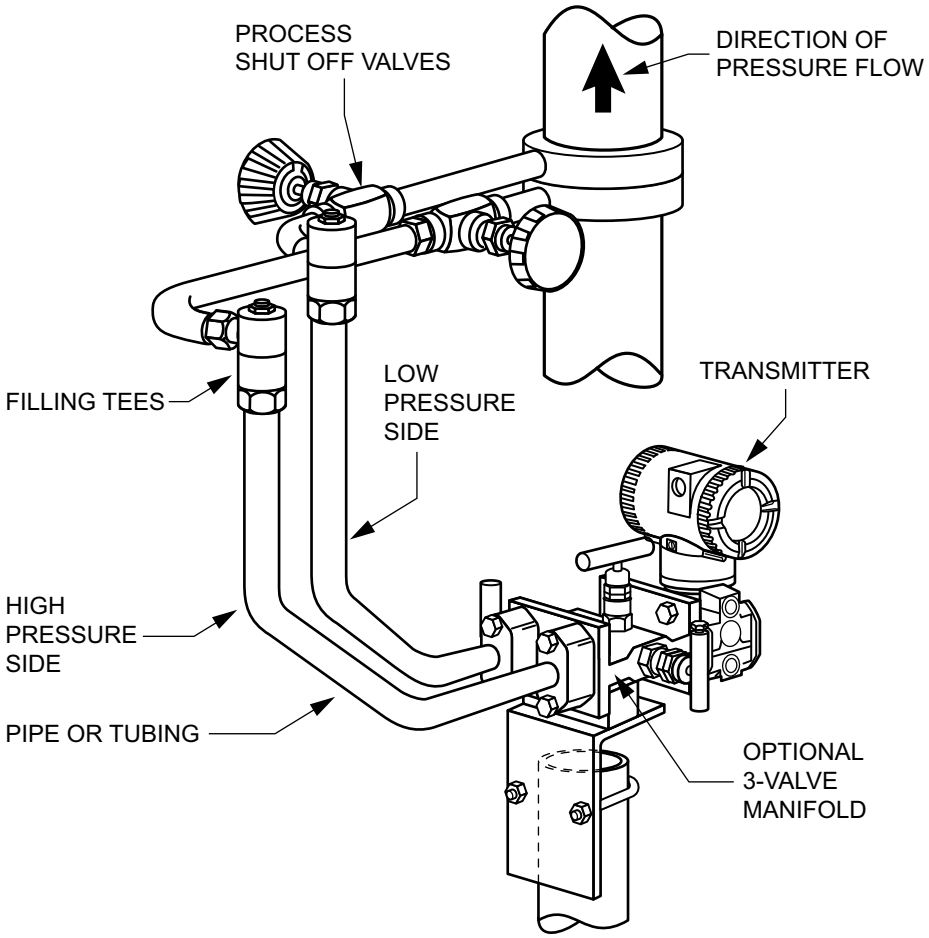


Figure 19 - Example of Vertical Process Line Installation



Filling the System with Seal Liquid

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

NOTICE
POTENTIAL EQUIPMENT DAMAGE AND PROCESS FLUID CONTAMINATION To help prevent loss of seal liquid and contamination of process fluid, never open both process shutoff valves and manifold shutoff valves if the bypass valve is open. **Failure to follow these instructions can result in equipment damage and process fluid contamination.**

1. If the transmitter is in service, follow the procedure in Taking a Differential Pressure Transmitter out of Operation, page 42.
2. Close both process shutoff valves.
3. Open all three valves on the 3-valve manifold.
4. Partially open the vent screws on the transmitter until all air has been forced out of the transmitter body and lines. Close the vent screws.
5. Refill the tee connections. Replace the plugs and close the bypass valve. Check for leaks.

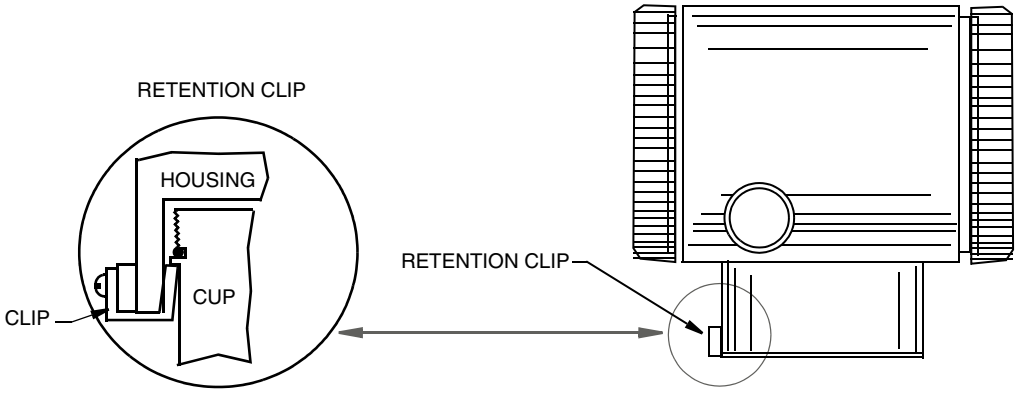
6. Follow the procedure in Putting a Differential Pressure Transmitter into Operation, page 41.

Positioning the Housing

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

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

Figure 20 - Housing Clip Location



Positioning the Display

The optional display can be rotated within the housing at 90° increments to any of four positions. To do this, 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.

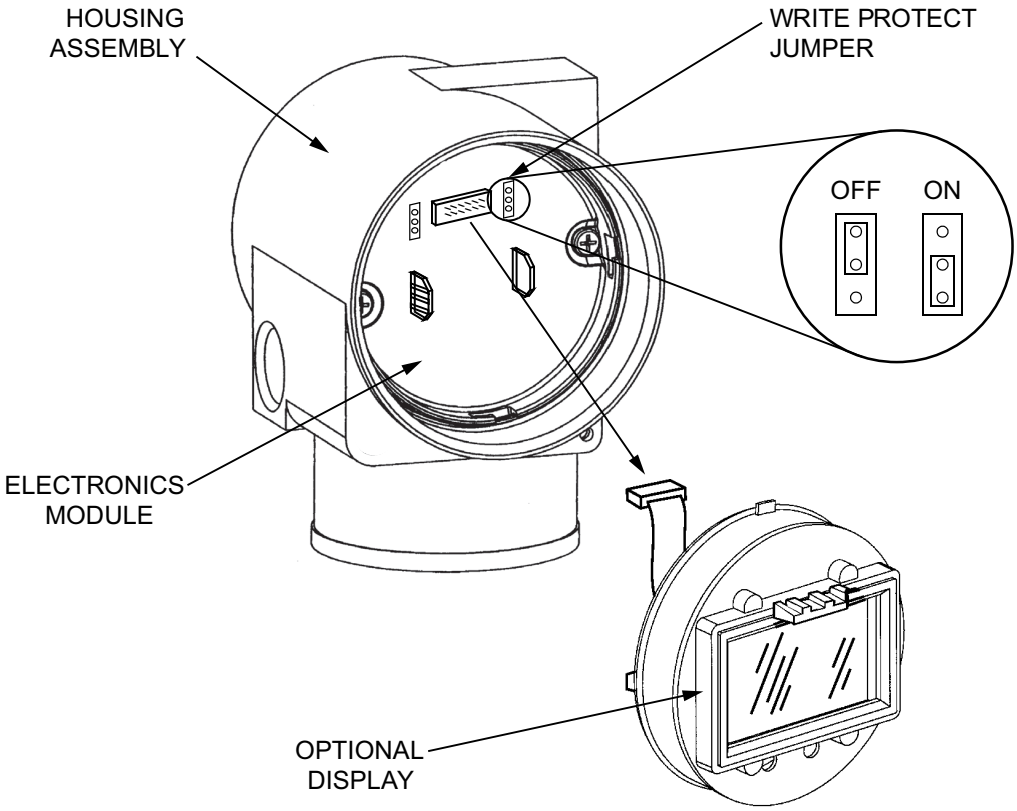
NOTICE
POTENTIAL EQUIPMENT DAMAGE Do not turn the display more than 180° in any direction. Doing so can damage its connecting cable. **Failure to follow these instructions can result in equipment damage.**

Setting the Write Protect Jumper

Your transmitter has write protection capability. This means that the local display and remote communications can be prevented from writing to the electronics. Enable write protection 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 Positioning the Display, page 34, then remove the jumper or move it to the lower position as shown on the exposed label. Replace the display.

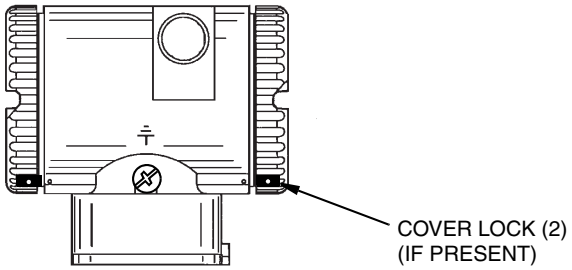
Figure 21 - Write Protect Jumper



Cover Locks

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

Figure 22 - Cover Lock Location



Wiring

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

⚠WARNING

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

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

NOTICE

HAZARD OF ELECTRICAL TRANSIENT OR SURGE

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

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

NOTICE

HAZARD OF EQUIPMENT DAMAGE

The transmitter's DC power port must be connected to a local power source. Do not connect it to a DC power distribution network.

Failure to follow these instructions can result in equipment damage.

Conduit/Cable Gland Connections

The electronics housing has two conduit/cable gland connections to allow access from either side of the housing. These connections are 1/2 NPT or M20 threads per your order. Use the correct threaded devices when making the connections. You can verify the type of thread with the ninth character after the dash in the model code on the data plate. The letter 1 or 3 indicate a 1/2 NPT thread; 5 or 6, an M20 thread. Refer to "Conduit Connection and Housing Material" in Model Code, page 81.

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

⚠⚠WARNING

EXPLOSION HAZARD

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

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

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

Accessing Transmitter Field Terminals

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

Figure 23 - Accessing Field Terminals

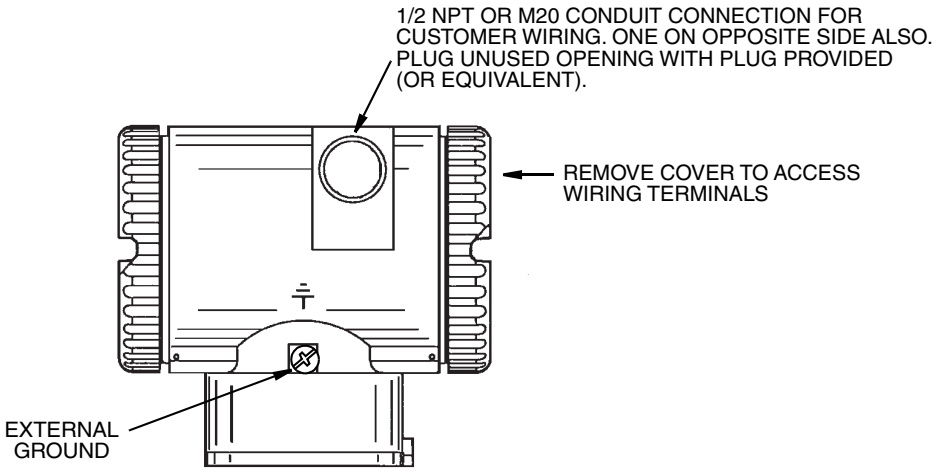
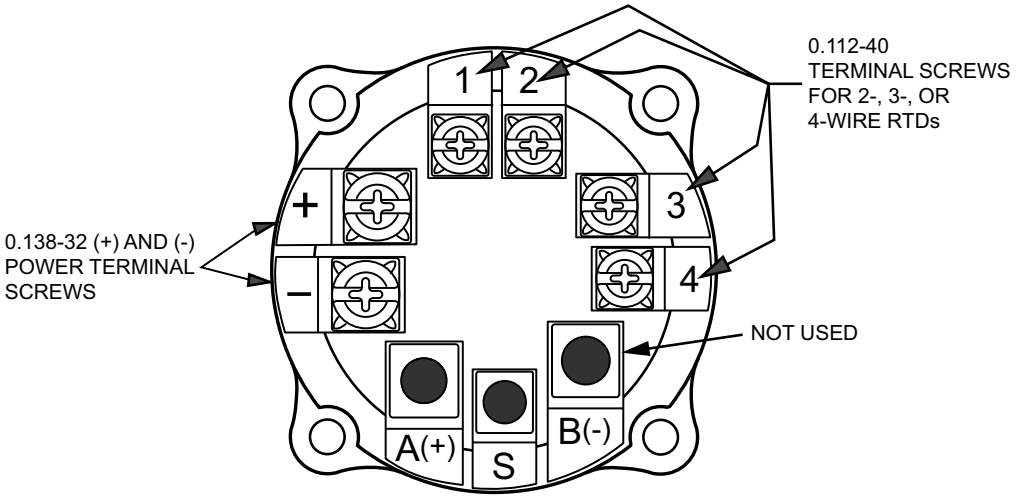


Figure 24 - Identification of Field Terminals

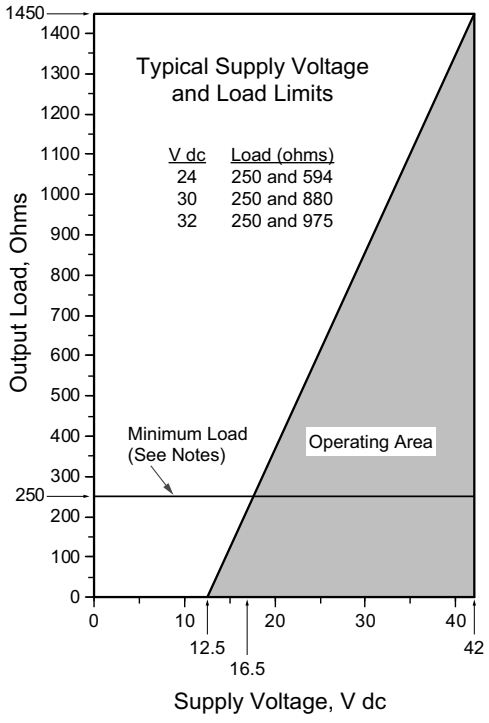


Wiring the Transmitter to a Control Loop

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

You can use any combination of supply voltage and loop load resistance in the shaded area shown in Supply Voltage and Loop Load, page 38. 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 25 - Supply Voltage and Loop Load



NOTES:
1. The minimum voltage for HART communication is 16.5 V dc.
2. The minimum load for the HART Communicator is 250 ohms.
3. The transmitter can function with an output load less than the minimum, but using a remote configurator while operating in this area will result in output and/or communication disturbances.

Examples:

- For a loop load resistance of 880 Ω, the supply voltage can be any value from 30 to 42 V dc.
- For a supply voltage of 24 V dc, the loop load resistance can be any value from 250 to 594 Ω (0 to 594 Ω without a HART communicator or PC-based configurator connected to the transmitter).

To wire one or more transmitters to a power supply, follow these 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. Use twisted single pair to help protect the 4 to 20 mA output and/or remote communications from electrical noise. The maximum recommended length for signal wires is:
   - 3,050 m (10,000 ft) using single pair cable and adhering to the requirements of the HART physical layer implementation defined in HART Document HCF_SPEC-53. Use CN=1 when calculating maximum lengths.
   - 1,525 m (5,000 ft) in multidrop mode. Shielded cable could be required in some locations.

   NOTE: Do not run the transmitter wires in the same conduit as the mains (ac power) wires.
3. If shielded cable is used, ground the shield at the power supply only. Do not ground the shield at the transmitter.
4. Plug the unused conduit connection.

⚠⚠WARNING

EXPLOSION HAZARD

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

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

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

NOTICE

POTENTIAL REDUCED PERFORMANCE OR EQUIPMENT DAMAGE

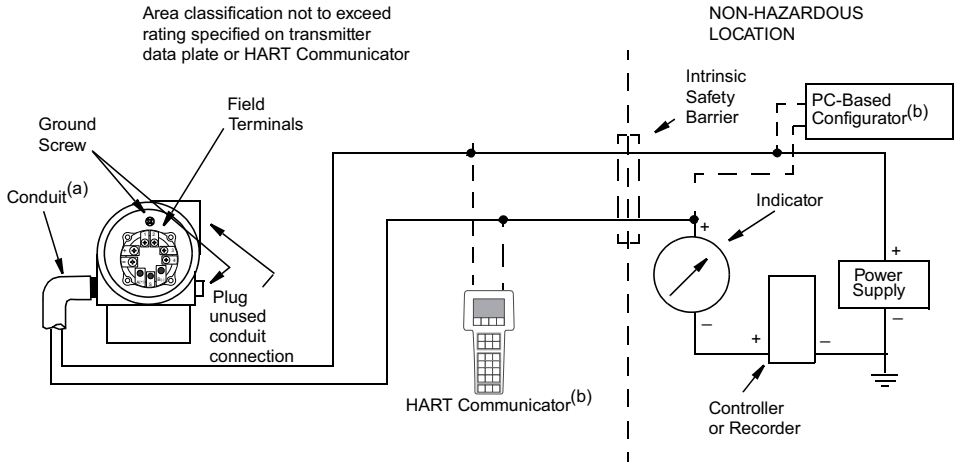
If the signal circuit must be grounded, it is preferable to ground it at the negative terminal of the dc power supply. To avoid errors resulting from ground loops or the possibility of short-circuiting groups of instruments in a loop, there should be only one ground in a loop.

Failure to follow these instructions can result in equipment damage.

6. Connect the power supply and receiver loop wires to the “+” and “–” terminal connections.

7. Connect receivers (such as controllers, recorders, indicators) in series with the power supply and transmitter as shown in the diagram.

Figure 26 - Loop Wiring Transmitters

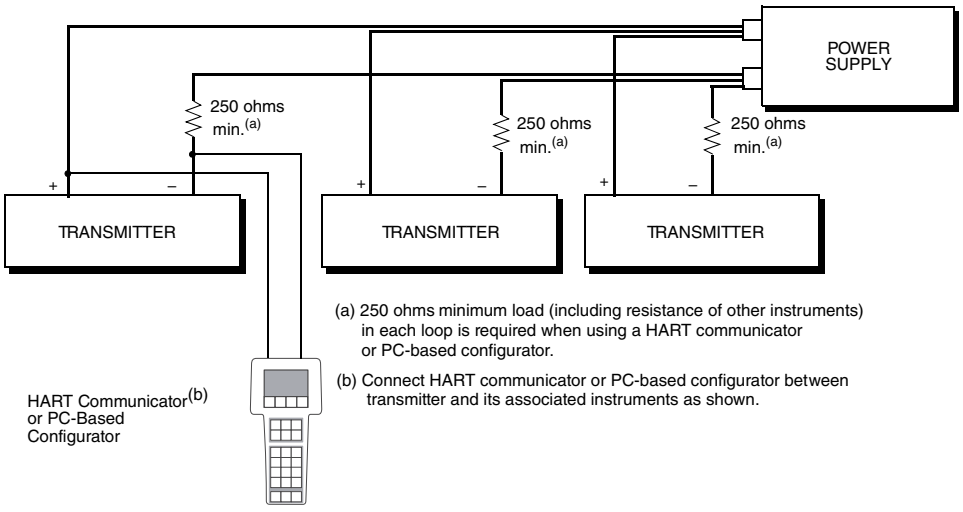


(a) Run conduit down to avoid moisture buildup in terminals compartment.
(b) There must be at least 250 ohms total resistance between the HART Communicator or PC-based configurator and the power supply.

8. Reinstall the cover onto the housing by rotating it clockwise to seat the o-ring into the housing, then continue to hand-tighten until the cover contacts the housing metal-to-metal. If cover locks are present, lock the cover as described in Cover Locks, page 35.

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

Figure 27 - Wiring Several Transmitters to a Common Power Supply



(a) 250 ohms minimum load (including resistance of other instruments) in each loop is required when using a HART communicator or PC-based configurator.
(b) Connect HART communicator or PC-based configurator between transmitter and its associated instruments as shown.

10. A HART communicator or PC-based configurator can be connected in the loop between the transmitter and the power supply as shown in Step 7, page 40 and Step 9, page 40. A minimum of 250 Ω must separate the power supply from the HART communicator and PC-based configurator.

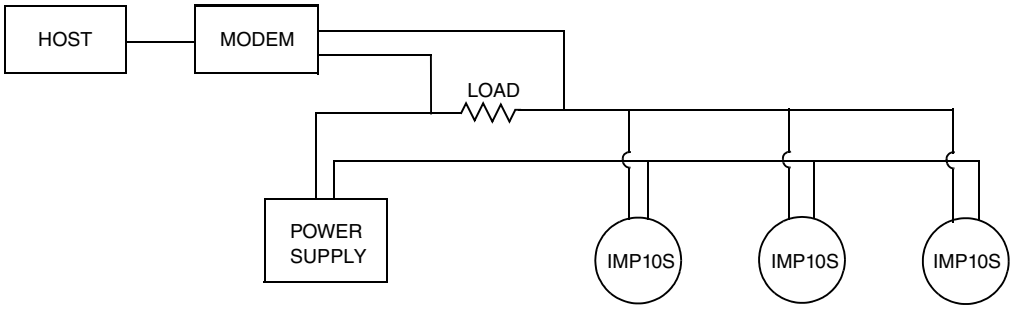
Multidrop Communication

"Multidrop communication" refers to the connection of several transmitters to a single communications transmission line. Communication between the host computer and the transmitters takes place digitally with the analog output of the transmitter deactivated. With the HART communication protocol, up to 64 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. 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 (0 through 63) and responds to the commands defined in the HART protocol.

The next diagram shows a typical multidrop network. Do not use this figure as an installation diagram. Contact the FieldComm Group (http://www.fieldcommgroup.org) for specific requirements for multidrop applications.

Figure 28 - Typical Multidrop Network



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

NOTE:

The transmitters are shipped from the factory with a poll address of 0 and with the loop current mode set to "enabled" (active), allowing the transmitters to operate in a standard point-to-point manner with a 4 to 20 mA output signal.

To activate multidrop communication, assign each transmitter a unique address (0 through 63) on each multidrop network. However, changing the transmitter poll address does not automatically deactivate the 4 to 20 mA analog output.

Only one device per multidrop network can be configured with loop current enabled. To fix the mA output value, set the loop current mode to "disabled."

Connecting the Transmitter to a Schneider Electric DCS

The transmitter can send its measurement to a Schneider Electric distributed control system (DCS) as a digital signal via an FBM214/215. Wiring terminations at the transmitter are the same as described in this section. For other system wiring details, refer to the installation instructions provided with the DCS.

Putting a Differential Pressure Transmitter into Operation

This procedure explains how to sequence the valves in your flow measurement piping or optional bypass manifold to help ensure that your transmitter is not overranged and

that seal liquid is not lost. Refer to the diagrams in Installation of Flow Measurement Piping, page 31.

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

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

Taking a Differential Pressure Transmitter out of Operation

This procedure explains how to sequence the valves in your flow measurement piping or optional bypass manifold to help ensure that your transmitter is not overranged and that seal liquid is not lost. Refer to the diagrams in Installation of Flow Measurement Piping, page 31.

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

1. Close both the upstream and downstream transmitter connection valves.
2. Open the bypass valve.
3. Slowly open the downstream side vent screw on the transmitter to release pressure before disconnecting lines.

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

4. Remove the transmitter, if applicable.

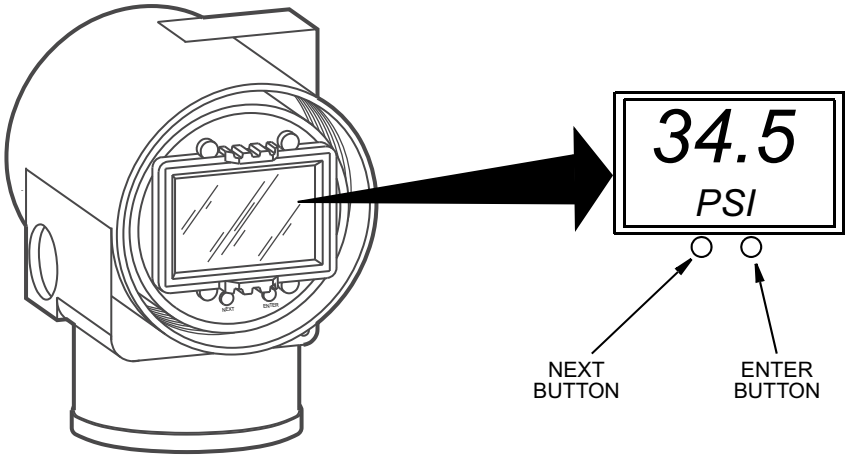
Operation with the Local Display

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

During normal transmitter operation, the display cycles through the selected items configured with the Display Control register. The **ENTER** button has no effect until you enter the menu using the **NEXT** button.

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

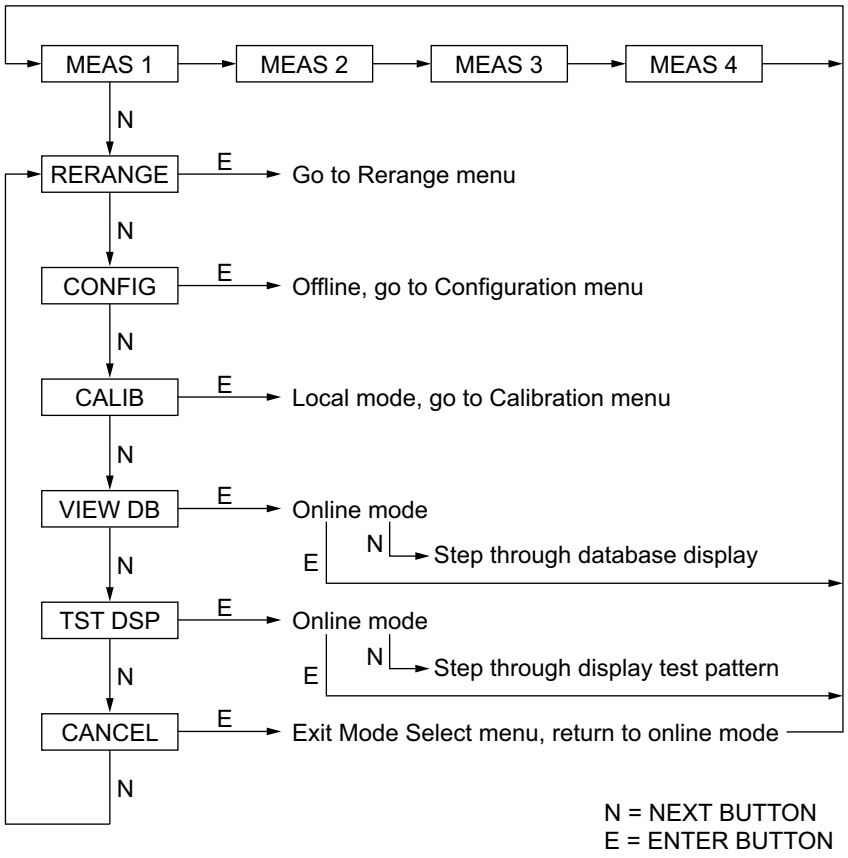
Figure 29 - Local Display



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

NOTE: You can configure many, but not all, parameters using the pushbuttons. For more complete configuration capability, use a HART Communicator or PC-based configurator.

Figure 30 - Top Level Menu



Entering Strings and Numeric Values

To enter strings or numeric values, follow these steps:

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

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

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

   NOTE:

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

   The display advances to the next menu item.

Table 8 - Permitted Characters for the Local Display

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

Reranging

Since the transmitter continuously determines an internal digital value of the measured pressure from the lower range limit (LRL) to the upper range limit (URL), the HART 4 and 20 mA output points can be assigned to any pressure values within the span and range limits, without the application of pressure.

- Reranging does not affect the calibration of the transmitter; that is, it does not affect the optimization of the internal digital value of pressure over a specific calibrated range.
- If the reranged LRV and URV are not within the calibrated range, the measured values may not be as accurate as when the LRV and URV are within the calibrated range.
- If you need to perform a span calibration after reranging the transmitter, be sure to perform an offset calibration (**CALDPLR**) before performing the span calibration (**CALDPUR**) operation. If you do not perform the offset calibration, you may get a **BADSPAN** message.
- If **M1 MODE** is in a square root mode, regardless of engineering units selected, **RERANGE** is done in the following pressure units:
  - **inH2O**, if **M2 MODE** is a type of square root with span range code B or C.
  - **psi**, if **M2 MODE** is a type of square root with span range code D or E.
  - **M2_EGU** units, if **M2 MODE** is linear with all span range codes.

  During **RERANGE**, the bottom line of the display indicates the units that are in use. After **RERANGE**, the display automatically returns to the configured engineering units.

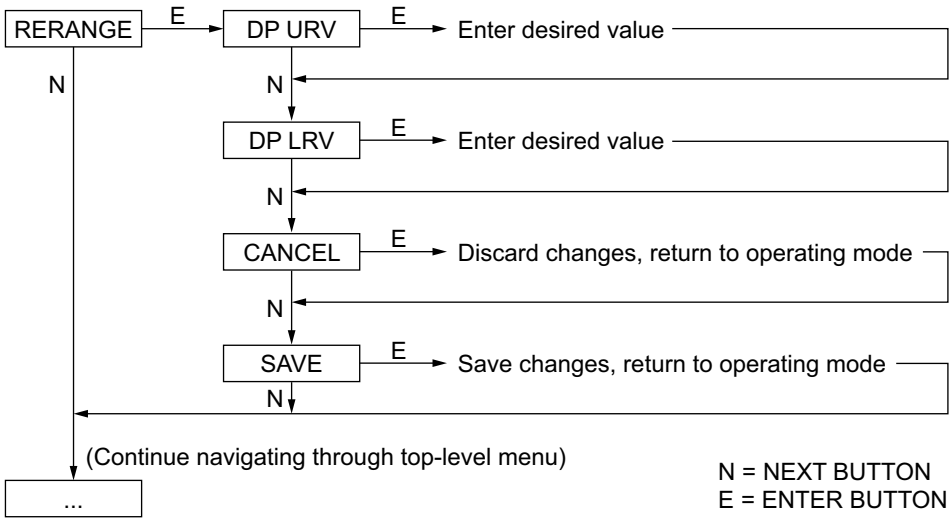
You can rerange the transmitter by entering new database values for the LRV and URV.

1. With the transmitter in normal operating mode, press the **NEXT** button to access the transmitter's top level menu. The first menu item is **RERANGE**. Press **ENTER** to select it.

2. Use the procedure in Entering Strings and Numeric Values, page 44 to adjust **DP URV** and/or **DP LRV** as desired.
   - To edit the upper range value, press **ENTER** at the **DP URV** prompt.
   - To edit the lower range value, press **ENTER** at the **DP LRV** prompt.

NOTE: DP LRV is bypassed if **M1 MODE** is configured as square root, because **DP LRV** must be zero.

Figure 31 - Rerange Menu Diagram



Viewing the Database

You can view the database using the multi-level menu system.

1. From the transmitter's normal operating mode, press the **NEXT** button to access the transmitter's top level menu.
2. Navigate to **VIEW DB**, then press **ENTER**. The display shows the first item in the database.
3. Continue stepping through the database by pressing **NEXT**, or exit the database view by pressing **ENTER**.

The following diagram shows the VIEW DB menu. The database items are described in Database Items, page 47.

Figure 32 - VIEW DB Menu

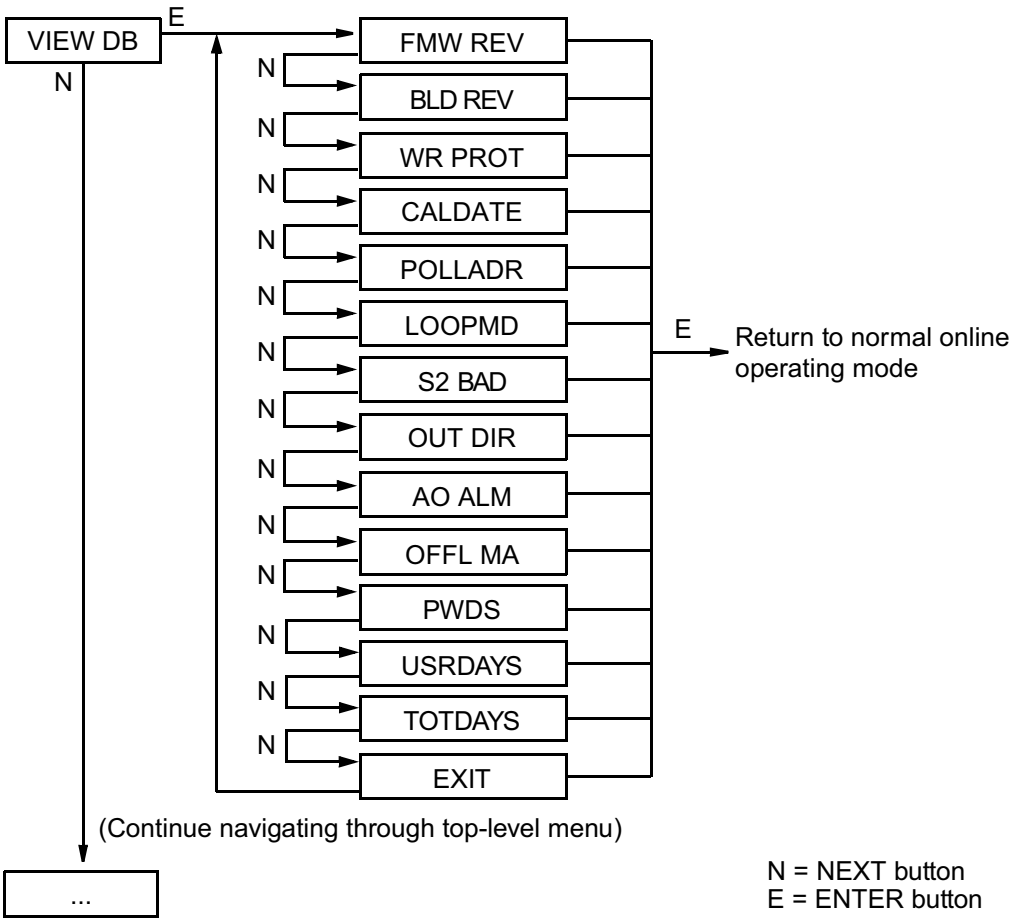


Table 9 - Database Items

Database Item	Available Settings or Example
Firmware revision (**FMW REV**)	**2.0** (example)
Build number (**BLD REV**)	**192** (example)
Write protection status (**WR PROT**)	**WP Dis** (disabled) **WP Ena** (enabled)
Date of last calibration (**CALDATE**)	**29DEC20** (example)
Poll address (**POLLADR**)	**0** through **63**
Loop current mode (**LOOPMD**) Used to disable loop current signaling whenever the transmitter is set for Multidrop mode	**Enable** **Disable**
Temperature sensor strategy (**S2 BAD**)	**Ao Alrm** **Use Def**
4 to 20 mA output direction (**OUT DIR**)	**Out Fwd** (forward) **Out Rev** (reverse)
4 to 20 mA output alarm mode (**AO ALRM**)	**Lo Alrm** (low) **Hi Alrm** (high)
4 to 20 mA output in offline mode (**OFFL MA**)	**Last mA** (last) **User mA** (user-defined)

Table 9 - Database Items (Continued)

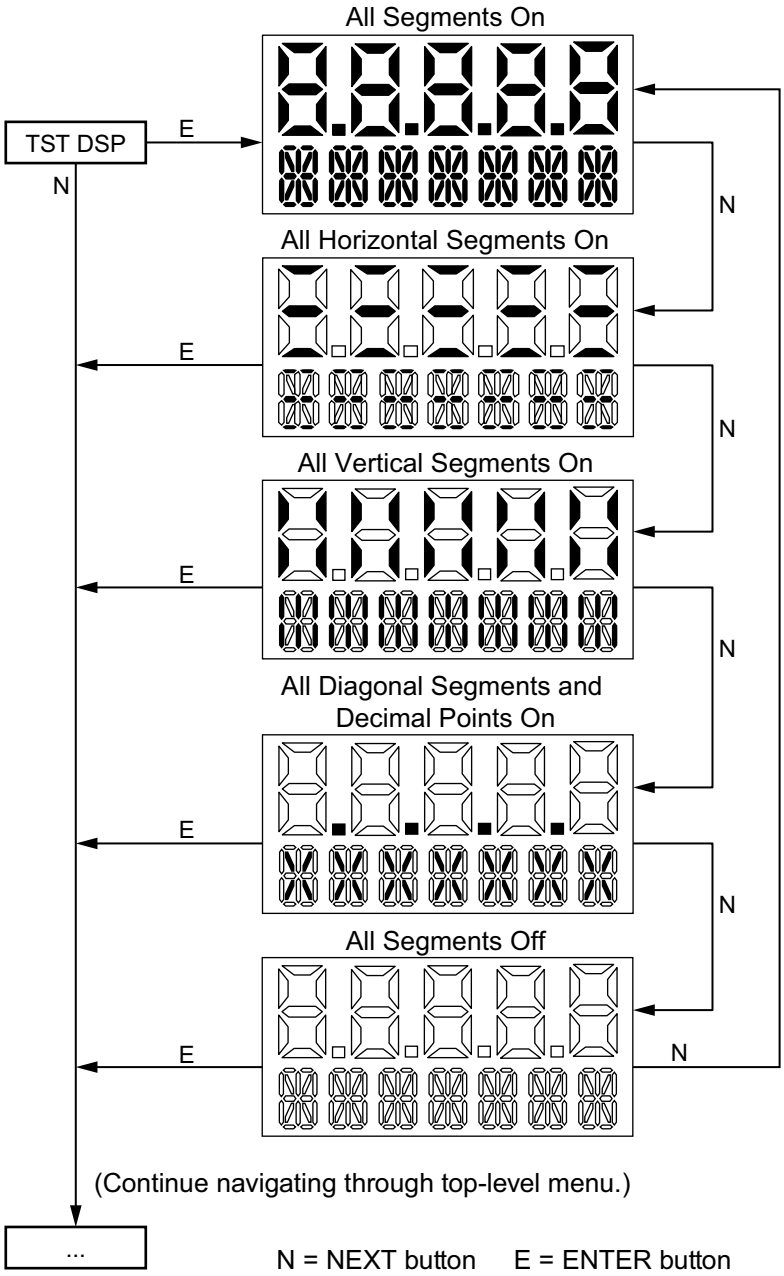
Database Item	Available Settings or Example
Current password setting (**PWDS**)	**No Pwds** (no password) **Ena Pwd** (enable password) **CfgOnly** (configuration only) **Cfg+Cal** (configuration and calibration)
Number of days the transmitter has been running since the Time in Service Meter was reset (**USRDAYS**)	**7** (example)
Number of days the transmitter has been running since it was installed (**TOTDAYS**)	**61** (example)

Testing the Display

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

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

Figure 33 - Display Test Segment Patterns



Operational Messages

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

Status	Condition Tested	Message	Description
Startup	Database corruption	INITBAD	Perform a RESETDB procedure.
Normal operation	Write protection enabled	WR PROT	Displays periodically to notify that unit is write protected.
	Any non-online condition	OFFLINE	Notifies of a non-online condition.

Status	Condition Tested	Message	Description
Measurement outside of limits[22]	Pressure	IN1 BAD AP SAT DP SAT	• Extreme overrange or underrange input; correct input condition. • Bad calibration; recalibrate transmitter. • Bad sensor connection; check electronics module to sensor. • Inoperative sensor.
	Electronics temperature	IN2 BAD	• Bad sensor connection; check electronics module connection to sensor. • Inoperative sensor.
		ET SAT	Electronics temperature input is outside of limits.
	Sensor (process) temperature	IN3 BAD	• Bad sensor connection; check electronics module connection to sensor. • Inoperative sensor.
		ST SAT	Sensor temperature input is outside of limits.

22. Input for this measurement is outside of limits.

Configuration

You can configure the transmitter by accessing the menu system using the **ENTER** and **NEXT** buttons on the local display, or by using a remote configurator.

NOTE: If your transmitter is write protected, you cannot write your configuration to the electronics. To disable this feature, see Setting the Write Protect Jumper, page 35.

Configurable Parameters

This table lists all of the configurable parameters and the factory defaults for the transmitter. The table also shows which configuration methods are available for each parameter.

NOTE: If the transmitter was ordered with optional feature -C1 or -C2, some parameters will have been customized.

Table 10 - Configurable Parameters

Parameter	Capability	Default	Configurable with		
			Integral Display	PC-Based Config.	HART Comm.
Poll Address	0 to 63	0	Yes	Yes	Yes
Descriptors					
Tag Number	Up to 8 characters	- - -	No	Yes	Yes
Descriptor	Up to 16 characters	- - -	No	Yes	Yes
Message	Up to 32 characters	- - -	No	Yes	Yes
Dynamic Variable Assignment					
Primary Variable	DP, AP, RTD, Sensor Temp, Electronics Temp	DP	Yes	Yes	Yes
Secondary Variable	DP, AP, RTD, Sensor Temp, Electronics Temp	AP	Yes	Yes	Yes
Tertiary Variable	DP, AP, RTD, Sensor Temp, Electronics Temp	STMP	Yes	Yes	Yes
Fourth Variable	DP, AP, RTD, Sensor Temp, Electronics Temp	RTD	Yes	Yes	Yes
mA					
Direction	Forward or Reverse	Forward	Yes	No	No
Failsafe	Fail mode output (High or Low)	High	Yes	Yes	No
Offline	Offline output: last value, or user set from 3.75 to 21 mA	User set at 4 mA	Yes	No	No
Differential Pressure					
Mode	Linear, or Type of SqRt	Linear	Yes	Yes	Yes
Units	Pressure units for Linear; % for SqRt	inH_2O	Yes	Yes	Yes
DP LRV	Within DP range	0	Yes	Yes	Yes
DP URV	Within DP range	URL	Yes	Yes	Yes
Damping	0 to 32 seconds	None	Yes	Yes	Yes

Table 10 - Configurable Parameters (Continued)

Parameter	Capability	Default	Configurable with		
			Integral Display	PC-Based Config.	HART Comm.
Absolute Pressure					
Mode	Display AP or GP	AP	Yes	Yes	Yes
Units	Pressure units	psia	Yes	Yes	Yes
AP LRV	Within AP range	0	Yes	Yes	Yes
AP URV	Within AP range	URL	Yes	Yes	Yes
ATM Reference	Pressure value	14.7 psi	Yes	Yes	Yes
Damping	0 to 32 seconds	None	Yes	Yes	Yes
RTD					
Mode	On or Off	On	Yes	Yes	Yes
Units	Temperature units	deg C	Yes	Yes	Yes
RTD LRV	Within RTD range	-200	Yes	Yes	Yes
RTD URV	Within RTD range	+850	Yes	Yes	Yes
Sensor Temperature (STMP)					
Units	Temperature units	deg C	No	Yes	Yes
STMP LRV	Within STMP limits	-40	No	Yes	Yes
STMP URV	Within STMP limits	+122	No	Yes	Yes
Electronics Temperature (ETMP)					
Units	Temperature units	deg C	No	Yes	Yes
ETMP LRV	Within ETMP limits	-40	No	Yes	Yes
ETMP URV	Within ETMP limits	+85	No	Yes	Yes
Other					
Calibration Date	ddmmmyy	none	Yes	No	Yes
Enable Passwords (for local display pushbuttons)	No Password Configuration only locked Calibration and Configuration locked	No Password	Yes	Yes	Yes
Reset Database	Keep or Clear	Keep	Yes	No	Yes

Configuration Using the Optional Local Display

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

NOTE:

- The standard factory default configuration is not used if model code option -C2 was specified for the order. Option -C2 is a custom factory configuration to user specifications.
- You can configure most parameters using the local display. For more complete configuration capability, use a HART communicator or PC-based configurator.

- During configuration, a single change could affect several parameters. For this reason, if you make a mistake, review the entire database. Or, use the **CANCEL** feature to restore the transmitter to its starting configuration and begin again.

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

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

NOTE: During configuration, the transmitter is in offline mode, and output is set to offline mA.

Configuration Menus

Figure 34 - CONFIG Menu

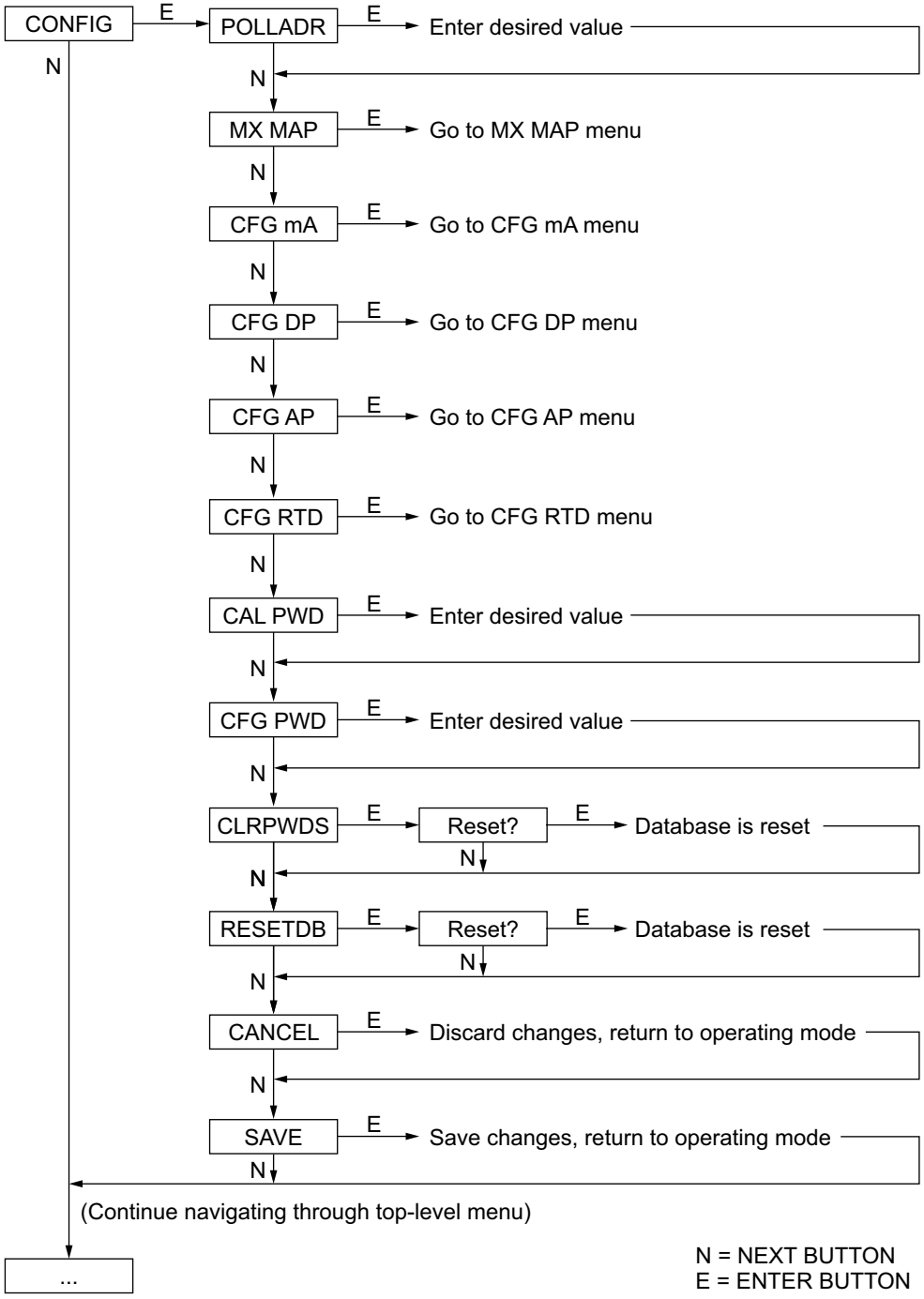


Figure 35 - MX MAP Menu

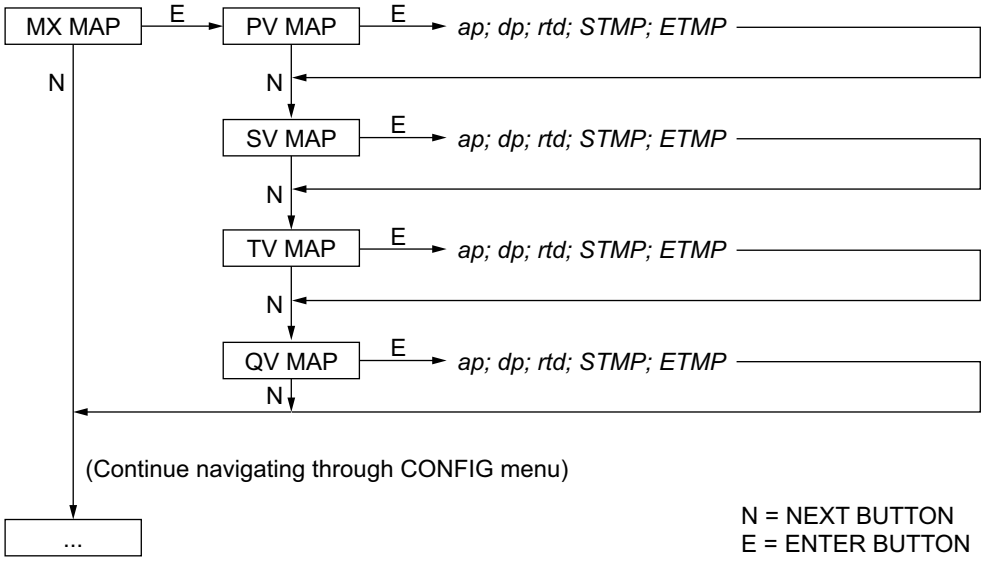


Figure 36 - CFG mA Menu

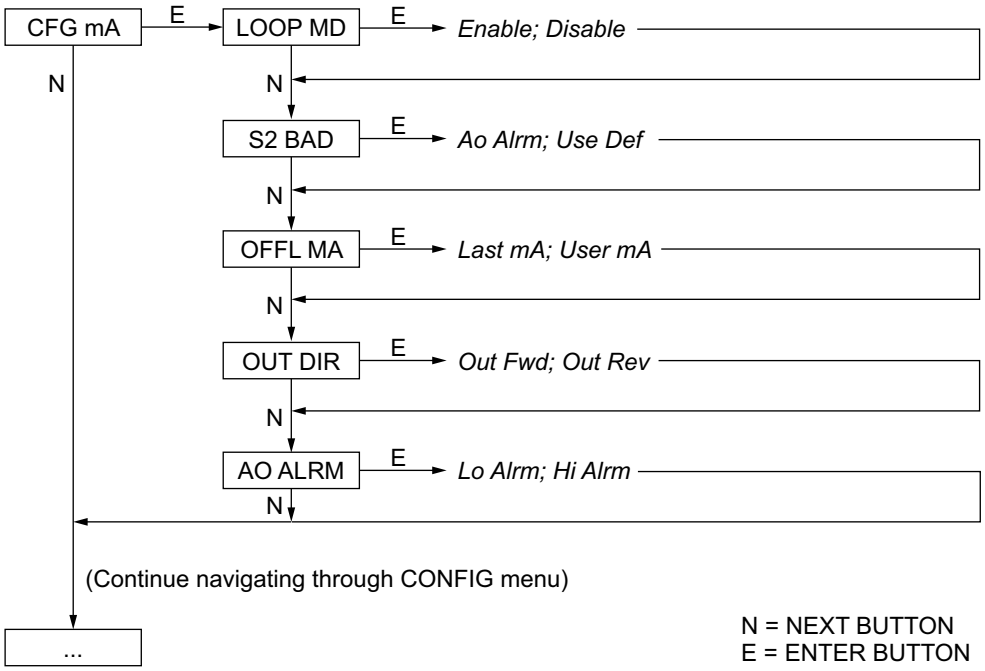


Figure 37 - CFG DP

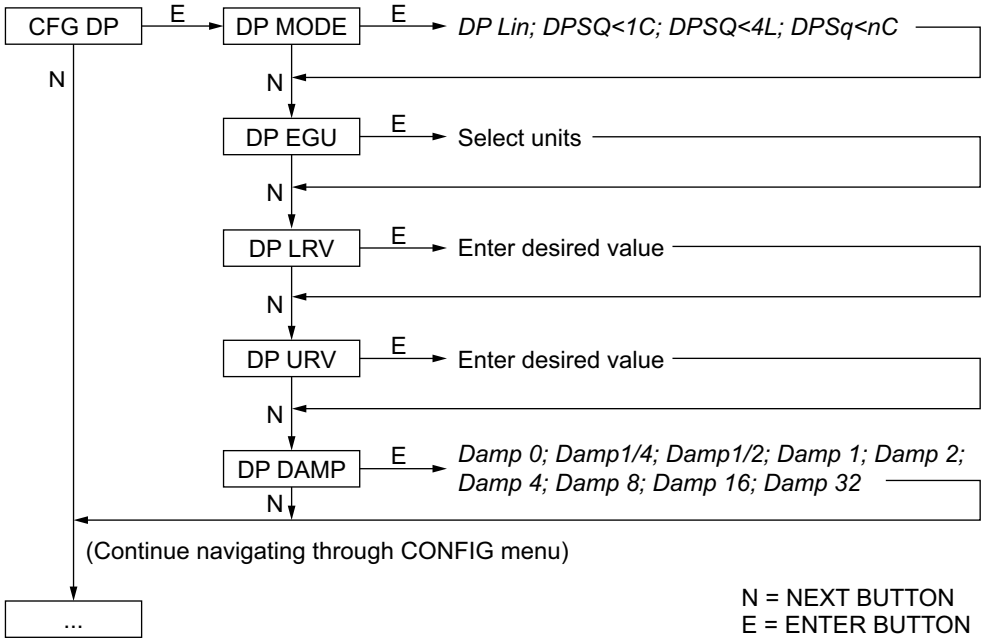


Figure 38 - CFG AP

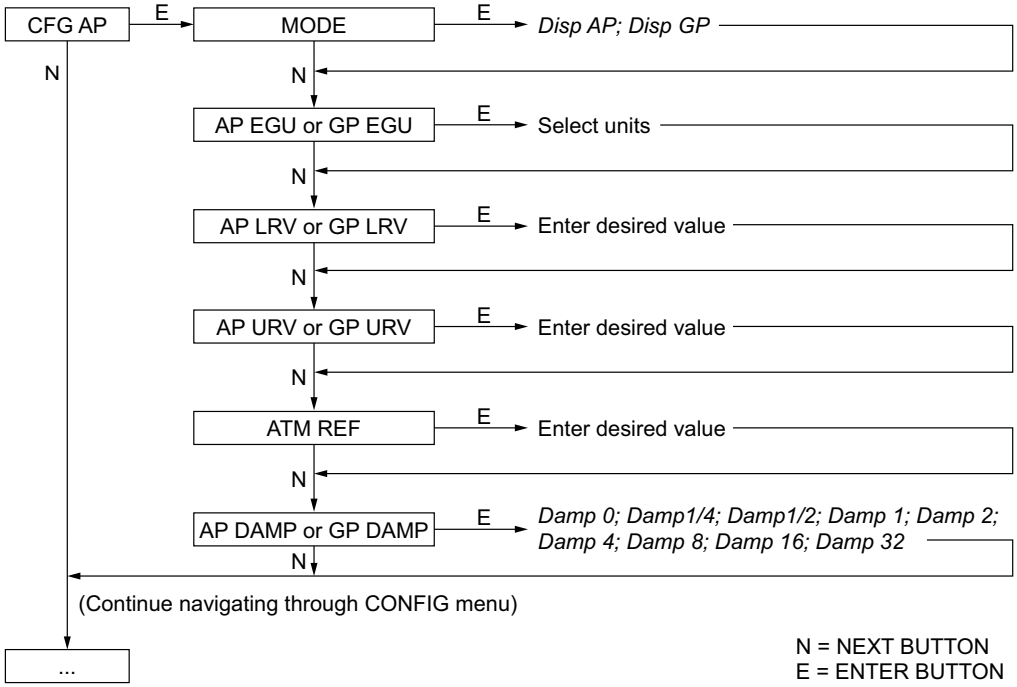
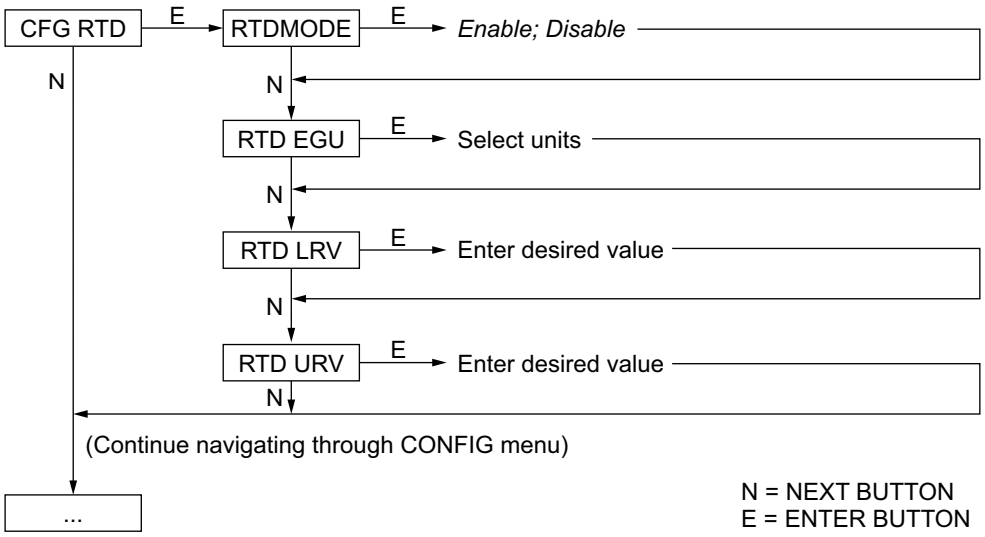


Figure 39 - CFG RTD



Configuration Messages

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

Parameter	Condition Tested	Message	Description
Any Configuration Action	Calculation Delay	WAIT	Displayed temporarily during calculation of updated values that result from a configuration change. No user action is necessary.
Password Protection	Password	BAD PWD	Bad password entered; use another.
Write Protection	Write Protection Enabled	REJECT	User attempted an action that is write-protected.
DP MODE (being changed to square root)	M1EOFF not 0 with M1 SqRt	BADEOFF	Square root mode with nonzero M1EOFF is not valid. Contact Global Customer Support.
	URV must be >LRV with M1 SqRt	URV<LRV	Square root mode with negative URV is not valid. Change M1_URV to a valid positive value.
	LRV must be 0 with M1 SqRt	LRVnot0	Square root mode with nonzero LRV is not valid. Change M1_LRV to 0.
AP MODE (changing DISP GP or DISP AP)	Adjusted LRV or URV is too large to display	99999	Change units if you want to edit the LRV or URV value on the display.
ATM REF	ATM REF too high	ATM>20	ATM REF must be set below 20 psia.
	ATM REF too low	ATM<10	ATM REF must be set above 10 psia.

Parameter	Condition Tested	Message	Description
CFG any (entering URV or LRV)	M1_URV>max pressure in units	URV>FMX	Entered pressure is greater than the maximum rated pressure of the transmitter. Check entry. Verify units.
	M1_URV<min pressure in units	URV<FMN	Entered pressure is less than the minimum rated pressure of the transmitter. Check entry. Verify units.
	M1_URV=M1_LRV	LRV=URV	Cannot set span to 0. Check entry. Check M1_LRV and M1_URV. Verify units.
	M1 calculated turndown exceeds limit	BADTDWN	Span too small. Check entry. Check M1_LRV and M1_URV. Verify units.
	M1EOFF not 0 with M1 SqRt	BADEOFF	Square root mode with nonzero M1EOFF is not valid. Contact Global Customer Support.
	URV must be >LRV with M1 SqRt	URV<LRV	Square root mode with negative URV is not valid. Change M1_URV to a valid positive value.
	LRV must be 0 with M1 SqRt	LRVnot0	Square root mode with nonzero LRV is not valid. Change M1_LRV to 0.
CFG any (changing units)	LRV in new units is too large to display	LRV>DSP	Change units if you want to edit the LRV value on the display.
	URV in new units is too large to display	URV>DSP	Change units if you want to edit the URV value on the display.
	M1EOFF not 0 with M1 SqRt	BADEOFF	Square root mode with nonzero M1EOFF is not valid. Contact Global Customer Support.
Normal Operation	Write Protection Enabled	WR PROT	Displays periodically to notify the user that the transmitter is write-protected.
	Any non-online condition	OFFLINE	Notifies user of a non-online condition.
Startup	Database OK or corrupted	INITERR	Perform the RESETDB procedure.

Configuration Using a PC50

To configure the transmitter using a PC50 Configurator, follow the procedures in MI 020-501 and MI 020-520.

Configuration Using a HART Communicator

To configure the transmitter using a HART communicator, follow the procedures in Operation with the HART Communicator, page 67.

Calibration

You can calibrate the transmitter by accessing the menu system using the **ENTER** and **NEXT** buttons on the local display, or by using a remote configurator.

NOTE:

- If Calibration has been configured as password protected, you are prompted for a password before you can proceed.
- If your transmitter is write protected, you cannot write your calibration to the electronics. To disable this feature, see Setting the Write Protect Jumper, page 35.
- For best results in applications where high accuracy is required, rezero the transmitter output once it has stabilized at the final operating temperature.
- Calibrate absolute pressure before calibrating differential pressure. The AP value is used to adjust the DP value.
- Zero shifts resulting from position effects and/or static pressure effects can be eliminated by rezeroing the transmitter output.
- Use test equipment that is at least three times as accurate as the desired accuracy of the transmitter.
- When checking the zero reading of a transmitter operating in the square root mode, return the output to linear mode. This eliminates an apparent instability in the output signal. Return the transmitter to the square root mode after the zero check is complete.
- After calibrating transmitters operating with a 4 to 20 mA output signal, check the underrange and overrange output values to ensure that they extend beyond 4 and 20, respectively.

Time in Service Meter

These transmitters have two ways of tracking the time that a transmitter has been in service:

- **Total Days** is a nonconfigurable value that represents the number of days the transmitter has been powered up in the field over its lifetime.
- **User Days** is the number of days the transmitter has been powered up since the last Time in Service Meter reset.

  You can reset the number of user days to zero at any time. For example, you may want to reset this value to zero when the transmitter is calibrated or reset.

Calibration Setup

Field calibration is performed without disconnecting the process piping. In order to do this, you must have bypass and shutoff valves between the process and the transmitter, and one of the following:

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

An adjustable air supply and a pressure measuring device are required. For example, a dead weight tester or an adjustable clean air supply and pressure gauge can be used. The pressure source can be connected to the transmitter with pipe fittings, or it can be connected to the vent screw assembly using a calibration screw. The calibration screw has a PolyFlo fitting and can be used for pressures up to 700 kPa (100 psi). It is available as Part Number F0101ES.

NOTE: It is not necessary to set up calibration equipment to rerange the transmitter to a different range. The transmitter can be accurately reranged by changing the Lower Range Value (LRV) and Upper Range Value (URV).

1. If the transmitter is in operation, follow the steps described in Taking a Differential Pressure Transmitter out of Operation, page 42.

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

2. Take the appropriate step:
   a. If a calibration screw **is** being used, remove the vent screw and replace it with the calibration screw. Connect the pressure source to the calibration screw using 6 x 1 mm or 0.250 inch tubing.
   b. If a calibration screw is **not** being used, remove the drain plug or the entire vent screw assembly (as applicable) from the high pressure side of the transmitter. Connect calibration tubing using a suitable thread sealant.
3. Close the bypass valve that was opened in Step 1.

4. Complete the setup shown in the diagram.

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

Figure 40 - Field Calibration Setup for Differential Pressure

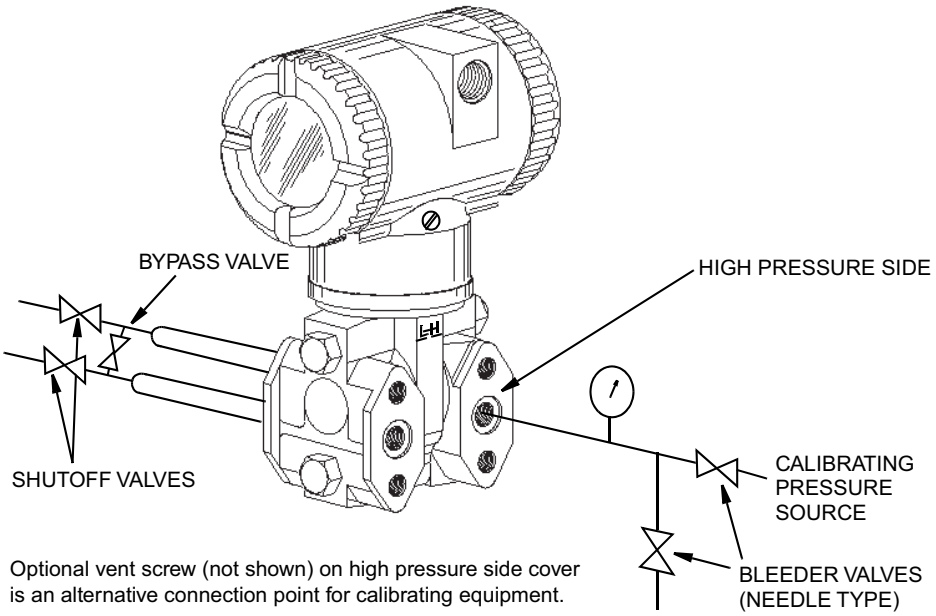
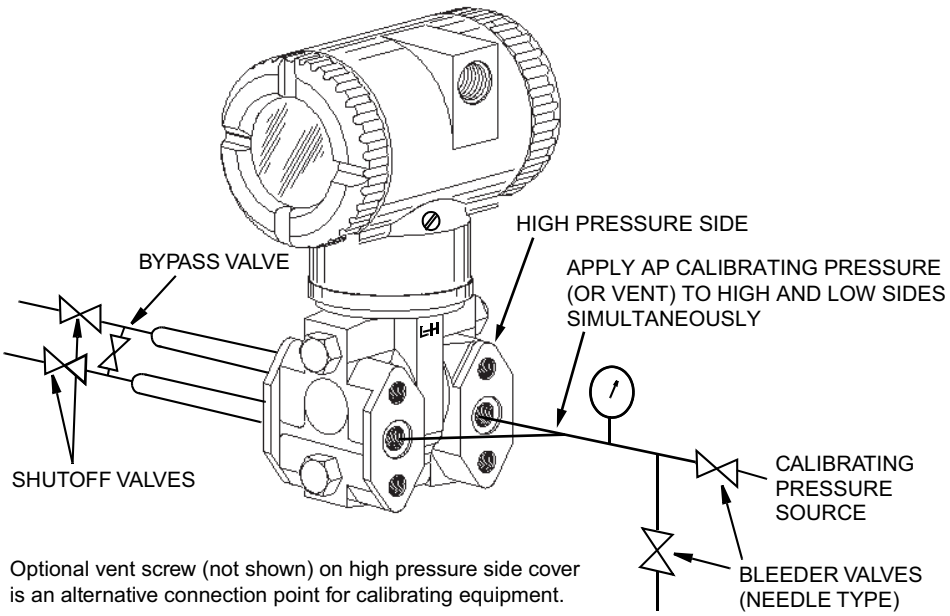
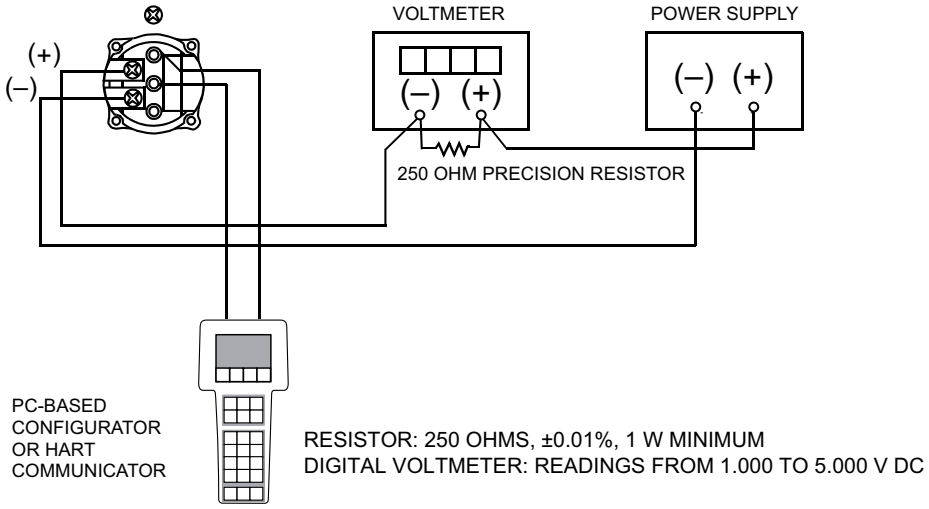


Figure 41 - Field Calibration Setup for Absolute Pressure



5. If you are calibrating the 4 to 20 mA output signal, also connect the electronic equipment as shown in the diagram.



Calibration Using the Optional Local Display

From the display, you can:

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

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

- If calibration has been configured as password protected, you are prompted for a password before you can proceed.
- If your transmitter is write protected, you cannot write your calibration to the electronics without disabling write protection.
- During calibration, a single change could affect several parameters. For this reason, if you make a mistake, review the entire database. Or, use the **CANCEL** feature to restore the transmitter to its starting configuration and begin again.
- During adjustment of 4 and 20 mA in the Calibration menu, the mA output does not reflect live measurement values.

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

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

Calibration Menus

Figure 42 - CALIB Menu

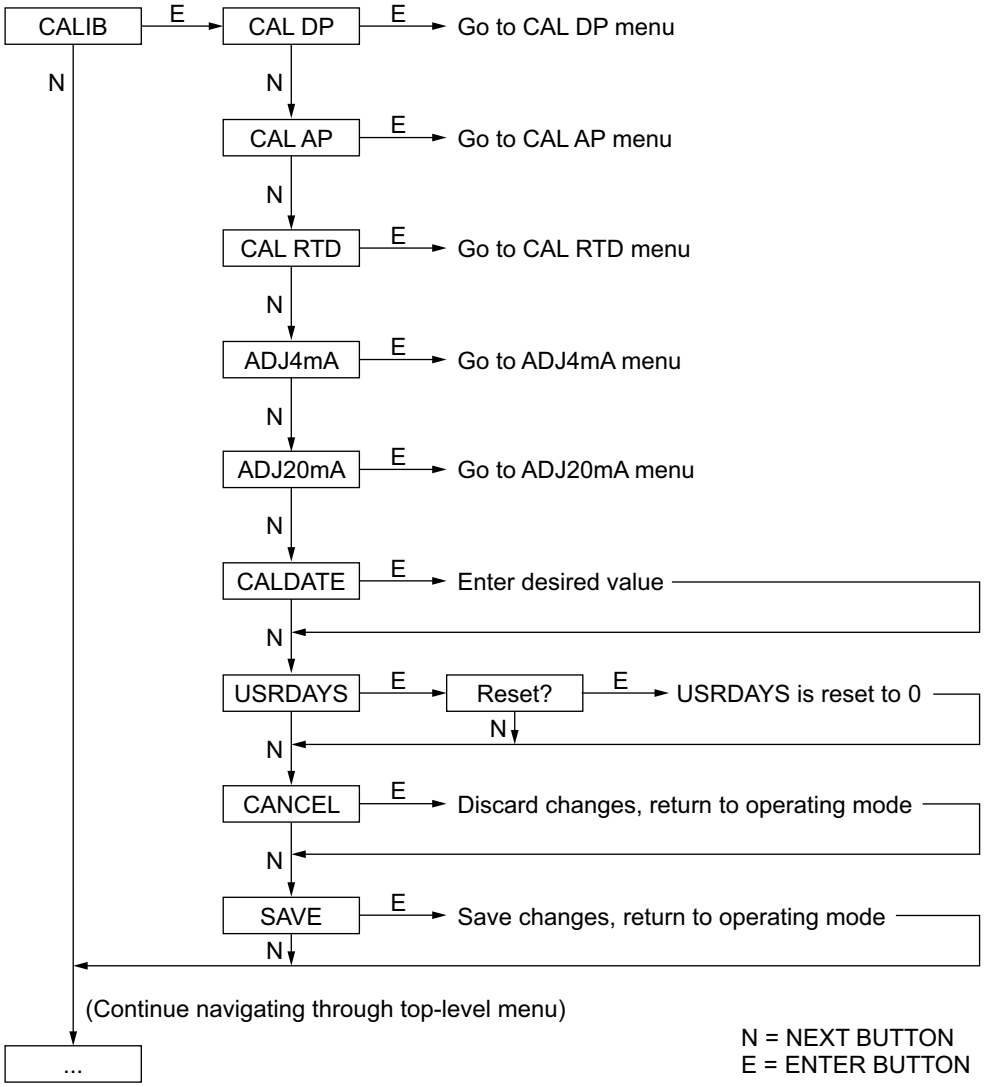


Figure 43 - CAL DP Menu

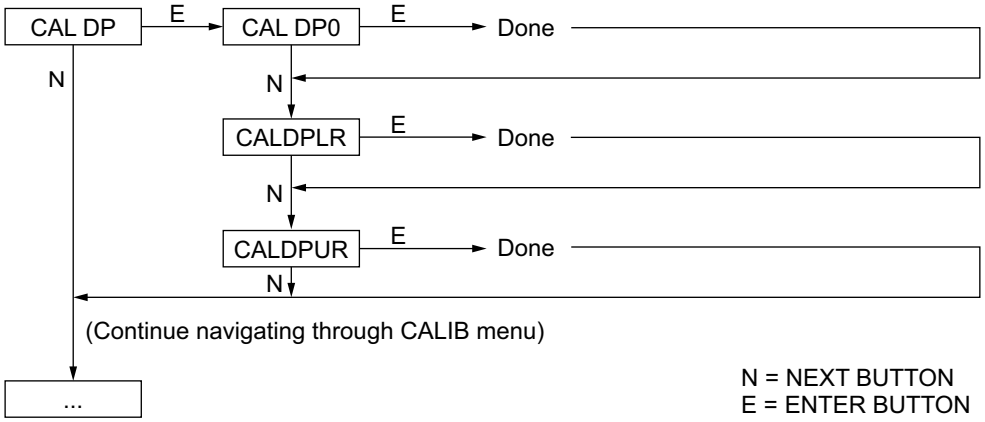


Figure 44 - CAL AP Menu

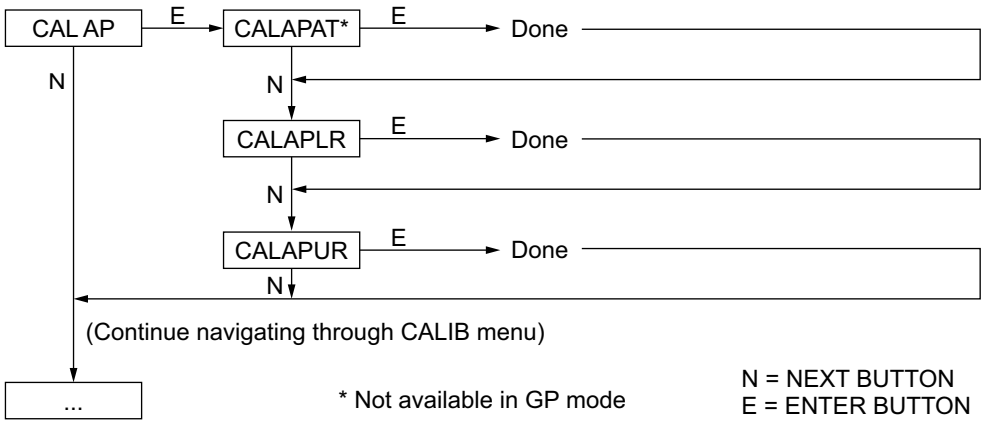


Figure 45 - CAL RTD Menu

Figure 46 - ADJ4mA Menu

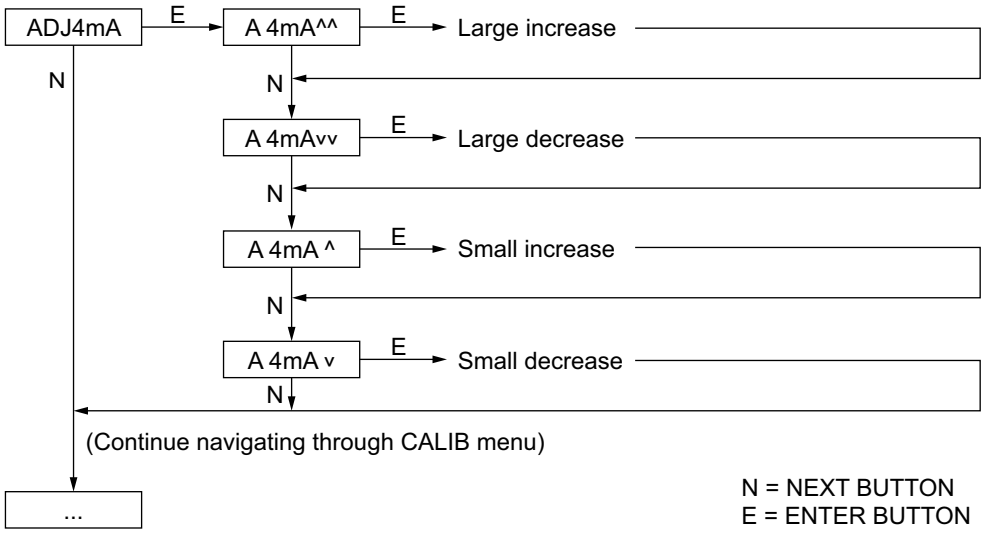
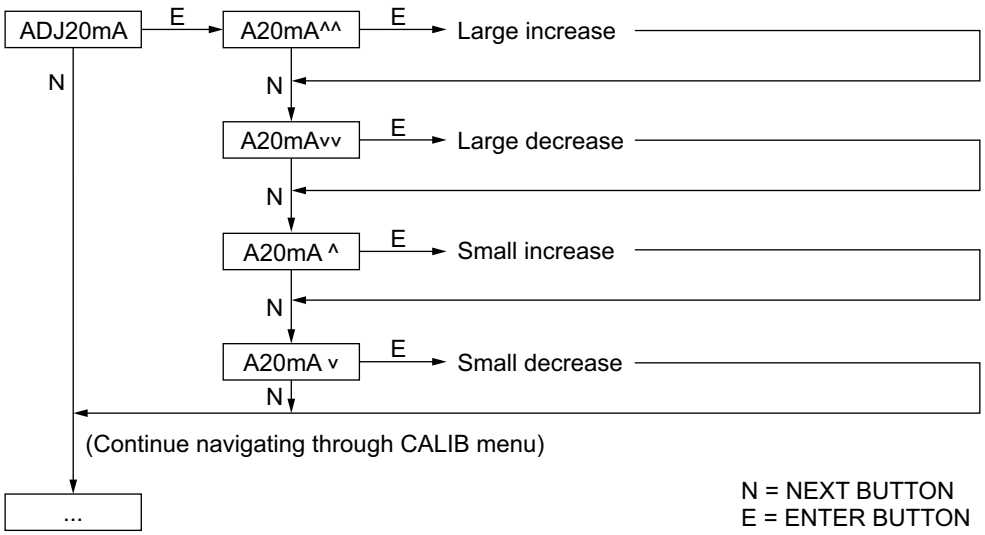


Figure 47 - ADJ20mA Menu



Calibration Messages

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

Parameter	Condition Tested	Message	Description
Password Protection	Password	BAD PWD	Bad password entered; use another.
Write Protection	Write protection enabled	REJECT	User attempted an action that is write protected.
CAL DP or CAL AP ZERO	Calculated offset too large	BADZERO	Check applied pressure, configured M1_LRV, and configured M1EOFF.
	Completion of data collection	CALWAIT	Displayed when data is collected for calibration.
	Measurement status error	BADSTAT	For AP, check that calibrating pressure or vent is applied to both high and low pressure sides simultaneously.
CAL RTD ADJTEMP	Calculated offset too large	BADOFST	Check RTD connections. Adjustment limited to 0.05% of range.
	Completion of data collection	CALWAIT	Displayed when data is collected for calibration.
	Measurement status error	BADSTAT	For AP, check that calibrating pressure or vent is applied to both high and low pressure sides simultaneously.
	RTD Mode	MEASOFF	Calibration attempt fails when RTD is configured Off.
CAL DP	DP Cal Point	CALnot0	User-entered calibration point must be 0 for a 1-point calibration using an external device with DP in square root mode.
CAL DP or CAL AP SPAN	Calculated slope too large or too small	BADSPAN	Check applied pressure, configured M1_LRV, and configured M1EFAC.
	Completion of data collection	CALWAIT	Displayed when data is collected for calibration.
	Measurement status error	BADSTAT	For AP, check that calibrating pressure or vent is applied to both high and low pressure sides simultaneously.

Parameter	Condition Tested	Message	Description
RERANGE (entering URV or LRV)	M1_URV>max pressure in units	URV>FMX	Entered pressure is greater than the maximum rated pressure of the transmitter. Check entry. Verify units.
	M1_URV<min pressure in units	URV<FMN	Entered pressure is less than the minimum rated pressure of the transmitter. Check entry. Verify units.
	M1_URV=M1_LRV	LRV=URV	Cannot set span to 0. Check entry. Check M1_LRV and M1_URV. Verify units.
	M1 calculated turndown exceeds limit	BADTDWN	Span too small. Check entry. Check M1_LRV and M1_URV. Verify units.
	M1EOFF not 0 with M1 SqRt	BADEOFF	Square root mode with nonzero M1EOFF is not valid. Contact Global Customer Support.
	URV must be >LRV with M1 SqRt	URV<LRV	Square root mode with negative URV is not valid. Change M1_ URV to a valid positive value.
	LRV must be 0 with M1 SqRt	LRVnot0	Square root mode with nonzero LRV is not valid. Change M1_ LRV to 0.
A4MA A20MA	Adjustment exceeds minimum/ maximum limit	HILIMIT LOLIMIT	Check loop resistance.

Calibration Using a PC50

To calibrate the transmitter using a PC50 Configurator, follow the procedures in MI 020-520.

Calibration Using a HART Communicator

To calibrate the transmitter using a HART Communicator, follow the procedures in Operation with the HART Communicator, page 67.

Operation with the HART Communicator

You can use a HART Communicator to configure, operate, and calibrate the transmitter.

Connect the HART Communicator to the transmitter as described in Calibration, page 59.

Valid Characters for the HART Communicator

Alphanumeric Characters		Numeric Characters
@	'	
, (comma)	(	- (minus sign)
A-Z (uppercase)	)	. (decimal point)
[	*	0
]	+	1
\	- (hyphen)	2
^	. (period)	3
_ (underscore)	/	4
(space)	0-9	5
!	:	6
"	;	7
#	<	8
$	>	9
%	=	
&	?	

HART Communicator Menus

Figure 48 - HART Communicator Menu (1 of 5)

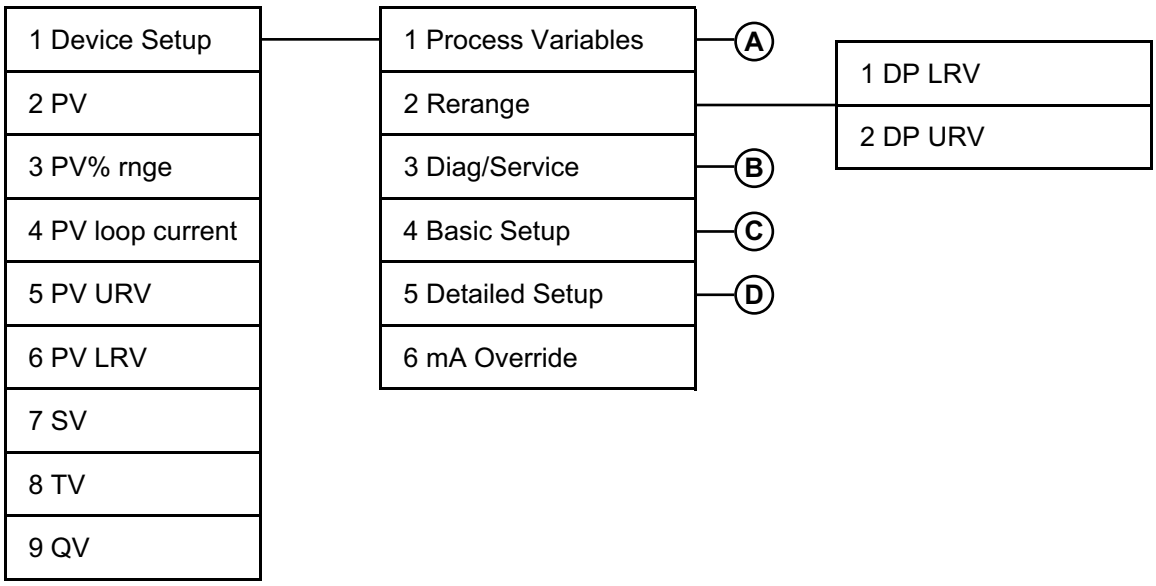


Figure 49 - HART Communicator Menu (2 of 5)

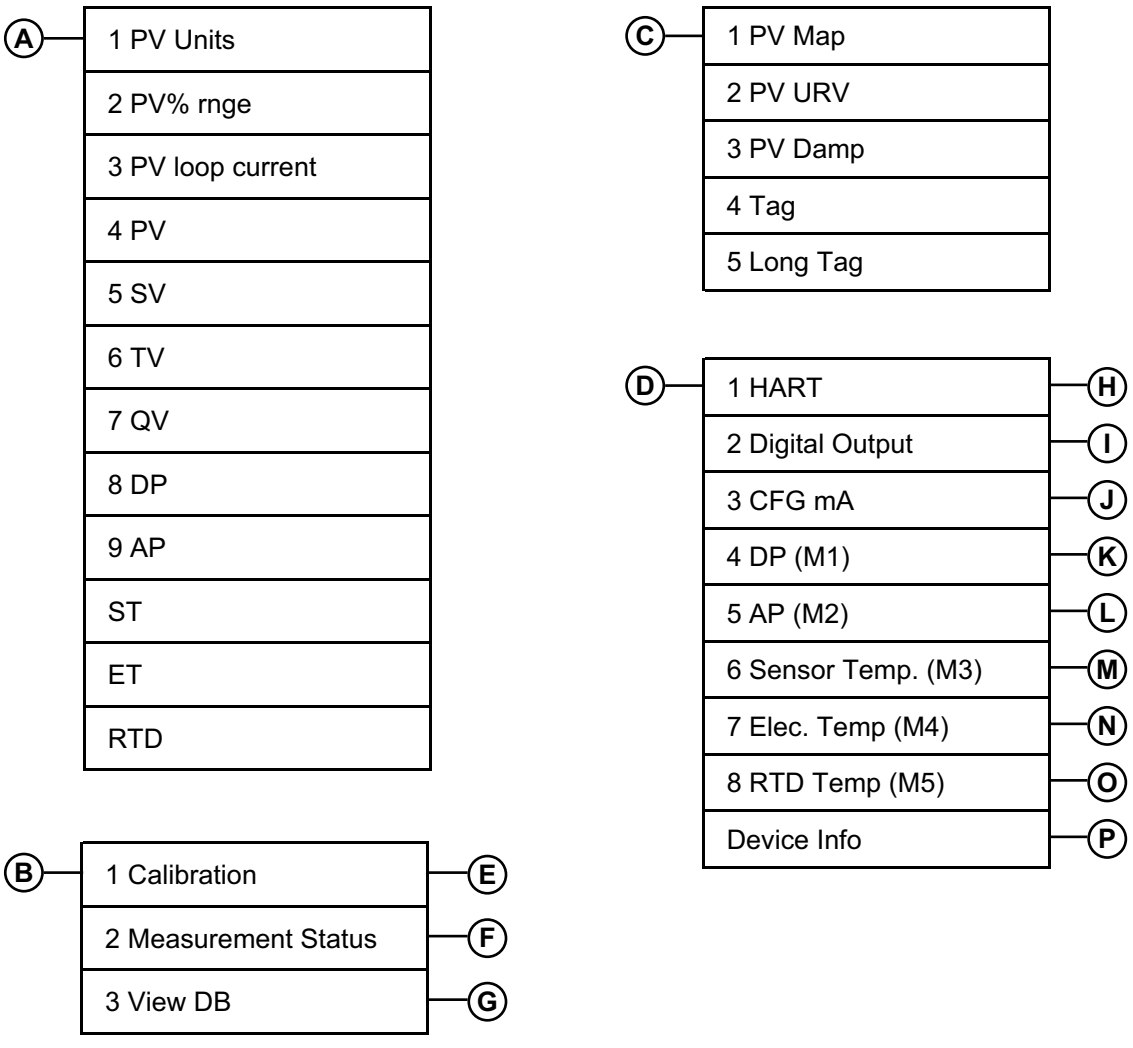


Figure 50 - HART Communicator Menu (3 of 5)

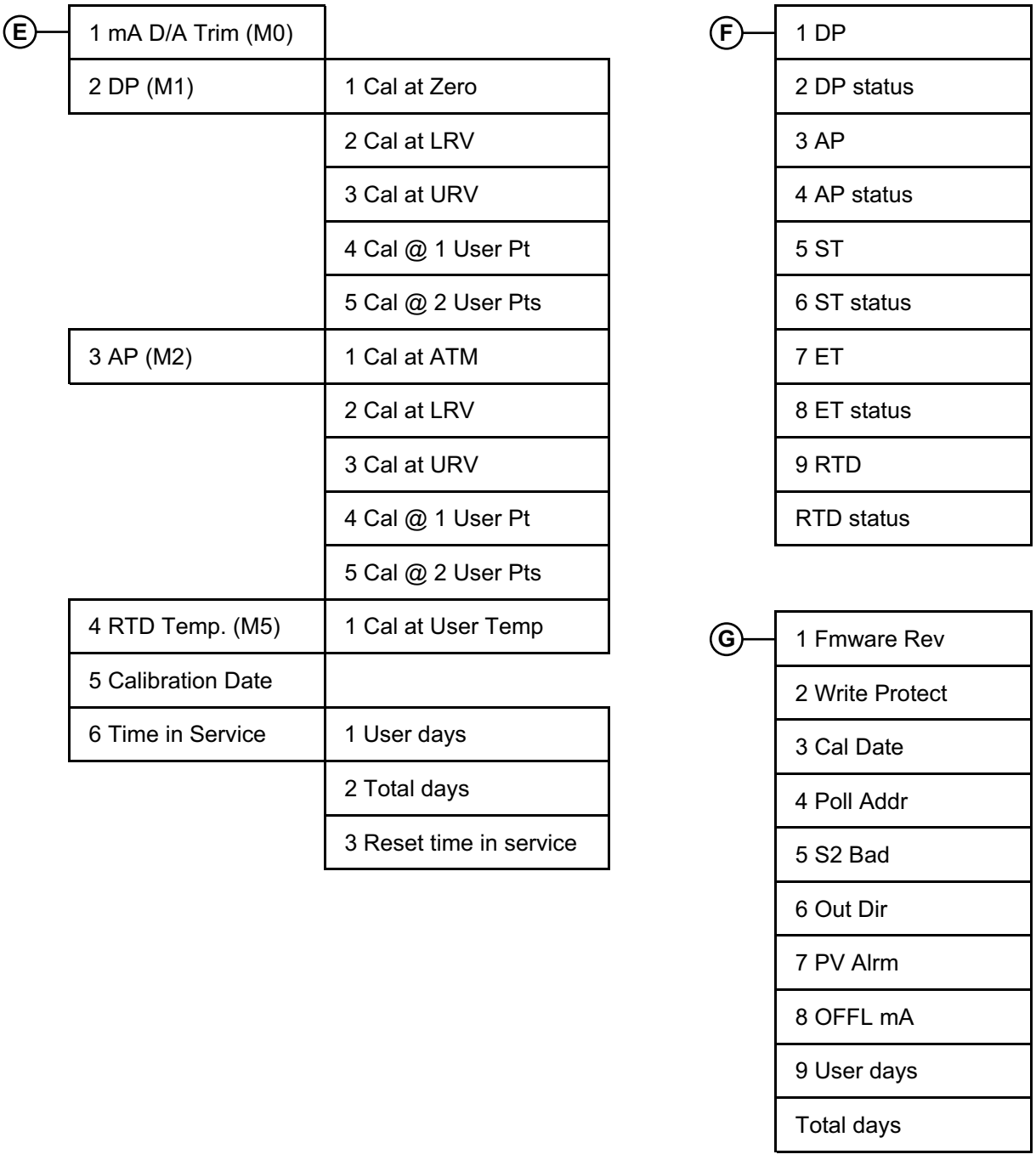


Figure 51 - HART Communicator Menu (4 of 5)

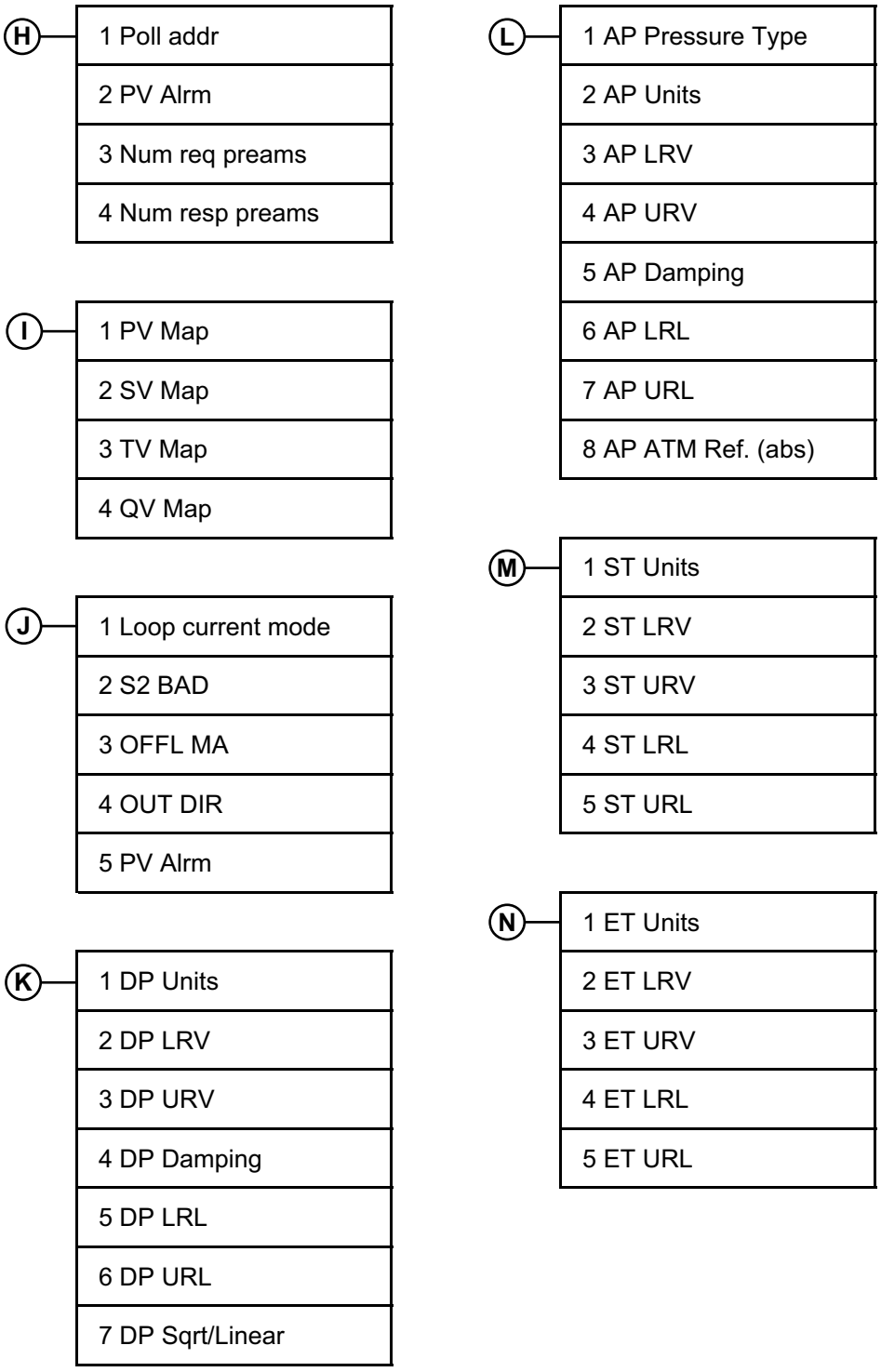
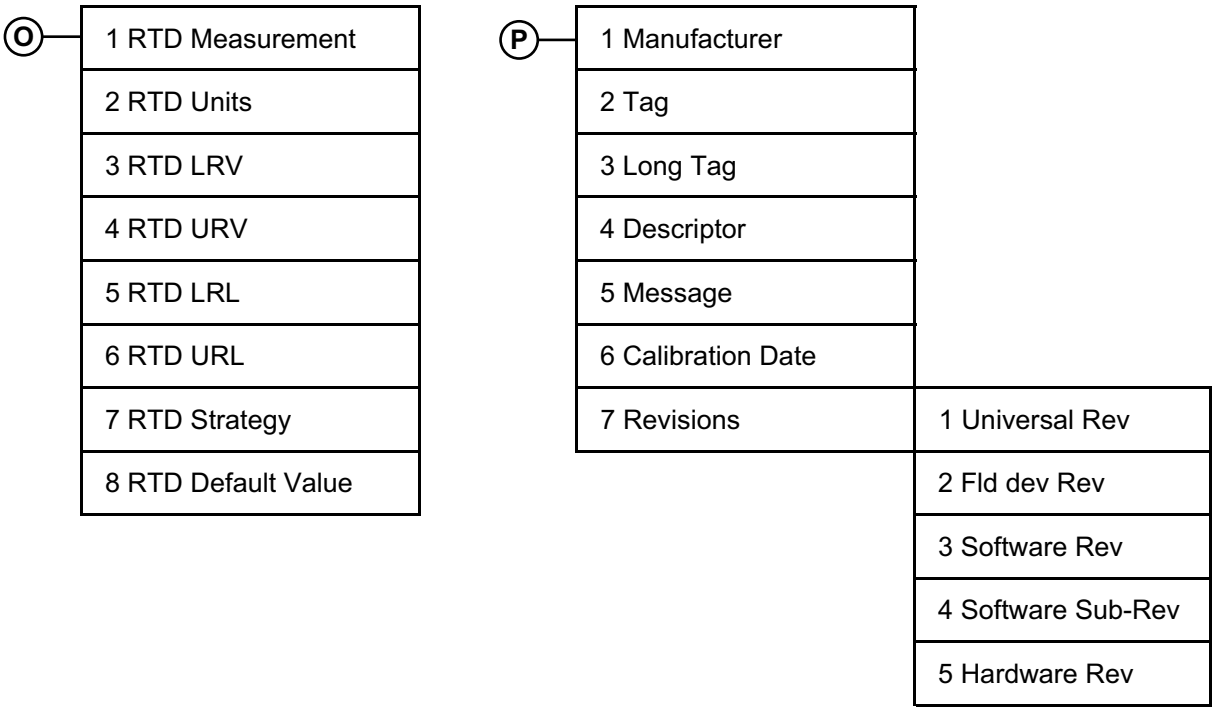


Figure 52 - HART Communicator Menu (5 of 5)



HART Communicator Parameters

Table 11 - Explanation of Parameters for Operation with the HART Communicator

Parameter	Explanation
AP (M2)	Absolute pressure measurement value; or path to AP calibration procedures or AP measurement configuration.
AP ATM Ref (abs)	Enter the ambient atmospheric pressure.[23]
AP Damping	Absolute pressure damping value in seconds.
AP LRL	Absolute pressure lower range limit.
AP LRV	Absolute pressure lower range value.
AP Pressure Type	Select Absolute or Gauge.
AP Status	Status of the absolute pressure measurement.
AP Units	Absolute pressure units.
AP URL	Absolute pressure upper range limit.
AP URV	Absolute pressure upper range value.
Cal @ 1 User Pt	Pressure calibration at one user determined point.
Cal @ 2 User Pts	Pressure calibration at two user determined points.
Cal at ATM	Calibration at atmospheric pressure for AP measurement.
Cal at LRV	Pressure calibration at the lower range value.
Cal at URV	Pressure calibration at the upper range value.
Cal at User Temp	Calibration procedure for sensor temperature (M3), electronics temperature (M4), and RTD temperature (M5).

23. Gauge pressure is equal to the atmospheric pressure minus the value entered in **ATM Ref**. It is not referenced to varying atmospheric pressure.

Table 11 - Explanation of Parameters for Operation with the HART Communicator (Continued)

Parameter	Explanation
Cal at zero	Differential pressure calibration at zero pressure differential.
Cal Date Calibration Date	Date of the last calibration.
Descriptor	HART device descriptor.
DP (M1)	Differential pressure measurement value; or path to DP calibration procedures or DP measurement configuration.
DP Damping	Differential pressure damping value in seconds.
DP LRL	Differential pressure lower range limit.
DP LRV	Differential pressure lower range value.
DP Sqrt/Linear	Differential pressure mode.
DP Status	Status of the differential pressure measurement.
DP Units	Differential pressure units.
DP URL	Differential pressure upper range limit.
DP URV	Differential pressure upper range value.
Elec. Temp. (M4)	Electronics temperature measurement value; or path to electronics temperature measurement configuration.
ET LRL	Electronics temperature lower range limit.
ET LRV	Electronics temperature lower range value.
ET Status	Status of the electronics temperature measurement.
ET Units	Electronics temperature units.
ET URL	Electronics temperature upper range limit.
ET URV	Electronics temperature upper range value.
Fmware Rev	Revision of the transmitter's firmware.
Long Tag	HART Long Tag.
Loop current mode	Status of loop current mode: enabled or disabled.
mA D/A Trim (M0)	Calibration procedure to match the 4 to 20 mA output to the calibration of the receiving device.
mA Override	Override value, 3.6 to mA.
Manufacturer	Manufacturer identifier.
Message	HART message information.
Num req preams	Number of preambles to be sent in a request message from the transmitter.
Num resp preams	Number of preambles to be sent in a response message from the transmitter.
Poll addr	Zero in standard point-to-point, two-wire analog mode. For multidrop operation, any address from 0 through 63.
OFFL mA	Output when in offline mode: last measurement (in mA) or user-defined.
Out Dir	Direction of the 4 to 20 mA output: forward or reverse.
PV	Value of the primary variable.
PV% rnge	Primary variable value in percent of range.
PV Alrm	Alarm mode of the 4 to 20 mA output: low or high.
PV Damp	Damping value in seconds for the primary variable.
PV loop current	Analog output value of the primary variable.
PV LRV	Lower range value of the primary variable.
PV Map	Select M1 DP or M2 AP.

Table 11 - Explanation of Parameters for Operation with the HART Communicator (Continued)

Parameter	Explanation
PV Units	Measurement units for the primary variable.
PV URV	Upper range value of the primary variable.
QV	Value of the fourth (quaternary) variable.
QV Map	Select M1 DP, M2 AP, M3 Sens Temp, M4 Elec Temp, or M5 RTD for the fourth (quaternary) variable.
Rerange	Path to setting DP LRV and DP URV.
Reset time in service	Resets User Days to zero.
Revisions	Path to revision numbers related to the hardware and software.
RTD (M5)	RTD temperature measurement value; or path to RTD temperature calibration procedures or RTD temperature configuration.
RTD Default Value	Default RTD temperature.
RTD LRL	RTD temperature lower range limit.
RTD LRV	RTD lower range value.
RTD Measurement	Select On or Off for RTD measurement.
RTD Status	Status of the RTD temperature measurement.
RTD Strategy	Select Never Use Default or Use Def. on RTD Fail.
RTD Units	Temperature units for the RTD measurement.
RTD URL	RTD temperature upper range limit.
RTD URV	RTD upper range value.
S2 Bad	Temperature sensor strategy.
ST (M3)	Sensor temperature measurement value; or path to sensor temperature configuration.
ST LRL	Sensor temperature lower range limit.
ST LRV	Sensor temperature lower range value.
ST Status	Status of the sensor temperature measurement.
ST Units	Temperature units for the sensor temperature measurement.
ST URV	Sensor temperature upper range value.
ST URL	Sensor temperature upper range limit.
SV	Value of the secondary variable.
SV Map	Select M1 DP, M2 AP, M3 Sens Temp, M4 Elec Temp, etc.
Tag	HART Tag.
Total days	Total number of days that the transmitter has been in service.
TV	Value of the tertiary variable.
TV Map	Select M1 DP, M2 AP, M3 Sens Temp, M4 Elec Temp, etc.
User days	Number of days since the Time in Service was last reset.
Write Protect	Write protection status (enabled or disabled).

Maintenance

⚠⚠WARNING

EXPLOSION HAZARD

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

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

Parts Replacement

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

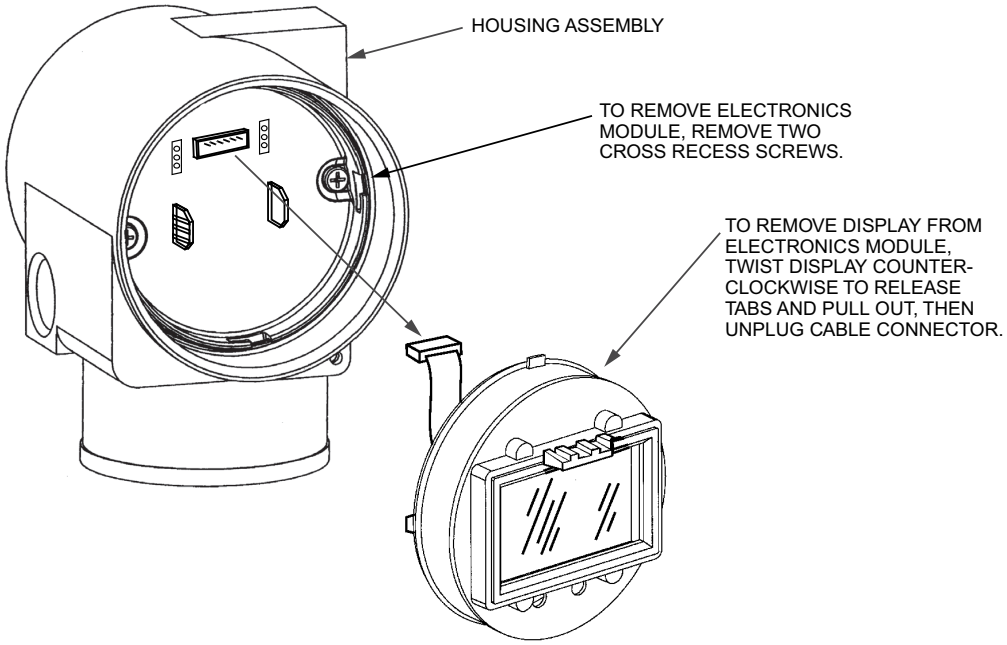
Replacing the Terminal Block Assembly

To replace the terminal block assembly, follow these steps:

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

Adding the Optional Display

Figure 53 - Adding the Optional Display



To add the optional display, refer to the diagram and follow these steps:

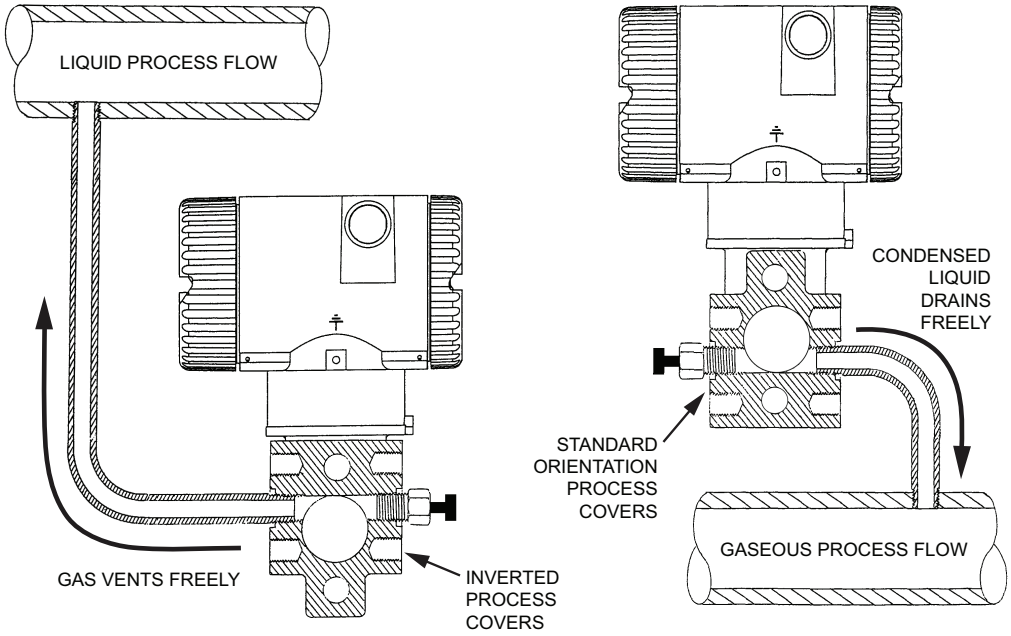
1. Turn off the transmitter power source.
2. Turn the cover lock screw (if applicable) clockwise to disengage the lock.
3. Remove the electronics compartment cover by rotating it counterclockwise.
4. Plug the display into the receptacle at the top of the electronics assembly.
5. Ensure that the o-ring is seated in its groove in the display housing. Then insert the display into the electronics compartment by grasping the two tabs on the display and rotating it about 10° in a clockwise direction.
6. Install the new, windowed cover onto the housing by rotating it clockwise to seat the o-ring into the housing. Continue to hand-tighten until the cover contacts the housing metal-to-metal.
7. If cover locks are present, lock the cover.
8. Turn on the transmitter power source.

Rotating Process Covers for Venting

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

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

Figure 54 - Sensor Cavity Venting and Draining



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

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

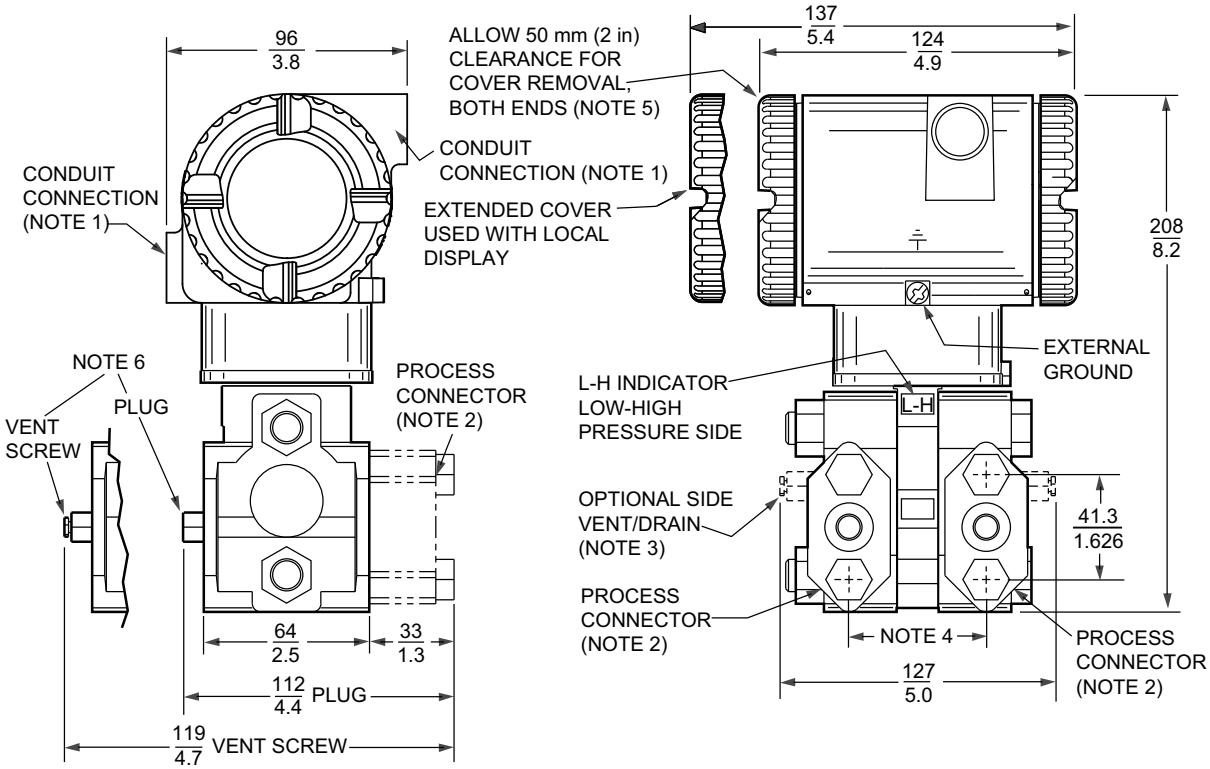
⚠CAUTION
RISK OF POTENTIAL INJURY AND/OR REDUCED PERFORMANCE Perform a hydrostatic test with a liquid, and follow proper hydrostatic test procedures. **Failure to follow these instructions can result in injury or reduced performance.**

Nominal Dimensions

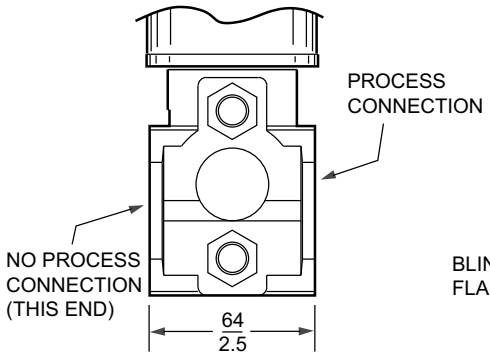
For dimensional information specific to your sales order, contact your sales representative to order a Certified Dimensional Print (CDP).

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

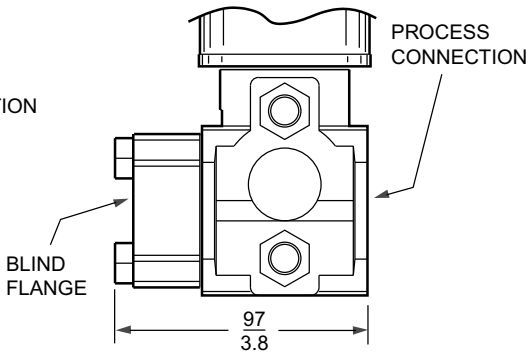
Figure 55 - Transmitters with Traditional Structure



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

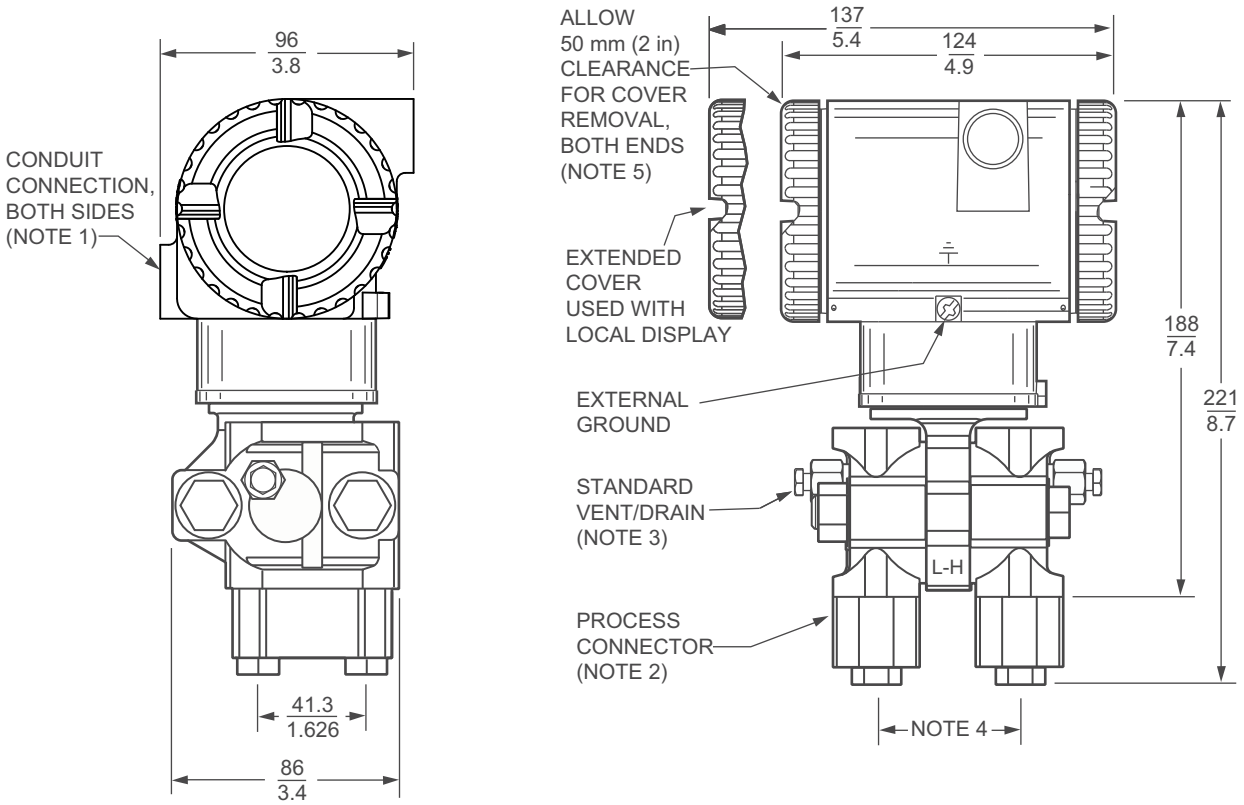


OPTIONAL IEC 61518 CONSTRUCTION
SINGLE ENDED PROCESS COVER
OPTIONS -D1, -D3, -D5, -D7, -D9



OPTIONAL IEC 61518 CONSTRUCTION
DOUBLE ENDED PROCESS COVER
OPTIONS -D2, -D4, -D6, -D8

Figure 56 - Transmitters with Low Profile (LP1) Structure



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

Figure 57 - Standard Style Mounting Bracket Kit (Options -M1 and -M2)

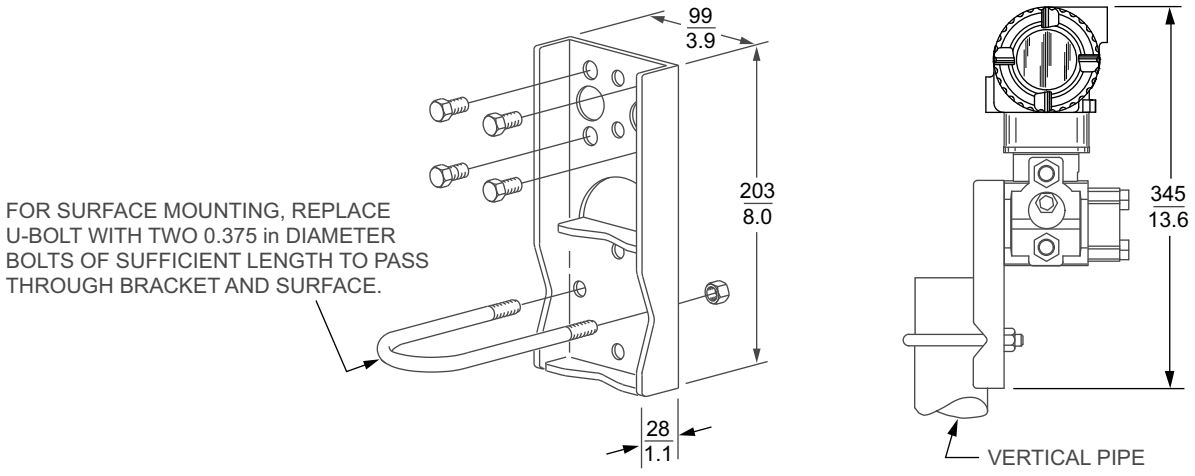
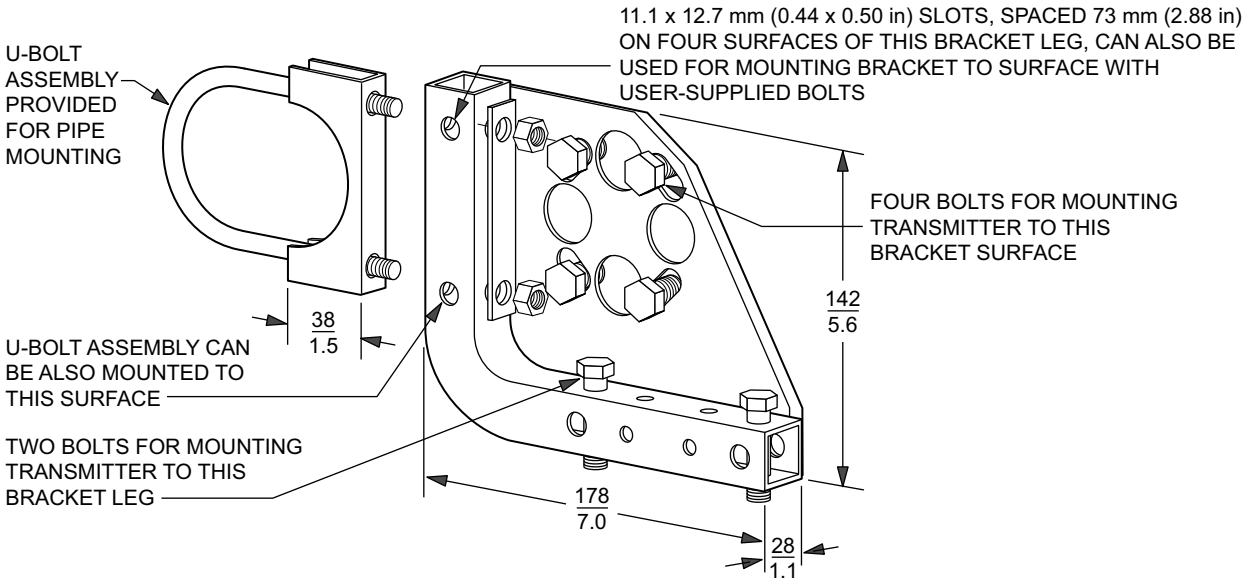
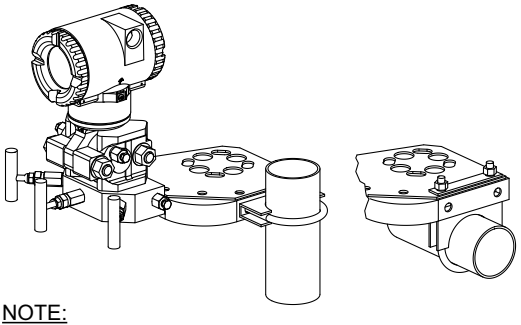


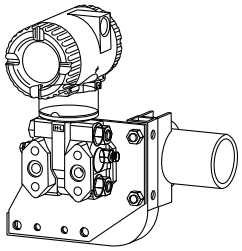
Figure 58 - Universal Style Mounting Bracket Kit (Option -M3)



TYPICAL PIPE MOUNTING
LOW PROFILE STRUCTURE LP1

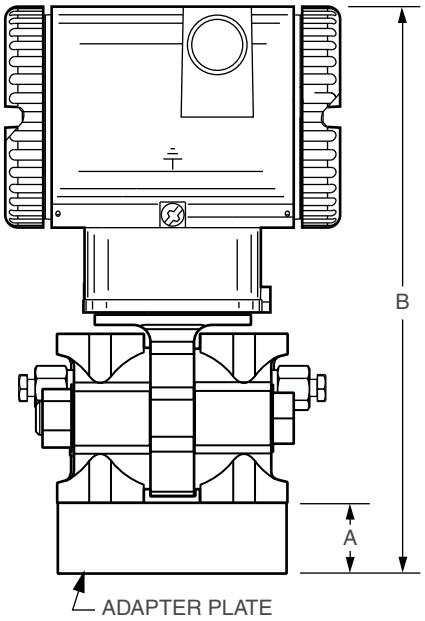


TYPICAL PIPE MOUNTING
WITH TRADITIONAL STRUCTURE



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

Figure 59 - Transmitter Mounted on a Coplanar™ Manifold (Options -MC and -MT3)



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

Model Code

This table lists the available options for the transmitters described in this document.

Table 12 - Model Code for IMP10S

Code	Description
Model	
IMP10S	Multivariable Transmitter with Differential Pressure, Absolute Pressure, and Temperature Measurement
Electronics Version	
-T	HART and 4 to 20 mA
Structures	
Traditional (Standard Mount) Structures	
22	316 ss process cover material, 316L ss diaphragm material, silicone fill fluid
2G	316 ss process cover material, 316L ss gold-plated diaphragm material, silicone fill fluid
23	316 ss process cover material, 316L ss diaphragm material, inert fill fluid
26	316 ss process cover material, C276 diaphragm material, silicone fill fluid
27	316 ss process cover material, C276 diaphragm material, inert fill fluid
46	C276 process cover material, C276 diaphragm material, silicone fill fluid
47	C276 process cover material, C276 diaphragm material, inert fill fluid
LP1 (Low Profile Type 1 Direct Mount) Structures[24]	
LL	316 ss process cover material, 316L ss diaphragm material, silicone fill fluid
LM	316 ss process cover material, 316L ss diaphragm material, inert fill fluid
LC	316 ss process cover material, C276 diaphragm material, silicone fill fluid
LD	316 ss process cover material, C276 diaphragm material, inert fill fluid
Structures Prepared for Schneider Electric Diaphragm Seals (static pressure rating limited by seals)[25] [26] [27]	
S1	Remote seals, both sides; 316 ss process cover, 316L ss diaphragm, silicone fill fluid
S2	Remote seals, both sides; 316 ss process cover, 316L ss diaphragm, inert fill fluid
S3	Remote seal, high side; 316 ss process cover (1/2 NPT), 316L ss diaphragm, silicone fill fluid
S4	Remote seal, high side; 316 ss process cover (1/2 NPT), 316L ss diaphragm, inert fill fluid
S5	Remote seal, low side; 316 ss process cover (1/2 NPT), 316L ss diaphragm, silicone fill fluid
S6	Remote seal, low side; 316 ss process cover (1/2 NPT), 316L ss diaphragm, inert fill fluid
F1	Direct connect seal, high side; 316 ss process cover (1/2 NPT), 316L ss diaphragm, silicone fill fluid
F2	Direct connect seal, high side; 316 ss process cover (1/2 NPT), 316L ss diaphragm, inert fill fluid
F3	Direct connect seal, high side, and remote seal, low side; 316 ss process cover, 316L ss diaphragm, silicone fill fluid
F4	Direct connect seal, high side, and remote seal, low side; 316 ss process cover, 316L ss diaphragm, inert fill fluid

24. Not available with diaphragm seals.
25. Both transmitter and diaphragm seal model numbers are required. See PSS 2A-1Z11 B for the diaphragm seal model codes.
26. Not available with options -X1, -X2, and -X3.
27. Requires Process Connector Type 0.

Table 12 - Model Code for IMP10S (Continued)

Code	Description	
Structures Prepared for Non-Schneider Electric Diaphragm Seals (static pressure rating limited by seals)[28] [29]		
SA	Remote seals, both sides; 316 ss process cover, 316L ss diaphragm, silicone fill fluid	
SB	Remote seals, both sides; 316 ss process cover, 316L ss diaphragm, inert fill fluid	
SC	Remote seal, high side; 316 ss process cover (1/2 NPT), 316L ss diaphragm, silicone fill fluid	
SD	Remote seal, high side; 316 ss process cover (1/2 NPT), 316L ss diaphragm, inert fill fluid	
SE	Remote seal, low side; 316 ss process cover (1/2 NPT), 316L ss diaphragm, silicone fill fluid	
SF	Remote seal, low side; 316 ss process cover (1/2 NPT), 316L ss diaphragm, inert fill fluid	
Span Limits		
Code	**Differential Pressure**	**Absolute Pressure**
LG[30]	0.12 and 2.5 kPa; 0.5 and 10 inH_2O; 1.2 and 25 mbar	0.07 and 3.5 MPaa; 10 and 500 psia; 0.7 and 35 bara
AG[30]	0.75 and 7.5 kPa; 3 and 30 inH_2O; 7.5 and 75 mbar	0.07 and 3.5 MPaa; 10 and 500 psia; 0.7 and 35 bara
BD	0.5 and 50 kPa; 2 and 200 inH_2O; 5 and 500 mbar	0.02 and 2.1 MPaa; 3 and 300 psia; 0.21 and 21 bara
BE	0.5 and 50 kPa; 2 and 200 inH_2O; 5 and 500 mbar	0.21 and 10 MPaa; 30 and 1,500 psia; 2.1 and 100 bara
BH	0.5 and 50 kPa; 2 and 200 inH_2O; 5 and 500 mbar	0.42 and 21 MPaa; 60 and 3,000 psia; 4.2 and 200 bara
BF[31]	0.5 and 50 kPa; 2 and 200 inH_2O; 5 and 500 mbar	3.4 and 36.5 MPaa; 500 and 5,300 psia; 34 and 365 bara
CD	2.5 and 210 kPa; 10 and 840 inH_2O; 25 and 2,100 mbar	0.02 and 2.1 MPaa; 3 and 300 psia; 0.21 and 21 bara
CE	2.5 and 210 kPa; 10 and 840 inH_2O; 25 and 2,100 mbar	0.21 and 10 MPaa; 30 and 1,500 psia; 2.1 and 100 bara
CH	2.5 and 210 kPa; 10 and 840 inH_2O; 25 and 2,100 mbar	0.42 and 21 MPaa; 60 and 3,000 psia; 4.2 and 200 bara
CF[31]	2.5 and 210 kPa; 10 and 840 inH_2O; 25 and 2,100 mbar	3.4 and 36.5 MPaa; 500 and 5,300 psia; 34 and 365 bara
Process Connector Type (material is same as Process Cover material)		
0	None	
1	1/4 NPT[32] [33]	
2	1/2 NPT[32]	
3	RC 1/4[32] [33]	
4	RC 1/2[32]	
6	1/2 Schedule 80 weld neck[32] [33]	
Conduit Connection and Housing Material		
1	1/2 NPT conduit connection; aluminum housing	
3	1/2 NPT conduit connection; 316 housing	
5	M20 conduit connection; aluminum housing	
6	M20 conduit connection; 316 housing	

28. Not available with options -X1, -X2, and -X3.
29. Requires Process Connector Type 0.
30. Span limit codes A and L not available with diaphragm seals, except for sanitary spud seal models DS-P4.
31. Options -B1, -B2, and -B3 not available with Span Code BF or CF.
32. Not available with structure codes SA, SB, S2, S2, F3, and F4.
33. Not available with structures that have C276 process covers.

Table 12 - Model Code for IMP10S (Continued)

Code	Description
Electrical Certifications[34]	
AA	ATEX and UKEX intrinsically safe
AD	ATEX and UKEX flameproof
AM	ATEX and UKEX multiple certifications (includes ATEX codes AA and AN)
AN	ATEX and UKEX protection type n
AP	ATEX and UKEX multiple certifications (includes ATEX codes AA, AD, and AN)
BA	INMETRO intrinsically safe
BD	INMETRO flameproof
BP	INMETRO multiple certifications (includes INMETRO codes BA and BD)
CA	CSA intrinsically safe, Zone certified
CD	CSA zone certified flameproof, explosionproof, dust ignitionproof
CM	CSA multiple certifications (includes CSA codes CA and CN)
CN	CSA nonincendive, Zone certified
CP	CSA multiple certifications (includes CSA codes CA, CD, and CN)
DA	Multi-marked ATEX and IECEx intrinsically safe
DD	Multi-marked ATEX and IECEx flameproof
DM	Multi-marked ATEX and IECEx multiple certifications (includes ATEX/IECEx codes DA and DN)
DN	Multi-marked ATEX and IECEx protection type n
DP	Multi-marked ATEX and IECEx multiple certifications (includes ATEX/IECEx codes DA, DD, and DN)
EA	IECEx intrinsically safe
ED	IECEx flameproof
EM	IECEx multiple certifications (includes IECEx codes EA and EN)
EN	IECEx protection type n
EP	IECEx multiple certifications (includes IECEx codes EA, ED, and EN)
FA	FM Classes I, II, and III Division 1 intrinsically safe
FD	FM Classes I, II, and III Division 1 explosionproof, dust ignitionproof, Zone approved
FM	FM multiple certifications (includes FM codes FA or FN)
FN	FM Classes I, II, and III Division 2 nonincendive, Zone appproved
FP	FM multiple certifications (includes codes FA, FD, or FN)
KD	KOSHA flameproof
MA	Multi-marked for ATEX, CSA, and FM Intrinsically Safe Application
NA	NEPSI intrinsically safe
ND	NEPSI flameproof
RA	EAC intrinsically safe
RD	EAC flameproof
RN	EAC protection type n
ZZ	No extra certification

34. Contact Global Customer Support for availability.

Table 12 - Model Code for IMP10S (Continued)

Code	Description
Optional Mounting Sets[35]	
-M1	Standard style painted steel bracket with plated steel bolts
-M2	Standard style stainless steel bracket with stainless steel bolts
-M3	Universal style stainless steel bracket with stainless steel bolts
Optional Adapter Plates[36] [37] Only available with LP1 direct mount structures (LL, LM, LC, LD).	
-P1	Adapter set for MC Coplanar manifolds, B7 bolts[38]
-P2	Adapter set for MC Coplanar manifolds, 316 ss bolts[39]
-P3	Adapter set for MC Coplanar manifolds, 17-4 ss bolts[40]
-P4	Adapter set for MC Coplanar manifolds, B7M bolts[41]
-P5	Adapter set for MT3 Coplanar manifolds, traditional flange, B7 bolts[38]
-P6	Adapter set for MT3 Coplanar manifolds, traditional flange, 316 ss bolts[39]
-P7	Adapter set for MT3 Coplanar manifolds, traditional flange, 17-4 ss bolts[40]
-P8	Adapter set for MT3 Coplanar manifolds, traditional flange, B7M bolts[41]
Optional Display with Pushbuttons and Window Cover	
-L1	Digital display, pushbuttons, and window cover
Optional IEC 61518 Construction[3742]	
-D1	Single-ended process covers with B7 bolts; no blind connectors; 2320 psi[43]
-D2	Double-ended process covers with B7 bolts; blind connectors with size M10 steel screw; 1500 psi[44] [45]
-D3	Single-ended process covers with B7 bolts; no blind connectors; 3000 psi[43]
-D4	Double-ended process covers with B7 bolts; blind connectors with size 7/16 steel screw; 1500 psi[44] [45]
-D5	Single-ended process covers with 316 ss bolts; no blind connectors; 2175 psi[43]
-D6	Double-ended process covers with 316 ss bolts; blind connectors with size 7/16 316 ss screw; 1500 psi[44] [45]
-D7	Single-ended process covers with 17-4 PH bolts; no blind connectors; 3000 psi[43]
-D8	Double-ended process covers with 17-4 PH bolts; blind connectors with size 7/16 17-4 PH screw; 1500 psi[44] [45]
-D9	Single-ended process covers with 17-4 PH bolts; no blind connectors; 5300 psi[43]

35. Not available with structures prepared for direct connect seals. Requires Process Connector code 0 for LP1 structures.
36. Not available with IEC Construction options -D1 through -D9.
37. Requires Process Connector selection 0.
38. Not available with bolting options -B1, -B2, and -B3.
39. Requires option -B1.
40. Requires option -B2.
41. Requires option -B3.
42. See Impact of Options on Maximum Static Pressure and Span and Range Limits, page 11 for pressure deratings when certain IEC61518 versions or Bolting Options -B1 or -B3 are specified. MWP is either the absolute pressure span limit or the MWP listed in the table, whichever is less.
43. Requires Structure Codes 22 through 27, LL, LM, LC, or LD; not available with options -V or -V1.
44. Requires Structure Codes 22 through 27; not available with -V or -V1.
45. Temperature limits are de-rated to -10 and +80°C (14 and 176°F) due to gaskets. Not available with Mounting Bracket Set options -M1, -M2, and -M3.

Table 12 - Model Code for IMP10S (Continued)

Code	Description
Optional Cleaning and Preparation	
-X1	Unit degreased[46]
-X2	Unit cleaned and prepared for oxygen service[47] [48]
-X3	Unit cleaned and prepared for chlorine service[47] [49]
Optional Bolting (process covers and process connectors; specify one selection)[50]	
-B1	316 ss bolts and nuts (MWP derated to 2175 psi)[51][52]
-B2	17–4 ss bolts and nuts[52]
-B3	B7M bolts and nuts (NACE) (MWP derated to 2900 psi)[51] [53]
Optional Conduit Thread Adapters[54]	
-A1	Hawke-type 1/2 NPT cable gland
-A3	M20 conduit thread adapter
Optional Custom Calibration or Configuration	
-C1	Custom factory calibration (calibration and unit tags required)
-C2	Full factory configuration (requires completed configuration form)
Optional Electronics Housing Features	
-Z2	Custody transfer lock and seal[55]
Optional Ermeto Connectors	
-E3	316 ss, connecting 6 mm tubing to 1/4 NPT process connector[56]
-E4	316 ss, connecting 12 mm tubing to 1/2 NPT process connector[57]
Optional Manifold Configurations	
-H1	Manifold mounted to transmitter and pressure tested (1.5 times transmitter range or 1.5 times manifold rating; whichever is less)
-H2	Manifold mounted to transmitter and pressure tested (certificate)

46. Not available with structures prepared for seals. Not available with structures that have inert fill.
47. Requires Structure Code 23, 27, 47, LM, or LD (inert fill).
48. After units are cleaned and reassembled for oxygen service, they are not rechecked for accuracy. This may affect performance.
49. For -X3, standard bolting is replaced with 17–4 PH ss nuts and bolts. Therefore, Optional Bolting codes -B1 through -B3 are not available with -X3.
50. MWP is either the absolute pressure span limit or the MWP listed in the table, whichever is less.
51. See Impact of Options on Maximum Static Pressure and Span and Range Limits, page 11 for pressure deratings when certain IEC61518 versions or Bolting Options -B1 or -B3 are specified.
52. Not available with IEC Construction options -D1 through -D9. For stainless steel bolts with IEC construction, specify -D5 to -D9, as required, instead of -B1 or -B2.
53. Not available with IEC Construction options -D1 through -D9.
54. Requires Conduit Connection Code 1 or 3. Available only with Electrical Certification ZZ.
55. Cover locks are provided as standard with Electrical Certifications that end in D or P.
56. Requires Structure Code 22 to 37 and Process Connector Code 0 or 1.
57. Requires Structure Code 22 to 37 and Process Connector Code 2.

Table 12 - Model Code for IMP10S (Continued)

Code	Description
Other Optional Selections	
-G1	Metal o-ring for diaphragm seals in vacuum service[58]
-J	Low temperature operative limit -50°C (-58°F)[59]
-T	Supplemental customer tag (stainless steel tag wired onto transmitter)
-V	Vent screw in side of each process cover[60]
-V1	Omit vent screw in side of each process cover[61]
Example: IMP10S-T2223AA-M1L1X3	

58. If the diaphragm seal is used in vacuum applications, -G1 is required. This option substitutes the vacuum service metal gasket for the standard PTFE process cover gasket. Requires Structure Codes prepared for use with seals.
59. Not available with structures that have inert fill. Not available with options -D2, -D4, -D6, and -D8. Not available with Electrical Certification KD.
60. Requires a Traditional Structure Code.
61. Requires a low-profile LP1 Structure Code.

Parts List

Warning

⚠WARNING

RISK OF MOISTURE INGRESS

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

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

Transmitter Parts

Figure 60 - Transmitter Topworks

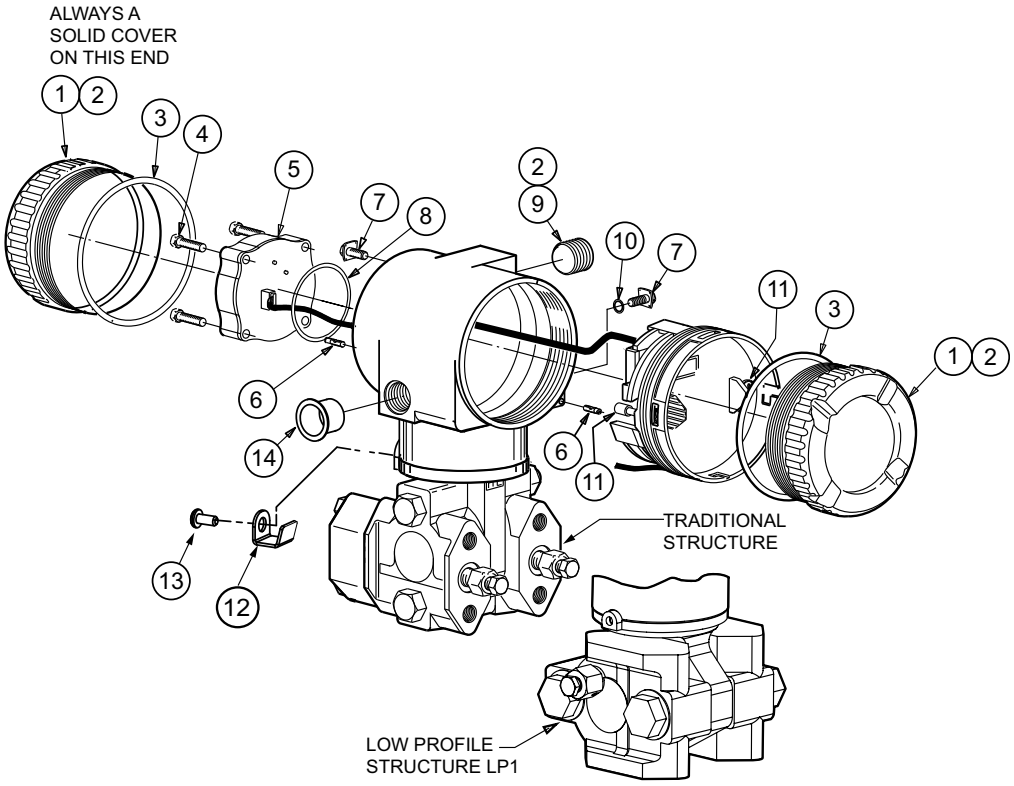


Table 13 - Parts for Transmitter Topworks

Item	Part No.	Qty.	Part Name
1	Cover, Electronics Housing; also see LCD Indicator Assembly (Option -L1), page 97.		
	D0162AP	2 or 1	Solid Standard Cover; Aluminum Housing
	D0162VD		Solid Standard Cover; Stainless Steel Housing
	D0162LH	0 or 1	Extended Window Cover; Aluminum Housing; without -J Option
	D0219EB		Extended Window Cover; Aluminum Housing; with -J Option
	D0162VH		Extended Window Cover; Stainless Steel Housing; without -J Option
	D0219ED		Extended Window Cover; Stainless Steel Housing; with -J Option
2	**Below**	1	**Grease, 1.75 oz. Tube**
	X0180JB		Lubit-8 for Transmitters with Aluminum Housing
	X0114AA		Never-Seez for Transmitters with Stainless Steel Housing
3	**Below**	2	**O-Ring, Cover**
	X0201FC		without -J option
	X0201QH		with -J option
4	**Below**	4	**Screw, Terminal Block Assembly, 0.138-32 x 0.750**
	X0133UW		Steel Screw - used with Aluminum Housing
	X0133VP		316 ss Screw - used with 316 ss Housing
5	**Below**	1	**Terminal Block Assembly with Power Cable**
	D0202EJ		for Electronics Version -T
	D0202EL		for Electronics Version -M
6	D0162WM	2	Screw, Lock, 0.164-32; part of Optional Selection -Z2; see Custody Transfer Lock and Seal (Option -Z2), page 98
7	D0162VJ	4	Screw Assembly, Ground, 0.164-32 x 0.375
8	**Below**	1	**O-Ring**
	X0144KR		without -J option
	X0201QR		with -J option
9	**Below**	1	**Pipe Plug for Unused Conduit Connection — see Warning, page 87**
	B0139CA		Aluminum,1/2 NPT; with Housing Code 1
	B0139SK		316 ss, 1/2 NPT; with Housing Code 3
	D0179FJ		Aluminum, M20; with Housing Code 5
	D0179FK		316 ss, M20; with Housing Code 6
10	X0173YA	1	Washer, Ext. Ground, 0.196 ID, 0.383 OD
11	Below	2	**Screw, Captive, Pan Head, 0.138-32 x 0.615**
	D0162VM		Steel Screw - used with Aluminum Housing
	D0166CY		316 ss Screw - used with 316 ss Housing
12	D0197PS	1	Retention Clip
13	X0174EK	1	Button Head Screw; 0.164-32 x 0.25 long
14	S0102BT	1	Poly Plug (remove prior to Transmitter installation)

Figure 61 - Transmitter Bottomworks for Use with Traditional Structures

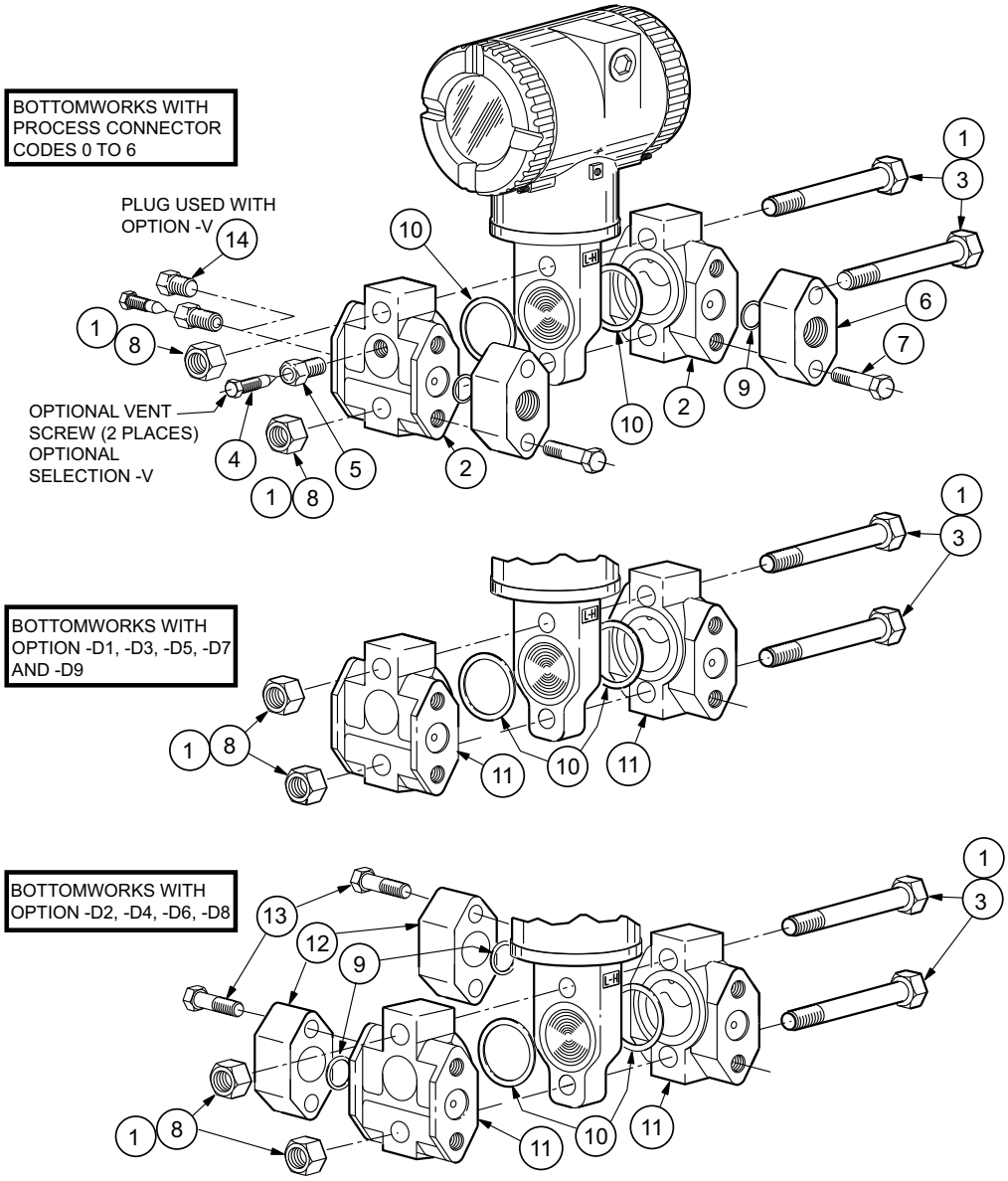


Table 14 - Parts for Transmitter Bottomworks for Use with Traditional Structures

Item	Part No.	Qty.	Part Name
1	**Below**	1	**Grease, 1.75 oz. Tube**
	X0118CC		Lubriplate for Transmitters with Aluminum Housing
	X0114AA		Never-Seez for Transmitters with Stainless Steel Housing
2	**Below**	2	**Process Cover for use with Process Connection Codes 0–6**[62]
	D0161NA		316 ss
	D0161NC		Nickel Alloy[63]
	Below		**Side Vent Process Cover for use with Process Connection Codes 0-6**[62]
	D0161NE		316 ss
	D0161NG		Nickel Alloy[63]
3	**Below**	2	**Screw, Hex Head, 0.500-13 x 3.5**
	X0173RP		2H (ASTM A193, Gr. B7 [standard])
	X0173TQ		316 ss (ASTM F593, Group 2) (Options -B1, -D5, -D6)
	X0173UK		ASTM A193, Gr. B7M (Option -B3)[62]
	X0173TD		17-4 ss (ASTM A564, Type 630) (Options -B2, -D7, -D8, -D9)
4	**Below**	2	**Vent Screw**
	B0138MJ		316 ss (standard)
	D0175PQ		Nickel Alloy[62] [64]
5	**Below**	2	**Vent Plug**[65]
	D0161QT		316 ss (standard)
	D0175PP		Nickel Alloy[62] [64]
6	2 Process Connectors; see Process Connectors, page 93.		
7	**Below**	4	**Screw, Hex Head, 0.438-20 x 1.5 (for threaded connectors, Codes 1-4)**
	X0100MN		ASTM A193 Gr. B7 (standard)
	X0171VP		ASTM A193, Gr. B7M (Option -B3)
	X0118AX		17-4 Stainless Steel (Options -B2, -D7, -D8, -D9, -Y)
	N1205RQ		316 ss (Options -B1, -D5, -D6)
	Below	4	**Screw, Hex Head, 0.438-20 x 1.0 (for weld neck connectors, Code 6)**
	X0100NT		ASTM A193, Gr. B7 (standard)
	X0171VN		ASTM A193, Gr. B7M (Option -B3)
	X0118AY		17-4 Stainless Steel (Options -B2, -Y)
	X0173TP		316 ss (Option -B1)

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

Table 14 - Parts for Transmitter Bottomworks for Use with Traditional Structures (Continued)

Item	Part No.	Qty.	Part Name
8	**Below**	2	**Nut, Hex Head, 0.500-13**
	X0173RN		2H (ASTM A193, Gr. B7) (standard) option
	X0173TR		316 ss (ASTM F594, Group 2) (Options -B1, -D5, -D6)
	X0173UJ		17-4 ss (ASTM F594, Group 2) (Options -B2, -D7, -D8, and -D9)
	X0173UL		ASTM A194, Gr. 2HM (Option -B3)
9	D0114RB	2	Gasket, PTFE
10	D0161QQ	2	Gasket, Process Cover, Glass-filled PTFE (Standard)
11	**Below**	1	**Cover, 316 ss - for use with Options -D1, -D3, -D5, -D7, and -D9**
	D0161NK		Single-ended process connection M10 (Option -D1) (High Side)
	D0161NJ		Single-ended process connection M10 (Option -D1) (Low Side)
	D0161NM		Single-ended process connection 7/16 (Options -D3, -D5, -D7) (High Side)
	D0161NL		Single-ended process connection 7/16 (Options -D3, -D5, -D7) (Low Side)
	D0174BU		Single-ended process connection 7/16 (Option -D9) (High Side)
	D0174BT		Single-ended process connection 7/16 (Option -D9) (Low Side)
	Below	2	**Cover, 316 ss - for use with Options -D2, -D4, -D6, and -D8**
	D0161NN		Double-ended process connection M10 (Option -D2)
	D0161NA		Double-ended process connection 7/16 (Options -D4, -D6, -D8)
12	D0153RK	2	Kidney Flange, Blind, 316 ss - for use with Options -D2, -D4, -D6, and -D8 (for double-ended process cover)
13	**Below**	4	**Screw, Hex Head, steel - for use with Options -D2, -D4, -D6, and -D8**
	X0173MJ		M10 x 1.5 x 40 mm, for Option -D2
	X0100MN		0.437-20 x 1.5 in, for Options -D4, -D6, and -D8
14	**Below**	2	**Pipe Plug, Hex Head, 1/4 NPT**
	D0161LU		316 ss
	D0161LW		Nickel Alloy[66]

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

Figure 62 - Transmitter Bottomworks for Use with Low Profile (LP1) Structures

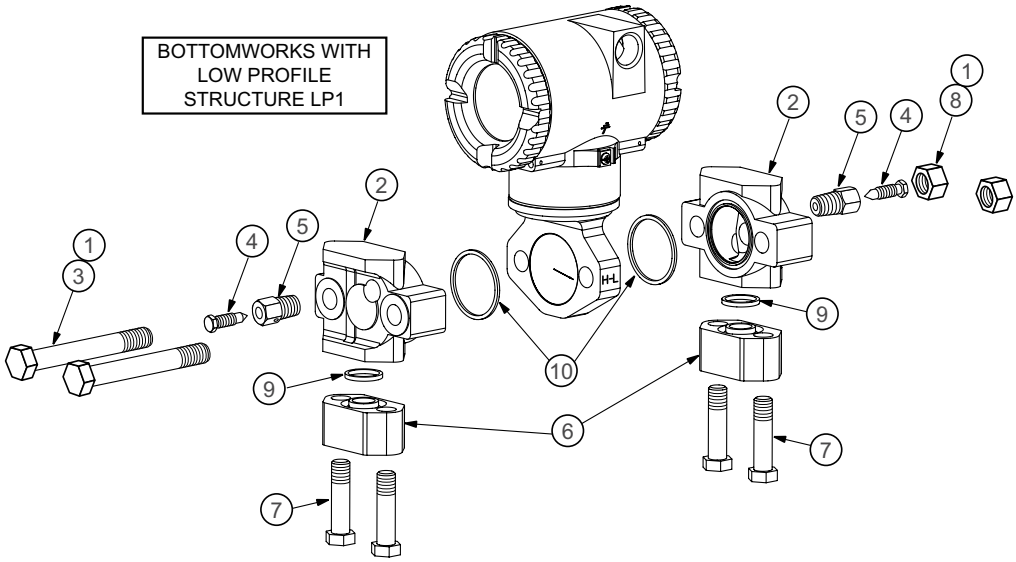


Table 15 - Parts for Transmitter Bottomworks for Use with Low Profile (-LP1) Structures

Item	Part No.	Qty.	Part Name
1	**Below**	1	**Grease, 1.75 oz. Tube**
	X0118CC		Lubriplate for Transmitters with Aluminum Housing
	X0114AA		Never-Seez for Transmitters with Stainless Steel Housing
2	**Below**	1	**Process Cover with Process Connection Codes 0-6**[67]
	D0170WW		with LP1; High Side Cover; 316 ss
	D0170WY		with LP1; Low Side Cover; 316 ss
3	**Below**	2	**Screw, Hex Head, 0.500-13 x 3.5**
	X0173RP		2H (ASTM A193, Gr. B7 [standard])
	X0173UK		ASTM A193, Gr. B7M (Option -B3)
	X0173TQ		316 ss (ASTM F593, Group 2) (Option -B1)
	X0173TD		17-4 ss (ASTM A564, Type 630) (Options -B2)
4	**Below**	2	**Vent Screw**
	B0138MJ		316 ss
	D0175PQ		Nickel Alloy[67] [68]
5	**Below**	2	**Vent Plug, 316 ss**[69]
	D0161QT		316 ss
	D0175PP		Nickel Alloy[67] [68]
6	2 Process Connectors for Stainless Steel Covers; see Process Connectors, page 93.		

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

Table 15 - Parts for Transmitter Bottomworks for Use with Low Profile (-LP1) Structures (Continued)

Item	Part No.	Qty.	Part Name
7	**Below**	4	**Screw, Hex Head, 0.438-20 x 1.5 for threaded connectors, Codes 1-4**
	X0100MN		ASTM A193 Gr. B7 (Standard)
	X0171VP		ASTM A193, Gr. B7M (Option -B3)
	N1205RQ		316 ss (Option -B1)
	X0118AX		17-4 Stainless Steel (Option -B2)
	Below		**Screw, Hex Head, 0.438-20 x 1.0 (for weld neck connectors, Code 6)**
	X0100NT		ASTM A193, Gr. B7 (standard)
	X0171VN		ASTM A193, Gr. B7M (Option -B3)
	X0173TP		316 ss (Option -B1)
	X0118AY		17-4 Stainless Steel (Option -B2)
8	**Below**	1	**Nut, 0.500-13**
	X0173RN		2H, ASTM A193, Gr. B7 (standard)
	X0173UL		ASTM A194, Gr. 2HM (Option -B3)
	X0173TR		316 ss, ASTM F594, Group 2 (Option -B1)
	X0173UJ		17-4 ss, ASTM F594, Group 2 (Option -B2)
9	D0114RB	2	Gasket, PTFE; Sensor Assembly to Process Cover
10	D0161QQ	2	Gasket, Glass-Filled PTFE; Process Connector to Process Cover

Table 16 - Process Connectors

Process Connector Code	Connector Description	Used with Cover Material	
		Stainless Steel	Nickel Alloy[70]
1	1/4 NPT	N0141XT	–
2	1/2 NPT	N0141XN	B0139JW
3	Rc 1/4	B0139BD	–
4	Rc 1/2	B0139BG	B0139JV
6	1/2 Schedule 80 Weld Neck	N0141XR	–

70. Equivalent to Hastelloy® C. Hastelloy is a registered trademark of Haynes International, Inc.

Optional Parts

Figure 63 - Standard Style Mounting Bracket Sets (Options -M1 and -M2) and Optional Standoff Kits

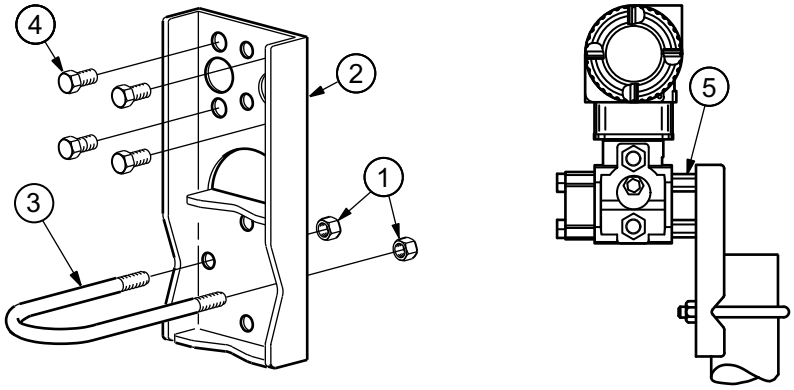


Table 17 - Parts for Standard Style Mounting Bracket Set with Painted Steel (Option -M1)

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

Table 18 - Parts for Standard Style Mounting Bracket Set with Stainless Steel (Option -M2)

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

Table 19 - Parts for Optional Standoff Kits (Not Included in -M1 or -M2)

Item	Part No.	Qty.	Part Name
5	D0170ME	1	Kit with Four Steel Standoffs, for use with Option -M1
	D0170MJ	1	Kit with Four 316 ss Standoffs, for use with Option -M2

Figure 64 - Universal Style Mounting Bracket Set (Option -M3)

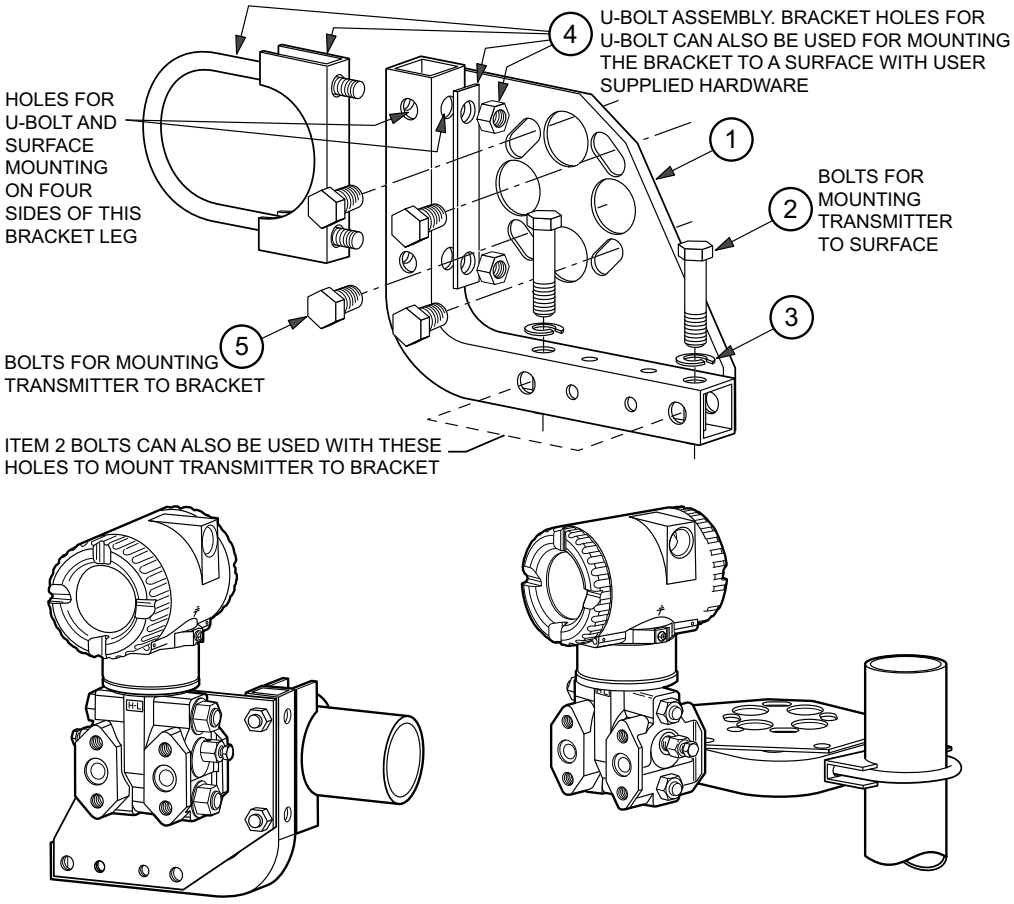


Table 20 - Parts for Universal Style Mounting Bracket Set (Option -M3)

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

Figure 65 - Vent Screw (Option -V1)

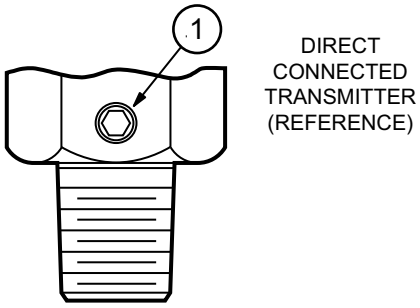


Table 21 - Parts for Vent Screw (Option -V1)

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

Figure 66 - Adapter Plates (Options -P1 to -P8) for Direct Mounting to Coplanar Manifolds

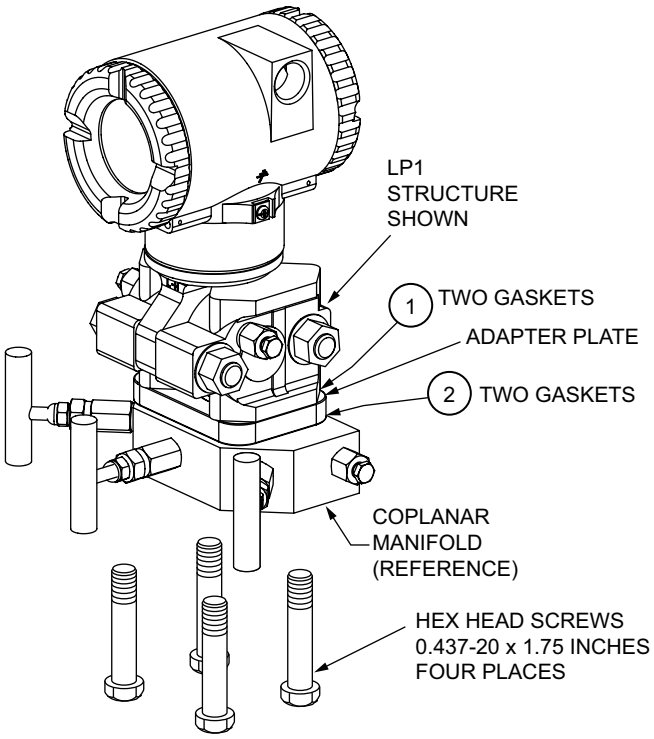


Table 22 - Parts for Adapter Plate Kits -P1 to -P4, Used with “MC” Manifold

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

Table 23 - Parts for Adapter Plate Kits -P5 to -P8, Used with "MT3" Manifold

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

Table 24 - Gaskets (Included in Kits)

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

Figure 67 - LCD Indicator Assembly (Option -L1)

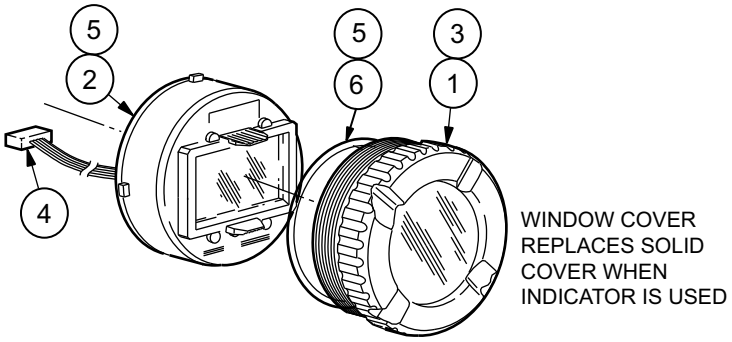


Table 25 - Parts for LCD Indicator Assembly (Option -L1)

Item	Part No.	Qty.	Part Name
1	**Below**	1	**Extended Cover with Window**
	D0162LH		Aluminum Housing; without -J Option
	D0219EB		Aluminum Housing; with -J Option
	D0162VH		Stainless Steel Housing; without -J Option
	D0219ED		Stainless Steel Housing; with -J Option
2	D0162LQ	1	LCD Indicator Module
3	**Below**	1	**Grease, 1.75 oz. Tube**
	X0180JB		Lubit-8 for Transmitters with Aluminum Housing
	X0114AA		Never-Seez for Transmitters with Stainless Steel Housing
4	P0177HB	1	Indicator Cable
5	0048130	1	Grease, Silicone (150 gram tube)
6	**Below**	2	**O-Ring, Cover**
	X0201FC		for Transmitter without -J option
	X0201QH		for Transmitter with -J option

Figure 68 - Conduit Connections (Options -A1 and -A3)

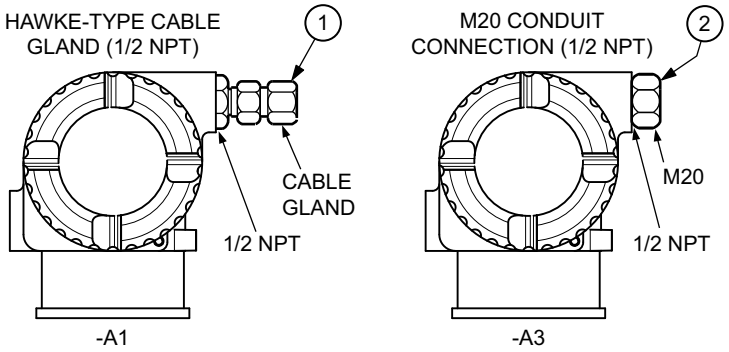


Table 26 - Parts for Conduit Connections (Options -A1 and -A3)

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

Figure 69 - Custody Transfer Lock and Seal (Option -Z2)

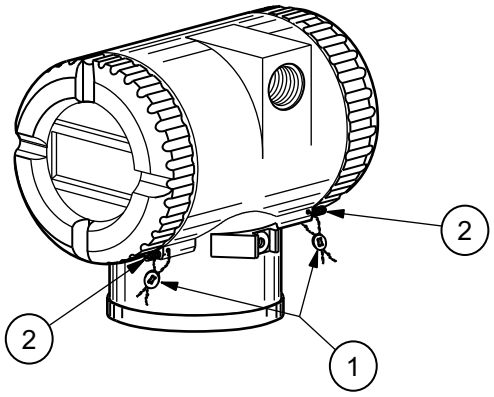


Table 27 - Parts for Custody Transfer Lock and Seal (Option -Z2)

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

Figure 70 - Ermeto Connectors (Options -E3 and -E4)

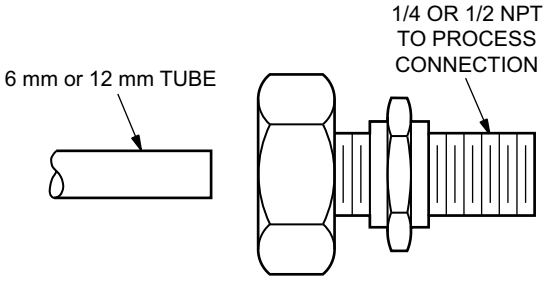


Table 28 - Parts for Ermeto Connectors (Options -E3 and -E4)

Item	Part No.	Qty.	Part Name
n/a	U7002AS	1	Process Connector, 316 ss, 640 bar, 1/4 NPT x 6 mm, Option -E3
	U7002AP		Process Connector, 316 ss, 640 bar, 1/2 NPT x 12 mm, Option -E4

Recommended Spare Parts Summary

Item No.	Part Number	Part Name	Number of Parts Recommended for		
			1 Inst.	5 Inst.	20 Inst.
See Transmitter Topworks, page 87					
3	**Below**	**O-Ring, Cover**	0	2	4
	X0201FC	without -J option			
	X0201QH	with -J option			
12	D0197PS	Retention Clip	1	2	4
13	X0174EK	Screw, Button Head	1	2	4
See Transmitter Bottomworks for Use with Traditional Structures, page 89 and Transmitter Bottomworks for Use with Low Profile (LP1) Structures, page 92					
4	**Below**	**Vent Screw**	0	2	4
	B0138MJ	316 ss (standard)			
	D0175PQ	Nickel alloy[71] (to NACE Standard MR0175/MR0103)			
5	**Below**	**Vent Plug**	0	2	4
	D0161QT	316 ss (standard)			
	D0175PP	Nickel alloy[71] (to NACE Standard MR0175/MR0103)			
9	D0114RB	Gasket, PTFE	2	4	8
10	D0161QQ	Gasket, Glass-Filled PTFE	2	4	8
See LCD Indicator Assembly (Option -L1), page 97					
2	D0162LQ	LCD Indicator Module	0	1	1
3	**Below**	**Grease, 1.75 oz. Tube**	1	2	4
	X0180JB	Lubit-8 for Transmitters with Aluminum Housing			
	X0114AA	Never-Seez for Transmitters with Stainless Steel Housing			
5	0048130	Grease, Silicone (150 gram tube)	0	2	4
6	**Below**	**O-Ring, Cover**	0	2	4
	X0201FC	for Transmitter without -J option			
	X0201QH	for Transmitter with -J option			
See Adapter Plates (Options -P1 to -P8) for Direct Mounting to Coplanar Manifolds, page 96					
1	D0114RB	Gasket - Transmitter to Adapter Plate	2	4	8
2	D0170XK	Gasket - Manifold to Adapter Plate	2	4	8

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

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