

Models IAP10, IGP10, IAP20, and IGP20 I/A Series® Absolute and Gauge Pressure Transmitters with HART® Communication Protocol



IAP20/IGP20
TRANSMITTER



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



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

The Foxboro® brand I/A Series® Models IAP10, IGP10, IAP20, and IGP20 are Intelligent, two-wire transmitters that provide precise, reliable, measurement of absolute or gauge pressure, and transmit a 4 to 20 mA output signal with a superimposed HART® digital signal for remote configuration and monitoring.

FEATURES

- ▶ Silicon strain gauge sensors successfully field-proven in many thousands of installations.
- ▶ Simple, elegant sensor packaging with very few parts; achieves exceptionally high reliability.
- ▶ Aluminum housing has durable, corrosion-resistant epoxy finish; 316 ss housing also available; both meet the ratings of NEMA 4X and IEC IP66.
- ▶ Remote configuration or locally via the optional LCD Indicator.
- ▶ Can be provided with numerous configurations of direct connect or remote mount seals.
- ▶ HART protocol allows multidrop topology.
- ▶ SIL2-Certified transmitter offered as an option.
- ▶ The IAP10 and IGP10 are offered with integral process connections for sanitary, and pulp and paper installations. Also, the IGP10 is offered for high gauge pressure applications to 52, 105, or 210 MPa (7500, 15,000, or 30,000 psi).
- ▶ Sensor wetted parts materials include Co-Ni-Cr, 316L ss, and nickel alloy (equivalent to Hastelloy®(1)); additionally, Monel, tantalum, and gold-plated 316L ss sensors are offered for the IAP20/IGP20.
- ▶ CE marked; complies with applicable EMC, ATEX, and PED European Union Directives.
- ▶ Multi-marking available for ATEX, CSA, and FM intrinsically safe applications. User determines and permanently marks the certification to be applied.

(1) Hastelloy® is a registered trademark of Haynes International, Inc.

- ▶ Complies with NAMUR NE 21 interference immunity requirement, and NAMUR NE 43 analog output overrange and underrange annunciations.
- ▶ Complies with electromagnetic compatibility requirements of European EMC Directive 2004/108/EC by conforming to following EN and IEC Standards: EN 61326-1, and IEC 61000-4-2 through 61000-4-6.
- ▶ Meet numerous requirements for hazardous locations. Versions available to meet Agency flameproof and zone requirements.
- ▶ Dual Seal certified by CSA to meet ANSI/ISA 12.27.01-2003 requirements.
- ▶ Numerous mounting bracket set options. Many other options and accessories offered.
- ▶ Standard 5-year warranty.

I/A Series® PRESSURE TRANSMITTER FAMILY

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

OPTIONAL LCD DIGITAL INDICATOR

This is a two-line digital indicator with on-board pushbuttons that displays the measurement with a choice of units. The pushbuttons allow zero and span adjustments, as well as local configuration without the need for a Communicator or PC-based Configurator. See Figure 10.

MODULAR ELECTRONICS

A common HART electronics module is used for all I/A Series HART Pressure Transmitters. Also, because all configuration and calibration data is stored in the sensor, you can replace a HART module with another HART module without transmitter reconfiguration or recalibration.

Furthermore, if your needs change, the transmitter modular design allows easy migration to other standards, including FoxCom™, FOUNDATION™ fieldbus, and Analog 4 to 20 mA or 1 to 5 V dc.

HART Communication Protocol Version (-T Electronics)

4 to 20 mA with HART communications. Allows direct analog connection to common receivers while still providing full digital communications using a Communicator, PC-based Configurator, or optional LCD Indicator.

HART Communicators can be upgraded with software to accommodate these transmitters. Also, Invensys will make use of the HART Foundation library of registered DDs (Device Descriptors), and reload a Communicator if the user desires to keep another supplier's DD along with the Foxboro DD.

In addition to HART, Invensys also offers transmitters with other protocols as described below.

FoxCom Version, Software Configurable for Digital or 4 to 20 mA Output (-D Electronics)

Provides measurement integration with an I/A Series system, or allows direct analog connection to common receivers while still providing full intelligent digital communication with a PC-based configurator. Refer to PSS 2A-1C13 A.

FOUNDATION Fieldbus Version (-F Electronics)

This is a FISCO/FNICO compliant all digital, serial, two-way communication system which interconnects field devices such as transmitters, actuators, and controllers. It is a local area network (LAN) with built-in capability to distribute control across the network. Refer to PSS 2A-1C13 E.

Analog Output Version (-A Electronics)

Provides a 4 to 20 mA analog output and includes a standard LCD Indicator to provide transmitter configuration directly from on-board pushbuttons. Refer to PSS 2A-1C13 C.

Analog Output Version (-V Electronics)

A low power, low voltage transmitter that draws no more than 3 mA, and transmits a 1 to 5 V dc output signal. As with the -A version, it includes a standard LCD Indicator. Refer to PSS 2A-1C13 D.

HART Intelligent Module Configured for 4 to 20 mA Output

Measurements and diagnostics are available from the HART Communicator connected to the two-wire loop carrying the 4 to 20 mA measurement signal by using a bidirectional digital signal superimposed on the 4 to 20 mA current signal.

Multiple measurements are transmitted digitally, including not only the primary measurement in pressure units, but also the electronics temperature and sensor temperature which can be used to monitor external heat tracing equipment. Complete transmitter diagnostics are also communicated.

Configuration and reranging can be accomplished with the Communicator, PC-based Configurator, or the optional LCD Indicator with pushbuttons.

HIGH PERFORMANCE

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

OPTIONAL SIL2 TRANSMITTERS

Modern industrial processes tend to be technically complex and have the potential to inflict serious harm to persons or property during a mishap. The IEC 61508 standard defines safety as “freedom from unacceptable risk.” SIL2 pressure transmitters with HART communication protocol, in conjunction with Triconex Safety Systems, provide integrated solutions for safety and critical control applications. The integrated solution is certified as interference-free from the 4 to 20 mA loop; this guarantees the integrity of the safety system and the safety of the controlled process. The integrated design allows uninterrupted operation of the safety function, while allowing access to device level information via HART commands. The solution permits interface of device diagnostics with asset management systems without compromising functional safety. Select Option -S2 for a SIL2-certified HART Transmitter. A copy of the certification is available via Auxiliary Specification (AS) Code CERT-S.

MULTIDROP COMMUNICATIONS

Point-to-point or multidrop topologies are permitted. Multidropping is the connection of several transmitters to a single communications line. Communications between the host computer and transmitters takes place digitally with the analog output of the transmitter fixed. Up to fifteen transmitters can be connected on a single twisted pair of wires or over leased telephone lines. See Figure 8 and Figure 9.

CHOOSE MOUNTING CONFIGURATION NEEDED

Direct Connected Transmitters (Models IAP10 and IGP10)

These transmitters are light weight and easy-to-install. They use 316L ss or nickel alloy (equivalent to Hastelloy®) process connections, and a choice of either 316L ss, Cobalt-Nickel-Chrome, or nickel alloy for the sensing diaphragm. See Direct-Connected Transmitters section.

Bracket-Mounted Transmitters (Models IAP20 and IGP20)

These transmitters offer a large selection of corrosion resistant process covers and sensing diaphragm materials. They are suitable for applications requiring low spans, vacuum service, and high overrange pressure.

EASE OF INSTALLATION

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

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

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

DIRECT CONNECTED TRANSMITTERS – IAP10 AND IGP10

EXCEPTIONAL VALUE

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

DIRECT PROCESS MOUNTING

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

WIDE RANGEABILITY

Three absolute pressure versions are offered to allow spans from 7 to 21,000 kPa (1 to 3,000 psi), and four gauge pressure versions are offered to allow spans from 7 to 42,000 kPa (1 to 6,000 psi). Refer to IGP20 Transmitter for gauge pressure vacuum service.

316L ss, NICKEL ALLOY, AND Co-Ni-Cr PROCESS WETTED PARTS

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

FLAMEPROOF DESIGN

The IAP10 and IGP10 flameproof versions are designed to meet Agency flameproof and zone requirements.



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

HIGH GAUGE PRESSURE VERSIONS

Three high gauge pressure versions with URLs of 52, 105, and 210 MPa (7,500, 15,000, and 30,000 psi) are available in the IGP10 line. See PSS 2A-1C13 F.

SANITARY AND PULP AND PAPER VERSIONS

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

BRACKET-MOUNTED TRANSMITTER – IAP20 AND IGP20

SENSOR CORROSION PROTECTION

Choice of 316L ss, Co-Ni-Cr, nickel alloy (equivalent to Hastelloy®), Monel, Gold-Plated 316L ss, and Tantalum materials. High corrosion resistance of Co-Ni-Cr (TI 037-078) means long service life in many difficult applications without the extra cost for exotic materials. Also see TI 37-75b for process applicability with Co-Ni-Cr and other process wetted parts materials.

WIDE RANGEABILITY

Gauge pressure measurement spans may be as low as 0.12 kPa (0.5 inH₂O) to as high as 35 MPa (5000 psi) by choosing one of only six sensors, and absolute pressure measurement spans may be as low as 0.87 kPa (3.5 inH₂O) to as high as 21 MPa (3000 psi) by choosing one of only four sensors. This provides exceptional measurement range capability with a minimum of versions.

VACUUM SERVICE

A lower range limit of -100 kPa (-14.7 psi, -1 bar or kg/cm²) means that vacuum measurements are easily handled with the versatile IGP20 Gauge Pressure transmitter.

PROCESS CONNECTOR

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

For highly corrosive chemical processes, a 1/2 NPT pvdf (Kynar) insert, as shown in Figure 3, is installed in the HI-side 316 ss cover and is used as the process connector. In these applications, tantalum is used as the sensor diaphragm material.

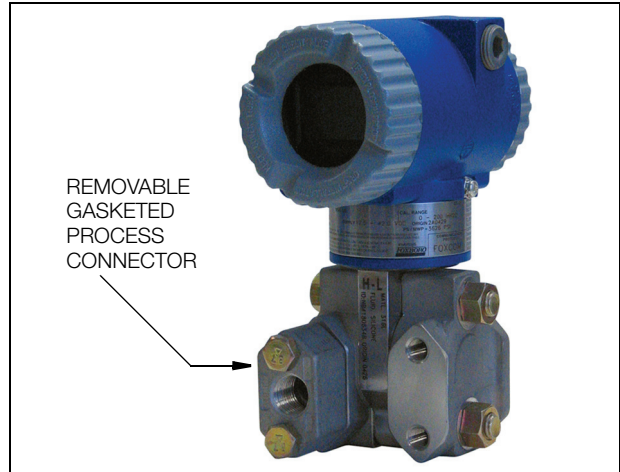


Figure 2. Bracket-Mounted Transmitter Shown with Conventional Process Connector

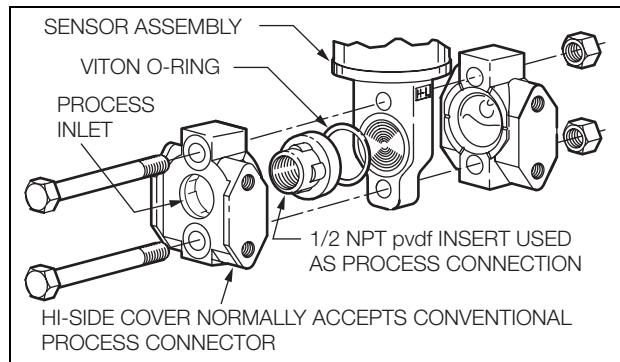


Figure 3. Bracket-Mounted Transmitter Shown with 1/2 NPT pvdf Insert Installed in HI-Side Cover

EASE OF MOUNTING TWO-VALVE MANIFOLD

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

FLAMEPROOF DESIGN

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

PRESSURE SEALS

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

Table 1 and Table 2 list the various seals that can be used with these transmitters. To order a transmitter with seals, both a Transmitter Model Number and Seal Model Number are required. See PSS 2A-1Z11 A for a complete listing of pressure seal models and specifications. Also see Figure 4 for typical pressure seal configurations.

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

Direct Connect Pressure Seal Assemblies		
Seal Model	Seal Description	Process Connections
PSFLT	Flanged, Direct Connect (Flanged Level), Flush or Extended Diaphragm (IAP10 only)	ANSI Class 150, 300, 600 flanges and BS/DIN PN 10/40, 10/16, 25/40 flanges
PSFAD	Flanged, Direct Connect, Recessed Diaphragm (IAP10 and IGP10 only)	ANSI Class 150, 300, 600, 1500 flanges
PSFFD	Flanged, Direct Connect, Flush Diaphragm (IAP10 and IGP10 only)	ANSI Class 150, 300, 600 and PN 10/40
PSTAD	Threaded, Direct Connect, Recessed Diaphragm (IAP10 and IGP10 only)	1/4, 1/2, 3/4, 1, or 1 1/2 NPT internal thread
PSISD	In-Line Saddle Weld, Direct Connect, Recessed Diaphragm (IAP10 and IGP10 only)	Lower housing of seal is in-line saddle welded to nominal 3- or 4-inch (and larger) Pipe
PSSCT	Sanitary, Direct Connect (Level Seal), Flush Diaphragm (IGP20 only)	Process Connection to Sanitary Piping with 2- or 3-inch Tri-Clamp
PSSST	Sanitary, Direct Connect (Level Seal), Extended Diaphragm (IGP20 only)	Process Connection to 2-in Mini Spud or 4-in Standard Spud; Tri-Clamp
Remote Mount, Capillary-Connected Pressure Seal Assemblies		
Seal Model	Seal Description	Process Connections
PSFPS	Flanged, Remote Mount, Flush Diaphragm	ANSI Class 150, 300, 600 flanges and BS/DIN PN 10/40 flanges
PSFES	Flanged, Remote Mount, Extended Diaphragm	ANSI Class 150, 300, 600 flanges and BS/DIN PN 10/40, 10/16, 25/40 flanges
PSFFR	Flanged, Remote Mount, Flush Diaphragm	ANSI Class 150, 300, 600 flanges and DIN/BS PN 10/40
PSFAR	Flanged, Remote Mount, Recessed Diaphragm	ANSI Class 150, 300, 600, 1500 flanges
PSTAR	Threaded, Remote Mount, Recessed Diaphragm	1/4, 1/2, 3/4, 1, or 1 1/2 NPT internal thread
PSISR	In-Line Saddle Weld, Remote Mount, Recessed Diaphragm	Lower housing of seal is in-line saddle welded to nominal 3- or 4-inch (and larger) Pipe
PSSCR	Sanitary, Remote Mount, Flush Diaphragm	Process Connection secured with a Tri-Clamp to a 2- or 3-inch pipe
PSSSR	Sanitary, Remote Mount, Extended Diaphragm	Process Connection to 2-in Mini Spud or 4-in Standard Spud; Tri-Clamp

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

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

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

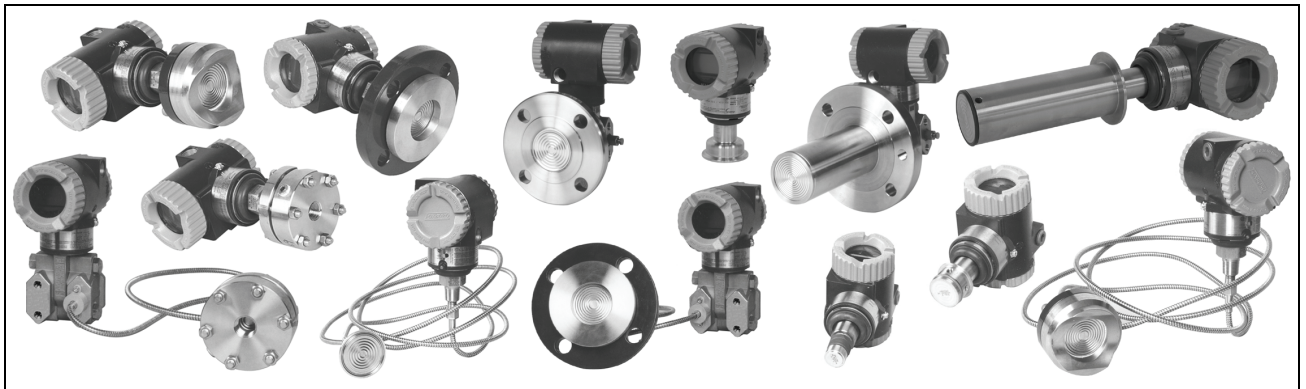


Figure 4. Typical Pressure Seals used with IAP10, IGP10, IAP20, and IGP20 Transmitters

FUNCTIONAL SPECIFICATIONS

Table 3. Span and Range Limits for IAP10 and IGP10 Transmitters

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

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

Table 4. Maximum Overrange and Proof Pressure Ratings for IAP10 and IGP10 Transmitters

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

(a) Values listed are in absolute or gauge pressure units, as applicable. Maximum overrange pressure is the maximum pressure that may be applied without causing damage to the transmitter.

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

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

Table 5. Span and Range Limits for IAP20 and IGP20 Transmitters

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

(a) For absolute pressure transmitters (IAP20), the lower range limit is 0.

(b) Span Codes A and F applicable to IGP20 Transmitter only. Also, Span Code A is not available when pressure seals are specified.

(c) For the IAP20, the minimum span for factory calibration is 1.2 kPa (5 inH₂O, 12.4 mbar). This span can be field reranged within the limits shown in Table .

(d) Minimum span limit is 30 psi (0.21 MPa, 2.1 bar) for Analog protocol (-A).

(e) When certain options are specified, the upper span and range limit values are reduced as shown in Table 7.

Table 6. Maximum Overrange and Proof Pressure Ratings for IAP20 and IGP20 Transmitters (a)

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

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

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

(c) Standard with IAP20/IGP20 Span Codes A to E.

Table 7. Impact of Certain Options on IAP20/IGP20 Span and Range Limits (a)

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

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

Output Signal and Configuration

Output is 4 to 20 mA with digital HART communications. For multidrop applications, the mA signal is fixed at 4 mA to provide power to the device. Configurable using the HART Communicator, PC-based Configurator, or optional LCD Indicator with on-board pushbuttons.

Electronics and Sensor Temperatures

Readable from the Communicator or PC-based Configurator. Measurement is transmitter temperature, at the sensor and the electronic module, not necessarily process temperature.

Field Wiring Reversal

No transmitter damage.

Suppressed Zero and Elevated Zero

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

Zero and Span Adjustments

Zero and span adjustments can be initiated using the Communicator, a PC-based Configurator, or the optional LCD with on-board pushbuttons.

Write Protect Jumper

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

Supply Voltage Requirements and External Loop Load Limitations

Nominal minimum supply voltage is 11.5 V dc. This value can be reduced to 11 V dc by using a plug-in jumper across the test receptacles in the field wiring compartment terminal block as shown in the Physical Specifications section.

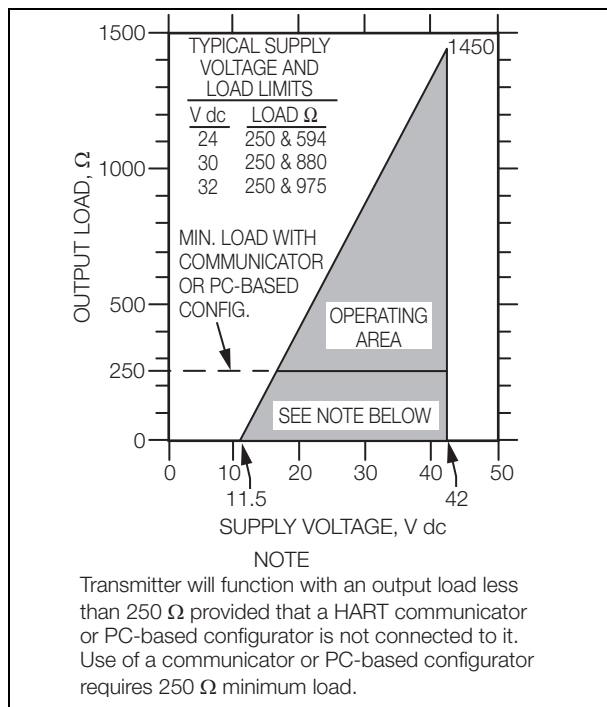


Figure 5. 4 to 20 mA Output, Supply Voltage vs. Output Load

Zeroing for Nonzero-Based Ranges

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

Adjustable Damping

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

Minimum Allowable Absolute Pressure vs. Transmitter Temperature

With Silicone Fill Fluid

Full Vacuum: up to 121°C (250°F)

With Inert Fill Fluid

Refer to Figure 6.

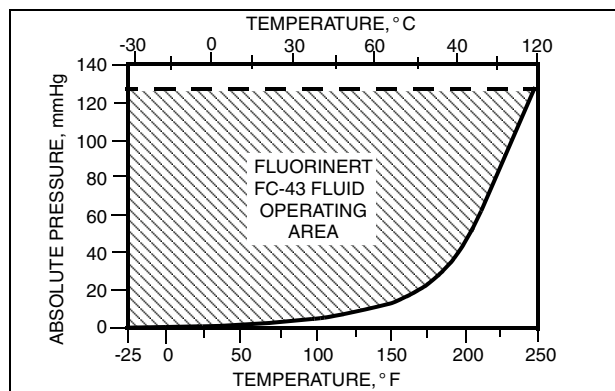


Figure 6. Minimum Allowable Absolute Pressure vs. Transmitter Temperature, Inert FC-43, 2.6 cSt at 25°C (77°F)

Current Outputs for Overrange, Fail, and Offline Conditions

Parameter	Current Outputs
Offline	Configurable between 4 and 20 mA
Sensor Failure	Configurable to Fail LO or Fail HI
Fail LO	3.60 mA
Underrange	3.80 mA
Overrange	20.50 mA
Fail HI	21.00 mA

Configuration and Calibration Data and Electronics Upgradeability

All factory characterization data and user configuration and calibration data are stored in the sensor (refer to Figure 7, Transmitter Functional Block Diagram). This means that the electronics module may be replaced, with one of like type, without the need for reconfiguration or recalibration.

Although module replacement can affect accuracy by a maximum of 0.20% of span, this error can be removed by a mA trim without application of pressure. Changing module types (e.g., from one to another communication protocol) may require reconfiguration and recalibration, as well as a different terminal block, but all factory characterization data is retained.

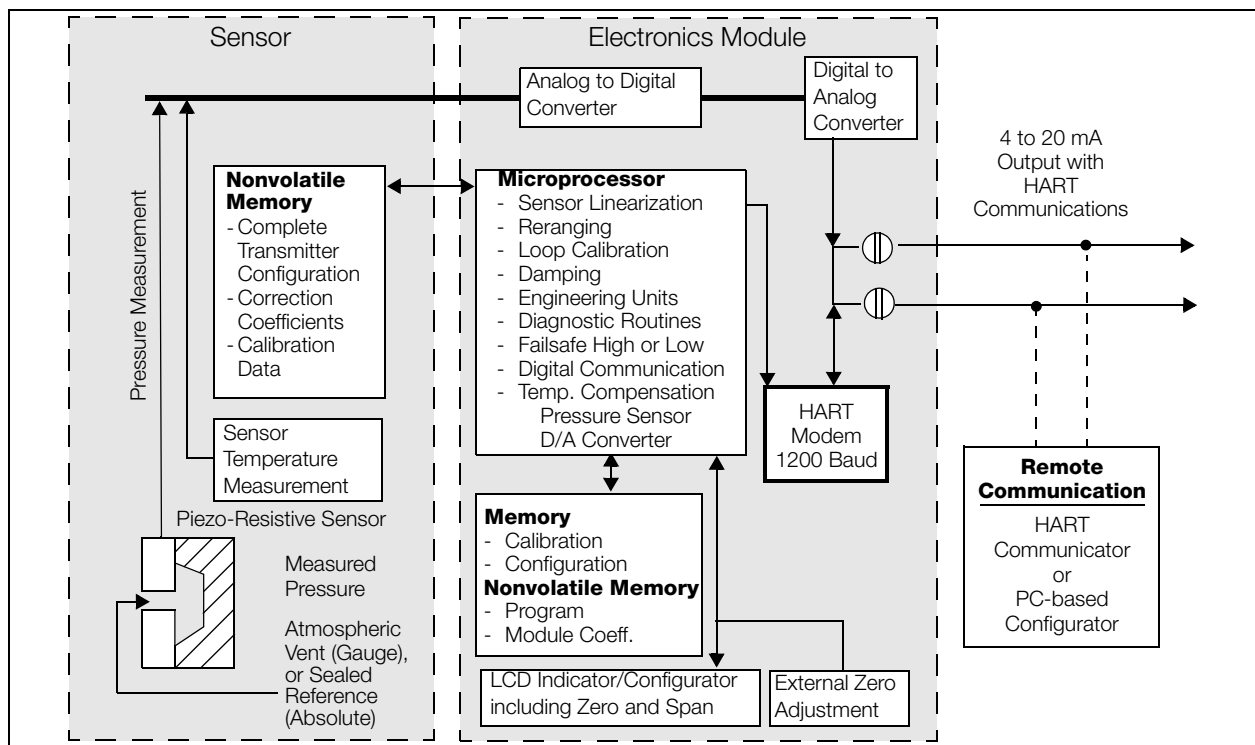


Figure 7. Transmitter Functional Block Diagram

Configuration Capability

Calibrated Range

- ▶ Input range within Range Limits
- ▶ See Table 8 for pressure units

Output Measurement #1 – Digital Primary Variable and 4 to 20 mA

- ▶ Mode: Linear
- ▶ Units: See Table 8 for pressure units

Output Measurement #2 – Digital Secondary Variable

- ▶ Mode: Linear
- ▶ Units: See Table 8 for pressure units

Communications

Configurable for either Analog or Multidrop (fixed current) Modes. Digital communications is provided in both modes based upon the FSK (Frequency Shift Keying) technique which alternately superimposes one of two different frequencies on the uninterrupted current carried by the two signal/power wires. See Figure 8 and Figure 9.

Analog Mode (4 to 20 mA)

The 4 to 20 mA output signal is updated 30 times per second. Digital communications between the transmitter and HART Communicator is rated for distances up to 3050 m (10,000 ft). The communications rate is 1200 baud and requires a minimum loop load of 250 ohms.

Multidrop Mode (Fixed Current)

This Mode supports communications with up to 15 transmitters on a single pair of signal/power wires. The output signal is updated 4 times per second and carries not only the pressure measurement, but also the sensor and electronics temperatures (internal recalculation rate for temperature is once per second). Communication between transmitter and system, or between transmitter and Communicator or Configurator, is rated for distances up to 1525 m (5000 ft). The communications rate is 1200 baud and requires a minimum loop load of 250 ohms.

Table 8. Allowable Pressure Units for Calibrated Range (a)

inH ₂ O	psi	Pa	atm	g/cm ²
ftH ₂ O	inHg	kPa	bar	kg/cm ²
mmH ₂ O	mmHg	MPa	mbar	torr
mH ₂ O	-	-	-	-

(a) For absolute pressure, change psi to psia and MPa to MPaa, etc.

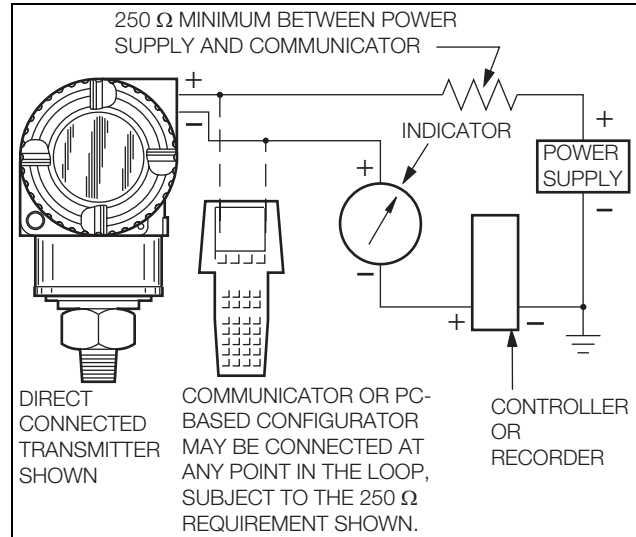


Figure 8. 4 to 20 mA Output Functional Block Diagram Point-to-Point Communications

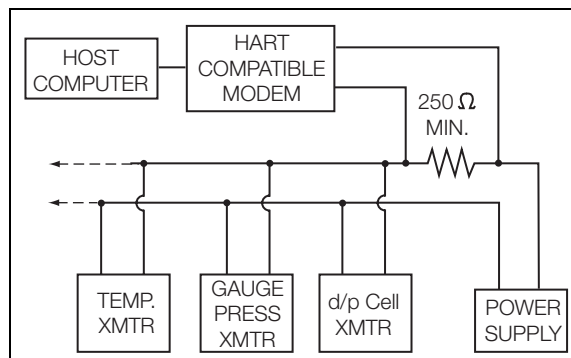


Figure 9. Typical Multidrop Functional Block Diagram (Up to Fifteen Transmitters)

FUNCTIONAL SPECIFICATIONS

Remote Communications

The HART Communicator or PC-based Configurator has full access to all of the “Display” and “Display and Reconfigure” items listed below. It may be connected to the communications wiring loop, and does not disturb the mA current signal. Plug-in connection points for the communicator are also provided on the transmitter terminal block.

“Display” Items

- ▶ Process Measurement in two formats
- ▶ Electronics and Sensor Temperatures
- ▶ mA Output

“Display and Reconfigure” Items

- ▶ Two Digital Outputs for Pressure
- ▶ Choice of Pressure Engineering Units
- ▶ Reranging without Pressure
- ▶ Zero and Span Calibration
- ▶ Electronic Damping
- ▶ Temperature Sensor Failure Strategy
- ▶ Failsafe Direction
- ▶ Tag, Descriptor, and Message
- ▶ Date of Last Calibration

Optional Custom Configuration (Option -C2)

For the transmitter to be custom configured by the factory, the user must fill out a data form. If this option is not selected, a standard (default) configuration will be provided. Refer to Table 9.

Table 9. Example of Custom Configuration Option -C2

Parameter	Standard (Default) Configuration	Example of Custom Configuration Option -C2
Tagging Info. Tag (8 char. max.)	TAG	PT101
Descriptor (16 char. max.)	TAG NAME	WATER PRESS.
Message (32 char. max.)	LOCATION	BUILDING 2
HART Poll Address (0 to 15)	0	0 (a)
Calibrated Range Pressure EGU LRV URV	per S.O. (b) per S.O. (c) per S.O. (c)	inH ₂ O 0 100
Measurement #1 Pressure EGU Output	per S.O. (d) 4 to 20 mA	inH ₂ O 4 to 20 mA (e)
Measurement #2 Pressure EGU	per S.O. (d)	inH ₂ O
Other Electronic Damping Failsafe Direction Failure Strategy Ext. Zero Option	None Upscale Continue Enabled	0.5 s Downscale Failsafe Disabled

- (a) Address is 1 to 15 for multidrop applications.
- (b) Units from Table 8. If not specified, factory default calibration is zero to maximum span; default units vary by sensor code.
- (c) Within Span and Range Limits for selected sensor code.
- (d) Same as Calibrated Range.
- (e) Fixed current is used for multidrop applications.

NOTE

Any of the configurable parameters in Table 9 can easily be changed using the HART communicator or PC-based configurator.

Optional LCD Indicator with Pushbuttons

Indicator provides:

- ▶ Two Lines: Five numeric characters on top line (four when a minus sign is needed); and seven alphanumeric characters on bottom line.
- ▶ Measurement readout: Value displayed on top line, and units label displayed on bottom line.
- ▶ Configuration and calibration prompts.

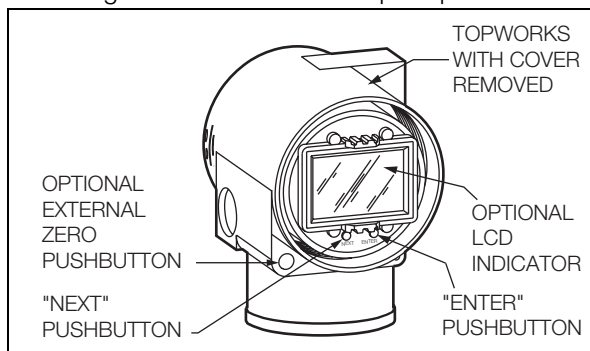


Figure 10. LCD Indicator with Pushbuttons

Optional External Zero Adjustment

An external pushbutton mechanism (Figure 10) is isolated from the electronics compartment and magnetically activates an internal reed switch through the housing. This eliminates a potential leak path for moisture or contaminants to get into the electronics compartment. This zero adjustment can be disabled by a configuration adjustment.

Two pushbuttons provide the following configuration and calibration prompts:

- ▶ Zero and Span settings, noninteractive to automatically set output to either 4 mA or 20 mA using the "NEXT" and "ENTER" pushbuttons.
- ▶ 4 and 20 mA Jog Settings, allowing the user to easily increment the mA output signal up or down in fine steps to match a value shown on an external calibrator.
- ▶ Forward or Reverse Output
- ▶ Damping Adjustment
- ▶ Enable/Disable Optional External Zero
- ▶ Temperature Sensor Failure Strategy
- ▶ Failsafe Action (High or Low)
- ▶ Units Label (Bottom Line of Display)
- ▶ Settable Lower and Upper Range Values for Transmission and Display (Top Line)
- ▶ Reranging without Pressure
- ▶ Percent (%) Output

OPERATING, STORAGE, AND TRANSPORTATION CONDITIONS

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

- (a) Temperature limits are derated as follows for IAP20 and IGP20 Transmitters:
to -7 and +82°C (20 and 180°F) when Structure Codes 78/79 (pdf inserts) are used, and
to 0 and 60°C (32 and 140°F) when DIN Construction Options D2/D4/D6/D8 are used.
- (b) Normal Operating Conditions and Operative Limits are defined per ANSI/ISA 51.1-1979 (R1993).
- (c) 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.
- (d) Although the LCD will not be damaged at any temperature within the "Storage and Transportation Limits", updates will be slowed and
readability decreased at temperatures outside the "Normal Operating Conditions".
- (e) Refer to the Electrical Safety Specifications section for a restriction in ambient temperature limits with certain electrical
approvals/certifications.
- (f) With topworks covers on and conduit entrances sealed.
- (g) 11.5 V dc can be reduced to 11 V dc by using a plug-in shorting bar; see "Physical Specifications" sections.
- (h) Sensor process wetted diaphragms in a vertical plane for IAP20 and IGP20 Transmitter.

PERFORMANCE SPECIFICATIONS

Zero-Based Calibrations; 316L ss or Co-Ni-Cr Diaphragms with Silicone Fluid for IGP10 and IAP10; Cobalt-Nickel-Chromium or 316L Stainless Steel Sensor with Silicone Fluid for IGP20; Under Reference Operating Conditions unless otherwise Specified; URL = Upper Range Limit, and Span = Calibrated Span.

Accuracy (Includes Linearity, Hysteresis, and Repeatability)

Accuracy, % of Span (a) (b)	
Spans ≥10% URL	Spans <10% URL
±0.060%	±[0.025 + 0.0035 (URL/Span)]%

(a) Add ±0.04% for Span Code A, and ±0.02% for Span Codes E and F.

(b) Subtract ±0.01% for digital output accuracy.

Stability

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

Calibration Frequency

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

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

Power-Up Time

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

Supply Voltage Effect

The output changes less than 0.005% of span for each 1 V change within the specified supply voltage requirements. See Figure 5.

Position Effect

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

Ambient Temperature Effect

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

For the IAP10 and IGP10 Transmitters

Span Code(a)	Ambient Temperature Effect
C, D, E, and F	± (0.03% URL + 0.060% Span)

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

For the IAP20 and IGP20 Transmitters

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

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

NOTE

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

Vibration Effect

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

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.)

Switching and Indirect Lightning Transients

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

PHYSICAL SPECIFICATIONS

Description	Direct Connected Absolute and Gauge Pressure Transmitters IAP10 and IGP10	Bracket Mounted Absolute and Gauge Pressure Transmitters IAP20 and IGP20
Process Wetted Parts Materials (High Pressure Side) <ul style="list-style-type: none"> ▶ Process Connection ▶ Gaskets ▶ Sensor Diaphragm 	<ul style="list-style-type: none"> ▶ 316L ss or nickel alloy (equivalent to Hastelloy®) ▶ Not Applicable ▶ 316L ss, Co-Ni-Cr, or nickel alloy (equivalent to Hastelloy®) 	<ul style="list-style-type: none"> ▶ Carbon Steel, 316 ss, nickel alloy (equivalent to Hastelloy®), Monel, or pvdf (Kynar) ▶ Glass Filled ptfe (Chemloy), Viton ▶ Co-Ni-Cr, 316L ss, Gold-Plated 316L ss, nickel alloy (equivalent to Hastelloy®), Monel, or Tantalum
Reference Side Materials. (Atmospheric Pressure Side)	IGP10 Transmitter: Silicon, Pyrex, RTV, and 316 ss IAP10 Transmitter: N/A	Sensor Diaphragm: Same as specified for High Pressure side process wetted material. Cover: 316 ss
Sensor Fill Fluid	Silicone or Fluorinert	Silicone or Fluorinert
Bolts and Nuts for Process Cover and Connector	N/A	Standard Bolting: ASTM A193, Grade B7 Bolts ASTM A194, Grade 2H Nuts Optional Bolting: 316 ss, Type 17-4 ss, or B7M (NACE)
Electrical Housing and Housing Covers	Two compartments to separate electronics from field connections. Material is low copper (1% maximum) die-cast aluminum alloy with epoxy finish, or 316 ss.	
Environmental Protection	The enclosure has the dusttight and weatherproof rating of IP66 as defined by IEC 60529, and provides the environmental and corrosion resistant protection rating of NEMA 4X.	
Electronics Module	Printed wiring assemblies are conformally coated for moisture and dust protection.	
Electrical Connections	1/2 NPT (Code 1) or PG 13.5 (Code 2) entrances on both sides of electronics housing, as specified. Unused entrance must be plugged to ensure moisture and RFI protection (Aluminum or 316 ss plug supplied by Invensys).	
Mounting Position	The transmitter may be mounted in any orientation.	
Approximate Mass (Does not include seals. Refer to PSS 2A-1Z11 A for integral transmitter and seal systems)	Standard Transmitter 1.5 kg (3.3 lb) With 316 ss Housing Add 1.1 kg (2.4 lb) With LCD Indicator Option Add 0.2 kg (0.4 lb)	With Process Connectors 4.2 kg (9.2 lb) Without Process Connectors 3.5 kg (7.8 lb) With 316 ss Housing Add 1.1 kg (2.4 lb) With LCD Indicator Option Add 0.2 kg (0.4 lb)
Field Terminal Connections		

ELECTRICAL SAFETY SPECIFICATIONS

The transmitter has been designed to meet the electrical safety descriptions listed in the tables that follow. Contact Invensys for information or status of testing laboratory approvals or certifications.

Notes:

- ▶ See Model Code for availability of Electrical Safety Design Codes with particular Transmitter structures.
- ▶ Refer to applicable Instruction Manual for application conditions and connectivity requirements.
- ▶ When selecting ATEX Safety Design Code M or P, the user must permanently mark (check off in rectangle block on data plate) one type of protection only (ia and ib, d, or n). Do not change this mark once it has been applied.
- ▶ When selecting Safety Design Code W, the user must permanently mark (check off in rectangular block on data plate) intrinsically safe certifications for ATEX, CSA, or FM, as applicable. Do not change this mark once it has been applied.

Electrical Safety Specifications – IAP10 and IGP10 Transmitters

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
ATEX flameproof; II 2 GD EEx d IIC, Zone 1.	Temperature Class T6, T85°C, Ta = -40°C to +80°C.	D
ATEX intrinsically safe; II 1 GD EEx ia IIC, Zone 0.	Temperature Class T4, Ta = -40°C to +80°C.	E
ATEX protection n; II 3 GD, EEx nL IIC, Zone 2.	Temperature Class T4, Ta = -40°C to +80°C.	N
ATEX multiple certifications, ia and ib, and n. Refer to ATEX Codes E and N for details.	Applies to Codes E and N but not to Code D.	M
ATEX multiple certifications, ia and ib, d, and n. Refer to ATEX Codes D, E, and N for details.	Applies to Codes D, E, and N.	P
CSA intrinsically safe for Class I, Division 1, Groups A, B, C, and D, Class II, Division 1, Groups E, F, and G; Class III, Division 1.	Temperature Class T4A at 40°C and T3C at 85°C maximum ambient.	C
CSA explosionproof for Class I, Division 1, Groups B, C, and D, and dust-ignitionproof for Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	Maximum Ambient Temperature 85°C.	C
CSA Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.	Temperature Class T4A at 40°C and T3C at 85°C maximum ambient.	C
CSA field device zone certified flameproof Ex d IIC. Also, all certifications of Code C above.	Maximum Ambient Temperature 85°C.	B
CSA zone certified intrinsically safe Ex ia IIC, and energy limited Ex nA II.	Temperature Class T4 at 40°C and T3 at 85°C maximum ambient.	B
FM intrinsically safe for Class I, Division 1, Groups A, B, C, and D, Class II, Division 1, Groups E, F, and G; Class III, Division 1.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient.	F

Electrical Safety Specifications – IAP10 and IGP10 Transmitters (Continued)

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
FM explosionproof for Class I, Division 1, Groups B, C, and D; and dust-ignitionproof for Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	Temperature Class T6 at 80°C and T5 at 85°C maximum ambient.	F
FM nonincendive Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G, and Class III, Division 2.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient.	F
FM field device zone certified flameproof AEx d IIC. Also, all certifications of Code F above.	Temperature Class T6 at 75°C maximum ambient.	G
FM zone certified intrinsically safe AEx ia IIC.	Temperature Class T4 at 85°C maximum ambient.	G
IECEx intrinsically safe, Ex ia IIC.	Temperature Class T4, Ta = -40°C to +80°C.	T
IECEx protection n, Ex nL IIC.	Temperature Class T4, Ta = -40°C to +80°C.	U
IECEx flameproof, Ex d IIC.	Temperature Class T6, Ta = -40°C to +75°C.	V
Multi-marked for HART as follows: ATEX intrinsically safe, II 1 GD, EEx ia IIC, Zone 0. CSA intrinsically safe, Cl. I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III, Div. 1; also CSA zone certified intrinsically safe Ex ia IIC. FM intrinsically safe, Cl. I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III, Div. 1. Also FM zone certified intrinsically safe AEx ia IIC.	See application conditions for Code E intrinsically safe applications. See application conditions for Code C intrinsically safe applications. See application conditions for Code F intrinsically safe applications.	W

Electrical Safety Specifications – IAP20 and IGP20 Transmitters

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
ATEX flameproof; II 2 GD EEx d IIC, Zone 1.	Temperature Class T6, T85°C, Ta = -40°C to +80°C.	D
ATEX intrinsically safe; II 1 GD EEx ia IIC, Zone 0.	Temperature Class T4, Ta = -40°C to +80°C.	E
ATEX protection n; II 3 GD, EEx nL IIC, Zone 2.	Temperature Class T4, Ta = -40°C to +80°C.	N
ATEX multiple certifications, ia and ib, and n. Refer to ATEX Codes E and N for details.	Applies to Codes D, E, and N.	M
CSA intrinsically safe for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1.	Temperature Class T4A at 40°C and T3C at 85°C maximum ambient.	C

Electrical Safety Specifications – IAP20 and IGP20 Transmitters (Continued)

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
CSA explosionproof for Class I, Division 1, Groups B, C, and D, and dust-ignitionproof for Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	Maximum Ambient Temperature 85°C.	C
CSA Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.	Temperature Class T4A at 40°C and T3C at 85°C maximum ambient.	C
CSA field device zone certified flameproof Ex d IIC. Also, all certifications of Code C above.	Maximum Ambient Temperature 85°C.	B
CSA zone certified intrinsically safe Ex ia IIC, and energy limited Ex nA II.	Temperature Class T4 at 40°C and T3 at 85°C maximum ambient.	B
FM intrinsically safe for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient.	F
FM explosionproof for Class I, Division 1, Groups B, C, and D; and dust-ignitionproof for Class II, Division 1, Groups E, F, and G, and Class III, Division 1.	Temperature Class T6 at 80°C and T5 at 85°C maximum ambient.	F
FM nonincendive Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient.	F
FM field device zone certified flameproof AEx d IIC. Also, all certifications of Code F above.	Temperature Class T6 at 75°C maximum ambient.	G
FM zone certified intrinsically safe AEx ia IIC.	Temperature Class T4 at 85°C maximum ambient.	G
IECEX intrinsically safe, Ex ia IIC.	Temperature Class T4, Ta = -40°C to +80°C.	T
IECEX protection n, Ex nL IIC.	Temperature Class T4, Ta = -40°C to +80°C.	U
IECEX flameproof, Ex d IIC.	Applies to Version 5 electronic module. T6, Ta = 80°C; T5, Ta = 85°C Ambient Temperature -20°C to +85°C.	V
Multi-marked for HART as follows: ATEX intrinsically safe, II 1 GD, EEx ia IIC, Zone 0. CSA intrinsically safe, Cl. I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III, Div. 1; also CSA zone certified intrinsically safe Ex ia IIC. FM intrinsically safe, Cl. I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III, Div. 1. Also FM zone certified intrinsically safe AEx ia IIC.	See application conditions for Code E intrinsically safe applications. See application conditions for Code C intrinsically safe applications. See application conditions for Code F intrinsically safe applications.	W

MODEL CODE – IAP10 AND IGP10 TRANSMITTERS

MODEL CODE – IAP10 AND IGP10 TRANSMITTERS

Description				Model
I/A Series, Electronic, Direct Connected Absolute Pressure Transmitter				IAP10 (a)
I/A Series, Electronic, Direct Connected Gauge Pressure Transmitter				IGP10 (a)
Electronics Versions and Output Signal				
Intelligent; Digital HART and 4 to 20 mA dc (Version -T)				-T
Structure Code - Select from one of the following six groups:				
1. Transmitter Only (no seals)				
Process Connection	Sensor	Sensor Fill Fluid	Connection Type	
316L ss	Co-Ni-Cr	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	20
316L ss	Co-Ni-Cr	Inert	1/2 NPT External Thread, 1/4 NPT Internal Thread	21
316L ss	316L ss	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	22
316L ss	316L ss	Inert	1/2 NPT External Thread, 1/4 NPT Internal Thread	23
316L ss	Nickel alloy (s)	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	30
316L ss	Nickel alloy (s)	Inert	1/2 NPT External Thread, 1/4 NPT Internal Thread	31
2. Transmitter Prepared for Foxboro Model Coded Seals (b)				
Transmitter Prepared for Foxboro Direct Connect Seal; Silicone Fill in Sensor (c)				D1
Transmitter Prepared for Foxboro Direct Connect Seal; Inert Fill in Sensor (IGP10 only) (c)				D2
Transmitter Prepared for Foxboro Remote Mount Seal; Silicone Fill in Sensor (d)				S3
Transmitter Prepared for Foxboro Remote Mount Seal; Inert Fill in Sensor (IGP10 only) (d)				S4
3. Transmitters Prepared for non-Foxboro Seals				
Transmitter Prepared for Remote Seal; Silicone Fill in Sensor (e)				SC
Transmitter Prepared for Remote Seal; Inert Fill in Sensor (f)				SD
4. Flameproof Transmitter Only (no seals)				
Process Connection	Sensor	Sensor Fill Fluid	Connection Type	
316L ss	316L ss	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	52
316L ss	316L ss	Inert	1/2 NPT External Thread, 1/4 NPT Internal Thread	53
316L ss	Nickel alloy (s)	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	60
316L ss	Nickel alloy (s)	Inert	1/2 NPT External Thread, 1/4 NPT Internal Thread	61
Nickel alloy (s)	Nickel alloy (s)	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	62
Nickel alloy (s)	Nickel alloy (s)	Inert	1/2 NPT External Thread, 1/4 NPT Internal Thread	63
5. Flameproof Transmitter Prepared for Foxboro Model Coded Seals (b)				
Flameproof Transmitter Prepared for Direct Connect Seal; Silicone Fill in Sensor (c)				D5
Flameproof Transmitter Prepared for Direct Connect Seal; Inert Fill in Sensor (IGP10 only) (c)				D6
Flameproof Transmitter Prepared for Remote Mount Seal; Silicone Fill in Sensor (d)				S5
Flameproof Transmitter Prepared for Remote Mount Seal; Inert Fill in Sensor (IGP10 only) (d)				S6
6. Flameproof Transmitter Prepared for non-Foxboro Seals				
Flameproof Transmitter Prepared for Remote Seal; Silicone Fill in Sensor (e)				SH
Flameproof Transmitter Prepared for Remote Seal; Inert Fill in Sensor (f)				SJ
Span Limits - Absolute or Gauge Pressure Units, as Applicable				
MPa	psi	bar or kg/cm²		
0.007 and 0.21	1 and 30	0.07 and 2.1		C
0.07 and 2.1	10 and 300	0.7 and 21		D
0.7 and 21	100 and 3000	7 and 210		E
14 and 42	2000 and 6000	140 and 420 (IGP10 only)		F

MODEL CODE – IAP10 AND IGP10 TRANSMITTERS (CONTINUED)

Description	Model
Conduit Connection and Housing Material	
1/2 NPT Conduit Connection, Aluminum Housing	1
PG 13.5 Conduit Connection, Aluminum Housing (With Electrical Safety Codes E, D, M, N, and P only)	2
1/2 NPT Conduit Connection, 316 ss Housing	3
PG 13.5 Conduit Connection, 316 ss Housing (With Electrical Safety Codes E, D, M, N, and P only)	4
M20 Conduit Connection, Both Sides, Aluminum Housing (With Electrical Safety Codes E, D, M, N, and P only)	5
M20 Conduit Connection, Both Sides, 316 ss Housing (With Electrical Safety Codes E, D, M, N, and P only)	6
Electrical Safety (Also See Electrical Safety Specifications Section)	
ATEX II 1 GD, EEx ia IIC, Zone 0	E
ATEX II 2 GD, EEx d IIC, Zone 1 (g)(j)	D
ATEX II 3 GD, EEx nL IIC, Zone 2	N
ATEX Multiple Certifications (includes ATEX Codes E and N) (See Electrical Safety Specifications section for <u>user marking</u>)	
ATEX Multiple Certifications (includes ATEX Codes E, D, and N) (g)(j) (See Electrical Safety Specifications section for <u>user marking</u>)	P
CSA Certifications: (h) Division 1 intrinsically safe, explosionproof, dust-ignitionproof Zone certified Ex ia IIC and energy limited Ex nA II Division 2, Classes I, II, and III	C
CSA zone certified flameproof Ex d IIC; also all certifications of Code C above (g)(j)	B
FM Approvals: (h) Division 1 intrinsically safe, explosionproof, dust-ignitionproof Zone approved AEx ia IIC Division 2 nonincendive, Classes I, II, and III	F
FM approved flameproof AEx d IIC; also all approvals of Code F above (g)(j)	G
IECEX intrinsically safe, Ex ia IIC	T
IECEX protection n, Ex nL IIC	U
IECEX flameproof, Ex d IIC (g)(j)	V
Multi-marked for ATEX, CSA, and FM Intrinsically Safe Applications only (q)	W
Optional Selections	
Mounting Bracket Set (i)	
Painted Steel Bracket with Plated Steel Bolts, 1/2 NPT (with Conduit Connection Codes 1 and 3 only)	-M1
Stainless Steel Bracket with Stainless Steel Bolts, 1/2 NPT (with Conduit Connection Codes 1 and 3 only)	-M2
Painted Steel Bracket with Plated Steel Bolts, PG 13.5 (with Conduit Connection Codes 2 and 4 only)	-M3
Stainless Steel Bracket with Stainless Steel Bolts, PG 13.5 (with Conduit Connection Codes 2 and 4 only)	-M4
Painted Steel Bracket with Plated Steel Bolts, M20 (with Conduit Connection Codes 5 and 6 only)	-M5
Stainless Steel Bracket with Stainless Steel Bolts, M20 (with Conduit Connection Codes 5 and 6 only)	-M6
Digital Indicator with Pushbuttons	
Digital Indicator, Pushbuttons, and Window Cover	-L1
Vent Screw and Block & Bleed Valve	
316 ss Vent Screw in Process Connection (Not with Structure Codes 32 or 33, or Pressure Seals)	-V1
Block and Bleed Valve, Carbon Steel (Not with Pressure Seals)	-V2
Block and Bleed Valve, 316 ss (Not with Pressure Seals)	-V3
Block and Bleed Valve, 316 ss w/Monel Trim (Not with Pressure Seals)	-V4

MODEL CODE – IAP10 AND IGP10 TRANSMITTERS (CONTINUED)

Description	Model
Conduit Thread Adapters	
Hawke-Type 1/2 NPT Cable Gland for use with Conduit Connection Codes 1 and 3 only (l)	-A1
Plastic PG 13.5 Cable Gland for use with Conduit Connection Codes 2 and 4 only (m)	-A2
M20 Connector for use with Conduit Connection Codes 1 and 3 only (l)	-A3
Brass PG 13.5 Cable Gland (Trumpet-Shaped) for use with Conduit Connection Codes 2 and 4 only (m)	-A4
Electronics Housing Features	
External Zero Adjustment	-Z1
Custody Transfer Lock and Seal	-Z2
External Zero Adjustment and Custody Transfer Lock and Seal	-Z3
Custom Factory Configuration	
Full Factory Configuration (Requires Configuration Form to be filled out)	-C2
Cleaning and Preparation	
Unit Degreased - for Silicone Filled Sensors Only (Not for Oxygen/Chlorine Service, Option -V1, or Pressure Seals)	-X1
Cleaned and Prepared for Oxygen Service - for Inert Filled Sensors Only (Not with Option -V1, or Pressure Seals)	-X2
Cleaned and Prepared for Chlorine Service - with Structure Code 33 Only (Not with Option -V1, or Pressure Seals)	-X3
SIL2 Transmitters	
SIL2-Certified HART Transmitter	-S2
Instruction Books (Common MI, Brochure, and Full Documentation Set on CD-ROM is Standard)	
Without Instruction Book and CD - Only "Getting Started" Brochure is supplied	-K1
Miscellaneous Optional Selections	
G 1/2 B Manometer Process Connection (Not Available with Option -V1 or Pressure Seals)	-G
Low Temperature Operative Limit of Electronics Housing Extended Down to -50°C (-58°F) (r)	-J
Not available with sensors and seals with Inert fill; Structure Codes 78 and 79; and DIN Options -D2, -D4, -D6, and -D8 (n)	
R 1/2 Process Connection (1/2 NPT to R 1/2 Adapter) (p)	-R
Supplemental Customer Tag (Stainless Steel Tag wired onto Transmitter)	-T

- (a) Refer to PSS 2A-1C13 F for very high GP versions with upper range limits of 52, 105, and 210 MPa (7500, 15000, and 30000 psi). Refer to PSS 2A-1C13 K and PSS 2A-1C13 L for AP and GP versions for sanitary and pulp/paper industries, respectively.
- (b) Both transmitter and pressure seal Model Numbers are required. Refer to PSS 2A-1Z11 A for pressure seal Model Codes.
- (c) Direct Connect Seal Models that may be specified are PSTAD, PSFAD, and PSISD.
- (d) Remote Mount Seal Models that may be specified are PSFPS, PSFES, PSFAR, PSTAR, PSISR, PSSCR, and PSSSR.
- (e) For transmitters with Silicone fill prepared for remote seal by others, specify Structure Code 22 or 52.
- (f) For transmitters with Inert fill prepared for remote seal by others, specify Structure Code 23 or 53.
- (g) Electrical Safety Codes B, D, G, V, and P are only available with flameproof transmitter Structure Codes 52, 53, 60, 61, 62, 63, D5, D6, S5, S6, SH, and SJ.
- (h) Electrical Safety Codes C and F are not available with flameproof transmitter Structure Codes 52, 53, 60, 61, 62, 63, D5, D6, S5, S6, SH, and SJ.
- (i) A cover lock is provided as standard with Electrical Safety Codes B, D, G, V, and P.
- (k) Mounting sets not offered with direct mounted seals, except if a direct mounted PSTAD threaded seal with a 1/4 NPT process connection is used, then a mounting set is recommended.
- (l) Available with Electrical Safety Codes E, D, M, N, and P only.
- (m) Available with Electrical Safety Code E only.
- (n) Not available with Inert fill in sensor or seal.
- (p) Not available with pressure seals, or nickel alloy sensors.
- (q) For multi-marking details, see Electrical Safety Specifications section.
- (r) -50°C indicates sensor and electronics ambient temperature capabilities. Performance is not assured below -29°C. Sensor damage may occur if process is frozen.
- (s) Equivalent to Hastelloy®.

MODEL CODE – IAP20 AND IGP20 TRANSMITTERS

Description	Model
I/A Series, Electronic, Bracket-Mounted Absolute Pressure Transmitter	IAP20
I/A Series, Electronic, Bracket-Mounted Gauge Pressure Transmitter	IGP20
Electronics Versions and Output Signal	
Intelligent; Digital HART and 4 to 20 mA dc (Version -T)	-T
Structure Code - Select from one of the following three groups:	
1. Transmitter	
Hi-Side Cover	
Sensor	
Fill Fluid	
Steel	Co-Ni-Cr
Steel	Co-Ni-Cr
Steel	316L ss
Steel	316L ss
Steel	Nickel alloy (q)
Steel	Nickel alloy (q)
316 ss	Co-Ni-Cr
316 ss	Co-Ni-Cr
316 ss	316L ss
316 ss	316L ss
316 ss	316L ss, Gold Plated
316 ss	Monel
316 ss	Monel
316 ss	Nickel alloy (q)
316 ss	Nickel alloy (q)
Monel	Monel
Monel	Monel
Nickel alloy (q)	Nickel alloy (q)
Nickel alloy (q)	Nickel alloy (q)
Nickel alloy (q)	Tantalum
Nickel alloy (q)	Tantalum
2. Transmitter Prepared for Foxboro Model Coded Seals (b)	
Transmitter Prepared for Remote Seal on HI Side; Silicone fill in sensor	S3 (c)
Transmitter Prepared for Remote Seal on HI Side; Inert fill in sensor (IGP20 only)	S4 (c)
Transmitter Prepared for PSFLT, PSSCT, or PSSST Seal, HI Side; Silicone fill in sensor (IGP20 only)	F1
Transmitter Prepared for PSFLT, PSSCT, or PSSST Seal, HI Side; Inert fill in sensor (IGP20 only)	F2
3. Transmitter Prepared for non-Foxboro Seals	
Transmitter Prepared for Remote Seal; Silicone Fill in Sensor	SC
Transmitter Prepared for Remote Seal; Inert Fill in Sensor	SD
Span Limits (Absolute or Gauge Pressure Units)	
kPa	
0.12 and 7.5	A (d)
0.87 and 50	B
MPa	
0.007 and 0.21	C
0.07 and 2.1	D
0.7 and 21	E (e)
1.38 and 35	F (e)

MODEL CODE – IAP20 AND IGP20 TRANSMITTERS (CONTINUED)

Description	Model
Process Connector Type (Material Same as Process Cover Material)	
None; connect directly to process cover (not available with Structure Codes 78 and 79)	0
1/4 NPT (not available with Structure Codes 46, 47, 48, 49, 78, 79)	1
1/2 NPT (not available with Structure Codes 78, 79)	2
Rc 1/4 (not available with Structure Codes 46, 47, 48, 49, 78, 79)	3
Rc 1/2 (not available with Structure Codes 78, 79)	4
1/2 Schedule 80 Welding Neck (not available with Structure Codes 46, 47, 48, 49, 78, 79)	6
None; pvdf (Kynar) insert tapped for 1/2 NPT on side of 316 ss Process Cover (only with Codes 78/79)	7
Conduit Connection and Housing Material	
1/2 NPT Conduit Connection, Aluminum Housing	1
PG 13.5 Conduit Connection, Aluminum Housing (With Electrical Safety Codes E, D, M, and N only)	2
1/2 NPT Conduit Connection, 316 ss Housing	3
PG 13.5 Conduit Connection, 316 ss Housing (With Electrical Safety Codes E, D, M, and N only)	4
M20 Conduit Connection, Both Sides, Aluminum Housing	5
M20 Conduit Connection, Both Sides, 316 ss Housing	6
Electrical Safety (Also see Electrical Safety Specifications section)	
ATEX II 1 GD, EEx ia IIC, Zone 0	E
ATEX II 2 GD, EEx d IIC, Zone 1 (n)	D
ATEX II 3 GD, EEx nL IIC, Zone 2	N
ATEX Multiple Certifications (includes ATEX Codes E, D, and N) (n) (See Electrical Safety Specifications section for <u>user marking</u>)	M
CSA Certifications:	C
Division 1 intrinsically safe, explosionproof, dust-ignitionproof	
Zone certified Ex ia IIC and energy limited Ex nA II	
Division 2, Classes I, II, and III	
CSA zone certified flameproof Ex d IIC; also all certifications of Code C above (h)	B
FM Approvals:	F
Division 1 intrinsically safe, explosionproof, dust-ignitionproof	
Zone approved AEx ia IIC	
Division 2 nonincendive, Classes I, II, and III	
FM approved flameproof AEx d IIC; also all approvals of Code F above (h)	G
IECEX intrinsically safe, Ex ia IIC	T
IECEX protection n, Ex nL IIC	U
IECEX flameproof, Ex d IIC	V
Multi-marked for ATEX, CSA, and FM Intrinsically Safe Applications only (p)	W
Optional Selections	
Mounting Bracket Set - Not available with Direct Connect Seals, Structure Codes F1 and F2	
Standard Style Painted Steel Bracket with Plated Steel Bolts	-M1
Standard Style Stainless Steel Bracket with Stainless Steel Bolts	-M2
Universal Style Stainless Steel Bracket with Stainless Steel Bolts	-M3
Digital Indicator with Pushbuttons	
Digital Indicator, Pushbuttons, and Window Cover	-L1

MODEL CODE – IAP20 AND IGP20 TRANSMITTERS (CONTINUED)

Description	Model				
<table border="0"> <tr> <td>Process Cover Type</td> <td>Cover Screw Material</td> <td>Cover Screw Size</td> <td>Connector Screw Material</td> </tr> </table>	Process Cover Type	Cover Screw Material	Cover Screw Size	Connector Screw Material	
Process Cover Type	Cover Screw Material	Cover Screw Size	Connector Screw Material		
Single Ended (f)	-D1				
Double Ended (f)(g) (Blind Kidney Flange on back)	-D2				
Single Ended	-D3				
Double Ended (f)(g) (Blind Kidney Flange on back)	-D4				
Single Ended (f)	-D5				
Double Ended (f)(g) (Blind Kidney Flange on back)	-D6				
Single Ended	-D7				
Double Ended (f)(g) (Blind Kidney Flange on back)	-D8				
Cleaning and Preparation - Not Available with Gold-Plated Sensor, Structure 2G (h)					
Unit Degreased - for Silicone Filled Sensors Only (Not for Oxygen/Chlorine/Other Fluids that may react with Silicone)	-X1				
Cleaned and Prepared for Oxygen Service - for Inert Filled Sensors Only (Not available with Carbon Steel Covers or with Silicone Filled Sensors)	-X2				
Cleaned and Prepared for Chlorine Service - for Inert Filled Sensors Only (i) (Not available with Carbon Steel Covers or with Silicone Filled Sensors)	-X3				
Bolting for Process Covers/Connectors (j)					
316 ss Bolts and Nuts (Pressure Derated) (f)	-B1				
17-4 ss Bolts and Nuts (i)	-B2				
B7M Bolts and Nuts (NACE)(Pressure Derated) (f)	-B3				
Conduit Thread Adapters					
Hawke-Type 1/2 NPT Cable Gland for use with Conduit Connection Codes 1 and 3 (k)	-A1				
Plastic PG 13.5 Cable Gland for use with Conduit Connection Codes 2 and 4 (l)	-A2				
M20 Connector for use with Conduit Connection Codes 1 and 3 (k)	-A3				
Brass PG 13.5 Cable Gland (Trumpet-Shaped) for use with Conduit Connection Codes 2 and 4 (l)	-A4				
Electronics Housing Features					
External Zero Adjustment	-Z1				
Custody Transfer Lock and Seal	-Z2				
External Zero Adjustment and Custody Transfer Lock and Seal	-Z3				
Custom Factory Configuration					
Full Factory Configuration (Requires Configuration Form to be filled out)	-C2				
Tube Connectors - Specify Only One (Only 316 ss process covers; no side vents on cover) (h)					
Steel, Connecting 6 mm Tubing to 1/4 NPT Process Connector	-E1				
Steel, Connecting 12 mm Tubing to 1/2 NPT Process Connector	-E2				
316 ss, Connecting 6 mm Tubing to 1/4 NPT Process Connector	-E3				
316 ss, Connecting 12 mm Tubing to 1/2 NPT Process Connector	-E4				
Gaskets					
Gasket for Vacuum Service with Pressure Seals (m)	-G1				

MODEL CODE – IAP20 AND IGP20 TRANSMITTERS

MODEL CODE – IAP20 AND IGP20 TRANSMITTERS (CONTINUED)

Description	Model
SIL2 Transmitters	
SIL2-Certified Transmitter	-S2
Instruction Books (Common MI, Brochure, and Full Documentation Set on CD-ROM is Standard)	
Without Instruction Book and CD - Only "Getting Started" Brochure is supplied	-K1
Miscellaneous Optional Selections	
Low Temperature Operative Limit of Electronics Housing Extended Down to -50°C (-58°F) (r)	-J
Not available with sensors and seals with Inert fill, Structure Codes 78 and 79, or DIN Options -D2, -D4, -D6, and -D8	
Vent Screw in side of Process Cover (with 316 ss process covers only)	-V (h)
Not available with seals, DIN construction options, or Structure Codes 78 and 79	
Supplemental Customer Tag (Stainless Steel Tag wired onto Transmitter)	-T
Examples: IGP20-T20B21F-M1Z2; IAP20-TS3C11F-T	

- (a) Maximum overrange pressure is 2.1 MPa (300 psi); temperature limits are -7 and +82°C (20 and 180°F).
- (b) Transmitter and Pressure Seal Model Codes are both required. See PSS 2A-1Z11 A for the various pressure seal model codes.
- (c) Remote Seal Models that may be specified are PSFPS, PSFES, PSFAR, PSTAR, PSISR, PSSCR, and PSSSR.
- (d) Span Limit Code A is not available with pressure seals (Structure Codes F1, F2, S3, S4, SC, SD).
- (e) Span Limit Codes E and F not available with Structure Codes 78 and 79 (pdf insert in HI Side Cover).
- (f) Pressure derated. See derating table in specifications section.
- (g) Temperature limits derated to 0 and 60°C (32 and 140°F). Also Mounting Sets -M1 and -M2 not available.
- (h) Not available when Remote Mount or Direct Connect Pressure Seals are specified.
- (i) When -X3 is specified, the standard bolting is replaced with 17-4 ss bolts and nuts. Therefore, there is no need to specify Option -B2 when selecting the Chlorine Service Option -X3.
- (j) Not available with DIN construction options. For stainless steel bolts with DIN construction, specify -D5 to -D8, as required.
- (k) Available with Electrical Safety Codes E, D, M, and N only.
- (l) Available with Electrical Safety Code E only.
- (m) Standard offering with IAP20 Transmitters with pressure seals. However, -G1 is a required option with IGP20 Transmitters when pressure seal (Structure Codes S3, S4, F1, F2, SC, and SD) will be used in vacuum applications. This option substitutes vacuum service metal gasket for standard ptfе process cover gasket.
- (n) A cover lock is provided as standard with Electrical Safety Codes D, B, G, and M.
- (p) For multi-marking details, see Electrical Safety Specifications section.
- (q) Equivalent to Hastelloy®.
- (r) -50°C indicates sensor and electronics ambient temperature capabilities. Performance is not assured below -29°C. Sensor damage may occur if process is frozen.

SUGGESTED RFQ SPECIFICATIONS

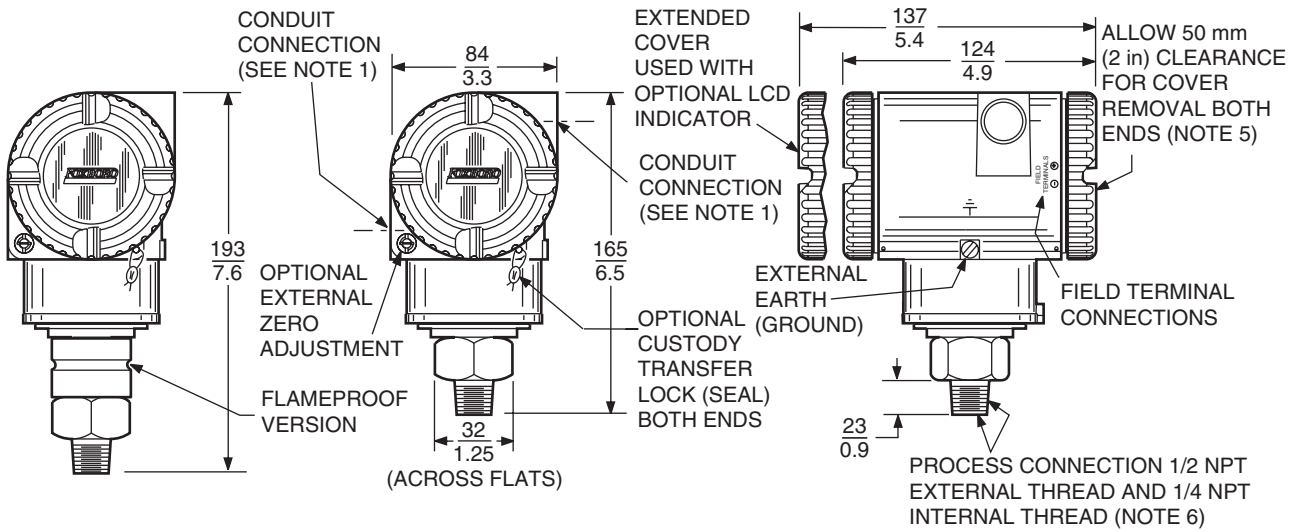
The manufacturer shall provide direct connected or bracket mounted pressure transmitters featuring remote digital communications capability for measuring absolute or gauge pressure and transmitting a 4 to 20 mA output with a superimposed HART digital signal for use in a standard two-wire dc supply voltage system. These transmitters shall also be provided (as required) with direct connect pressure seals, or remote mount capillary connected pressure seals. The specifications for these transmitters are as follows:

Communication Protocol:	HART, 4 to 20 mA dc, and digital output signal.
Remote Communications:	Must not interfere with output.
Accuracy:	Digital Output: $\pm 0.050\%$ of calibrated span. 4 to 20 mA Output: $\pm 0.060\%$ of calibrated span.
RFI Protection:	0.1% error between 27 and 1000 MHz at 30 V/m field intensity
Proof Pressure:	120, 1200, 11 500, or 22 000 psi for direct connected transmitters; 27 250 psi for bracket mounted transmitters, as specified.
Span Limits:	From 1 to 6000 psi for standard direct connected transmitters; and from 0.5 inH ₂ O to 5000 psi for standard bracket mounted transmitters, as specified; or SI and Metric equivalents.
Electronics Housing:	IEC IP66 (NEMA 4X); 316 ss or aluminum housing with Epoxy finish; two compartments (field wiring and electronics); housing sealed with O-rings for double protection against moisture or other contaminants.
Modular Electronics:	Easily replaceable modular electronics; optional integral LCD Digital Indicator with on-board configuration pushbuttons.
Mounting:	Direct to process or bracket mounted to pipe or surface.
Process Connection:	IAP10/IGP10 Transmitters: Direct to process piping or pressure seal with 1/2 NPT; optional Rc 1/2 or G 1/2 B external threads to process piping. Internal 1/4 NPT thread also provided as plumbing connection to process; or prepared for a direct connect seal or capillary connected seal. IAP20/IGP20 Transmitters: Used with process connectors to accept 1/4 NPT, 1/2 NPT, Rc 1/4, Rc 1/2, Schedule 80 welding neck; or a pvdf insert (tapped for 1/2 NPT) in Hi side process cover is used as process connection. Process connection can also be prepared to accept a direct connect seal; or prepared for a remote capillary connected seal.
Process Cover Materials Available:	Applicable to IAP20/IGP20 transmitters only. Industry Standard 316 ss, Carbon Steel, Monel, and nickel alloy (equivalent to Hastelloy®).
Sensor Materials:	Co-Ni-Cr, 316L ss, and nickel alloy (equivalent to Hastelloy®) for IAP10/IGP10 transmitters; and Co-Ni-Cr, 316L ss, nickel alloy (equivalent to Hastelloy®), Monel, Tantalum, and Gold-Plated 316L ss for IAP20/IGP20 transmitters.
Electrical Classification:	Nonincendive for Class I and Class II, Division 2 locations; intrinsically safe or explosionproof for Class I and Class II, Division 1 locations. Versions available to meet Agency flameproof and zone requirements; comply with applicable European Union Directives.
Approximate Mass:	Direct Connected Transmitter: 1.5 kg (3.3 lb) Bracket-Mounted Transmitter: 3.5 kg (7.8 lb) without process connector 4.2 kg (9.2 lb) with process connector With 316 ss Electronics Housing: Add 1.1 kg (2.4 lb) With Optional LCD Indicator: Add 0.2 kg (0.4 lb) With Pressure Seals: See PSS 2A-1Z11 A
Model Code:	I/A Series IGP10 or IAP10 Direct Connected Gauge or Absolute Pressure Transmitters; or IGP20 or IAP20 Bracket Mounted Gauge or Absolute Pressure Transmitters; all with HART Communication Protocol; with or without pressure seals; or equivalent.

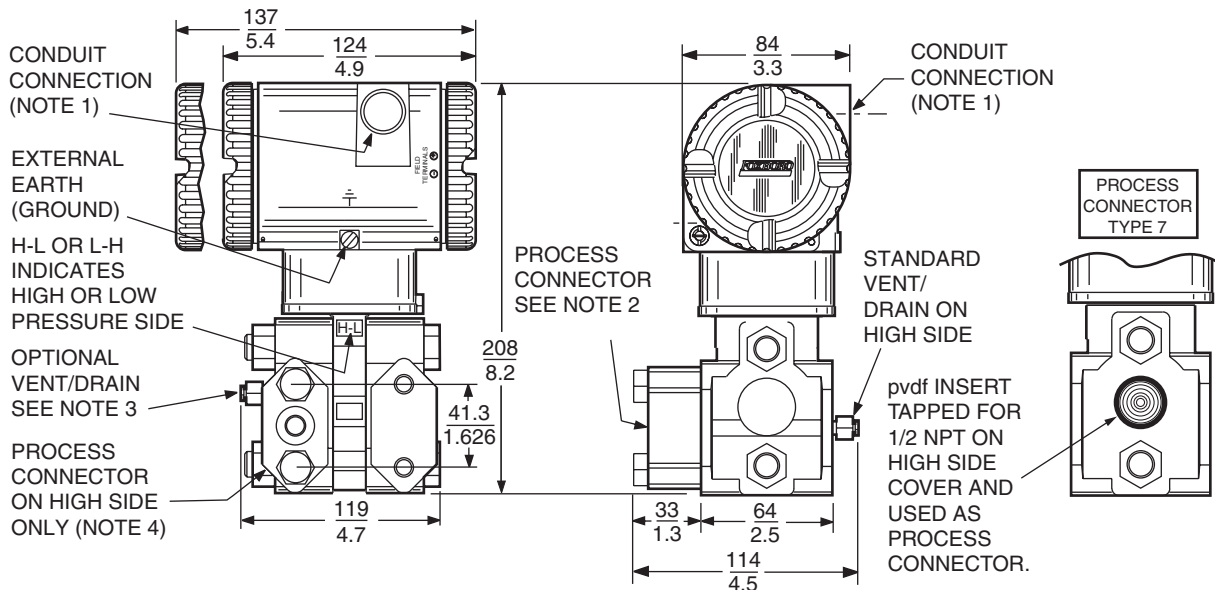
DIMENSIONS – NOMINAL

IAP10 AND IGP10 DIRECT CONNECTED TRANSMITTERS

mm
in



IAP20 AND IGP20 BRACKET MOUNTED TRANSMITTERS

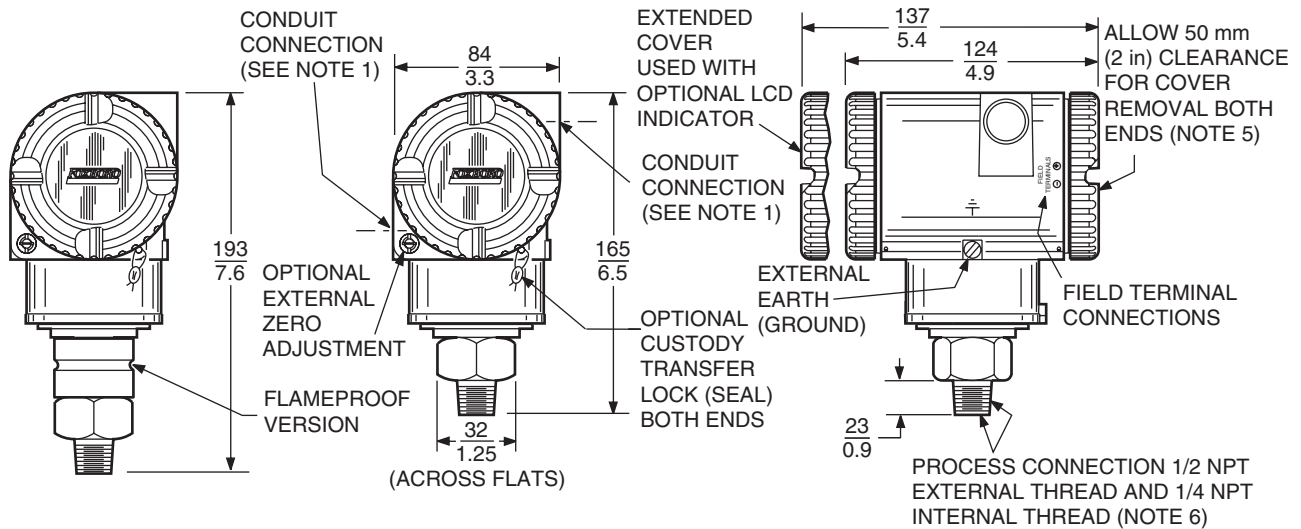


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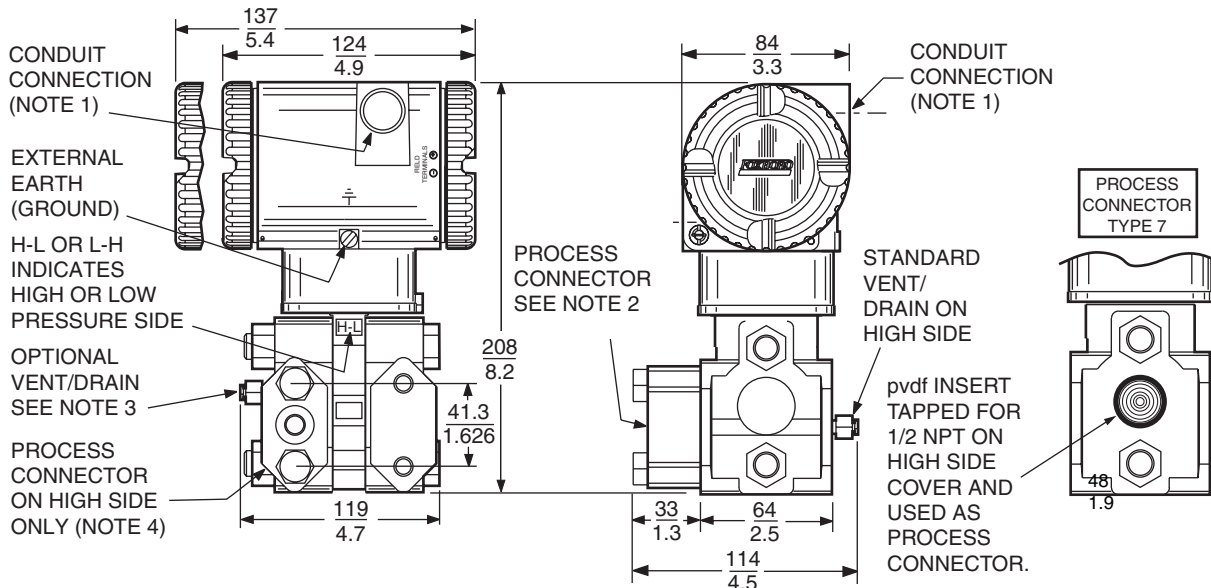
1. CONDUIT CONNECTION 1/2 NPT, PG 13.5, OR M20, BOTH SIDES : PLUG UNUSED CONNECTION WITH METAL PLUG (SUPPLIED).
2. PROCESS CONNECTOR CAN BE REMOVED AND CONNECTION MADE DIRECTLY TO PROCESS COVER USING 1/4 NPT INTERNAL THREAD IN PROCESS COVER. NOTE THAT WITH PROCESS CONNECTION CODE "0", THERE IS NO CONNECTOR.
3. PROCESS COVER CAN BE INVERTED MAKING OPTIONAL SIDE VENT A SIDE DRAIN.
4. FOR USERS WHO DESIRE THE PROCESS CONNECTOR ON THE RIGHT SIDE, MERELY ROTATE TRANSMITTER 180° AND RELOCATE PROCESS CONNECTOR SHOWN TO THE RIGHT SIDE.
5. TOPWORKS ROTATABLE TO ANY POSITION WITHIN ONE TURN COUNTERCLOCKWISE OF FULLY TIGHTENED POSITION.
6. DO NOT USE THE 1/4 NPT INTERNAL THREAD TO DIRECT-CONNECT THE TRANSMITTER.

IAP10 AND IGP10 DIRECT CONNECTED TRANSMITTERS

mm
in



IAP20 AND IGP20 BRACKET MOUNTED TRANSMITTERS



NOTES

1. CONDUIT CONNECTION 1/2 NPT, PG 13.5, OR M20, BOTH SIDES : PLUG UNUSED CONNECTION WITH METAL PLUG (SUPPLIED).
2. PROCESS CONNECTOR CAN BE REMOVED AND CONNECTION MADE DIRECTLY TO PROCESS COVER USING 1/4 NPT INTERNAL THREAD IN PROCESS COVER. NOTE THAT WITH PROCESS CONNECTION CODE "0", THERE IS NO CONNECTOR.
3. PROCESS COVER CAN BE INVERTED MAKING OPTIONAL SIDE VENT A SIDE DRAIN.
4. FOR USERS WHO DESIRE THE PROCESS CONNECTOR ON THE RIGHT SIDE, MERELY ROTATE TRANSMITTER 180° AND RELOCATE PROCESS CONNECTOR SHOWN TO THE RIGHT SIDE.
5. TOPWORKS ROTATABLE TO ANY POSITION WITHIN ONE TURN COUNTERCLOCKWISE OF FULLY TIGHTENED POSITION.
6. DO NOT USE THE 1/4 NPT INTERNAL THREAD TO DIRECT-CONNECT THE TRANSMITTER.

NOTES

ORDERING INSTRUCTIONS

1. Model Number(s) as follows:
 - ▶ Transmitter only if pressure seals are not selected
 - ▶ Both transmitter and pressure seal if pressure seal is selected. See PSS 2A-1Z11 A.
2. Calibrated Pressure Range (using allowable pressure units from the table below).

inH ₂ O	inHg	kPa	mbar	kg/cm ²
ftH ₂ O	mmHg	MPa	bar	psi
mmH ₂ O	Pa	torr	g/cm ²	atm
mH ₂ O	–	–	–	–

 - (a) Absolute or gauge pressure units, as applicable. The suffix (a) is added to the unit to indicate absolute pressure; e.g., psia, MPaa.
3. Configuration Data Form when Factory Calibration Option -C2 is specified.
4. If Option -S2 (SIL-Certified HART Transmitter) is selected, a copy of the certification can be provided by specifying AS Code CERT-L.
5. Options and Accessories not in Model Code (see PSS 2A-1Z9 E).
6. User Tag Data – Data Plate; 32 characters maximum. For additional tag data, specify Optional Supplemental Tag -T.
7. User Tag Data – Software (Database); 8 characters maximum (user configured).

OTHER M&I PRODUCTS

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

www.iom.invensys.com