Intelligent Electronic Transmitters

IMP10S Multivariable Transmitter with Temperature and Modbus Communication

MI 020-623

Instruction

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Schneider Electric™

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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.

Modbus Communication

Communication with remote terminal units (RTUs) is via the Modbus communication protocol over an RS-485 shielded twisted pair multidrop serial connection. The communication function permits you to reconfigure or rerange a transmitter from a remote host PC.

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 Modbus RTU host.

Reference Documents

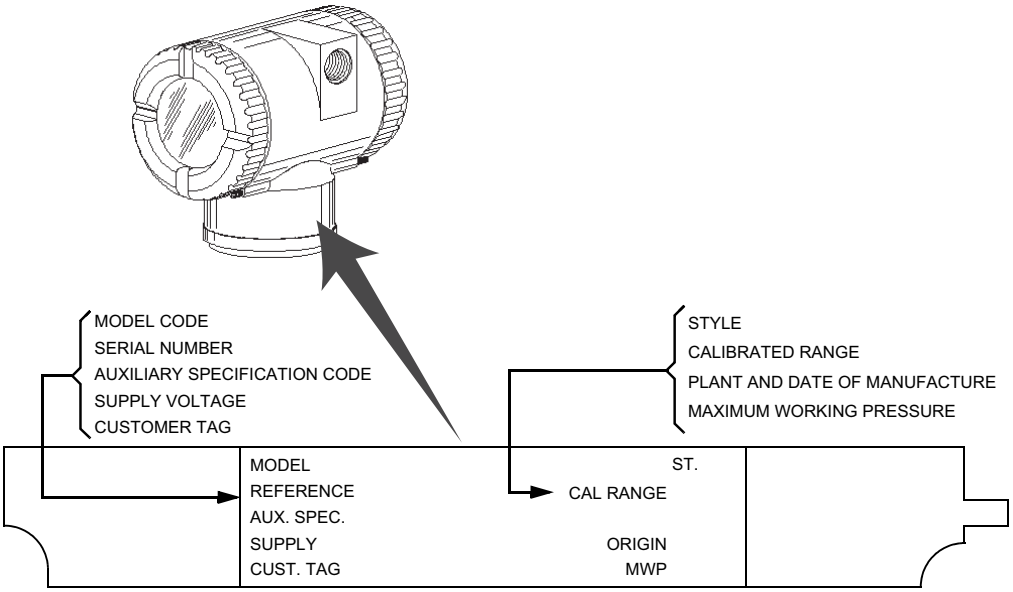
Document	Description
Instructions	
MI 020-329	High Accuracy Flow Measurement
MI 020-369	Diaphragm Seals
MI 020-543	FM/CSA Safety Information
MI 020-544	ATEX/UKEX/IECEx Safety Information
MI 022-138	Bypass Manifolds — Installation and Maintenance
TI 1-50a	Liquid Density Measurement
TI 001-051	Liquid Interface 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

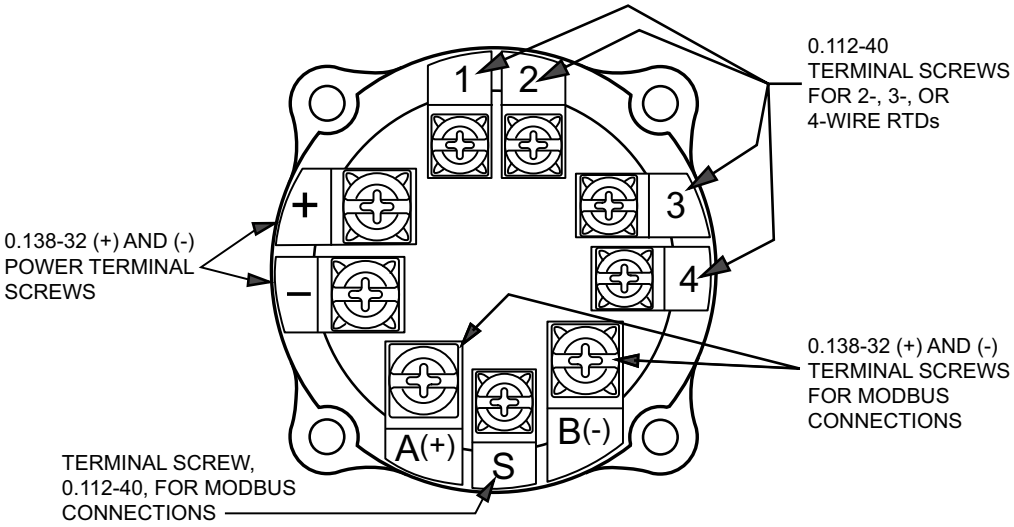
EXPLOSION HAZARD

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 19 for transmitter limits

Output Signal and Configuration

Digital output. Configurable using an RTU host 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.

Communication

Modbus RTU over a 2-wire RS-485 multidrop serial connection.

- Rate: 1200, 2400, 4800, 9600 (default), or 19200 baud.
- Response Delay: User-selectable between 0 and 65,535 ms. The default value is 0 ms.

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

9 to 30 V dc at 250 mW.

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.

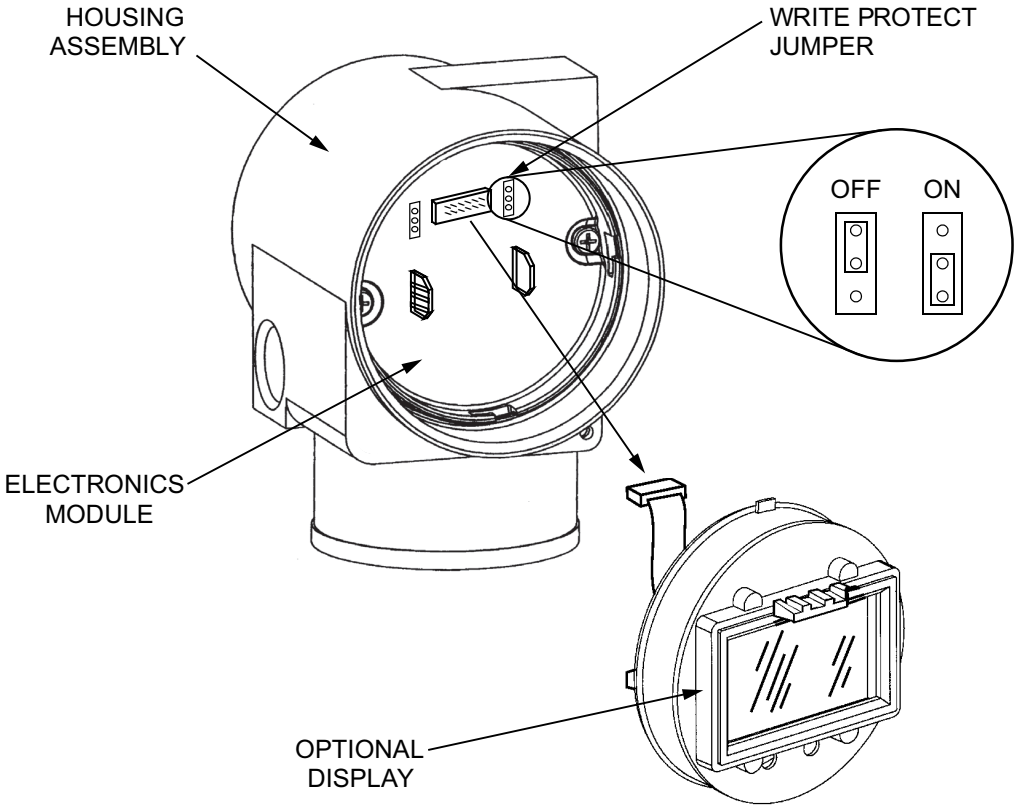
Suppressed Zero and Elevated Zero

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)

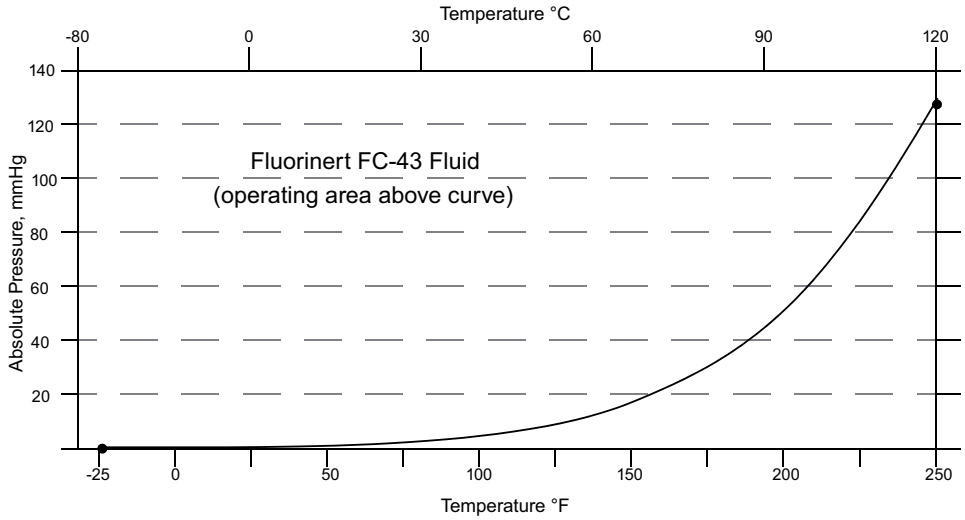
Variable	Measurement
Primary Variable	Differential Pressure
Secondary Variable	Absolute Pressure
Tertiary Variable	Process Temperature
Quaternary Variable	Electronics Temperature

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	**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[5]	**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
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

5. For gauge pressure accuracy, add the anticipated variation from the user-entered barometric pressure.

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[6]	Operative Limits[6]
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)[7]
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[8]			
Without display	24 ± 2°C (75 ± 5°F)	-29 to +82°C (-20 to +180°F)	-40 and +85°C (-40 and +185° F)[9]
With display[10]	24 ± 2°C (75 ± 5°F)	-20 to +82°C (-4 to +180°F)	-40 and +85°C (-40 and +185° F)[9]
Relative Humidity[11]	50 ± 10%	0 to 100%	0 and 100%
Ambient Pressure	860 to 1060 mbar	Atmospheric	Atmospheric
Supply Voltage (HART)[12]	30 ± 0.5 V dc	16.5 to 42 V dc	12.5 V dc and 42 V dc
Supply Voltage (Modbus)[13]	24 ± 0.5 V dc	9 to 30 V dc	9 and 30 V dc
Output Load (HART)[14]	650 ohms	0 to 1,450 ohms	0 and 1,450 ohms
Mounting Position	Vertical or Horizontal[15]	Vertical or Horizontal[15]	No limit
Vibration	1 m/s^2 (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

6. Normal operating conditions and operative limits are defined per ANSI/ISA 51.1–1979 (R1993).
7. 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.
8. Refer to Electrical Certifications, page 20 for a restriction in ambient temperature limits with certain electrical approvals/certifications.
9. -40 and +75°C (-40 and +167°F) for transmitters with ATEX flameproof classification.
10. 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).
11. 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.
12. Refer to Supply Voltage, page 12.
13. Power supplied by an external Modbus power supply.
14. 250 ohm minimum load is required for communication with a HART Communicator.
15. 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 34.

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.

Agency Certification, Types of Protection, and Area Classification	Application Conditions[16]	Model Code Option
ATEX and UKEX flameproof	Temperature Class T6, T85°C, Ta = -40°C to +75°C	AD
INMETRO flameproof	Temperature Class T6, T85°C, Ta = -40°C to +75°C	BD
CSA zone certified flameproof, explosionproof, dust ignitionproof	Temperature Class T6, Maximum Ambient Temperature 75°C	CD
Multi-marked ATEX and IECEx flameproof	Temperature Class T6, T85°C, Ta = -40°C to +75°C	DD
IECEx flameproof	Temperature Class T6, T85°C, Ta = -40°C to +75°C	ED
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

16. 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.

Agency Certification, Types of Protection, and Area Classification	Application Conditions[17]	Model Code Option
KOSHA flameproof	Temperature Class T6, T85°C, Ta = -40°C to +75°C	KD
NEPSI flameproof	Temperature Class T6, T85°C, Ta = -40°C to +75°C	ND
EAC flameproof	Temperature Class T4, Ta = -40°C to +75°C	RD

17. 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 23 and Surface Mounting, page 24. In addition, transmitters can be supported by the process piping; see Transmitter Supported by Process Piping, page 24.

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

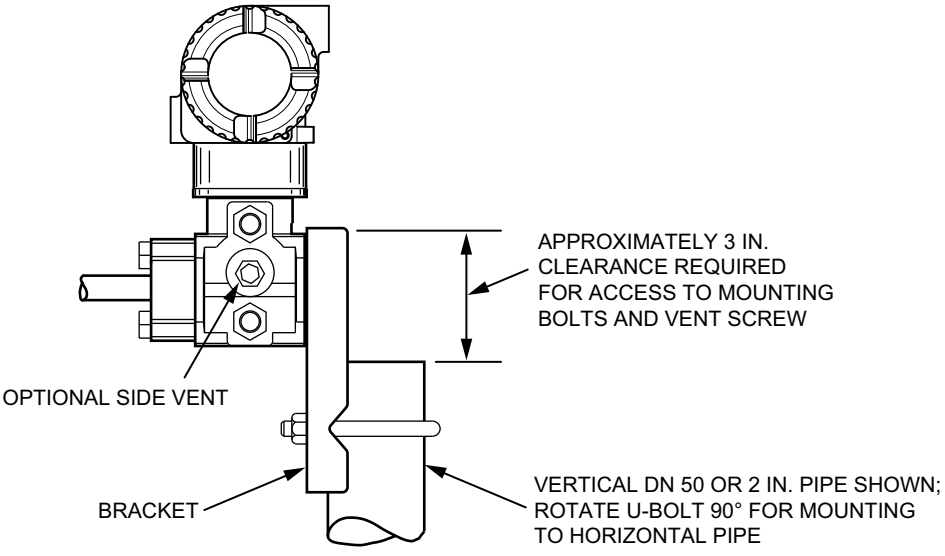


Figure 5 - Surface Mounting

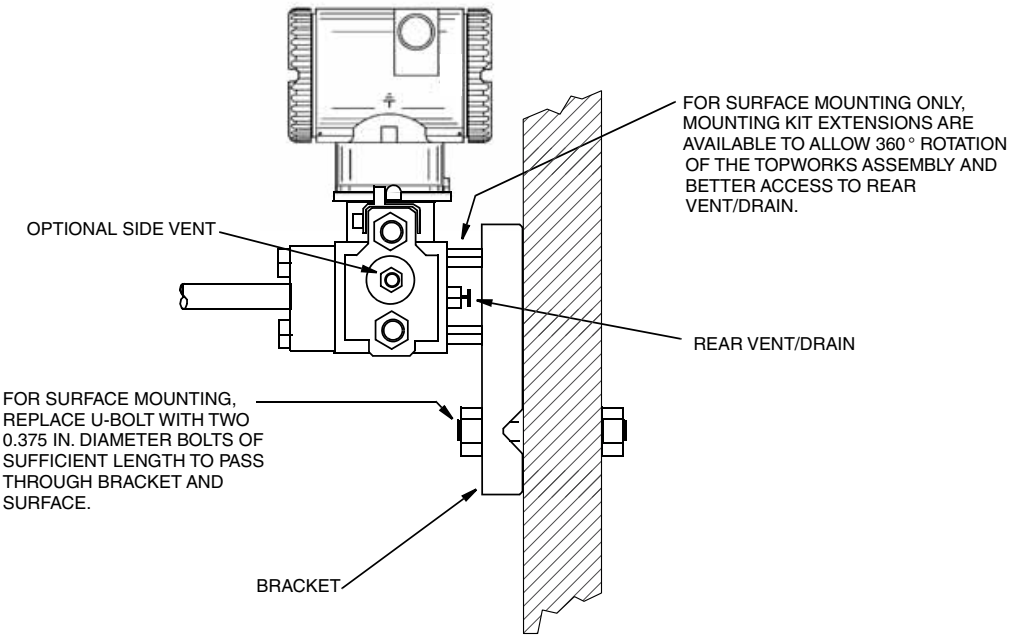
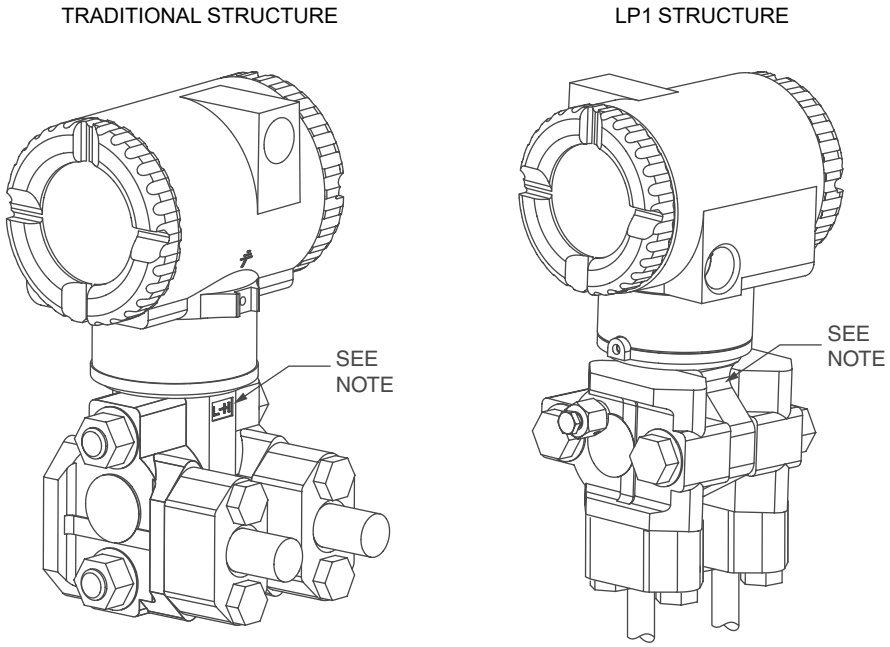


Figure 6 - Transmitter Supported by Process Piping

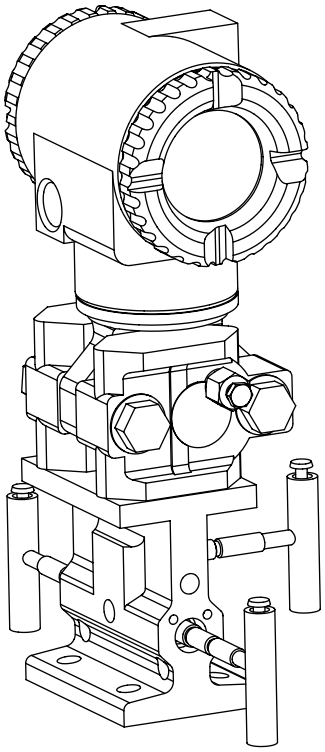


NOTE: MARK INDICATING LOW AND HIGH PRESSURE SIDES OF TRANSMITTER

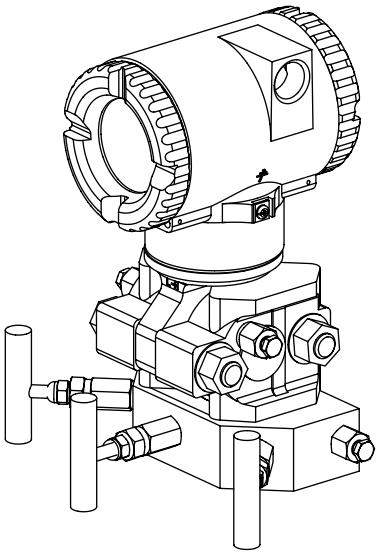
Manifold Mounting

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

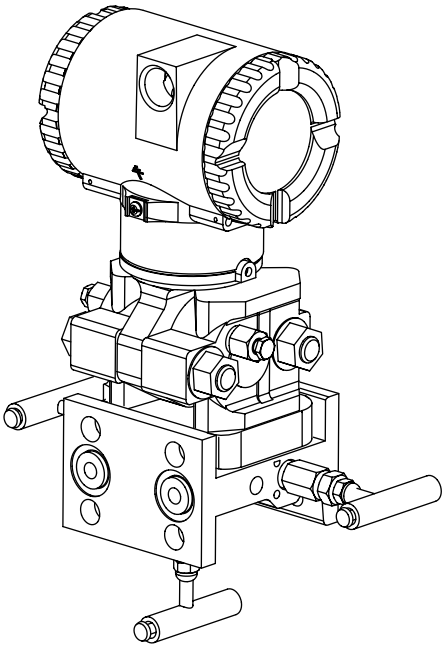


M4A MANIFOLD

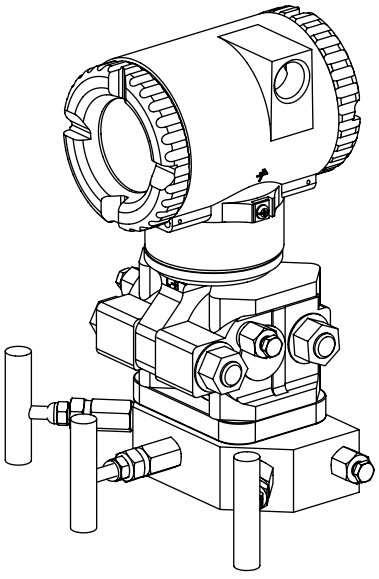


MB3 MANIFOLD

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

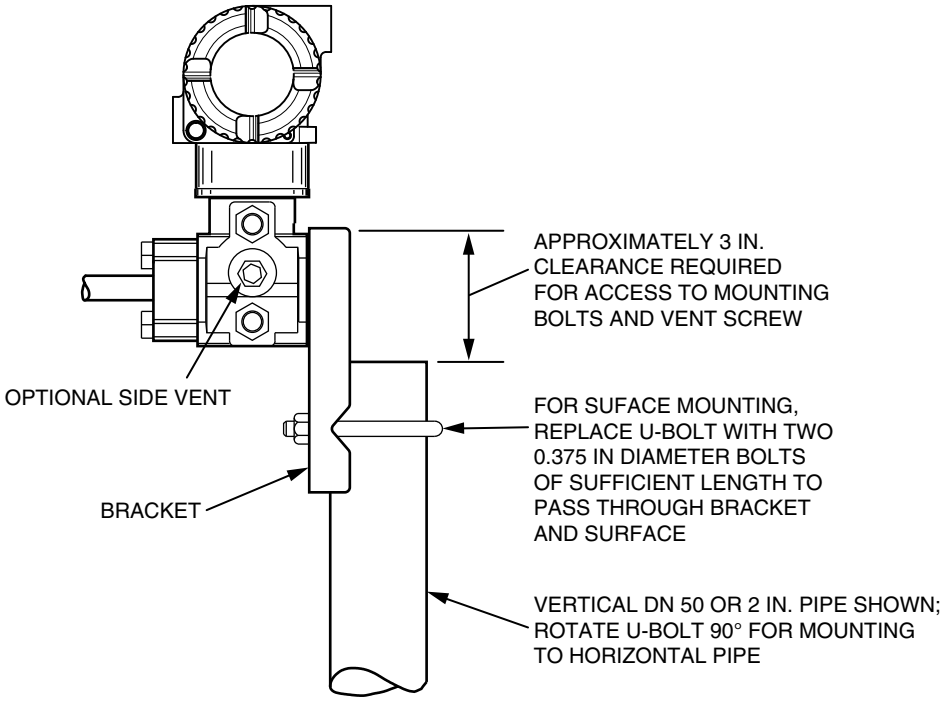
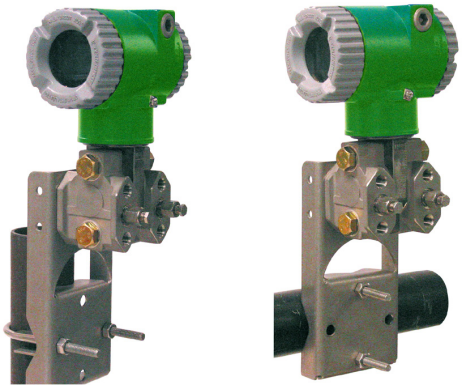


Figure 10 - Examples of Transmitters Mounted with a Standard Bracket



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

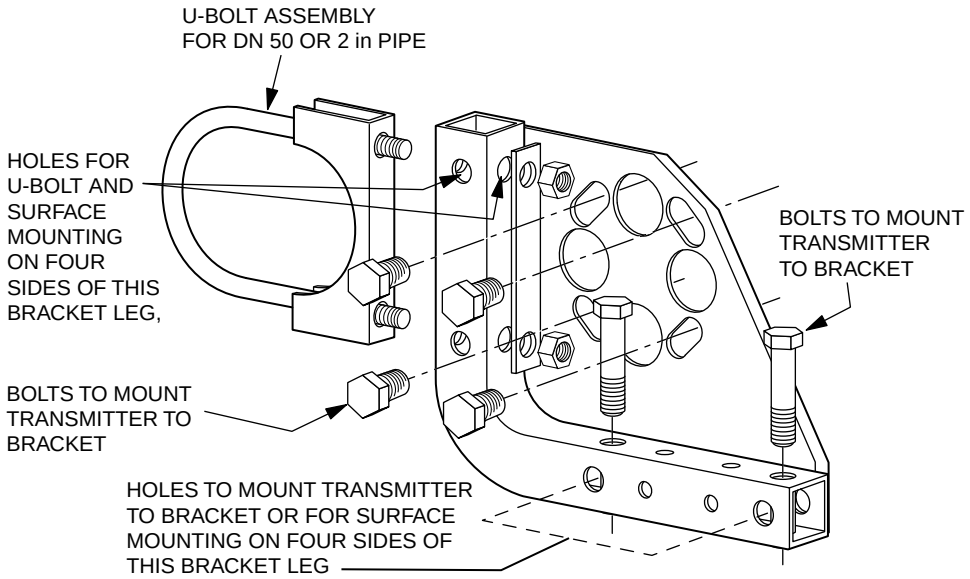
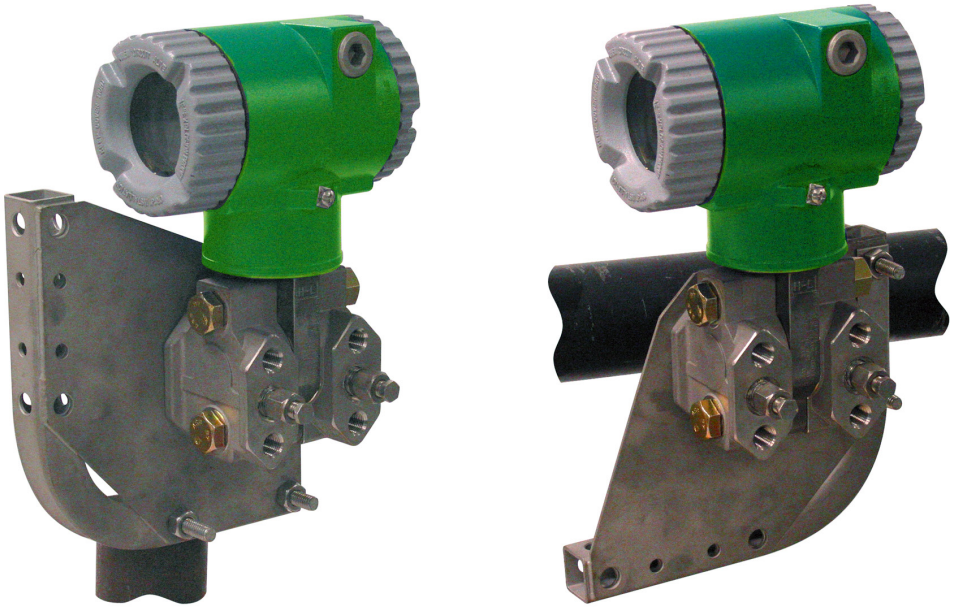


Figure 12 - Examples of Transmitters Mounted with a Universal Bracket



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

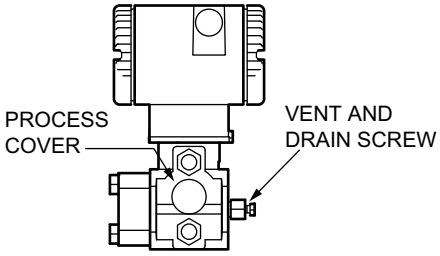


Figure 14 - Vertical Mounting — Cavity Venting

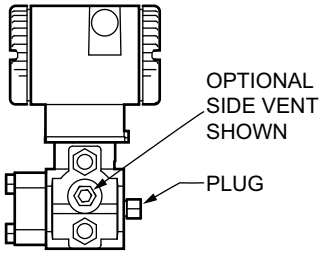
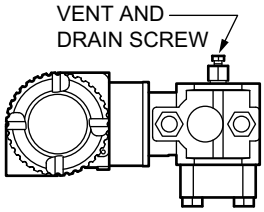


Figure 15 - Horizontal Mounting — Cavity Venting



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

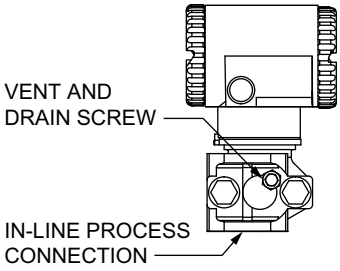
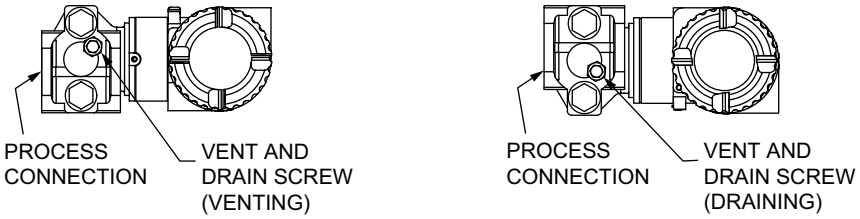


Figure 17 - Horizontal Mounting — Cavity Venting and Draining



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 31. 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

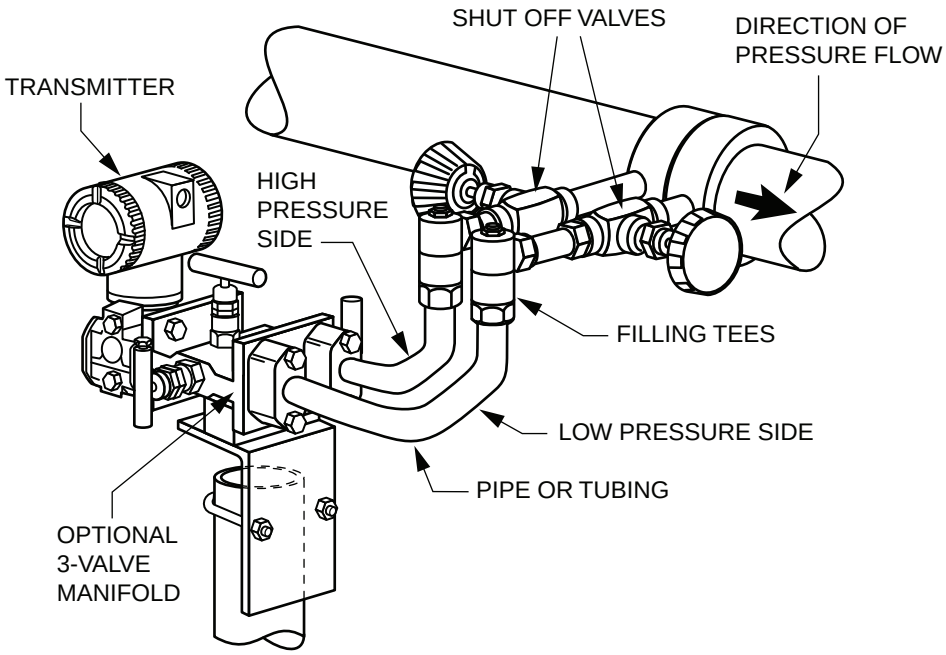
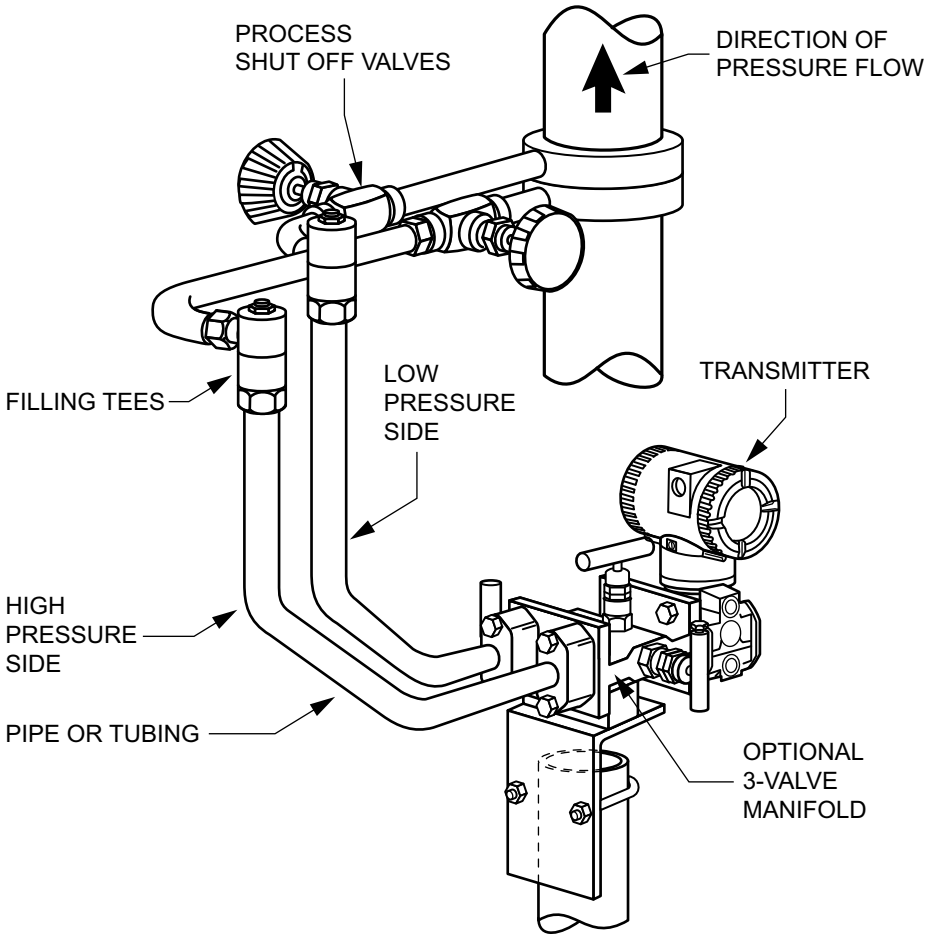


Figure 19 - Example of Vertical Process Line Installation



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 36.
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.

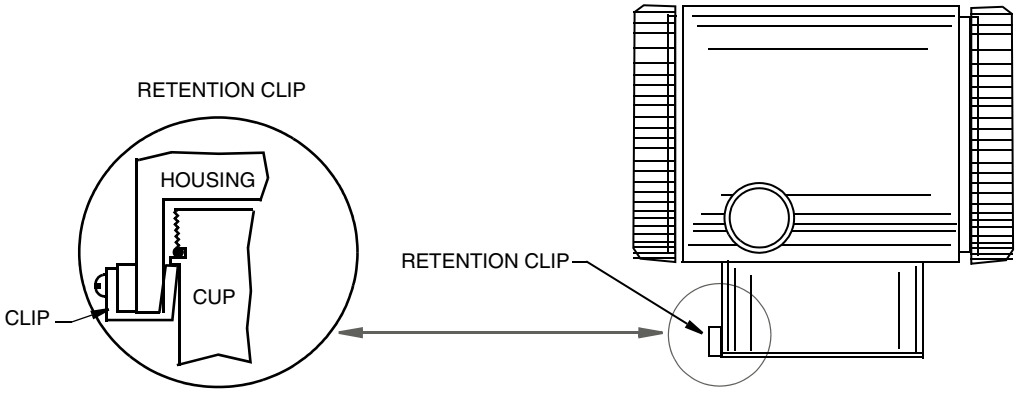
6. Follow the procedure in Putting a Differential Pressure Transmitter into Operation, page 36.

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.

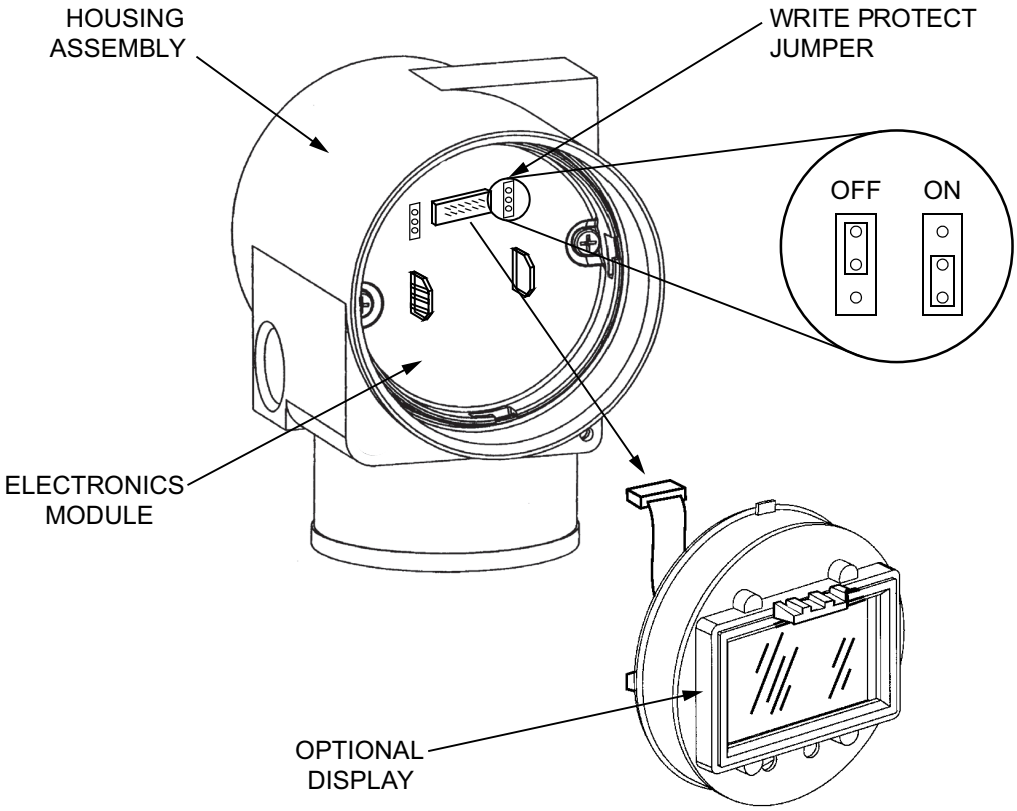
NOTICE
POTENTIAL EQUIPMENT DAMAGE Do not turn the display more than 180° in any direction. Doing so can damage its connecting cable. **Failure to follow these instructions can result in equipment damage.**

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 32, then remove the jumper or move it to the lower position as shown on the exposed label. Replace the display.

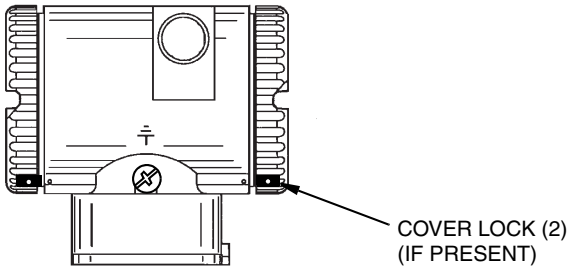
Figure 21 - Write Protect Jumper



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. Also for FM and CSA installations, refer to MI 020-543; for ATEX and IECEx installations, refer to MI 020-544.

⚠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

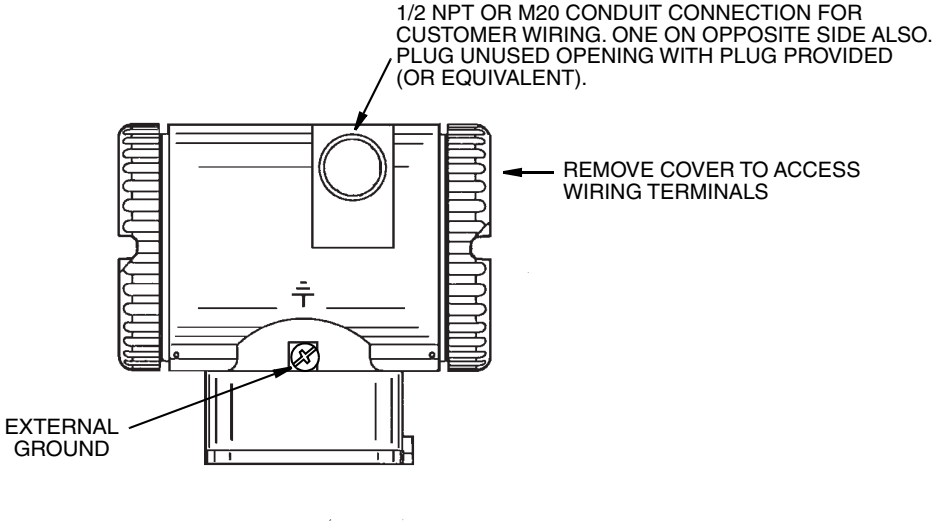
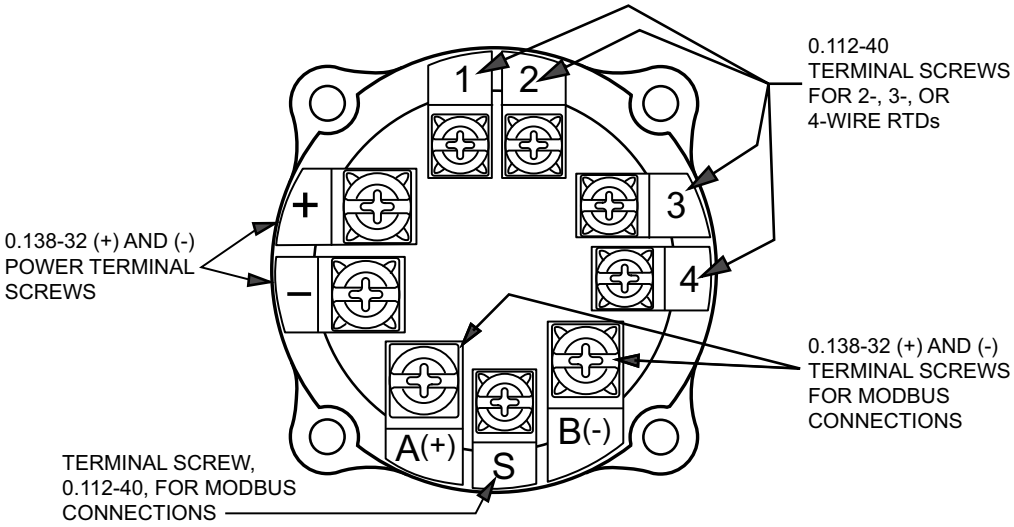


Figure 24 - Identification of Field Terminals



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 FBM224. 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 29.

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 29.

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.

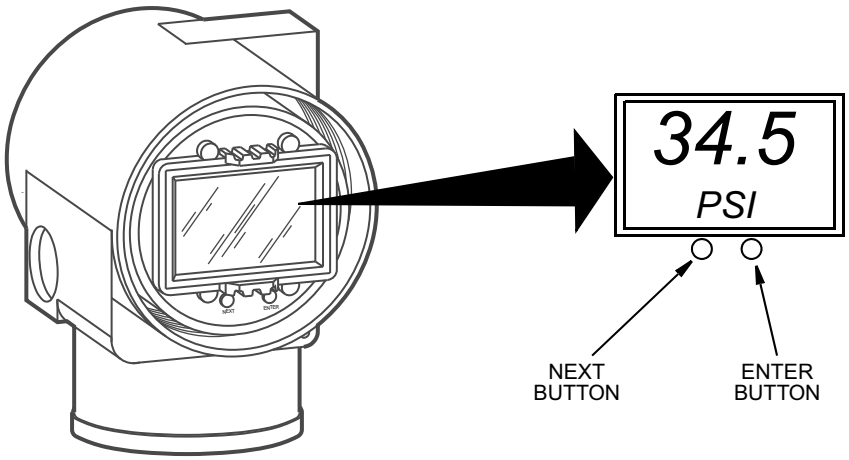
Operation with the Local Display

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.

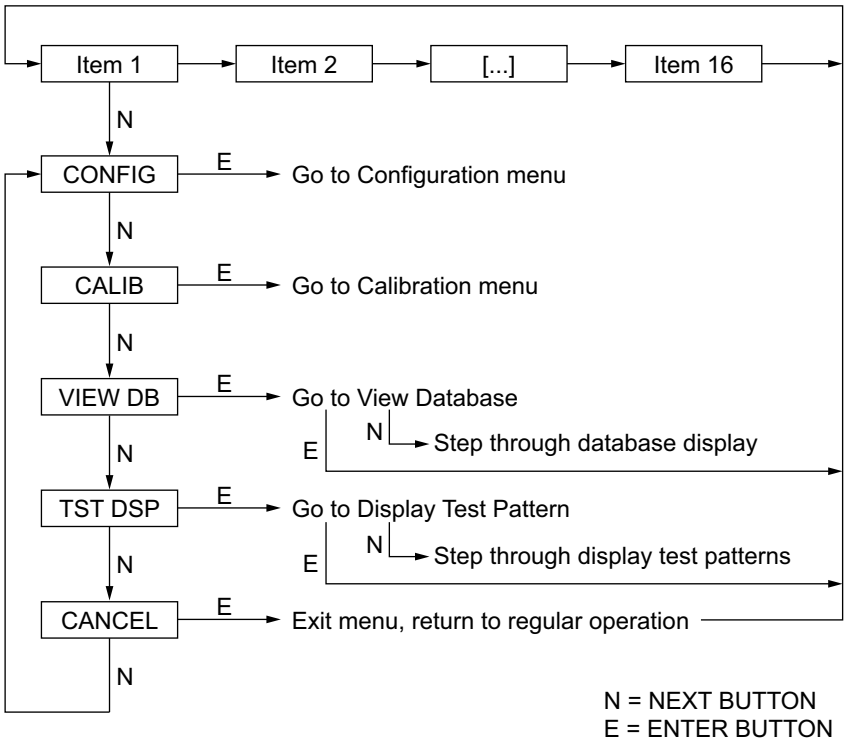
Figure 25 - Local Display



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 PC-based configurator.

Figure 26 - 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

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 41.

Figure 27 - VIEW DB Menu

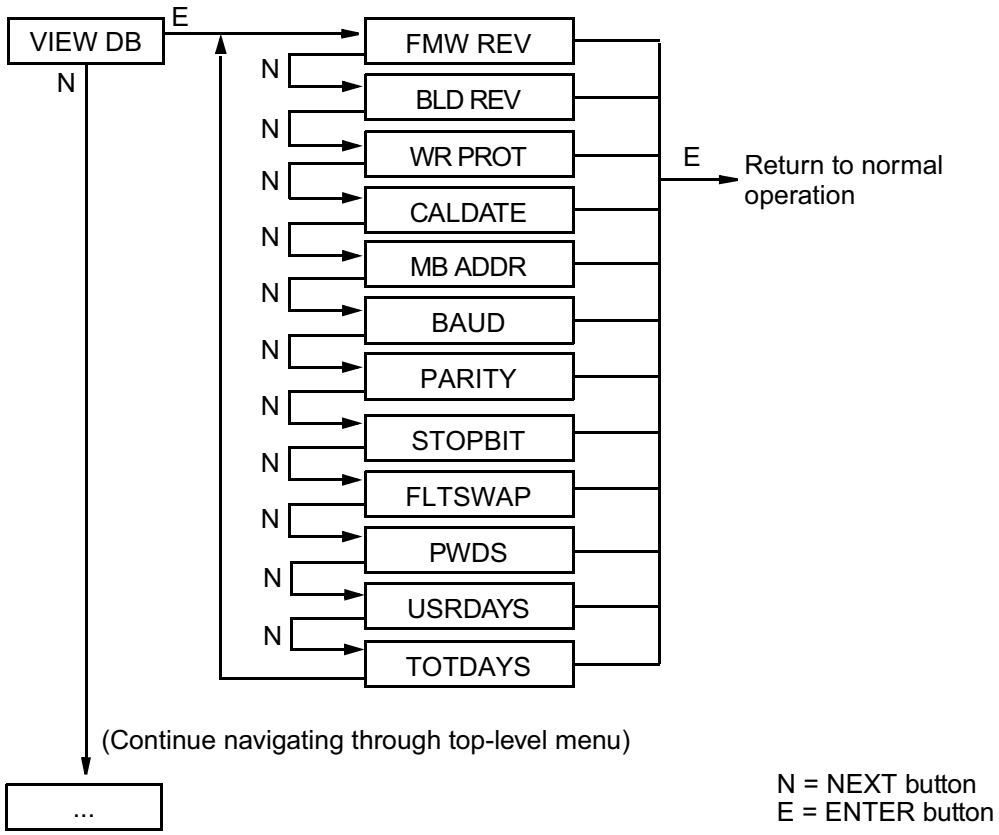


Table 9 - Database Items

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)
Server (station) address (**MB ADDR**)	**1** through **247**
Baud rate (**BAUD**)	**9600** (example)
Parity (**PARITY**)	**None** **Odd** **Even**
Stop bit (**STOPBIT**)	**One** **Two**
Float swap (**FLTSWAP**)	**ab cd** (no swap) **cd ab** (word swap) **ba dc** (word and byte swap) **dc ba** (full swap)

Table 9 - Database Items (Continued)

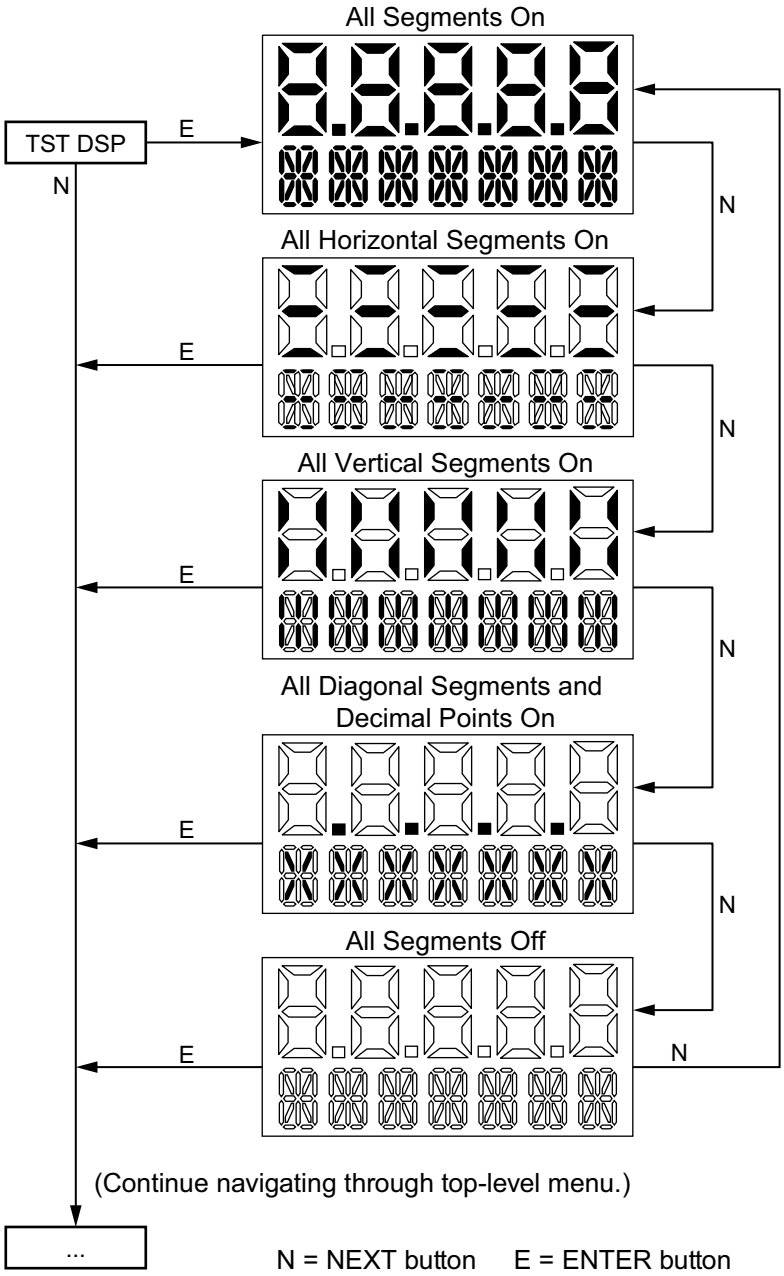
Database Item	Available Settings or Example
Current password setting (**PWDS**)	**No Pwds** (no password) **Ena Pwd** (enable password) **CfgOnly** (configuration only) **Cfg+Cal** (configuration and calibration)
Number of days the transmitter has been running since the Time in Service Meter was reset (**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 28 - 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[18]	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.

18. 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 33.

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.

Table 10 - Configurable Parameters

Parameter	Capability	Default	Configurable with	
			Integral Display	PC-Based Config.
Descriptors				
Tag Number	Up to 8 characters	- - -	No	Yes
Descriptor	Up to 16 characters	- - -	No	Yes
Message	Up to 32 characters	- - -	No	Yes
Differential Pressure				
DP Mode	Linear, or Type of SqRt	Linear	Yes	Yes
Units	Pressure units for Linear; % for SqRt	inH_2O	Yes	Yes
DP LRV	Within DP range	0	Yes	Yes
DP URV	Within DP range	URL	Yes	Yes
Damping	0 to 32 seconds	None	Yes	Yes
Absolute Pressure				
Mode	Display AP or GP	AP	Yes	Yes
Units	Pressure units	psia	Yes	Yes
AP LRV	Within AP range	0	Yes	Yes
AP URV	Within AP range	URL	Yes	Yes
ATM Reference	Pressure value	14.7 psi	Yes	Yes
Damping	0 to 32 seconds	None	Yes	Yes
RTD				
RTD Mode	On or Off	On	Yes	Yes
Units	Temperature units	deg C	Yes	Yes
RTD LRV	Within RTD range	-200	Yes	Yes
RTD URV	Within RTD range	+850	Yes	Yes

Table 10 - Configurable Parameters (Continued)

Parameter	Capability	Default	Configurable with	
			Integral Display	PC-Based Config.
Sensor Temperature (STMP)				
Units	Temperature units	deg C	No	No
STMP LRV	Within STMP limits	-40	No	No
STMP URV	Within STMP limits	+122	No	No
Electronics Temperature (ETMP)				
Units	Temperature units	deg C	No	No
ETMP LRV	Within ETMP limits	-40	No	No
ETMP URV	Within ETMP limits	+85	No	No
Other				
Calibration Date	ddmmmyy	none	Yes	Yes
Enable Passwords (for local display pushbuttons)	No Password Configuration only locked Calibration and Configuration locked	No Password	Yes	Yes
Reset Database	Keep or Clear	Keep	Yes	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 Modbus RTU host 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.

Configuration Menus

Figure 29 - CONFIG Menu

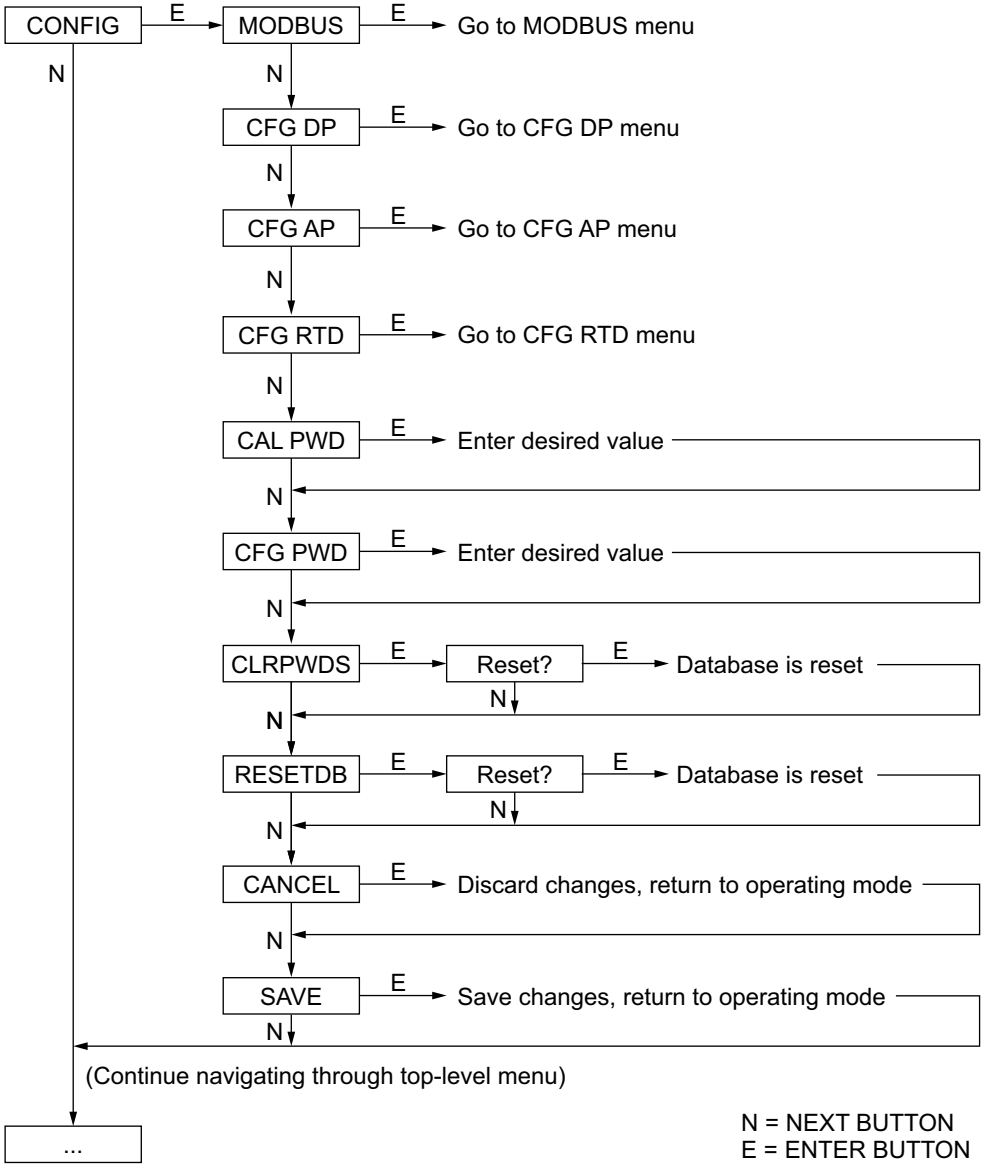


Figure 30 - MODBUS Menu

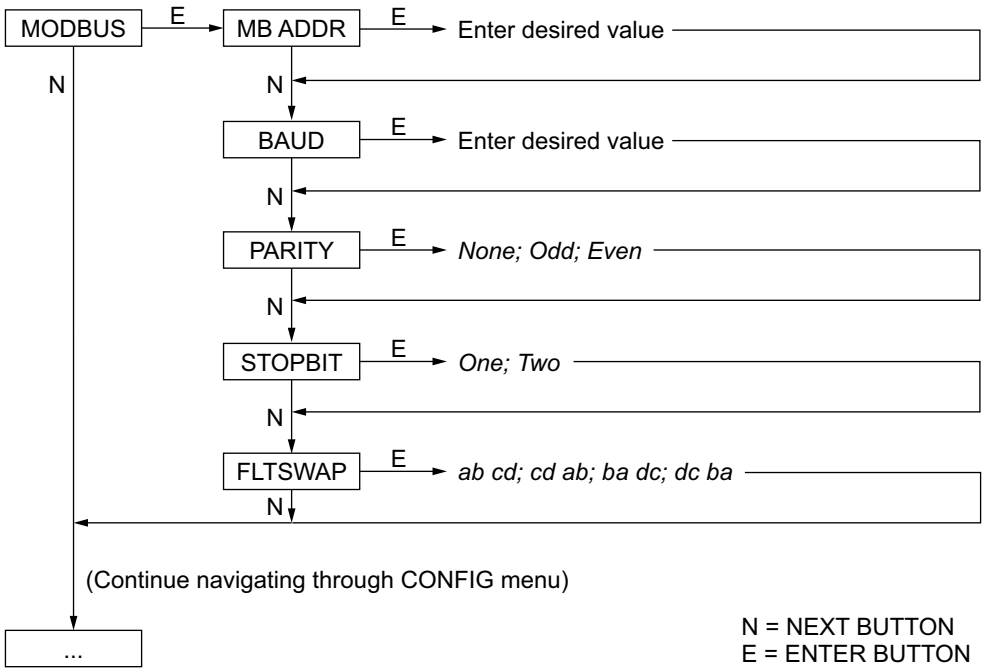


Figure 31 - CFG DP

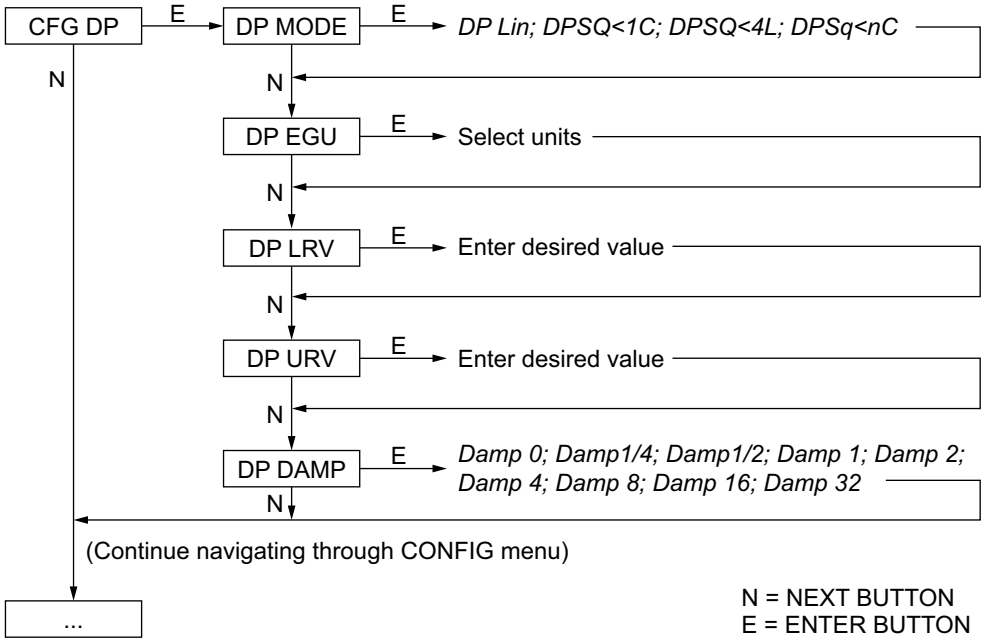


Figure 32 - CFG AP

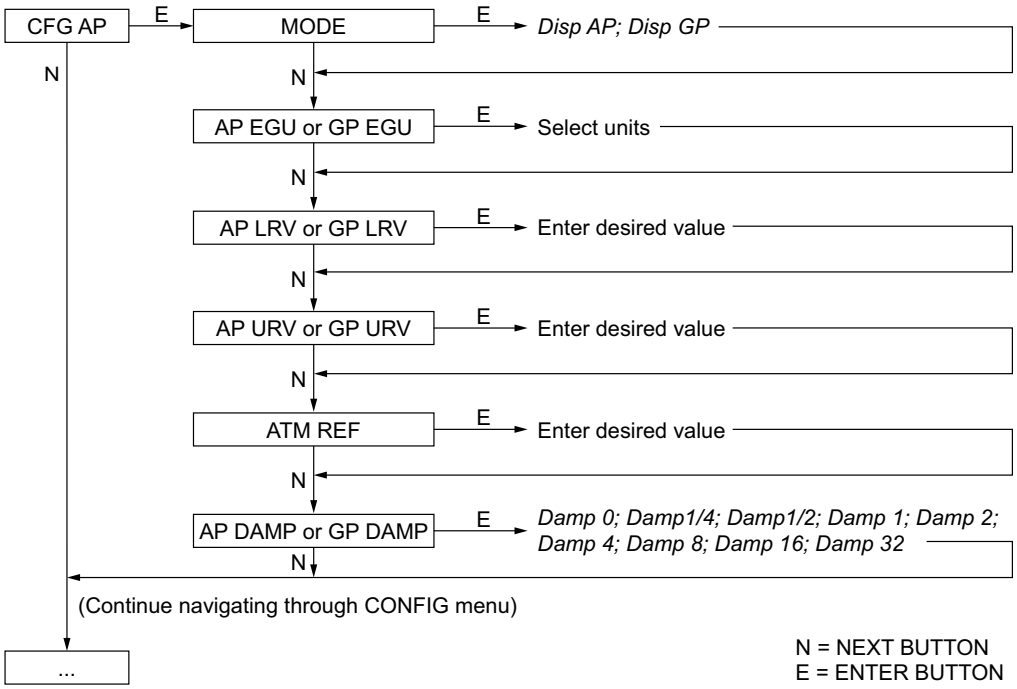
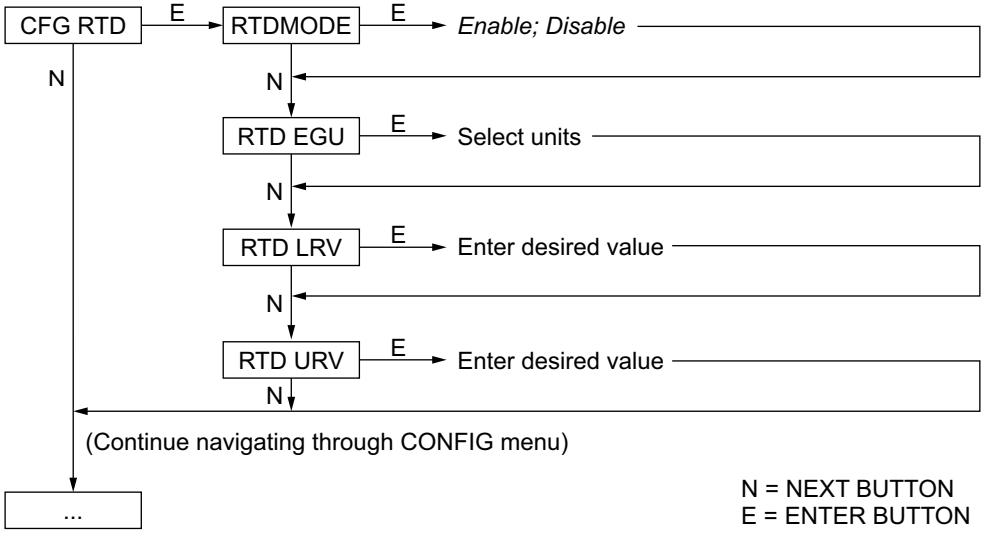


Figure 33 - CFG RTD



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.

Parameter	Condition Tested	Message	Description
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.
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.

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 33.
- 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.

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.

  NOTE: You cannot reset this number when write-protect is enabled.

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 36.

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 34 - Field Calibration Setup for Differential Pressure

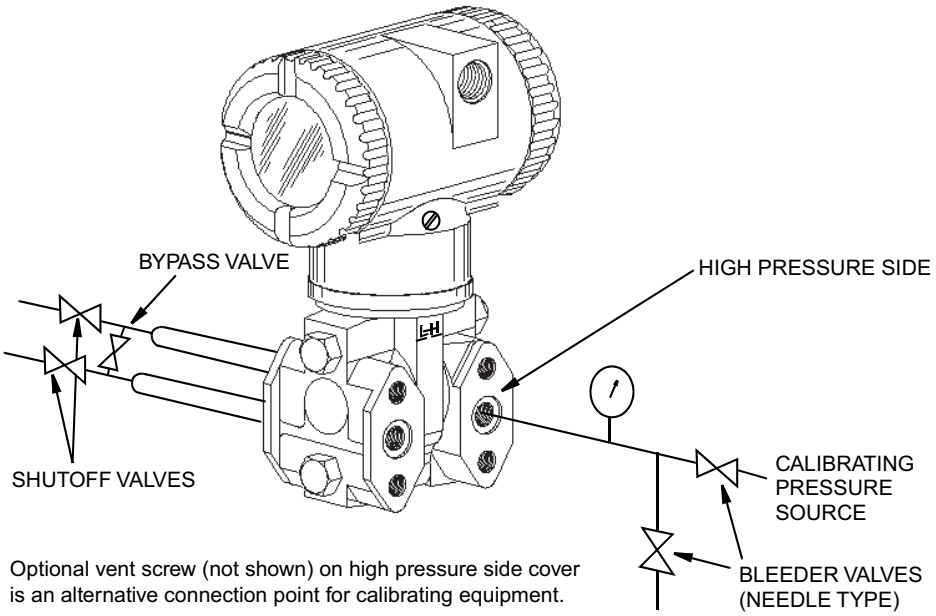
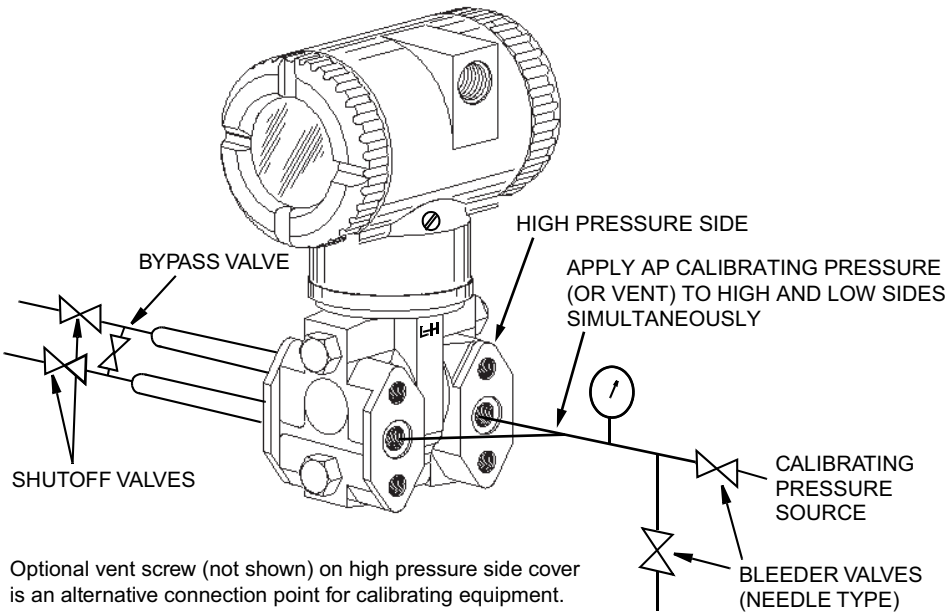


Figure 35 - Field Calibration Setup for Absolute Pressure



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.

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 36 - CALIB Menu

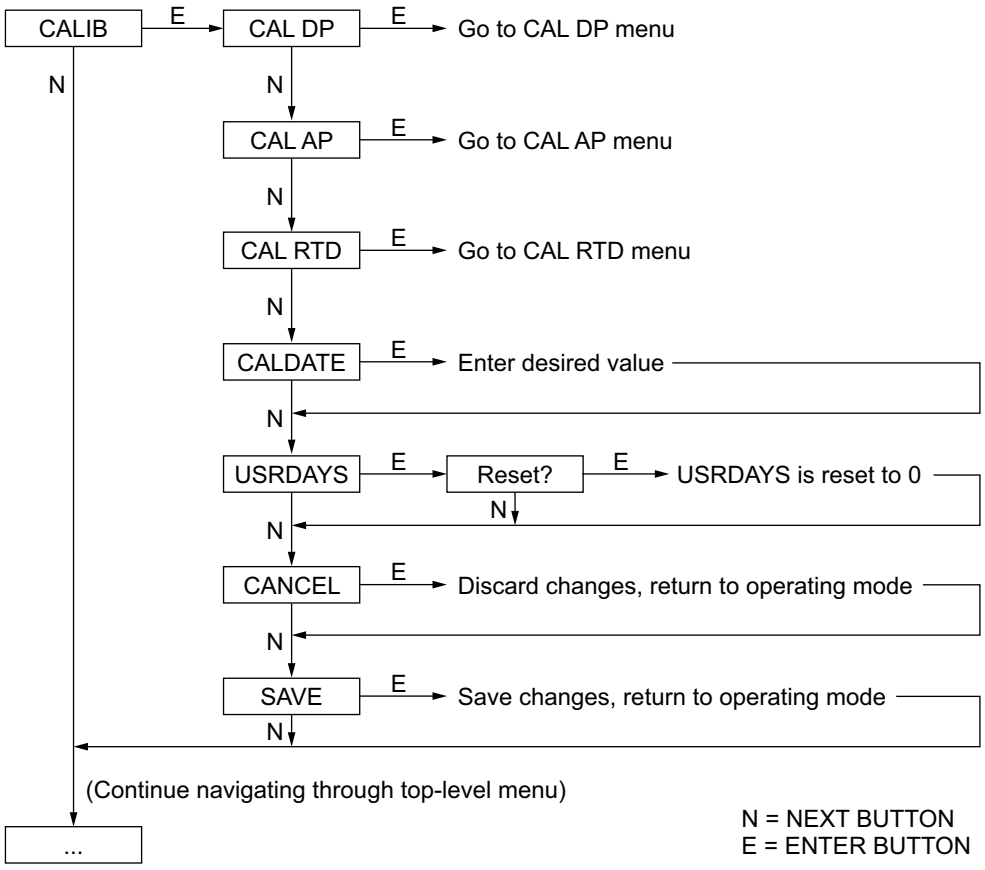


Figure 37 - CAL DP Menu

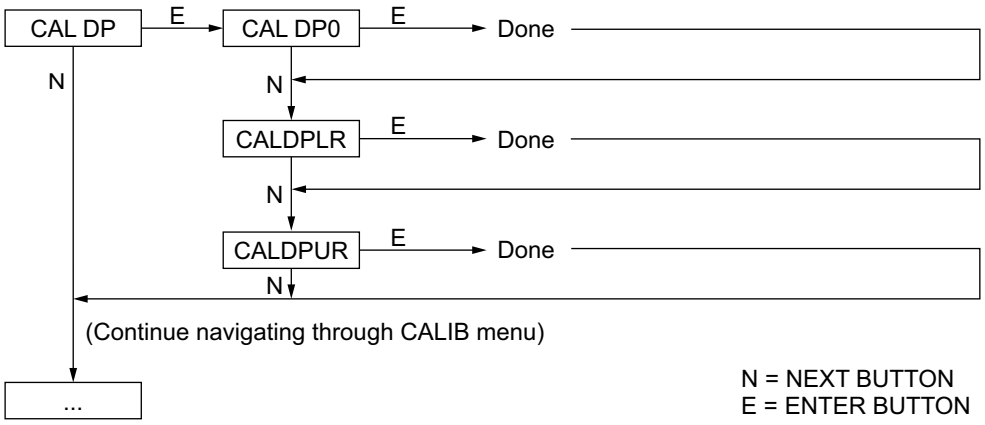


Figure 38 - CAL AP Menu

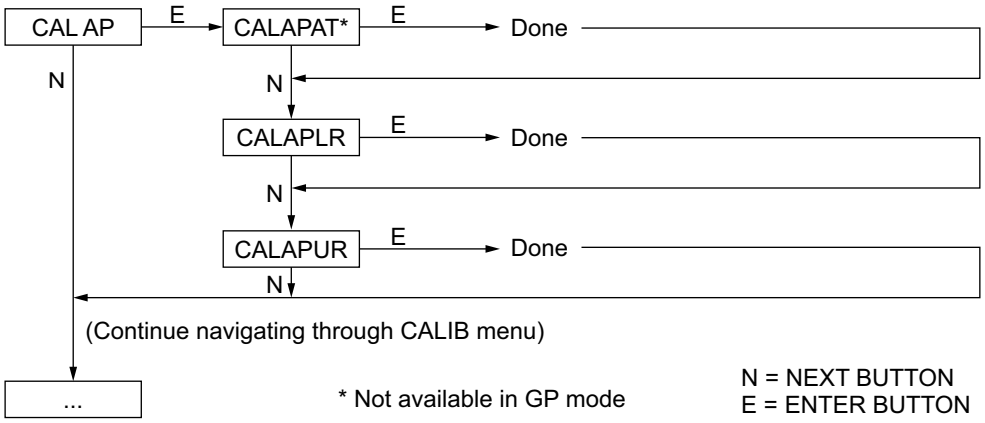


Figure 39 - CAL RTD Menu

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	Done	Displayed when data is collected for calibration.
	Failure due to override	OVRRIDE	Correct the override.

Parameter	Condition Tested	Message	Description
CAL RTD ADJTEMP	Calculated offset too large	BADOFST	Check RTD connections. Adjustment limited to 0.05% of range.
	Completion of data collection	Done	Displayed when data is collected for calibration.
	Failure due to override	OVRRIDE	Correct the override.
	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	Done	Displayed when data is collected for calibration.
	Failure due to override	OVRRIDE	Correct the override.
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.

Modbus RTU Operation

Modbus Registers

Table 11 - Data Formats

Type	Registers Required	Description
Char	1	Two ASCII characters per register
UInt16	1	One unsigned 16-bit integer in the range 0 to 65535
Float	2	Floating point numbers are in the IEEE 754 format. Numbers are made up of one sign bit (S), eight exponent bits (E), and 23 mantissa bits (M). A number consists of four bytes as shown below: Byte A: SEEE EEEE Byte B: EMMM MMMM Byte C: MMMM MMMM Byte D: MMMM MMMM Floating-point values are stored in two consecutive registers. Both registers must be read or written in the same Modbus command. Not doing so results in an exception response.

Host-specific formatting notes:

- These Modbus register addresses are “1-based.” Modbus host software that follows this convention automatically subtracts 1 from any register address before sending it in a command to a remote device. If your host software does not perform this function, subtract 1 from the register addresses before you use them.
- Some host systems require that the register addresses be entered in a specific format, such as 3xxxx for read-only, and 4xxxx for read/write or write-only.

Table 12 - Modbus Registers

Name	Address	Type	Registers	Read/ Write[19]
Manufacturer Code This register holds a constant value of 4000. This indicates that the transmitter is manufactured by Schneider Electric Systems USA, Inc.	1	UInt16	1	RO
Type Code This register holds a value, Type Code, which indicates the model of the transmitter. • Type Code 25 = Model IMP10S	2	UInt16	1	RO
Software Build Level Build revision number of the transmitter firmware as an integer value.	3	UInt16	1	RO
Software Revision Level Version number of the transmitter firmware, shown in the format: MAJOR_VERSION x 1000 + MINOR_VERSION For example, “1.19” would be displayed as “1019.”	4	UInt16	1	RO
Not used	5	n/a	2	n/a

19. RO=Read Only; WO=Write Only; RW=Read/Write.

Table 12 - Modbus Registers (Continued)

Name	Address	Type	Registers	Read/ Write[20]
Transmitter Manufacture Date Manufacture date, in the format YYYYYYY MMMM DDDDD • YYYYYYY is the number of years since 1986. Add this number to 1986 to obtain the year of manufacture. • MMMM is the month of manufacture. • DDDDD is the day of manufacture.	7	UInt16	1	RO
Transmitter Core Number This number is set when the sensor core is manufactured.	8	UInt16	1	RO
Sensor Hardware Version Version number of the sensor hardware. This is read from the sensor.	9	UInt16	1	RO
Modbus Revision Modbus mapping and protocol revision. It is fixed at 1.	10	UInt16	1	RO
Sensor Type This register selects whether the Secondary Variable measures gauge pressure or absolute pressure. • A value of 1 means gauge pressure (GP). GP is calculated by measuring absolute pressure and adding the contents of register 399. You must set the value in register 399 for the gauge pressure to be accurate. • A value of 0 means absolute pressure.	11	UInt16	1	RO
Not used	12	n/a	3	n/a
Baud Rate Serial port baud rate for the transmitter. When this register changes, it updates the serial port settings. • 1=1200 • 2=2400 • 3=4800 • 4=9600 • 5=19200	15	UInt16	1	RW
Transmitter Address Transmitter's Modbus address for the serial port and the LAN port.	16	UInt16	1	RW
Not used	17	n/a	15	n/a
Tag Name Transmitter tag name, up to eight characters. (Two characters are stored in each register.) Valid values are any ASCII character.	32	Char	4	RW
Description Transmitter description, up to 16 characters. (Two characters are stored in each register.) Valid values are any ASCII character.	36	Char	8	RW
Message Transmitter message, up to 32 characters. (Two characters are stored in each register.) Valid values are any ASCII character.	44	Char	16	RW
Primary Value Units This register holds a value representing the units (EGUs) for the primary measurement. See Units, page 70.	60	UInt16	1	RW

20. RO=Read Only; WO=Write Only; RW=Read/Write.

Table 12 - Modbus Registers (Continued)

Name	Address	Type	Registers	Read/ Write[21]
Secondary Value Units This register holds a value representing the units (EGUs) for the secondary measurement. See Units, page 70.	61	UInt16	1	RW
Tertiary Value Units This register holds a value representing the units (EGUs) for the tertiary measurement. See Units, page 70.	62	UInt16	1	RW
Not used	63	n/a	53	n/a
Primary Variable Integer Value Not implemented (always returns 0).	116	UInt16	1	RO
Not used	117	n/a	2	n/a
Process Variable Integer Register Mode Not implemented (always returns 0).	119	UInt16	1	RW
Not used	120	n/a	6	n/a
Display Scan Interval[22] This register controls the display scan interval. It holds the value in seconds that each reading selected in the Display Control remains on the display. Valid values are integers between 2000 and 60000 ms.	126	UInt16	1	RW
Not used	127	n/a	1	n/a
Display Control[22] This register controls which items are shown on the display. This register is a bit-mapped field. The following shows the effects of individual bits. When a bit is turned onn the floating point value and associated text are cycled through on the display. • Bit 00 = Display DP in transmitter units • Bit 01 = Display SP in transmitter units • Bit 02 = Display PT in transmitter units • Bit 03 = Display Communication settings (baud rate and station number) • Bit 04 = Display 1st user defined data set • Bit 05 = Display 2nd user defined data set • Bit 06 = Display 3rd user defined data set • Bit 07 = Display 4th user defined data set • Bit 08 = Display 5th user defined data set • Bit 09 = Display 6th user defined data set • Bit 10 = Display 7th user defined data set • Bit 11 = Display 8th user defined data set • Bit 12 = Display 9th user defined data set • Bit 13 = Display 10th user defined data set • Bit 14 = Display 11th user defined data set • Bit 15 = Display 12th user defined data set	128	UInt16	1	RW
Not used	129	n/a	2	n/a
Response Delay Time Not implemented (always returns 0).	131	UInt16	1	RW

21. RO=Read Only; WO=Write Only; RW=Read/Write.
22. Do not write to this register continuously. Excessively writing to this register will wear out the EEPROM and then the display will not function properly.

Table 12 - Modbus Registers (Continued)

Name	Address	Type	Registers	Read/ Write[23]
Floating Point Format The floating point format is fixed. This register specifies the byte order of floating point registers. See Data Formats, page 57 for a description of floating point format. • 0=ab_cd • 1=cd_ab • 2=ba_dc • 3=dc_ba	132	UInt16	1	RW
Not used	133	n/a	12	n/a
Com1 Framing Errors Number of framing errors on COM1. This register is cleared when the controller is reset.	145	UInt16	1	RO
Com1 Parity Errors Number of parity errors on COM1. This register is cleared when the controller is reset.	146	UInt16	1	RO
Com1 Overrun Errors Number of character overrun errors on COM1. This register is cleared when the controller is reset.	147	UInt16	1	RO
Com1 Modbus Checksum Errors Number of Modbus checksum errors on COM1. This register is cleared when the controller is reset.	148	UInt16	1	RO
Com1 Modbus Commands Received Number of Modbus commands received on COM1. This register is cleared when the controller is reset.	149	UInt16	1	RO
Com1 Modbus Responses Sent Number of Modbus responses sent on COM1. This register is cleared when the controller is reset.	150	UInt16	1	RO
Not used	151	n/a	6	n/a
Sensor Framing Errors Not implemented (always returns 0).	157	UInt16	1	RO
Sensor Parity Errors Not implemented (always returns 0).	158	UInt16	1	RO
Sensor Overrun Errors Not implemented (always returns 0).	159	UInt16	1	RO
Sensor Checksum Errors Not implemented (always returns 0).	160	UInt16	1	RO
Sensor Commands Sent Not implemented (always returns 0).	161	UInt16	1	RO
Sensor Responses Received Not implemented (always returns 0).	162	UInt16	1	RO
Not used	163	n/a	41	n/a
Scaled Integer Method Not implemented (always returns 0).	204	UInt16	1	RO

23. RO=Read Only; WO=Write Only; RW=Read/Write.

Table 12 - Modbus Registers (Continued)

Name	Address	Type	Registers	Read/ Write[24]
Reset to Default Parameters Writing to this register resets the transmitter to default parameters. See the “Default Transmitter Parameters” section for default values. The transmitter calibration is reset to full scale with an offset of zero. Re-zero the transmitter after this action and verify the readings. You may need to re-span the device.	205	UInt16	1	RW
Sensor Operating Mode Controls the operating mode of the transmitter: • 1=Offline Request (write) • 4=Reset Request (go Online) (write) • 5=Online State (read) • 7=Offline state (read)	206	UInt16	1	RW
1st User Defined Display Value These registers hold the floating-point value that will be included in the display cycle if the bit to display the first user defined data set is turned on in the Display Control register. Only values between -9999 and 99999 can be displayed. Any value outside that range is replaced with five dashes on the display. By default, the display shows five dashes.	207	Float	2	RW
1st User Defined Display Text These registers hold the text that will be included in the display cycle if the bit to display the 1st user defined data set is turned on in the Display Control register. Each register holds two ASCII characters. The first seven ASCII characters are shown on line 2 of the display, followed by the remaining seven ASCII characters. On a power cycle, these registers are reset to all spaces.	209	Char	7	RW
2nd User Defined Display Value These registers hold the floating-point value that will be included in the display cycle if the bit to display the second user defined data set is turned on in the Display Control register. Only values between -9999 and 99999 are displayed. Any value outside that range is replaced with five dashes on the display. By default, the display shows five dashes.	216	Float	2	RW
2nd User Defined Display Text These registers hold the text that will be included in the display cycle if the bit to display the 2nd user defined data set is turned on in the Display Control register. Each register holds two ASCII characters. The first seven ASCII characters are shown on line 2 of the display, followed by the remaining seven ASCII characters. On a power cycle, these registers are reset to all spaces.	218	Char	7	RW
3rd User Defined Display Value These registers hold the floating-point value that will be included in the display cycle if the bit to display the third user defined data set is turned on in the Display Control register. Only values between -9999 and 99999 are displayed. Any value outside that range is replaced with five dashes on the display. By default, the display shows five dashes.	225	Float	2	RW
3rd User Defined Display Text These registers hold the text that will be included in the display cycle if the bit to display the 3rd user defined data set is turned on in the Display Control register. Each register holds two ASCII characters. The first seven ASCII characters are shown on line 2 of the display, followed by the remaining seven ASCII characters. On a power cycle, these registers are reset to all spaces.	227	Char	7	RW
4th User Defined Display Value These registers hold the floating-point value that will be included in the display cycle if the bit to display the fourth user defined data set is turned on in the Display Control register. Only values between -9999 and 99999 are displayed. Any value outside that range is replaced with five dashes on the display. By default, the display shows five dashes.	234	Float	2	RW

24. RO=Read Only; WO=Write Only; RW=Read/Write.

Table 12 - Modbus Registers (Continued)

Name	Address	Type	Registers	Read/ Write[25]
4th User Defined Display Text These registers hold the text that will be included in the display cycle if the bit to display the 4th user defined data set is turned on in the Display Control register. Each register holds two ASCII characters. The first seven ASCII characters are shown on line 2 of the display, followed by the remaining seven ASCII characters. On a power cycle, these registers are reset to all spaces.	236	Char	7	RW
5th User Defined Display Value These registers hold the floating-point value that will be included in the display cycle if the bit to display the fifth user defined data set is turned on in the Display Control register. Only values between -9999 and 99999 are displayed. Any value outside that range is replaced with five dashes on the display. By default, the display shows five dashes.	243	Float	2	RW
5th User Defined Display Text These registers hold the text that will be included in the display cycle if the bit to display the 5th user defined data set is turned on in the Display Control register. Each register holds two ASCII characters. The first seven ASCII characters are shown on line 2 of the display, followed by the remaining seven ASCII characters. On a power cycle, these registers are reset to all spaces.	245	Char	7	RW
6th User Defined Display Value These registers hold the floating-point value that will be included in the display cycle if the bit to display the sixth user defined data set is turned on in the Display Control register. Only values between -9999 and 99999 are displayed. Any value outside that range is replaced with five dashes on the display. By default, the display shows five dashes.	252	Float	2	RW
6th User Defined Display Text These registers hold the text that will be included in the display cycle if the bit to display the 6th user defined data set is turned on in the Display Control register. Each register holds two ASCII characters. The first seven ASCII characters are shown on line 2 of the display, followed by the remaining seven ASCII characters. On a power cycle, these registers are reset to all spaces.	254	Char	7	RW
7th User Defined Display Value These registers hold the floating-point value that will be included in the display cycle if the bit to display the seventh user defined data set is turned on in the Display Control register. Only values between -9999 and 99999 are displayed. Any value outside that range is replaced with five dashes on the display. By default, the display shows five dashes.	261	Float	2	RW
7th User Defined Display Text These registers hold the text that will be included in the display cycle if the bit to display the 7th user defined data set is turned on in the Display Control register. Each register holds two ASCII characters. The first seven ASCII characters are shown on line 2 of the display, followed by the remaining seven ASCII characters. On a power cycle, these registers are reset to all spaces.	263	Char	7	RW
8th User Defined Display Value These registers hold the floating-point value that will be included in the display cycle if the bit to display the eighth user defined data set is turned on in the Display Control register. Only values between -9999 and 99999 are displayed. Any value outside that range is replaced with five dashes on the display. By default, the display shows five dashes.	270	Float	2	RW
8th User Defined Display Text These registers hold the text that will be included in the display cycle if the bit to display the 8th user defined data set is turned on in the Display Control register. Each register holds two ASCII characters. The first seven ASCII characters are shown on line 2 of the display, followed by the remaining seven ASCII characters. On a power cycle, these registers are reset to all spaces.	272	Char	7	RW

25. RO=Read Only; WO=Write Only; RW=Read/Write.

Table 12 - Modbus Registers (Continued)

Name	Address	Type	Registers	Read/ Write[26]
9th User Defined Display Value These registers hold the floating-point value that will be included in the display cycle if the bit to display the ninth user defined data set is turned on in the Display Control register. Only values between -9999 and 99999 are displayed. Any value outside that range is replaced with five dashes on the display. By default, the display shows five dashes.	279	Float	2	RW
9th User Defined Display Text These registers hold the text that will be included in the display cycle if the bit to display the 9th user defined data set is turned on in the Display Control register. Each register holds two ASCII characters. The first seven ASCII characters are shown on line 2 of the display, followed by the remaining seven ASCII characters. On a power cycle, these registers are reset to all spaces.	281	Char	7	RW
10th User Defined Display Value These registers hold the floating-point value that will be included in the display cycle if the bit to display the tenth user defined data set is turned on in the Display Control register. Only values between -9999 and 99999 are displayed. Any value outside that range is replaced with five dashes on the display. By default, the display shows five dashes.	288	Float	2	RW
10th User Defined Display Text These registers hold the text that will be included in the display cycle if the bit to display the 10th user defined data set is turned on in the Display Control register. Each register holds two ASCII characters. The first seven ASCII characters are shown on line 2 of the display, followed by the remaining seven ASCII characters. On a power cycle, these registers are reset to all spaces.	290	Char	7	RW
11th User Defined Display Value These registers hold the floating-point value that will be included in the display cycle if the bit to display the eleventh user defined data set is turned on in the Display Control register. Only values between -9999 and 99999 are displayed. Any value outside that range is replaced with five dashes on the display. By default, the display shows five dashes.	297	Float	2	RW
11th User Defined Display Text These registers hold the text that will be included in the display cycle if the bit to display the 11th user defined data set is turned on in the Display Control register. Each register holds two ASCII characters. The first seven ASCII characters are shown on line 2 of the display, followed by the remaining seven ASCII characters. On a power cycle, these registers are reset to all spaces.	299	Char	7	RW
12th User Defined Display Value These registers hold the floating-point value that will be included in the display cycle if the bit to display the twelfth user defined data set is turned on in the Display Control register. Only values between -9999 and 99999 are displayed. Any value outside that range is replaced with five dashes on the display. By default, the display shows five dashes.	306	Float	2	RW
12th User Defined Display Text These registers hold the text that will be included in the display cycle if the bit to display the 12th user defined data set is turned on in the Display Control register. Each register holds two ASCII characters. The first seven ASCII characters are shown on line 2 of the display, followed by the remaining seven ASCII characters. On a power cycle, these registers are reset to all spaces.	308	Char	7	RW
Display Valid Time This register holds the number of minutes for which display data will be valid. When this limit is exceeded, instead of displaying the normal user defined text, line 1 appears as dashes and line 2 reads **READING UNAVAIL**. The range of valid values is 0 to 65535. A value of 0 means the user-defined text is always displayed. Writing to the user defined display registers resets this timeout.	315	UInt16	1	RW

26. RO=Read Only; WO=Write Only; RW=Read/Write.

Table 12 - Modbus Registers (Continued)

Name	Address	Type	Registers	Read/ Write[27]
Lockout Register This register can be used to prevent writing to other registers. When a nonzero value is entered in this register, all other registers become read-only. When 0 is entered in this register, all registers revert to their normal read/write status. There is also a hardware write protect jumper. Refer to Setting the Write Protect Jumper, page 33 for more details. This register is set to 0 (disabled) at power-up.	316	UInt16	1	RW
Not used	317	n/a	76	n/a
Sensor Temperature Sensor temperature in degrees C.	393	Float	2	RO
Not used	395	n/a	2	n/a
Input Voltage Not implemented (always returns 0).	397	UInt16	1	RO
Analog Output Not implemented (always returns 0).	398	UInt16	1	RW
Atmospheric Pressure Value must be between 10.0 and 20.0.	399	Float	2	RW
Primary Variable Value Value of the primary variable. The diagnostic bits indicate the validity of this register.	401	Float	2	RO
Secondary Variable Value Value of the secondary variable. The diagnostic bits indicate the validity of this register.	403	Float	2	RO
Tertiary Variable Value Value of the tertiary variable. The diagnostic bits indicate the validity of this register.	405	Float	2	RO
Diagnostic Bits1 This register holds a bitmapped value. The individual bits correspond to these conditions: • Bit 15=Calibration flag (see register 206) • Bit 14=The process values may not be valid; if this is the only bit set, contact Global Customer Support • Bit 13=Primary Variables are outside specification • Bit 12=DP signal above URL +10% • Bit 11=DP signal above URL • Bit 10=DP signal above Upper Operating Limit • Bit 09=DP signal below Lower Operating Limit • Bit 08=DP signal below LRL • Bit 07=DP signal below LRL - 10% • Bit 06=SP signal above URL +10% • Bit 05=SP signal above URL • Bit 04=SP signal above Upper Operating Limit • Bit 03=SP signal below Lower Operating Limit • Bit 02=SP signal below LRL • Bit 01=SP signal below LRL - 0% • Bit 00=N/A	407	UInt16	1	RO

27. RO=Read Only; WO=Write Only; RW=Read/Write.

Table 12 - Modbus Registers (Continued)

Name	Address	Type	Registers	Read/ Write[28]
Diagnostic Bits2 This register holds a bit-mapped value. The individual bits correspond to these conditions: • Bit 15=N/A • Bit 14=RTD open; Tertiary signal above URL+10% • Bit 13=Tertiary signal above URL • Bit 12=Tertiary signal above upper operating limit • Bit 11=Tertiary signal below lower operating limit • Bit 10=Tertiary signal below LRL • Bit 09=Tertiary signal below LRL-10%; RTD short • Bit 08=N/A • Bit 07=Primary variable is bad • Bit 06=Secondary variable is bad • Bit 05=Tertiary variable is bad • Bits 04 to 01=Reserved • Bit 00=Offline flag (see register 206)	408	UInt16	1	RO
Diagnostic Bits3 This register holds a bitmapped value. The individual bits correspond to these conditions: • Bit 15=Sensor module is not updating • Bit 14=Reserved • Bit 13=Sensor microprocessor is not responding • Bits 12 to 09=Reserved • Bit 08=RTD Offset is outside normal range. Check the RTD for physical damage if this bit is enabled. Compare RTD results with a known good RTD, and check the resistance between the RTD and case. • Bits 07 to 02=Reserved • Bit 01=Hardware write protect status • Bit 00=Reserved	409	UInt16	1	RO
Diagnostic Bits4	410	UInt16	1	RO
Diagnostic Bits5	411	UInt16	1	RO
Diagnostic Bits6	412	UInt16	1	RO
Primary Variable Upper Range Limit These registers hold the Primary Variable Upper Range Limit.	413	Float	2	RO
Primary Variable Lower Range Limit These registers hold the Primary Variable Lower Range Limit.	415	Float	2	RO
Primary Variable Upper Operating Limit These registers hold the Primary Variable Upper Operating Limit.	417	Float	2	RW
Primary Variable Lower Operating Limit These registers hold the Primary Variable Lower Operating Limit.	419	Float	2	RW
Secondary Variable Upper Range Limit These registers hold the Secondary Variable Upper Range Limit.	421	Float	2	RO
Secondary Variable Lower Range Limit These registers hold the Secondary Variable Lower Range Limit.	423	Float	2	RO

28. RO=Read Only; WO=Write Only; RW=Read/Write.

Table 12 - Modbus Registers (Continued)

Name	Address	Type	Registers	Read/ Write[29]
Secondary Variable Upper Operating Limit These registers hold the Secondary Variable Upper Operating Limit.	425	Float	2	RW
Secondary Variable Lower Operating Limit These registers hold the Secondary Variable Lower Operating Limit.	427	Float	2	RW
Tertiary Variable Upper Range Limit These registers hold the Tertiary Variable Upper Range Limit.	429	Float	2	RO
Tertiary Variable Lower Range Limit These registers hold the Tertiary Variable Lower Range Limit.	431	Float	2	RO
Tertiary Variable Upper Operating Limit These registers hold the Tertiary Variable Upper Operating Limit.	433	Float	2	RW
Tertiary Variable Lower Operating Limit These registers hold the Tertiary Variable Lower Operating Limit.	435	Float	2	RW
Primary Variable Zero Calibration These registers are used to change the primary variable zero.	437	Float	2	RW
Primary Variable Span Calibration These registers are used to change the primary variable span.	439	Float	2	RW
Primary Variable Damping These registers hold the primary variable damping. Valid values are 0.0 (no damping), 0.5, 1.0, 2.0, 4.0, 8.0, 16.0, and 32.0 seconds.	441	Float	2	RW
Secondary Variable Zero Calibration These registers are used to change the secondary variable zero.	443	Float	2	RW
Secondary Variable Span Calibration These registers are used to change the secondary variable span.	445	Float	2	RW
Secondary Variable Damping These registers hold the secondary variable damping. Valid values are 0.0 (no damping), 0.5, 1.0, 2.0, 4.0, 8.0, 16.0, and 32.0 seconds.	447	Float	2	RW
Tertiary Variable Zero Calibration These registers are used to change the tertiary variable zero.	449	Float	2	RW
Tertiary Variable Span Calibration These registers are used to change the tertiary variable span.	451	Float	2	RW
Tertiary Variable Damping These registers hold the tertiary variable damping. Valid values are 0.0 (no damping), 0.5, 1.0, 2.0, 4.0, 8.0, 16.0, and 32.0 seconds.	453	Float	2	RW
Not used	455	n/a	46	n/a
DP Custom Units Name	501	Char	3	RW
DP Custom Units Slope	504	Float	2	RW
DP Custom Units Offset	506	Float	2	RW
AP Custom Units Name	508	Char	3	RW
AP Custom Units Slope	511	Float	2	RW

29. RO=Read Only; WO=Write Only; RW=Read/Write.

Table 12 - Modbus Registers (Continued)

Name	Address	Type	Registers	Read/ Write[30]
AP Custom Units Offset	513	Float	2	RW
Not used	515	n/a	86	n/a
Modbus Baud Rate This register holds the serial port baud rate for the transmitter. When this register changes, it updates the serial port settings. • 1=1200 • 2=2400 • 3=4800 • 4=9600 • 5=19200	601	UInt16	1	RW
Modbus Transmitter Address[31] This register holds the transmitter Modbus address for the serial port and the LAN port.	602	UInt16	1	RW
Modbus Parity[32] Sets the parity of the Modbus serial connection. • 0=None • 1=Odd • 2=Even	603	UInt16	1	RW
Modbus Stop Bits[32] Sets the stop bits of the Modbus serial connection. • 0=One • 1=Two	604	UInt16	1	RW
Test Register[32] The **Test Register** displays the test value **1234.0** when the byte format of the Modbus client matches that of the device. The client can use this to verify that the byte-swapping format is set accordingly in the device.	605	Float	2	RO
Configuration Change Counter Increments on a configuration change.	607	UInt16	1	RW
Last Configuration Access Return Code Last return code from a Modbus write.	608	UInt16	1	RW
Detailed Return Code Return code.	609	UInt16	1	RW
Configuration Access Specific Information Detail of return the code.	610	UInt16	1	RW
Owner	611	UInt16	1	RW
Malfunction Code	612	UInt16	1	RW
Diagnostic Code	613	UInt16	1	RW
Calibration Date ASCII representation of the most recent calibration date.	614	Char	4	RW
Calibration Initials Initials of the person who performed the most recent calibration.	618	Char	3	RW

30. RO=Read Only; WO=Write Only; RW=Read/Write.
31. Changes to these parameters do not take effect until you reset the device.
32. Changes to these parameters do not take effect until the device is reset.

Table 12 - Modbus Registers (Continued)

Name	Address	Type	Registers	Read/ Write[33]
Write Protect State Status of the write protect jumper. • 0=Write Protected • 1=Not Write Protected	621	UInt16	1	RO
Sim Protect State	622	UInt16	1	RO
Not used	623	n/a	128	n/a
Cold Restart Restarts the device.	751	UInt16	1	WO
Not used	752	n/a	1	n/a
M2 Mode Measurement mode of the secondary variable. • 0=Absolute pressure • 1=Gauge Pressure	753	UInt16	1	RW
M1 Variable Transfer Function The mode of the primary output can be set to linear or a type of square root. • 0=Linear • 1=Sqrt_lt_1C • 2=Sqrt_lt_4L • 3=Sqrt_lt_nC	754	UInt16	1	RW
Not used	755	n/a	21	n/a
Reset Days In Service Write any value to this register to reset the user days in service.	776	UInt16	1	WO
Total Days In Service	777	UInt16	1	RO
User Days In Service	778	UInt16	1	RO
Not used	779	n/a	8	n/a
Reset Passwords Write any value to reset the configuration and calibration passwords.	787	UInt16	1	WO
M1 Square Root Cutoff User-configured cutoff specified between 0 and 20% of the flow upper range value.	788	Float	2	RW
Not used	790	n/a	3	n/a
RTD Control Indicates whether the RTD is on or off. Defaults to 1 (On). • 0=Off • 1=On	793	UInt16	1	RW
RTD Strategy	794	UInt16	1	RW
RTD Default	795	Float	2	RW
Not used	797	n/a	1	n/a
Differential Pressure Current Value	798	Float	2	RO
Absolute Pressure Current Value	800	Float	2	RO
Process Temperature Current Value	802	Float	2	RO

33. RO=Read Only; WO=Write Only; RW=Read/Write.

Table 12 - Modbus Registers (Continued)

Name	Address	Type	Registers	Read/ Write[34]
Electronics Temperature Current Value	804	Float	2	RO
Sensor Temperature Current Value	806	Float	2	RO
Not used	808	n/a	20	n/a
Differential Pressure Simulation Simulate the value written to these registers on device variable M1.	828	Float	2	WO
Absolute Pressure Simulation Simulate the value written to these registers on device variable M2	830	Float	2	WO
Process Pressure Simulation Simulate the value written to these registers on device variable M3.	832	Float	2	WO
Electronics Pressure Simulation Simulate the value written to these registers on device variable M4.	834	Float	2	WO
RTD Pressure Simulation Simulate the value written to these registers on device variable M5.	836	Float	2	WO
Not used	838	n/a	13	n/a
Rerange Units	851	UInt16	1	RO
Not used	852	n/a	6	n/a
Electronics Temperature URV	858	Float	2	RW
Sensor Temperature URV	860	Float	2	RW
Not used	862	n/a	26	n/a
Electronics Temperature LRV	888	Float	2	RW
Sensor Temperature LRV	890	Float	2	RW
Not used	892	n/a	26	n/a
Differential Pressure Status See Status, page 73 for enumerations.	918	UInt16	1	RO
Absolute Pressure Status See Status, page 73 for enumerations.	919	UInt16	1	RO
Process Temperature Status See Status, page 73 for enumerations.	920	UInt16	1	RO
Electronics Temperature Status See Status, page 73 for enumerations.	921	UInt16	1	RO
RTD Temperature Status See Status, page 73 for enumerations.	922	UInt16	1	RO
Not used	923	n/a	178	n/a
Model Code	1101	Char	8	RO

34. RO=Read Only; WO=Write Only; RW=Read/Write.

Table 13 - Units

Description	Hex	Decimal
degC	0x0600	1536
K (kelvin)	0x0601	1537
degF	0x0602	1538
degR	0x0603	1539
Percent Flow	0x0200	512
Volts	0x0019	25
psi	0x0300	768
psf	0x0322	802
inHg	0x0301	769
FtH2O	0x0302	770
inH2O	0x0303	771
atm	0x0304	772
bar	0x0305	773
mbar	0x0306	774
MPa	0x0307	775
kPa	0x0308	776
hPa	0x0309	777
Pa	0x030A	778
kg/m2	0x030B	779
kg/cm2	0x030C	780
g/cm2	0x030D	781
mHg	0x030E	782
cmHg	0x030F	783
mmHg	0x0310	784
torr	0x0311	785
mmH2O	0x0312	786
inWC60	0x0315	789
ftWC60	0x0316	790
inWC4	0x0317	791
ftWC4	0x0318	792
mmWC4	0x0319	793
cmWC4	0x031A	794
mWC4	0x031B	795
dy/cm2	0x031C	796
kg/s	0x0900	2304
kg/m	0x0901	2305
kg/h	0x0902	2306
kg/d	0x0903	2307
g/s	0x0904	2308
g/m	0x0905	2309

Table 13 - Units (Continued)

Description	Hex	Decimal
g/h	0x0906	2310
g/d	0x0907	2311
lb/s	0x0908	2312
lb/m	0x0909	2313
lb/h	0x090A	2314
lb/d	0x090B	2315
T/m	0x090C	2316
T/h	0x090D	2317
T/d	0x090E	2318
STon/m	0x090F	2319
STon/h	0x0910	2320
STon/d	0x0911	2321
LTon/h	0x0912	2322
LTon/d	0x0913	2323
m3/s	0x0A12	2578
m3/m	0x0A13	2579
m3/h	0x0A14	2580
m3/d	0x0A15	2581
Am3/h	0x0A30	2608
gal/s	0x0A16	2582
gal/m	0x0A17	2583
gal/h	0x0A18	2584
gal/d	0x0A19	2585
Mgal/h	0x0A1A	2586
Mgal/d	0x0A1B	2587
Igal/s	0x0A1C	2588
Igal/m	0x0A1D	2589
Igal/h	0x0A1E	2590
Igal/d	0x0A1F	2591
l/s	0x0A20	2592
l/m	0x0A21	2593
l/h	0x0A22	2594
l/d	0x0A23	2595
Ml/h	0x0A24	2596
Ml/d	0x0A25	2597
Ft3/s	0x0A26	2598
Ft3/m	0x0A27	2599
Ft3/h	0x0A28	2600
Ft3/d	0x0A29	2601
bbl3/s	0x0A51	2641

Table 13 - Units (Continued)

Description	Hex	Decimal
bbl3/m	0x0A52	2642
bbl3/h	0x0A53	2643
bbl3/d	0x0A54	2644
bbl/s	0x0A55	2645
bbl/m	0x0A56	2646
bbl/h	0x0A57	2647
bbl/d	0x0A58	2648
Sm3/s	0x0B2E	2862
Sm3/m	0x0B2F	2863
Sm3/h	0x0B30	2864
Sm3/d	0x0B31	2865
SF3/s	0x0B32	2866
SF3/m	0x0B33	2867
SF3/h	0x0B34	2868
SF3/d	0x0B35	2869
Sgal/s	0x0B36	2870
Sgal/m	0x0B37	2871
Sgal/h	0x0B38	2872
Sgal/d	0x0B39	2873
Sbl3/s	0x0B3A	2874
Sbl3/m	0x0B3B	2875
Sbl3/h	0x0B3C	2876
Sbl3/d	0x0B3D	2877
Sbl/s	0x0B3E	2878
Sbl/m	0x0B3F	2879
Sbl/h	0x0B40	2880
Sbl/d	0x0B41	2881
Nl/s	0x0C42	3138
Nl/m	0x0C43	3139
Nl/h	0x0C44	3140
Nl/d	0x0C45	3141
Nm3/s	0x0C46	3142
Nm3/m	0x0C47	3143
Nm3/h	0x0C48	3144
Nm3/d	0x0C49	3145
mcfd	0x0D00	3328
mmcfd	0x0D01	3329
mScfd	0x0D02	3330
mmScfd	0x0D03	3331

Table 14 - Status

Description	Hex	Decimal	Description
OK	0x60	96	OK: All inputs and calculations are OK.
Overridden	0x63	99	OK: Overridden (fixed).
W_LimitSoftLower	0x80	128	Notice: Outside lower soft limit.
W_LimitSoftUpper	0x81	129	Notice: Outside upper soft limit.
B_LimitHardLower	0x91	145	Bad: Outside lower hard limit.
B_LimitHardUpper	0x92	146	Bad: Outside upper hard limit.
B_Input	0x93	147	Bad: An input has a BAD status.
B_RtdIsShort	0x97	151	Bad: RTD is shorted.
B_RtdIsOpen	0x98	152	Bad: RTD is open.
UserOff	0xA0U	160	Measurement is turned off by the user.

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.

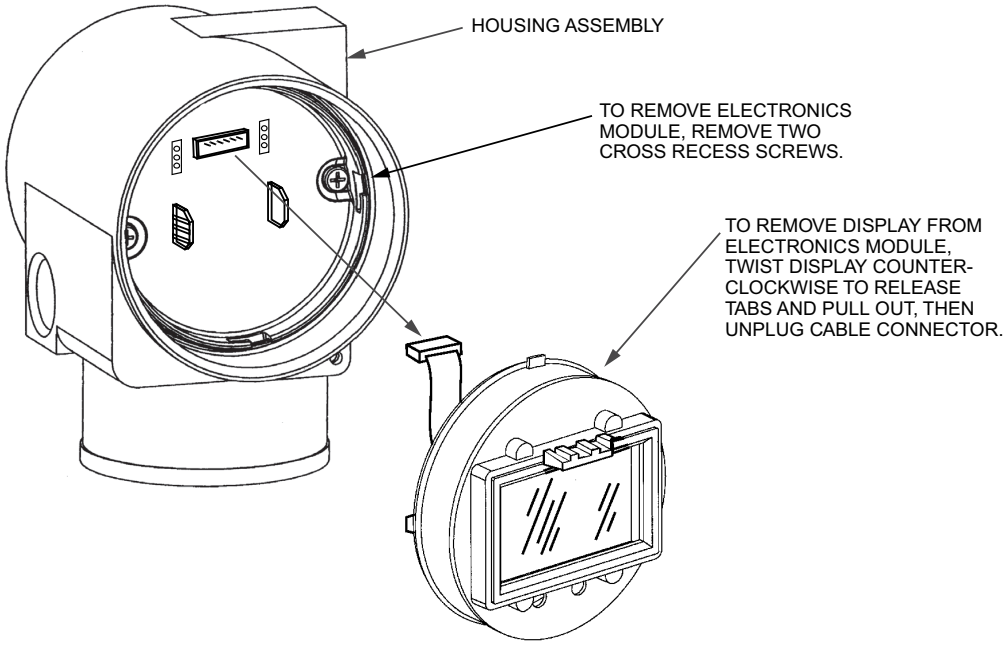
Replacing the Terminal Block Assembly

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 40 - Adding the Optional Display



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

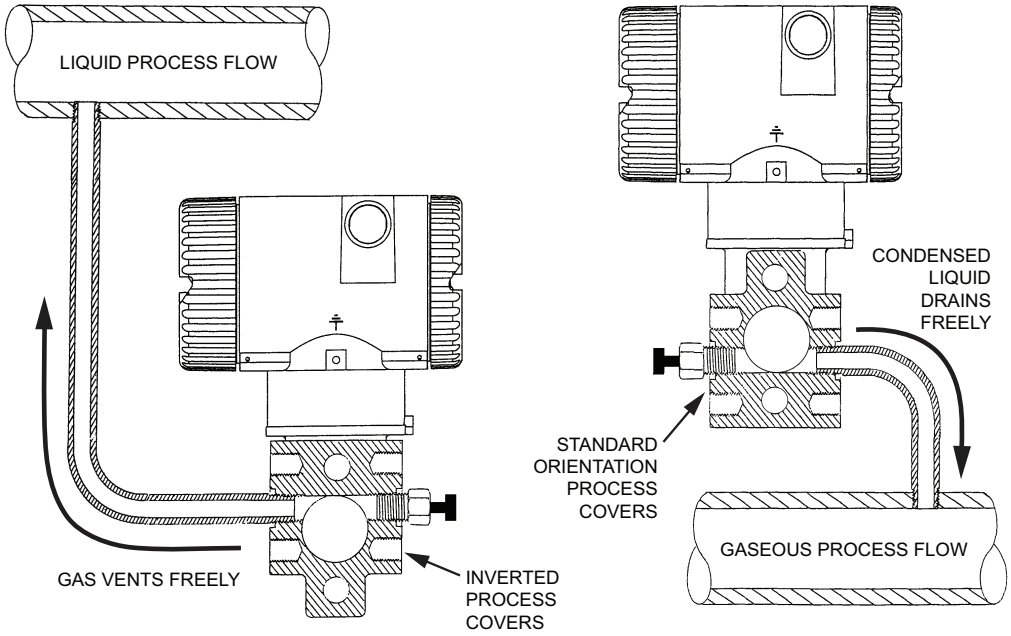
1. Turn off the transmitter power source.
2. Turn the cover lock screw (if applicable) clockwise to disengage the lock.
3. Remove the electronics compartment cover by rotating it counterclockwise.
4. Plug the display into the receptacle at the top of the electronics assembly.
5. Ensure that the o-ring 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 41 - 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.

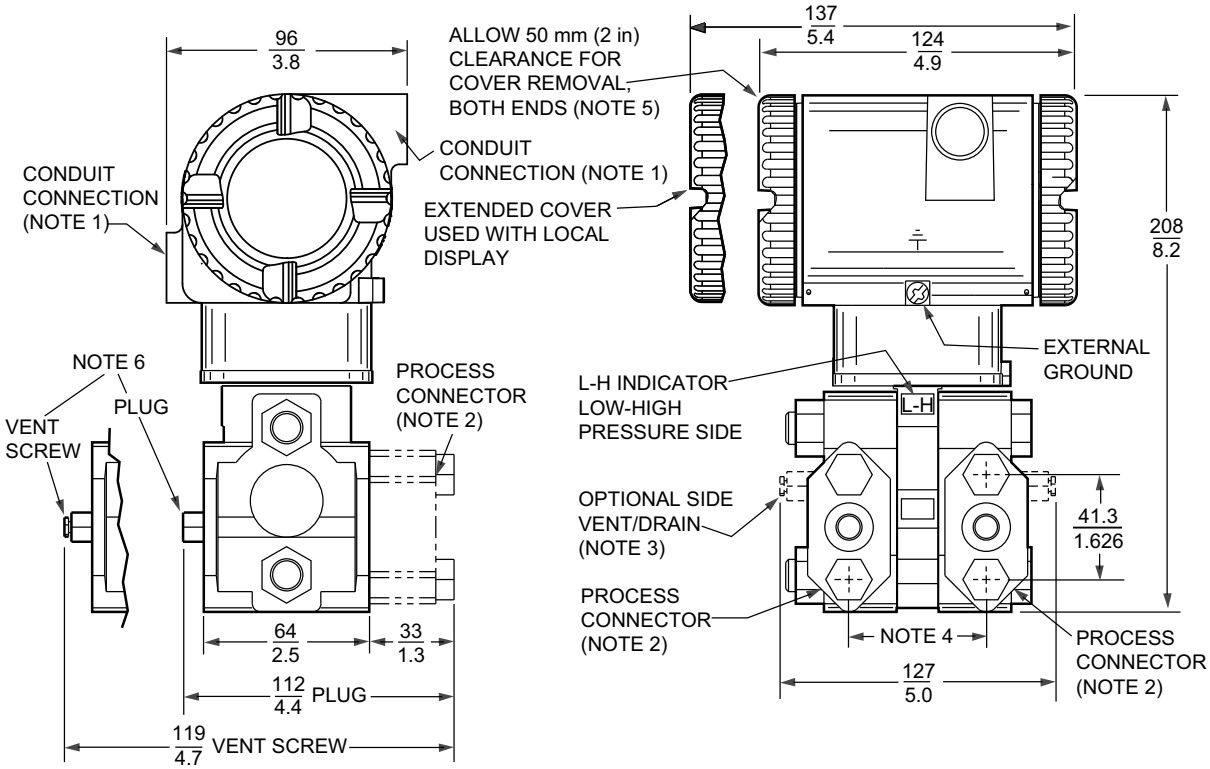
⚠CAUTION
RISK OF POTENTIAL INJURY AND/OR REDUCED PERFORMANCE Perform a hydrostatic test with a liquid, and follow proper hydrostatic test procedures. **Failure to follow these instructions can result in injury or reduced performance.**

Nominal Dimensions

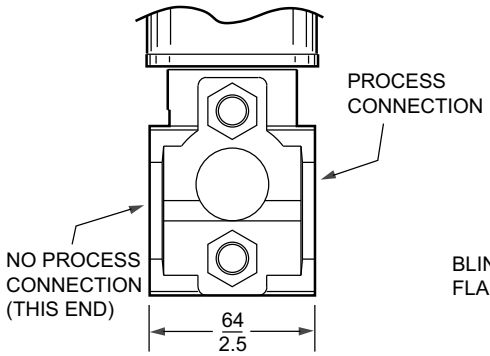
For dimensional information specific to your sales order, contact your sales representative to order a Certified Dimensional Print (CDP).

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

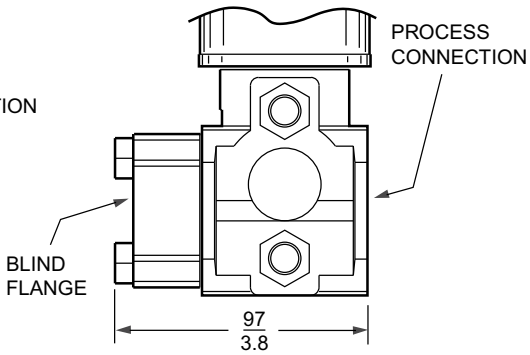
Figure 42 - Transmitters with Traditional Structure



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.

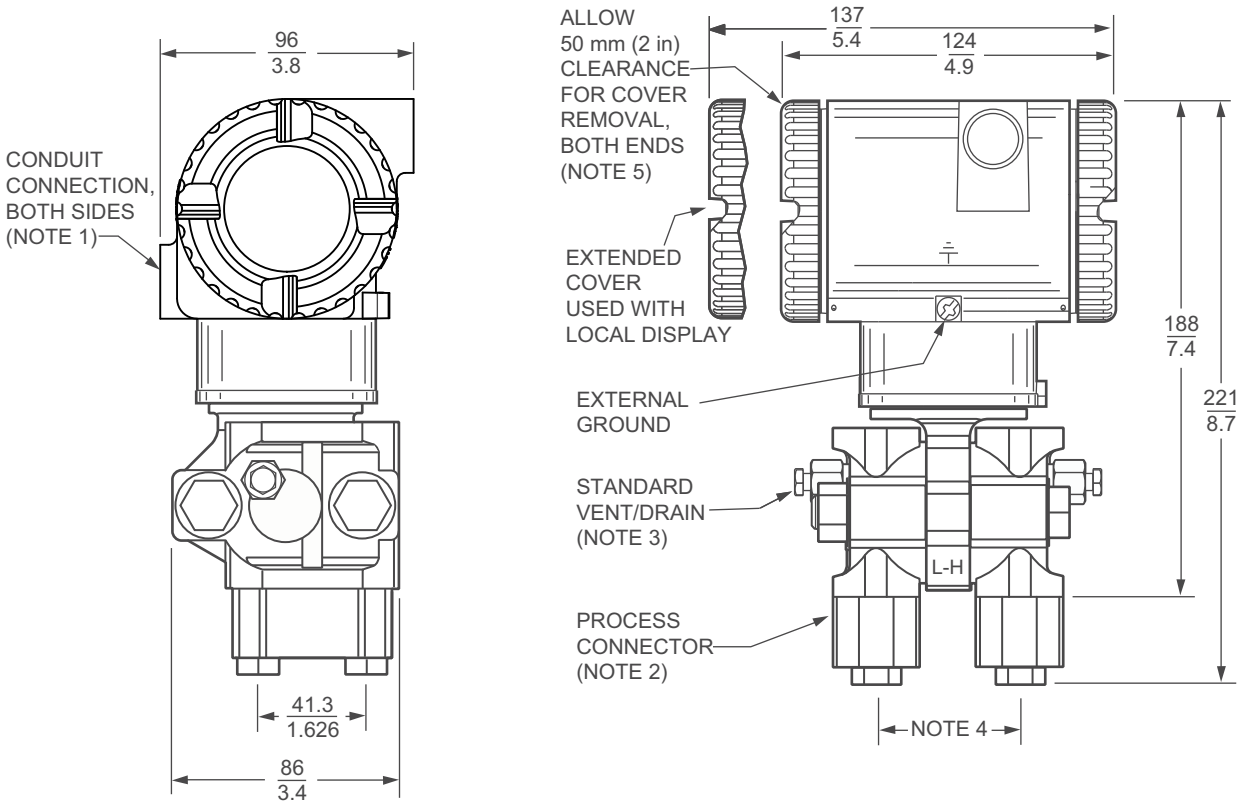


OPTIONAL IEC 61518 CONSTRUCTION
SINGLE ENDED PROCESS COVER
OPTIONS -D1, -D3, -D5, -D7, -D9



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

Figure 43 - 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 44 - Standard Style Mounting Bracket Kit (Options -M1 and -M2)

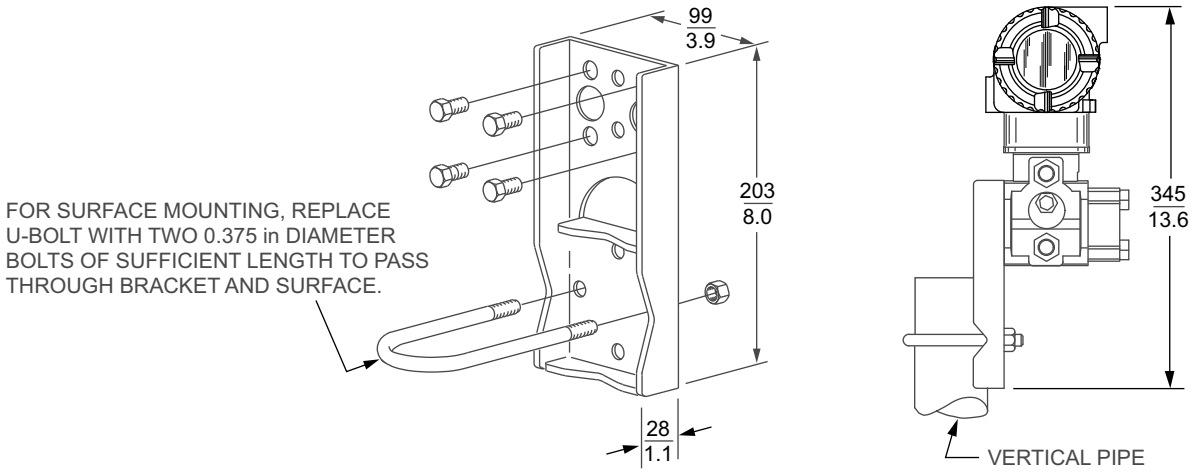
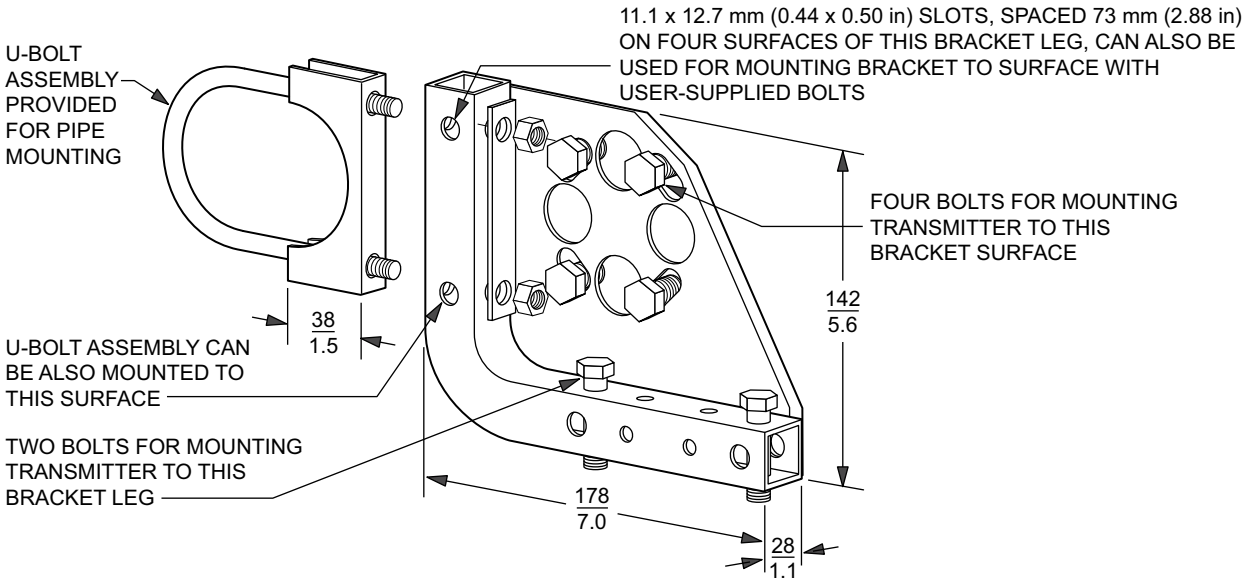
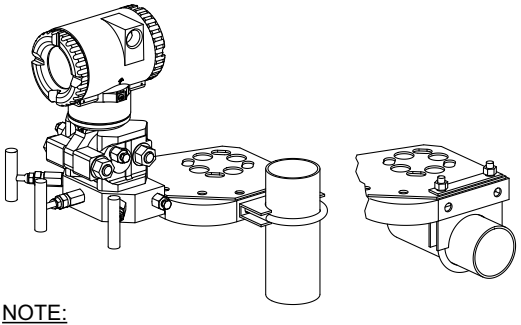


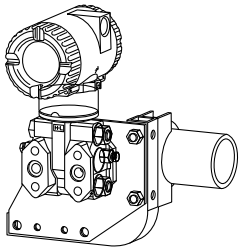
Figure 45 - Universal Style Mounting Bracket Kit (Option -M3)



TYPICAL PIPE MOUNTING
LOW PROFILE STRUCTURE LP1

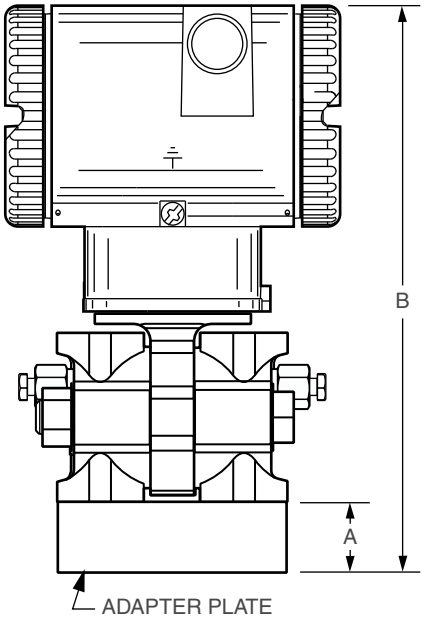


TYPICAL PIPE MOUNTING
WITH TRADITIONAL STRUCTURE



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 46 - 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 15 - Model Code for IMP10S

Code	Description
Model	
IMP10S	Multivariable Transmitter with Differential Pressure, Absolute Pressure, and Temperature Measurement
Electronics Version	
-M	Modbus RTU
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[35]	
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)[36] [37] [38]	
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

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

Table 15 - Model Code for IMP10S (Continued)

Code	Description	
Structures Prepared for Non-Schneider Electric Diaphragm Seals (static pressure rating limited by seals)[39] [40]		
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[41]	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[41]	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[42]	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[42]	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[43] [44]	
2	1/2 NPT[43]	
3	RC 1/4[43] [44]	
4	RC 1/2[43]	
6	1/2 Schedule 80 weld neck[43] [44]	
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	

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

Table 15 - Model Code for IMP10S (Continued)

Code	Description
Electrical Certifications[45]	
AD	ATEX and UKEX flameproof
BD	INMETRO flameproof
CD	CSA zone certified flameproof, explosionproof, dust ignitionproof
DD	Multi-marked ATEX and IECEx flameproof
ED	IECEx flameproof
FD	FM Classes I, II, and III Division 1 explosionproof, dust ignitionproof, Zone approved
KD	KOSHA flameproof
ND	NEPSI flameproof
RD	EAC flameproof
ZZ	No extra certification
Optional Mounting Sets[46]	
-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[47] [48] Only available with LP1 direct mount structures (LL, LM, LC, LD).	
-P1	Adapter set for MC Coplanar manifolds, B7 bolts[49]
-P2	Adapter set for MC Coplanar manifolds, 316 ss bolts[50]
-P3	Adapter set for MC Coplanar manifolds, 17-4 ss bolts[51]
-P4	Adapter set for MC Coplanar manifolds, B7M bolts[52]
-P5	Adapter set for MT3 Coplanar manifolds, traditional flange, B7 bolts[49]
-P6	Adapter set for MT3 Coplanar manifolds, traditional flange, 316 ss bolts[50]
-P7	Adapter set for MT3 Coplanar manifolds, traditional flange, 17-4 ss bolts[51]
-P8	Adapter set for MT3 Coplanar manifolds, traditional flange, B7M bolts[52]
Optional Display with Pushbuttons and Window Cover	
-L1	Digital display, pushbuttons, and window cover

45. Contact Global Customer Support for availability.
46. Not available with structures prepared for direct connect seals. Requires Process Connector code 0 for LP1 structures.
47. Not available with IEC Construction options -D1 through -D9.
48. Requires Process Connector selection 0.
49. Not available with bolting options -B1, -B2, and -B3.
50. Requires option -B1.
51. Requires option -B2.
52. Requires option -B3.

Table 15 - Model Code for IMP10S (Continued)

Code	Description
Optional IEC 61518 Construction[53][54]	
-D1	Single-ended process covers with B7 bolts; no blind connectors; 2320 psi[55]
-D2	Double-ended process covers with B7 bolts; blind connectors with size M10 steel screw; 1500 psi[56] [57]
-D3	Single-ended process covers with B7 bolts; no blind connectors; 3000 psi[55]
-D4	Double-ended process covers with B7 bolts; blind connectors with size 7/16 steel screw; 1500 psi[56] [57]
-D5	Single-ended process covers with 316 ss bolts; no blind connectors; 2175 psi[55]
-D6	Double-ended process covers with 316 ss bolts; blind connectors with size 7/16 316 ss screw; 1500 psi[56] [57]
-D7	Single-ended process covers with 17-4 PH bolts; no blind connectors; 3000 psi[55]
-D8	Double-ended process covers with 17-4 PH bolts; blind connectors with size 7/16 17-4 PH screw; 1500 psi[56] [57]
-D9	Single-ended process covers with 17-4 PH bolts; no blind connectors; 5300 psi[55]
Optional Cleaning and Preparation	
-X1	Unit degreased[58]
-X2	Unit cleaned and prepared for oxygen service[59] [60]
-X3	Unit cleaned and prepared for chlorine service[59] [61]
Optional Bolting (process covers and process connectors; specify one selection)[62]	
-B1	316 ss bolts and nuts (MWP derated to 2175 psi)[63][64]
-B2	17–4 ss bolts and nuts[64]
-B3	B7M bolts and nuts (NACE) (MWP derated to 2900 psi)[63] [65]
Optional Conduit Thread Adapters[66]	
-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[67]

53. Requires Process Connector selection 0.
54. 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.
55. Requires Structure Codes 22 through 27, LL, LM, LC, or LD; not available with options -V or -V1.
56. Requires Structure Codes 22 through 27; not available with -V or -V1.
57. 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.
58. Not available with structures prepared for seals. Not available with structures that have inert fill.
59. Requires Structure Code 23, 27, 47, LM, or LD (inert fill).
60. After units are cleaned and reassembled for oxygen service, they are not rechecked for accuracy. This may affect performance.
61. 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.
62. MWP is either the absolute pressure span limit or the MWP listed in the table, whichever is less.
63. 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.
64. 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.
65. Not available with IEC Construction options -D1 through -D9.
66. Requires Conduit Connection Code 1 or 3. Available only with Electrical Certification ZZ.
67. Cover locks are provided as standard with Electrical Certifications that end in D or P.

Table 15 - Model Code for IMP10S (Continued)

Code	Description
Optional Ermeto Connectors	
-E3	316 ss, connecting 6 mm tubing to 1/4 NPT process connector[68]
-E4	316 ss, connecting 12 mm tubing to 1/2 NPT process connector[69]
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)
Other Optional Selections	
-G1	Metal o-ring for diaphragm seals in vacuum service[70]
-J	Low temperature operative limit -50°C (-58°F)[71]
-T	Supplemental customer tag (stainless steel tag wired onto transmitter)
-V	Vent screw in side of each process cover[72]
-V1	Omit vent screw in side of each process cover[73]
Example: IMP10S-T2223AA-M1L1X3	

68. Requires Structure Code 22 to 37 and Process Connector Code 0 or 1.
69. Requires Structure Code 22 to 37 and Process Connector Code 2.
70. 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.
71. Not available with structures that have inert fill. Not available with options -D2, -D4, -D6, and -D8. Not available with Electrical Certification KD.
72. Requires a Traditional Structure Code.
73. 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 47 - Transmitter Topworks

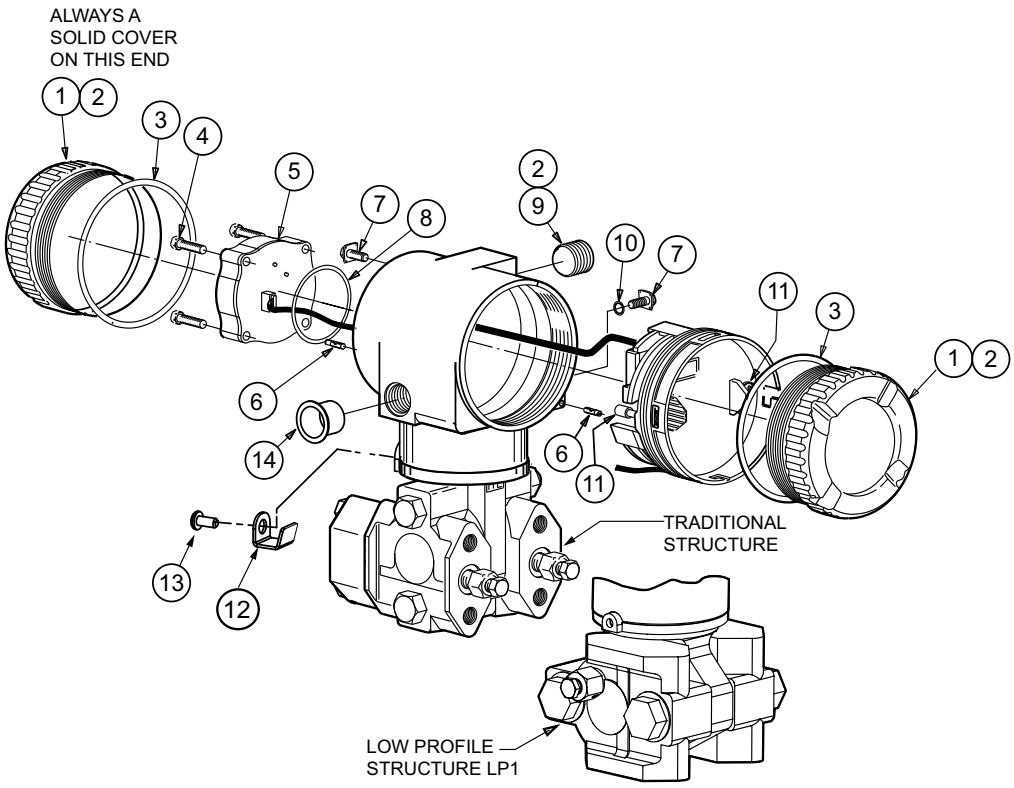


Table 16 - Parts for Transmitter Topworks

Item	Part No.	Qty.	Part Name
1	Cover, Electronics Housing; also see LCD Indicator Assembly (Option -L1), page 96.		
	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 97
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 86**
	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 48 - Transmitter Bottomworks for Use with Traditional Structures

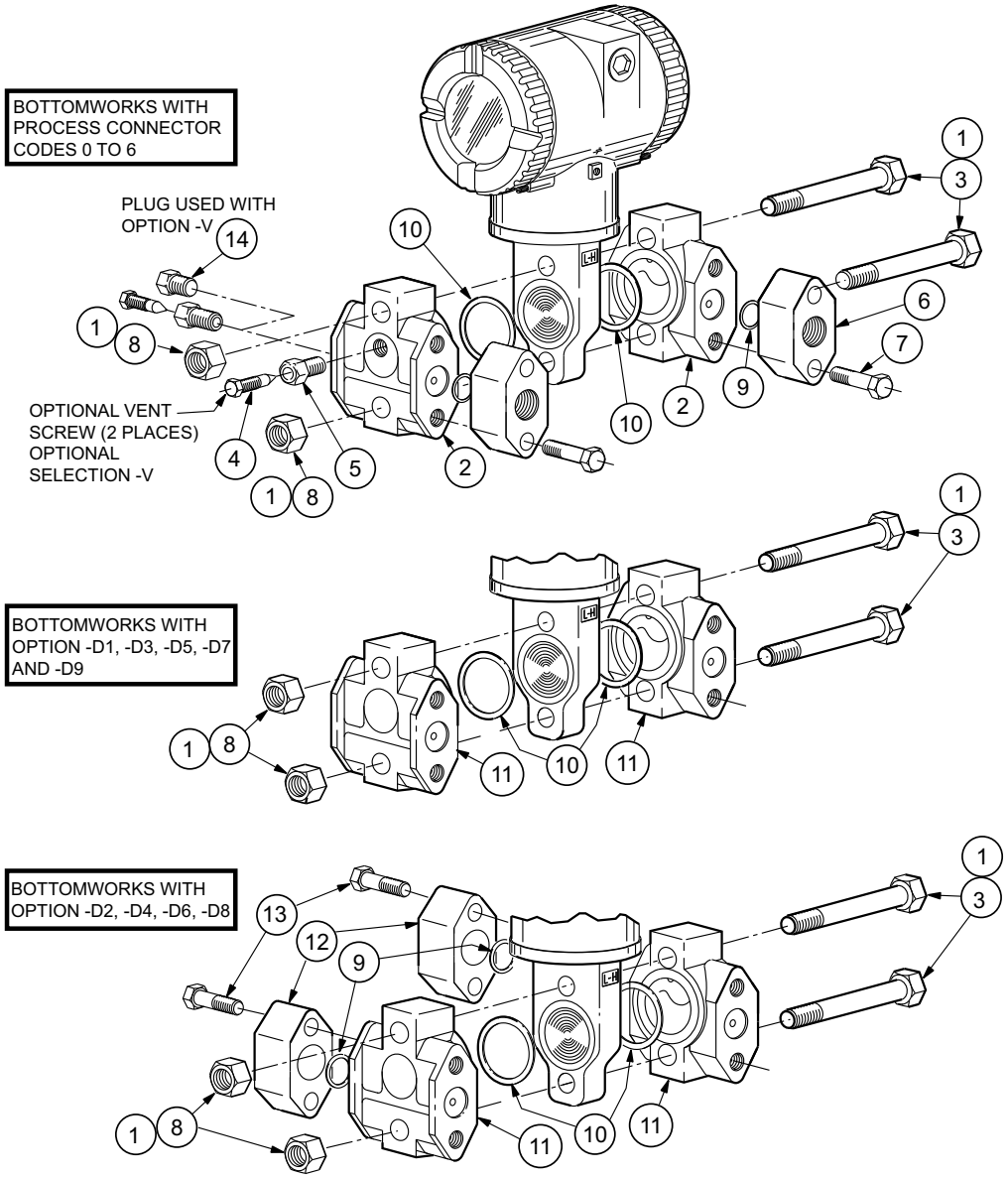


Table 17 - Parts for Transmitter Bottomworks for Use with Traditional Structures

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**[74]
	D0161NA		316 ss
	D0161NC		Nickel Alloy[75]
	Below		**Side Vent Process Cover for use with Process Connection Codes 0-6**[74]
	D0161NE		316 ss
	D0161NG		Nickel Alloy[75]
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)[74]
	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[74] [76]
5	**Below**	2	**Vent Plug**[77]
	D0161QT		316 ss (standard)
	D0175PP		Nickel Alloy[74] [76]
6	2 Process Connectors; see Process Connectors, page 92.		
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)

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

Table 17 - 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[78]

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

Figure 49 - Transmitter Bottomworks for Use with Low Profile (LP1) Structures

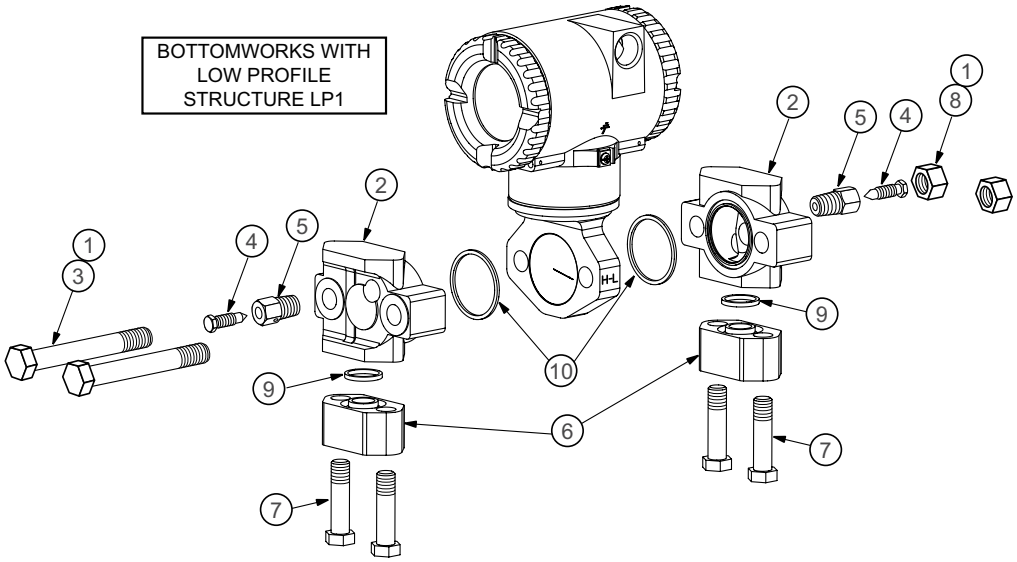


Table 18 - Parts for Transmitter Bottomworks for Use with Low Profile (-LP1) Structures

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**[79]
	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[79] [80]
5	**Below**	2	**Vent Plug, 316 ss**[81]
	D0161QT		316 ss
	D0175PP		Nickel Alloy[79] [80]
6	2 Process Connectors for Stainless Steel Covers; see Process Connectors, page 92.		

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

Table 18 - 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 19 - Process Connectors

Process Connector Code	Connector Description	Used with Cover Material	
		Stainless Steel	Nickel Alloy[82]
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	–

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

Optional Parts

Figure 50 - Standard Style Mounting Bracket Sets (Options -M1 and -M2) and Optional Standoff Kits

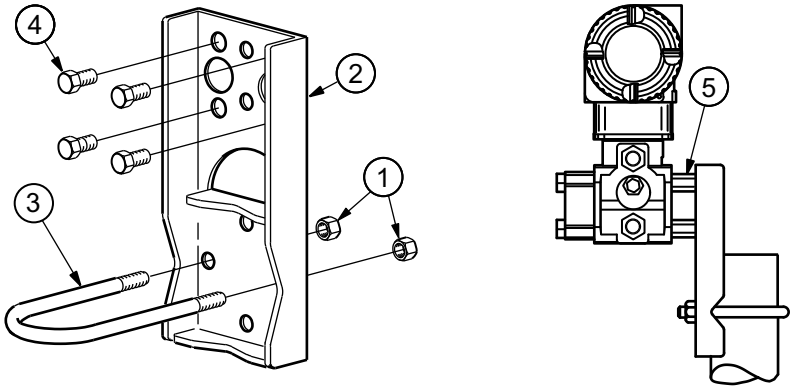


Table 20 - Parts for Standard Style Mounting Bracket Set with Painted Steel (Option -M1)

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

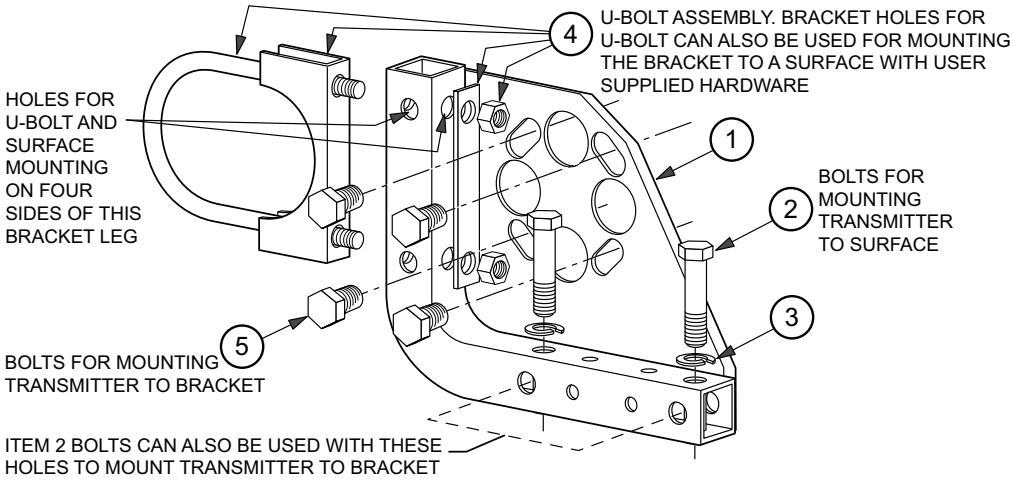
Table 21 - Parts for Standard Style Mounting Bracket Set with Stainless Steel (Option -M2)

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 22 - 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 51 - Universal Style Mounting Bracket Set (Option -M3)



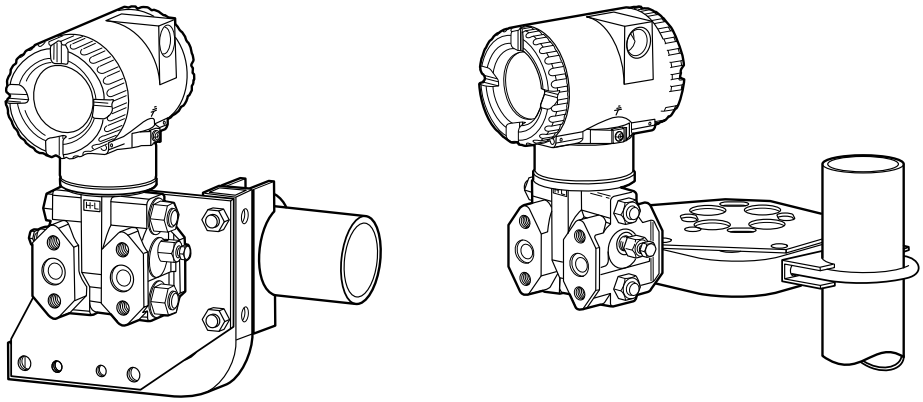


Table 23 - Parts for Universal Style Mounting Bracket Set (Option -M3)

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 52 - Vent Screw (Option -V1)

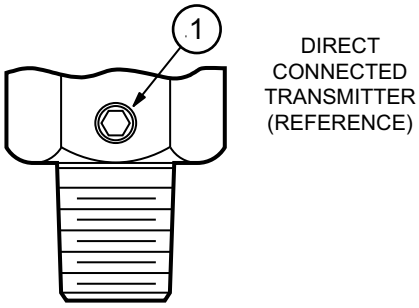


Table 24 - Parts for Vent Screw (Option -V1)

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

Figure 53 - Adapter Plates (Options -P1 to -P8) for Direct Mounting to Coplanar Manifolds

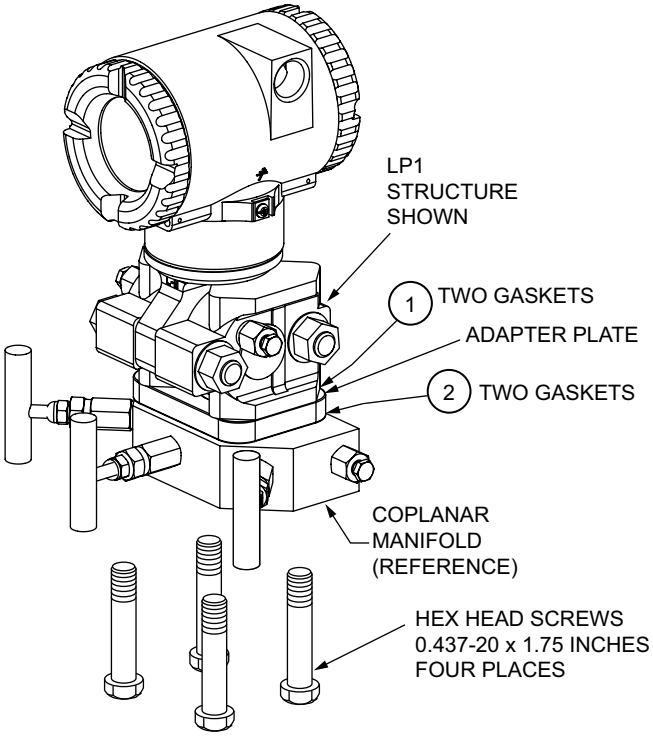


Table 25 - Parts for Adapter Plate Kits -P1 to -P4, Used with "MC" Manifold

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 26 - 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 27 - 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 54 - LCD Indicator Assembly (Option -L1)

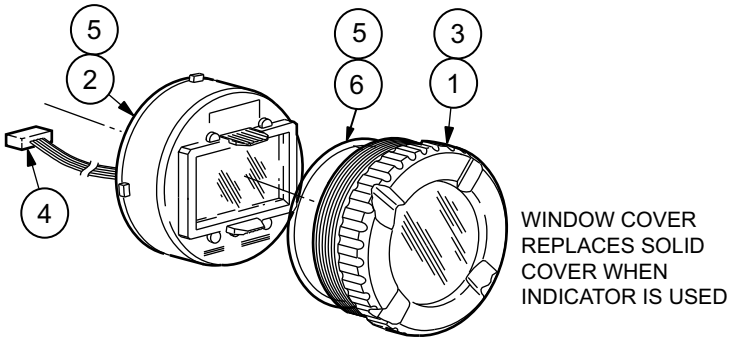


Table 28 - Parts for LCD Indicator Assembly (Option -L1)

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 55 - Conduit Connections (Options -A1 and -A3)

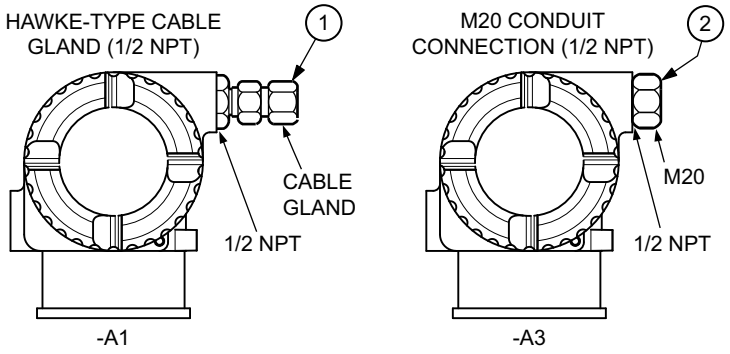


Table 29 - Parts for Conduit Connections (Options -A1 and -A3)

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 56 - Custody Transfer Lock and Seal (Option -Z2)

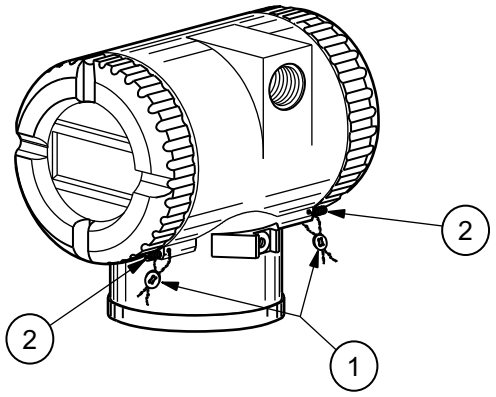


Table 30 - Parts for Custody Transfer Lock and Seal (Option -Z2)

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 57 - Ermeto Connectors (Options -E3 and -E4)

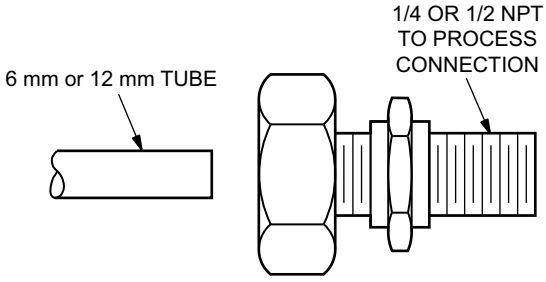


Table 31 - Parts for Ermeto Connectors (Options -E3 and -E4)

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 86					
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 88 and Transmitter Bottomworks for Use with Low Profile (LP1) Structures, page 91					
4	**Below**	**Vent Screw**	0	2	4
	B0138MJ	316 ss (standard)			
	D0175PQ	Nickel alloy[83] (to NACE Standard MR0175/MR0103)			
5	**Below**	**Vent Plug**	0	2	4
	D0161QT	316 ss (standard)			
	D0175PP	Nickel alloy[83] (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 96					
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 95					
1	D0114RB	Gasket - Transmitter to Adapter Plate	2	4	8
2	D0170XK	Gasket - Manifold to Adapter Plate	2	4	8

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

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