I/A Series® Electronic Pressure Transmitters Model IGP10 Gauge Pressure Transmitter for High Gauge Pressure Measurement

These two-wire transmitters provide precise, reliable measurement of high gauge pressures, and provide a digital or analog output signal for local or remote configuration, monitoring, and control.

FEATURES

- Gauge pressure ranges to 52, 105, or 210 MPa (7500, 15000, or 30000 psi).
- Digital output versions with either FoxCom™, HART, or FOUNDATION Fieldbus communication protocol.
- Analog output version can be either 4 to 20 mA, or 1 to 5 V dc for low power installations.
- Fieldbus version FISCO/FNICO compliant.
- SIL-Certified transmitter offered as an option for HART versions.
- Aluminum housing has durable, corrosion-resistant epoxy finish; 316 ss housing also available; both meet NEMA 4X and IEC IP66.
- Stainless steel or Inconel wetted sensor for 105 MPa (15 000 psi) transmitters, or high strength 13-8 Molybdenum stainless steel for 210 MPa (30 000 psi) transmitters.
- Silicon strain gauge sensors successfully field-proven in many thousands of installations.
- Welded, stainless steel pressure capsule assembly with bonded strain gauge sensor provides an airtight and watertight seal and intrinsic overpressure protection.
- Complies with NAMUR NE 21 Interference Immunity Requirement, and NAMUR 105 overrange and underrange annunciations.
- CE marked; complies with applicable EMC, ATEX, and PED European Directives.
- Meets numerous Agency requirements for hazardous area locations. Versions available to meet Agency zone requirements.
- Many options and accessories offered to expand the capabilities of these transmitters.
- Standard 5-year warranty.

invensys®
FOXBORO®

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. The family additionally includes transmitters, also with common topworks, specifically for use in sanitary, and pulp and paper processes.

Select the electronics module you need to provide just the right level of intelligence for your application and budget. If your needs change, the modular design allows easy migration to standards including FoxCom, HART, FOUNDATION Fieldbus, and Analog 4 to 20 mA or 1 to 5 V dc.

DIGITAL OUTPUT VERSIONS

Electronics versions with a digital output include transmitters with FoxCom, HART, or FOUNDATION Fieldbus (FISCO/FNICO compliant) communication protocols.

Digital FoxCom or 4 to 20 mA dc (Version -D Electronics)

FoxCom Digital Output

Provides Measurement Integration with I/A Series systems, transmission of multiple measurements, and workstation configuration and diagnostics. Also provides digital communications with a PC-based Configurator or optional LCD Indicator with pushbuttons for local configuration and calibration.

FoxCom 4 to 20 mA Output

Allows direct analog connection to common receivers while still providing full Intelligent Transmitter Digital Communications with a PC-based Configurator, applicable I/A Series system FBMs, or optional LCD Indicator with pushbuttons for configuration and calibration.

Digital HART and 4 to 20 mA dc (Version -T Electronics)

4 to 20 mA with HART communications. Allows direct analog connection to common receivers while still providing full Intelligent Digital Communications using a HART Communicator or PC-based Configurator.

Users having HART Communicators for other devices can have them upgraded with Foxboro software to accommodate these transmitters. Also, Invensys Process Systems will make use of the HART Foundation library of registered DDs and reload the Communicator if the user desires to keep another supplier's DD along with the Foxboro DD.

DIGITAL FOUNDATION Fieldbus - FISCO/FNICO Compliant (Version -F Electronics)

This all digital, serial, two-way communication system interconnects field devices, such as transmitters, actuators, and controllers. It is a Local Area Network (LAN) with built-in capability to distribute control application across the network. Fieldbus technology consists of a Physical Layer, a Communication Stack, and User Application Blocks. The communication stack includes an LAS (Link Access Scheduler), and the user application software blocks include AI (Analog Input) and PID (Proportional/Integral/Derivative) function blocks. Interoperability of fieldbus devices is achieved using device addresses (IDs) and device descriptions (DDs).

ANALOG OUTPUT VERSIONS

Analog output versions include transmitters with 4 to 20 mA dc and 1 to 5 V dc output signals.

4 to 20 mA dc Analog Output (Version -A Electronics)

Version -A transmitters are the most cost effective analog output transmitters available providing full configuration capability. They represent Invensys Foxboro advancements in providing the greatest functionality for the largest number of applications at the least possible cost to you.

These transmitters even provide the ability to rerange to new calibrated ranges, using the standard LCD Indicator with on-board pushbuttons, without the need to apply calibration pressure.

They are explosionproof for use in Division 1 hazardous areas, and comply with Division 2 requirements.

1 to 5 V dc Analog Output (Version -V Electronics)

These low power, low voltage transmitters are both explosionproof and intrinsically safe and provide a standard LCD Indicator with on-board pushbuttons for configuration and calibration. They provide:

- 1 to 5 V dc Output Signal
- 9 V dc Minimum Voltage
- 3 mA maximum current

HIGH PERFORMANCE

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

OPTIONAL SIL TRANSMITTERS WITH HART PROTOCOL

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.” SIL 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 SIL-certified HART Transmitter. A copy of the certification is available via Auxiliary Specification (AS) Code CERT-L.

ALL WELDED PRESSURE CAPSULE ASSEMBLY

All welded, stainless steel exterior pressure capsule assembly surfaces provide an airtight and watertight bottomworks ideal for corrosive environments. The capsule assembly features a bonded foil strain gauge sensor. The intrinsic overpressure protection in this design eliminates sensor damage when exposed to high pressure surges.

DEPENDABLE AND EFFICIENT DESIGN

- Silicon Strain Gauge Technology has been Field-Proven in Hundreds of Thousands of Successful Applications.
- Simple, Elegant Packaging uses a Minimum of Parts to Achieve Exceptionally High Reliability.

DIRECT PROCESS MOUNTING

Because of their light weight, these transmitters can be directly connected to the process piping without mounting brackets. However, for unique requirements, an optional mounting bracket is offered, and an interconnection to the process can be made using the transmitter process connection selected.

COMPLIANCE WITH EUROPEAN UNION DIRECTIVES

- Complies with Electromagnetic Compatibility Requirements of European EMC Directive 89/336/EEC by conforming to the following CENELEC and IEC Standards: EN 50081-2, EN 50082-2, EN 61326, and IEC 61000-4-2 through 61000-4-6.
- Complies with NAMUR NE 21 Interference Immunity Requirement (EMC), and NAMUR 105 overrange and underrange annunciations.
- Complies with all Applicable European Union Directives (“CE” Logo marked on product).

EXPLOSIONPROOF DESIGN

Transmitter meets numerous agency requirements for hazardous area locations. Versions available to meet Agency flameproof and zone requirements.

EASE OF INSTALLATION

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

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

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

LCD INDICATOR (FIGURE 1)

A two-line indicator with pushbuttons displays the measurement with a choice of units. The pushbuttons allow zero and span adjustments as well as local configuration without the need for a PC-based Configurator. This indicator is optional with the Digital Output transmitters, and standard with the Analog Output transmitters. When used with Analog Output transmitters, if local process indication is not required or desired, an optional blind (solid) cover can be substituted for the standard window cover.

NOTE

When an LCD Indicator is used, ensure that the URV (upper range value) in the selected pressure units does not exceed the character capacity on the top line of the display; i.e., five numeric characters, or four with the analog output transmitters. This is especially important with analog output transmitters (Versions -A and -V) since the LCD must be used for URV entry.

Figure 1. Topworks with LCD Indicator

FUNCTIONAL SPECIFICATIONS

Span and Range Limits

Span Limit Code	Span Limits			Range Limits (Gauge Pressure Units)		
	MPa	psi	bar or kg/cm^2	MPa	psi	bar or kg/cm^2
K	17 and 52	2500 and 7500	175 and 525	0 and 52	0 and 7500	0 and 525
G	35 and 105	5000 and 15 000	350 and 1050	0 and 105	0 and 15 000	0 and 1050
H	70 and 210	10 000 and 30 000	700 and 2100	0 and 210	0 and 30 000	0 and 2100

Maximum Overrange Pressure Rating

Span Limit Code	Maximum Overrange Pressure(a)		
	MPa	psi	bar or kg/cm^2
K	79	11250	775
G	137	19 500	1365
H	231	33 000	2310

(a) Maximum overrange pressure is the maximum pressure that may be applied without causing damage to the transmitter. The ratings are in gauge pressure units.

Output Signal (as specified)

VERSION -D ELECTRONICS
Digital FoxCom and/or 4 to 20 mA dc, configurable
VERSION -T ELECTRONICS
Digital HART and 4 to 20 mA dc
VERSION -F ELECTRONICS
Digital FOUNDATION Fieldbus
VERSION -A ELECTRONICS
Analog 4 to 20 mA dc
VERSION -V ELECTRONICS
Analog 1 to 5 V dc, Low Power

Adjustable Damping

VERSIONS -D, -T, AND -F ELECTRONICS
Transmitter response time is normally 0.75 s, and electronically adjustable to 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 a 63.2% recovery, 0.5 s with Sensor Codes K, G, and H.) Damping can be set in both the transducer and AI blocks with the -F version. Additional damping is available using the LCD Indicator.
VERSIONS -A AND -V ELECTRONICS
Transmitter response time is normally 0.75 s, and electronically adjustable to 0 (none), 2, 4, or 8 seconds, whichever is greater, for a 90% recovery from an 80% input step as defined in ANSI/ISA S51.1. (For a 63.2% recovery, 0.5 s with both Sensor Codes K, G, and H.)

Suppressed Zero

Suppressed zero ranges are acceptable as long as the Span and Range Limits are not exceeded.

Zero and Span Adjustments

These adjustments can be initiated from the I/A Series Workstation (with applicable FBMs), the PC-based Configurator, or the LCD Indicator with on-board pushbuttons.

Zeroing for Nonzero-Based Ranges for FoxCom and HART Versions Only

Dual Function Zeroing is provided to allow zeroing with the transmitter open to atmosphere, even when there is a nonzero-based range. This greatly simplifies position effect zeroing on many pressure and level applications. It also applies to the LCD Indicator Pushbuttons and Optional External Zero Adjustment (see Figure 3).

Optional External Zero Adjustment

External pushbutton mechanism (Figure 3) 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 selection.

Field Wiring Reversal

No transmitter damage.

Electronics and Sensor Temperatures

Readable from I/A Series system or PC-based Configurator only. Measurement is transmitter temperature, at the sensor and electronics module, not necessarily process temperature.

Current Outputs for Overrange, Fail, and Offline Conditions - FoxCom and HART Only

Parameter	FoxCom	HART
OFFLINE	User configurable between 4 and 20 mA	
SENSOR FAILURE	User configurable to Fail LO or Fail HI	
FAIL LO	3.60 mA	3.60 mA
UNDERRANGE	3.75 mA	3.80 mA
OVERRANGE	21.00 mA	20.50 mA
FAIL HI	22.00 mA	21.00 mA

FUNCTIONAL SPECIFICATIONS (Cont.)

Write Protect Jumper
(Electronics Versions -D, -F, and -T)

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

DIGITAL OUTPUT

Version -D Electronics (FoxCom)
Power supplied through I/A Series System.

Version -T Electronics (HART)
Bidirectional digital signal superimposed on the 4 to 20 mA current signal.

Version -F Electronics (FOUNDATION Fieldbus)
Power supplied through a specific Fieldbus power supply connected to the bus.

4 TO 20 mA OUTPUT

Minimum supply voltage shown in Figure 2 is 11.5 V dc. For Versions -D, -T, and -A, this can be reduced to 11 V dc by using a jumper across test receptacles in the field wiring compartment terminal block. See Figure 8.

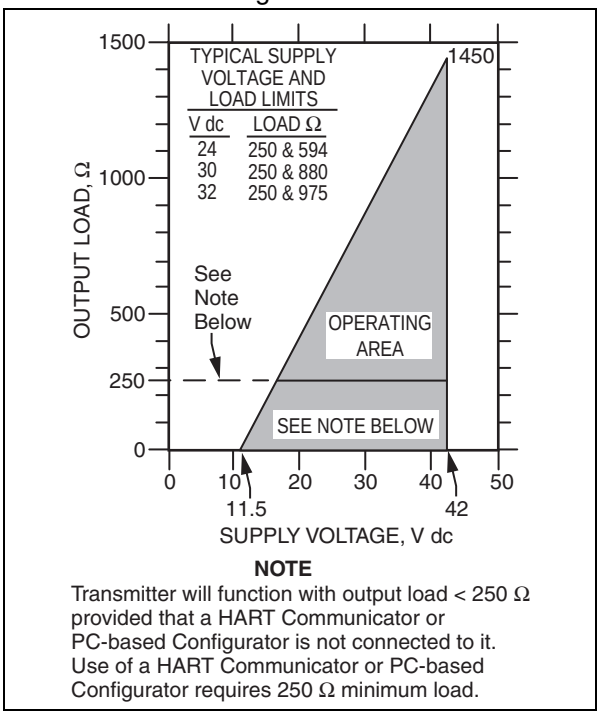


Figure 2. 4 to 20 mA Output, Supply Voltage vs. Output Load

Liquid Crystal Display (LCD) Indicator with On-Board Pushbuttons (Figure 3)

This indicator is standard with the -A and -V electronic versions, and optional with the -D, -T, and -F electronic versions.

The indicator provides:

- Two Lines; five numeric characters on top line (four when a minus sign is needed, and for analog output versions) and seven alphanumeric characters on bottom line.
- Measurement Readout; value on top line and units label on bottom line.
- Configuration and Calibration Prompts.

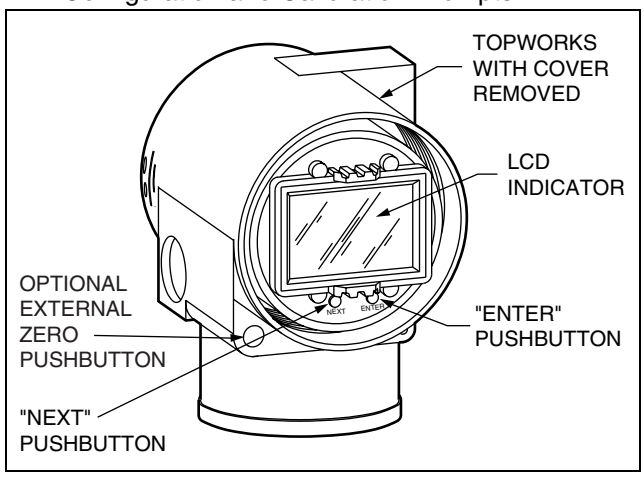


Figure 3. LCD Indicator with Pushbuttons

Configuration and Calibration Data, and Electronics Upgradeability

All factory characterization data and user configuration and calibration data are stored in the sensor. This means that the electronics module may be replaced, with one of like type, without the need for reconfiguration or recalibration. Although module replacement can affect accuracy by a maximum of 0.20% of span, this error can be removed by an mA trim without application of pressure (not applicable to Fieldbus version).

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

Allowable Pressure Units for Calibrated Range

MPa, psig, bar, kg/cm^2, mH_2O, and atm. Also mH_2O for HART only.

FUNCTIONAL SPECIFICATIONS (Cont.)

FoxCom (Version -D) Communications

DIGITAL MODE (FIXED CURRENT)

Digital Output signal is updated 10 times per second and carries the pressure measurement, and sensor and electronics temperature measurements. See Table 1 for communication parameters and Figure 4 for a digital output block diagrams.

4 TO 20 mA ANALOG MODE

Analog output is updated a minimum of 30 times per second. A minimum loop load of 250 ohms is required. See Table 1 for communication parameters and Figure 5 for 4 to 20 mA output block diagram.

HART (Version -T) Communications

4 TO 20 mA ANALOG MODE

Analog output signal is updated 30 times per second. A minimum loop load of 250 ohms is required. See Table 1 for communication parameters and Figure 5 for 4 to 20 mA output block diagram.

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/second. A minimum loop load of 250 ohms is required. See Table 1 for communication parameters and Figure 6 for a typical multidrop block diagram.

FOUNDATION Fieldbus (Version -F) Communications

Fieldbus is a serial, two-way communication system that runs at 31.25 kbits/s. The digital output signal is superimposed on the dc power signal on the bus, and controlled by a strict cycle schedule and protocol. Supply voltage, 9 to 32 V dc, is by a specific Fieldbus power source. The maximum number of devices on a non-intrinsically safe bus is 32. For intrinsically safe bus systems, the maximum number is 6. See Table 1 for communication parameters and Figure 7 for a typical installation topology.

Analog Output Versions -A and -V

VERSION -A

This version provides a 4 to 20 mA analog output signal and also full configuration capability using the standard LCD Indicator with pushbuttons. Also, reranging to new calibrated ranges is allowed without the need to apply calibration pressure.

VERSION -V

This is a low power, low voltage transmitter that provides a 1 to 5 V dc analog output signal, a 9 V dc minimum voltage, and 3 mA maximum current. As with the Version -A, it allows full configuration capability, and reranging without the need to apply calibration pressure, using the standard LCD Indicator with pushbuttons.

Table 1. Communication Parameters - FoxCom, HART, and FOUNDATION Fieldbus

	FoxCom		HART		Fieldbus
Parameter	**Analog Mode**	**Digital Mode**	**Analog Mode**	**Multidrop Mode**	**Digital**
Remote Configurator	PC-based Configurator, or I/A Series System		HART Communicator or PC-based Configurator		I/A Series System, PC Host, or Fieldbus Certified Host
Communication Rate	600 baud	4800 baud	1200 baud	1200 baud	31.25 kbits/s
Communication Distance (Rated)	1800 m (6000 ft)	600 m (2000 ft)	3050 m (10 000 ft)	1525 m (5000 ft)	1900 m (a) (6235 ft) (a)

(a) Total bus length including all spurs. Maximum spur length is 120 m (395 ft). For hybrid installations, maximum I.S. spur length is dependent on the field barrier used. For intrinsically safe bus installations, the maximum spur length is 30 m (98 ft).

FUNCTIONAL SPECIFICATIONS (Cont.)

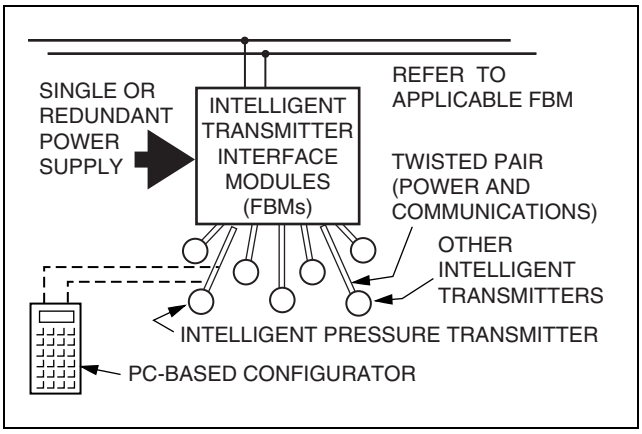


Figure 4.
Digital Output Block Diagram
(FoxCom)

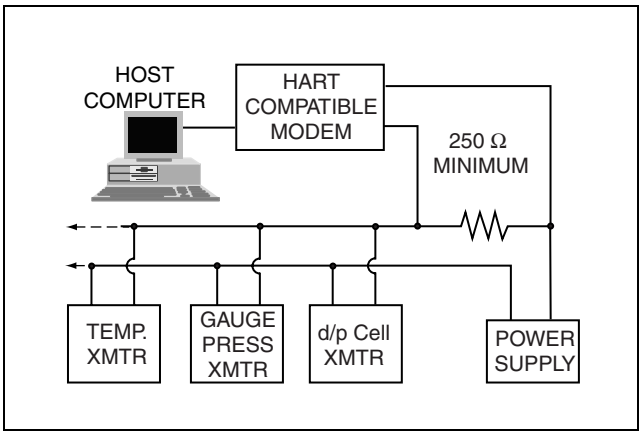


Figure 6.
Typical Multidrop Block Diagram
(HART – Up to Fifteen Transmitters)

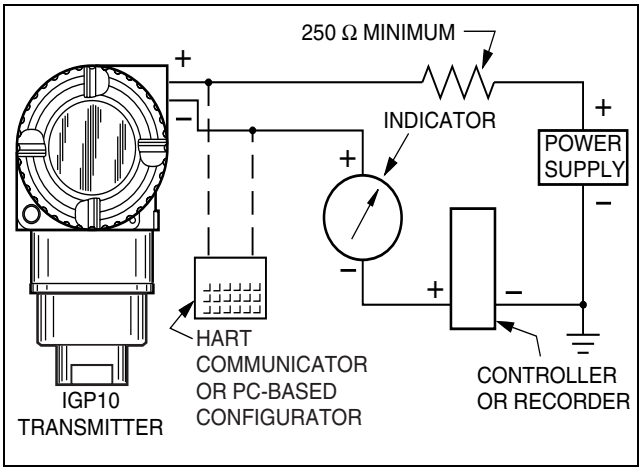


Figure 5.
4 to 20 mA Output Block Diagram
(FoxCom and HART)

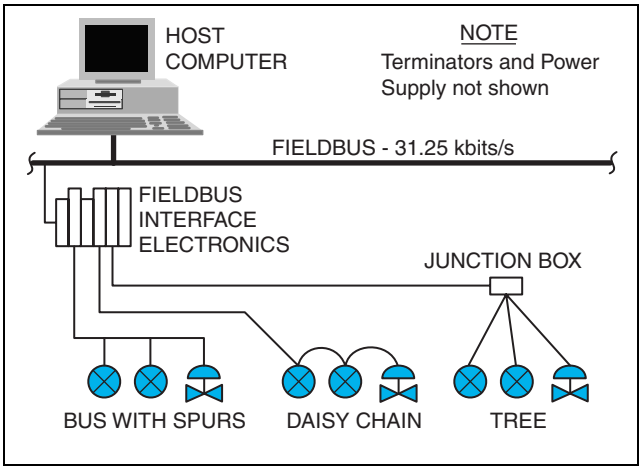


Figure 7.
Miscellaneous Installation Topologies
(FOUNDATION Fieldbus)

OPERATING, STORAGE, AND TRANSPORTATION CONDITIONS

Influence	Reference Operating Conditions	Normal Operating Conditions	Operative Limits	Storage and Transportation Limits
Process Connection Temp. (Neobee M-20 Fill)	24 ±2°C (75 ±3°F)	-40 and +82°C (-40 and +180°F)	-40 and +104°C (j) (-40 and +220°F) (j)	Not Applicable
Electronics Temperature with LCD Indicator (Note a)	• 24 ±2°C (75 ±3°F) • 24 ±2°C (75 ±3°F)	• -29 to + 82°C (h) (-20 to +180°F) (h) • -20 to + 82°C(h) (-4 to +180°F)(h)	• -40 and +85°C (h) (-40 and +185°F) (h) • -40 and +85°C (h) (-40 and +185°F) (h)	• -54 and +85°C (-65 and +185°F) • -54 and +85°C (-65 and +185°F)
Relative Humidity (Note b)	50 ±10%	0 to 100%	0 and 100%	0 and 100% Noncondensing
mA Output • Supply Voltage • Output Load	 • 30 ±0.5 V dc • 650 Ω	 • 11.5 to 42 V dc (c) • 0 to 1450 Ω (d)	 • 11.5 and 42 V dc (c) • 0 and 1450 Ω (d)	 • Not Applicable • Not Applicable
Voltage Output • Supply Voltage • Supply Current • Output Load	 • 12.5 ±0.5 V dc • Note (e) • 10 MΩ	 • 9 to 15.5 V dc • Note (e) • 1 to 10 MΩ	 • 9 and 30 V dc • Note (e) • Note (f)	 • Not Applicable • Not Applicable • Not Applicable
FOUNDATION Fieldbus • Supply Voltage (g)	 • 30 ±0.5 V dc	 • 9 to 32 V dc	 • 9 and 32 V dc	 • 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	Upright	No Limit	Not Applicable

(a) 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”.
(b) With topworks covers on and conduit entrances sealed.
(c) 11.5 V dc can be reduced to 11 V dc by using a plug-in shorting bar with -D, -T, and -A electronic versions. See Figure 8.
(d) 250 Ω minimum load required for proper communication with FoxCom and HART Protocol. See Figure 2.
(e) Supply Current: 3 mA maximum demand within operative limits.
(f) Operative limits are 100 kΩ to open circuit, 0.2 µf maximum.
(g) Power supplied by a specific Fieldbus power supply.
(h) Refer to the Electrical Safety Specifications section for restriction in electronic temperature limits with certain electrical approvals/ certifications.
(j) Selection of Option -J extends the low temperature operative limit of transmitters down to -50°C (-58°F).

PERFORMANCE SPECIFICATIONS

Zero-Based Calibrations; Under Reference Operating Conditions Unless Otherwise Specified;
URL = Upper Range Limit; Span = Calibrated Span

Accuracy (Includes Linearity, Hysteresis, and Repeatability)

±0.20% of Span (factory configured with 2.0 seconds user-adjustable damping)

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.

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 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 316 ss housings.

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 55°C (100°F) change within Normal Operating Condition limits is:

Span Limit Codes	Ambient Temperature Effect
for -D FoxCom Transmitters	
All	±(0.155% URL + 0.045% Span)
for -T HART Transmitters	
All	±(0.155% URL + 0.045% Span)
for -F FOUNDATION Fieldbus Transmitters	
All	±(0.155% URL + 0.045% Span)
for -A Analog Transmitters	
All	±(0.155% URL + 0.30% Span)
for -V Analog Transmitters	
All	±(0.155% URL + 0.10% Span)

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 10 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

Environmental Protection

Transmitter is dusttight and weather resistant per IEC IP66 and provides the environmental and corrosion resistant protection of NEMA Type 4X.

Electronics Housing and Housing Covers

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

Process Wetted Parts

FOR SPAN LIMIT CODE G
15-5 ss or Inconel X-750
FPR SPAN LIMIT CODE H
13-8 Molybdenum Stainless Steel

Process Connections

Structure Code	Span Limit Code	Process Connection		
		1/4 NPT Internal	G 1/2(a) External	Autoclave F-250-C(b)
24	G	Standard	Optional	Optional
26	G	Standard	Optional	Optional
28	H	N/A	N/A	Standard

(a) Option -G = G 1/2 Form B ext. thread manometer connection.
(b) Option -G1 = Autoclave F-250-C connection with a 9/16-18 internal gland thread.

Electronics Module

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

Mounting Position

The transmitter may be mounted in any orientation.

Electrical Conduit Connections

Two 1/2 NPT, PG13.5, or M20 conduit threads on sides of transmitter housing. Unused connection must be plugged (metal plug supplied by Invensys) to ensure moisture/RFI protection. See Model Code for optional cable glands and thread adapters.

Electrical Terminations

Field wires enter through the conduit connections described above and terminate under screw terminals and washers on the terminal block in the field terminals compartment. See Figure 8 for the terminal block configuration for the different transmitter electronics versions offered.

Approximate Mass

WITH ALUMINUM HOUSING
1.5 kg (3.3 lb)
WITH 316 ss HOUSING
2.6 kg (5.7 lb)
WITH LCD INDICATOR
Add 0.2 kg (0.4 lb

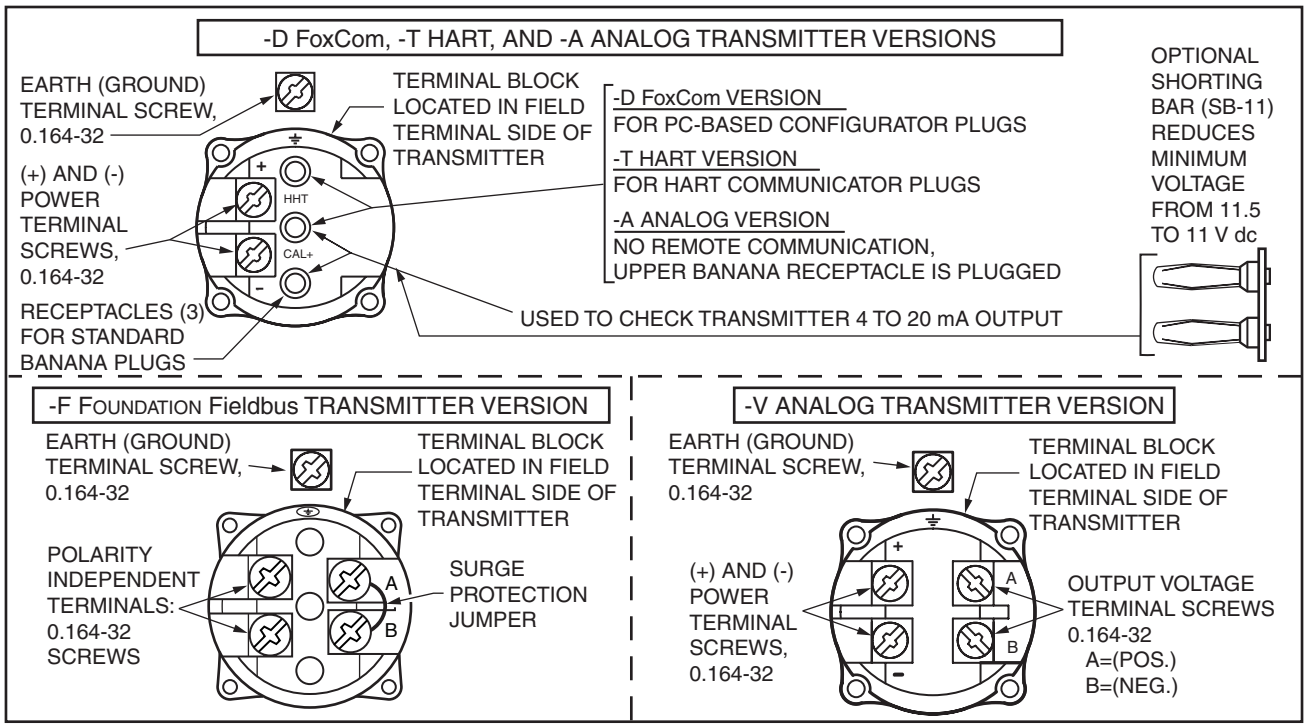


Figure 8. Field Terminals Compartment for the Electronics Versions Offered

ELECTRICAL SAFETY SPECIFICATIONS

Electronics Version -A (4 to 20 mA Analog Output Version)

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 T6 at 40°C and T4A at 85°C maximum ambient.	
FM explosionproof for Class I, Division 1, Groups B, C, and D; and dust-ignitionproof for Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	Temperature Class T6 at 80°C and T5 at 85°C maximum ambient.	F
FM nonincendive for Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G, and Class III, Division 2.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient.	

Electronics Version -D (FoxCom Version)

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
ATEX intrinsically safe; II 1 GD, EEx ia IIC, Zone 0 or II 1/2 GD, EEx ib IIC, Zone 0 and 1.	Temperature Class T4 at 80°C; T5 at 40°C; T6 at 40°C maximum ambient.	E
ATEX protection n; II 3 GD, EEx nL IIC, Zone 2.	Temperature Class T4 at 80°C; T5 at 70°C; T6 at 40°C maximum ambient.	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
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 T6 at 40°C, and T4A 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.	
CSA Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.	Temperature Class T6 at 40°C and T4A at 85°C maximum ambient.	
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.	
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.	

ELECTRICAL SAFETY SPECIFICATIONS (Cont.)

Electronics Version -F (FOUNDATION Fieldbus Version)

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
ATEX FISCO field device intrinsically safe; II 1 G, EEx ia IIC, Zone 0.	Temperature Class T4, Ta = -40°C to +80°C.	E
ATEX FNICO field device protection n; II 3 G, EEx nL IIC, Zone 2.	Temperature Class T4, Ta = -40°C to +80°C.	N
CSA FISCO field device 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. Also zone certified intrinsically safe Ex ia IIC, and energy limited Ex nA II.	Temperature Class T6 at 40°C, and T4A at 85°C maximum ambient. Temperature Class T4 at 40°C, and T3 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.	
CSA FNICO field device Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.	Temperature Class T6 at 40°C and T4A at 85°C maximum ambient.	
FM FISCO field device 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. Also zone approved intrinsically safe AEx ia IIC.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient. Temperature Class 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.	
FM FNICO field device 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.	
IECEx FISCO field device intrinsically safe, Ex ia IIC, Zone 0.	Temperature Class T4, Ta = -40°C to +80°C.	T
IECEx FNICO field device protection n, Ex nL IIC, Zone 2.	Temperature Class T4, Ta = -40°C to +80°C.	U

ELECTRICAL SAFETY SPECIFICATIONS (Cont.)

Electronics Version -T (HART Version)

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
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
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. Also, zone certified intrinsically safe Ex ia IIC, and energy limited Ex nA II.	Temperature Class T4A at 40°C and T3C at 85°C maximum ambient. Temperature Class T4 at 40°C and T3 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.	
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.	
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. Also, zone certified intrinsically safe AEx ia IIC.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient. Temperature Class 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.	
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.	
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

ELECTRICAL SAFETY SPECIFICATIONS (Cont.)

Electronics Version -V (1 to 5 V dc Analog Output Version)

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
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. Also zone certified intrinsically safe Ex ia IIC, and energy limited Ex nA II.	Temperature Class T6 at 40°C and T4A at 85°C maximum ambient. Temperature Class T4 at 40°C and T3 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.	
CSA Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.	Temperature Class T6 at 40°C and T4A at 85°C maximum ambient.	
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. Also zone approved intrinsically safe AEx ia IIC.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient. Temperature Class 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.	
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.	

NOTE

1. Transmitters have been designed to meet the electrical safety descriptions listed in the tables above. Contact Invensys Process Systems for information or status of testing laboratory approvals/ certifications.
2. See Model Code section for availability of Electrical Safety Design Codes with Transmitter Structures.
3. Refer to applicable Instruction Manual for application conditions and connectivity requirements.
4. When selecting ATEX Safety Design Code M, the user must permanently mark (check off in rectangle block on data plate) one type of protection only (ia and ib, or n). Do not change this mark.

MODEL CODE

IGP10 Series for High Gauge Pressure Measurement (a)

Description	Model
I/A Series, Electronic, Direct Connected, High Gauge Pressure Transmitter	IGP10
Electronics Versions and Output Signal	
Intelligent; Digital FoxCom and 4 to 20 mA dc, Configurable (Version –D)	–D
Intelligent; Digital HART and 4 to 20 mA (Version –T)	–T
Intelligent; Digital FOUNDATION fieldbus (Version –F)	–F
Electronic; 4 to 20 mA Analog Output, (Version –A) (b)	–A
Electronic; 1 to 5 V dc Analog Output, Low Power (Version –V) (b)	–V
Structure Code – Process Connection, Sensor, and Fill Fluid	

Connection Material	Diaphragm Material	Fill Fluid	Connection Type	Used with:	
15-5 ss	15-5 ss	None	1/4 NPT, Internal	Span Limit Code G only	24
Inconel X-750	Inconel X-750	None	1/4 NPT, Internal	Span Limit Code G only	26
13-8 Moly ss	13-8 Moly ss	None	Autoclave F-250-C (c)	Span Limit Code H only	28

Span Limits – Gauge Pressure Units

MPa	psi	bar or kg/cm^2	Used with	
17 and 52	2500 and 7500	175 and 525	Structure Codes 24 and 26 only	K
35 and 105	5000 and 15 000	350 and 1050	Structure Codes 24 and 26 only	G
70 and 210	10 000 and 30 000	700 and 2100	Structure Code 28 only	H

Conduit Connection and Housing Material	
1/2 NPT Conduit Connection, Both Sides, Aluminum Housing	1
PG 13.5 Conduit Connection, Both Sides, Aluminum Housing (with Electrical Safety Codes E, M, and N only)	2
1/2 NPT Conduit Connection, Both Sides, 316 ss Housing	3
PG 13.5 Conduit Connection, Both Sides, 316 ss Housing (with Electrical Safety Codes E, M, and N only)	4
M20 Conduit Connection, Both Sides, Aluminum Housing (with Electrical Safety Codes E, M, and N only)	5
M20 Conduit Connection, Both Sides, 316 ss Housing (with Electrical Safety Codes E, M, and N only)	6
Electrical Safety (See Electrical Safety Specifications Section for Description)	
ATEX Certifications as follows: Version D; EEx ia IIC, Zone 0; or EEx ib IIC, Zone 0 and 1 Version F; FISCO EEx ia IIC, Zone 0 Version T; EEx ia IIC, Zone 0	E
ATEX Certifications as follows: Versions D and T; EEx nL IIC, Zone 2 Version F; FNICO EEx nL IIC, Zone 2	N
ATEX Certifications as follows: Versions D and T; Multiple Certifications, includes ATEX Codes E and N. See Electrical Safety Specifications section for user marking.	M
CSA Certifications as follows:	C

Description	Electronic Version				
	A	D	F	T	V
Intrinsically Safe; Div. 1		X			X
Explosionproof, Dust-ignitionproof; Div. 1	X	X	X	X	X
Class I, II, III; Div. 2	X	X		X	X
Zone Certified: Ex ia IIC; Ex nA II			X	X	X
FISCO, Class I, II, III, Div. 1			X		
FNICO, Class I, II, III, Div. 2			X		

Model Code Continued on next page.

MODEL CODE (Continued)

IGP10 Series for High Gauge Pressure Measurement (Continued) (a)

Description (Continued) — **Model**

FM Approvals as follows: — F

Description	Electronic Version				
	A	D	F	T	V
Intrinsically Safe; Div. 1		X		X	X
Explosionproof, Dust-ignitionproof; Div. 1	X	X	X	X	X
Nonincendive for Div. 2	X	X		X	X
Zone Approved: AEx ia IIC			X	X	X
FISCO, Class I, II, III, Div. 1			X		
FNICO, Class I, II, III, Div. 2			X		

IECEx certified FISCO Ex ia IIC; Version F	T
IECEx certified FNICO Ex nL IIC; version F	U
SAA certified Ex ia IIC; Versions D and T	H
SAA certified Ex d IIC; Versions D, T, F, and A	A
SAA certified Ex n IIC; Versions D, T, and A	K
Optional Selections (see Descriptions below)	
Mounting Bracket Set	
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 or Solid (Blind) Cover over Standard Indicator	
Digital Indicator, Pushbuttons, and Window Cover (Electronics Versions -D, -F, and -T only)	-L1
Substitute Solid (Blind) Cover over Standard Indicator (Electronics Versions -A and -V only)	-L2
Conduit Connectors	
Hawke-Type 1/2 NPT Cable Gland for use with Conduit Connection Codes 1 and 3 (d)	-A1
Plastic PG 13.5 Cable Gland for use with Conduit Connection Codes 2 and 4 (e)	-A2
M20 Conduit Thread Adapter for use with Conduit Connection Codes 1 and 3 (d)	-A3
Brass PG 13.5 Cable Gland (Trumpet-Shaped) for use w/Conduit Connection Codes 2 and 4 (e)	-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	
Digital Output (4 to 20 mA Default if not selected) - Electronics Version -D only	-C1
Full Factory Configuration (Requires Configuration Form to be filled out)	-C2
Process Connections	
G 1/2 Form B, External Thread (with Span Limit Codes K and G only)	-G
Autoclave F-250-C (with Span Limit Code G only)	-G1
1/2 NPT External Thread (with Span Limit Codes K and G only)	-G2
SIL Transmitters for HART Versions Only	
SIL-Certified HART Transmitter	-S2
Instruction Books (Common MI, Brochure, and Full Documentation Set on CD-ROM is Standard)	
Without Instruction Book and CD (“Getting Started” document only provided)	-K1
Miscellaneous Optional Selections	
Low Temperature Operative Limits extended down to -50°C (-58°F) Not Available with Electronics Version -V.	-J
Supplemental Customer Tag (Stainless Steel Tag wired onto Transmitter)	-T
Example: IGP10-D24G1F-L1Z1C1T	

(a) Refer to PSSs 2A-1C13A to 2A-1C13 E for gauge pressure transmitters with span limits less than 52 MPa (7500 psi).
Refer to PSS 2A-1C13K for IGP10 Transmitters with Sanitary Process Connections.
Refer to PSS 2A-1C13L for IGP10 Transmitters with Pulp and Paper Process Connections.
(b) Refer to “LCD INDICATOR” section regarding URV character limitation with selected measurement units.
(c) Autoclave F-250-C Connection with a 9/16-18 internal gland thread.
(d) Available with Electrical Safety Codes E, M, and N only.
(e) Available with Electrical Safety Code E only.

SUGGESTED RFQ SPECIFICATIONS

The manufacturer shall provide direct connected pressure transmitters for measuring high gauge pressures and transmitting a digital or analog output signal for use in a standard two-wire dc supply voltage system. The specifications for these transmitters are as follows:

Digital Output Signal: FoxCom digital and 4 to 20 mA dc output signal;
HART digital signal superimposed on a 4 to 20 mA output signal;
FOUNDATION fieldbus digital signal, 31.25 kbits/s.

Analog Output Signal: 4 to 20 mA dc or 1 to 5 V dc

Remote Communications: FoxCom, HART, or Fieldbus Remote Communications must not interfere with the output signal.

RFI Protection: 0.1% error between 27 and 1000 MHz at 10 V/m field intensity

Span Limits: From 17 to 210 MPa (2500 to 30000 psi)

Proof Pressure: 1.5 times Full Scale Pressure Range or 140 MPa (20 000 psi), whichever is less, for the 105 MPa (15 000 psi) transmitters; and 1.2 times Full Scale Pressure Range for the 210 MPa (30 000 psi) transmitters.

Process Connection: Direct to process piping: 1/4-18 NPT internal thread is standard for the 105 MPa (15 000 psi) transmitters; and 9/16-18 internal gland thread (conforms to Autoclave Type F250C) is standard for the 210 MPa (30 000 psi) transmitters.

Sensor Materials: 15-5 ss and Inconel X-750 for the 105 MPa (15 000 psi) transmitters; and 13-8 Molybdenum stainless steel for the 210 MPa (30 000 psi) transmitters.

Housing: 316 ss, or Aluminum housing with Epoxy finish

Electronics: Enclosed in a NEMA 4X (IEC IP66) housing sealed with O-rings for double protection against moisture or other contaminants. Integral LCD Digital Indicator with on-board configuration pushbuttons; standard with analog output transmitters, and optional with digital output transmitters.

Mounting: Direct to process or bracket mounted to pipe.

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. Fieldbus versions FISCO/FNICO compliant. Versions available to meet Agency zone requirements. Designed to comply with applicable European Union Directives.

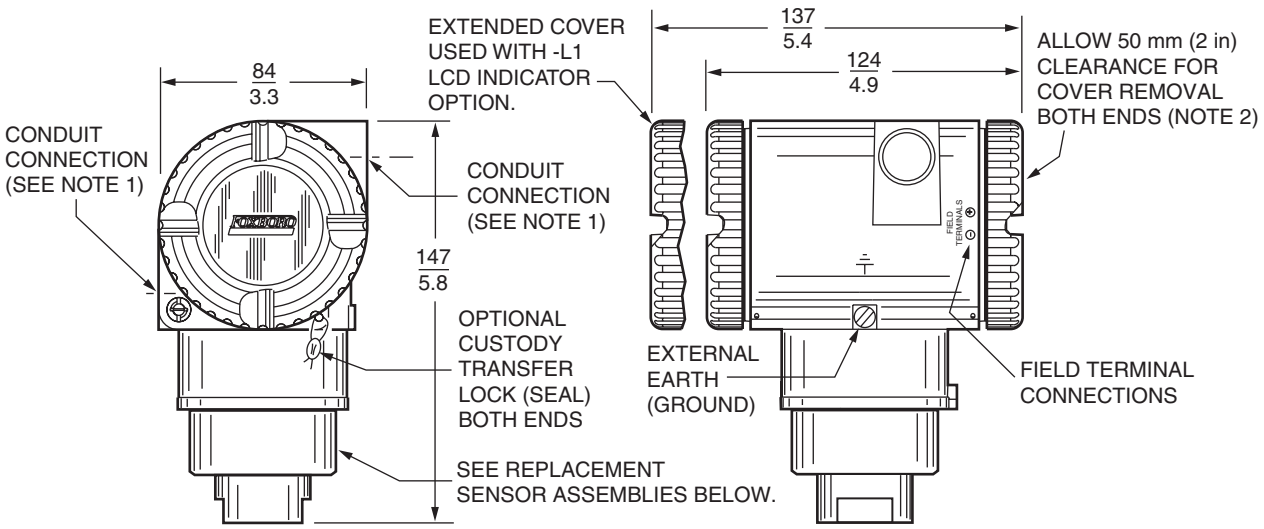
Approximate Mass:

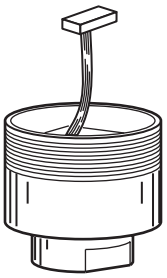
Direct Connected Transmitter:	1.5 kg (3.3 lb)
With 316 ss Electronics Housing:	Add 1.1 kg (2.4 lb)
With LCD Indicator:	Add 0.2 kg (0.4 lb)

Model Code: Invensys Foxboro I/A Series IGP10 Direct Connected, High Gauge Pressure Transmitter with FoxCom Communication Protocol, HART Communication Protocol, FOUNDATION Fieldbus Communication Protocol, 4 to 20 mA dc Analog Output Signal, or a Low Power Transmitter with a 1 to 5 V dc Analog Output Signal, or equivalent

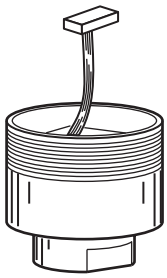
DIMENSIONS-NOMINAL

mm
in

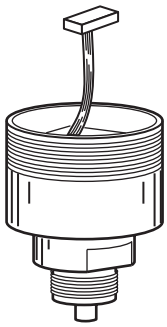




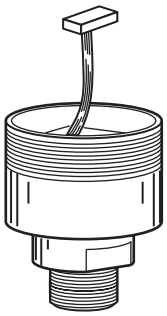
1/4 NPT
INTERNAL THREAD
PROCESS CONNECTION
STANDARD WITH SPAN
LIMIT CODES K AND G;
NOT AVAILABLE WITH
SPAN LIMIT CODE H.



AUTOCLAVE F-250-C
INTERNAL
PROCESS CONNECTION
STANDARD WITH SPAN
LIMIT CODE H;
OPTIONAL WITH SPAN
LIMIT CODES K AND G.



G 1/2 FORM B
EXTERNAL THREAD
PROCESS CONNECTION
OPTIONAL WITH SPAN
LIMIT CODES K AND G;
NOT AVAILABLE WITH
SPAN LIMIT CODE H.



1/2 NPT
EXTERNAL THREAD
PROCESS CONNECTION
OPTIONAL WITH SPAN
LIMIT CODES K AND G;
NOT AVAILABLE WITH
SPAN LIMIT CODE H.

NOTES

1. CONDUIT CONNECTION 1/2 NPT, OR PG 13.5, OR M20 BOTH SIDES: PLUG UNUSED CONNECTION WITH METAL PLUG (SUPPLIED).
2. TOPWORKS ROTATABLE TO ANY POSITION WITHIN ONE TURN COUNTERCLOCKWISE OF FULLY TIGHTENED POSITION.
3. REFER TO DIMENSIONAL PRINT DP 020-344 FOR IGP10 HIGH GAUGE PRESSURE TRANSMITTER WITH CONDUIT CONNECTOR OPTIONS -A1, -A2, -A3, AND -A4, AND MOUNTING BRACKET OPTIONS -M1, -M2, -M3, -M4, -M5, AND -M6.

ORDERING INSTRUCTIONS

1. Model Number
2. Calibrated Pressure Range (in MPa, psig, bar, kg/cm^2, or atm Engineering Units; also mH_2O for HART version only)
3. Configuration Data Form when Factory Configuration 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. Optional Features not Included in Model Code (see PSS 2A-1Z9 E)
6. Accessories (see PSS 2A-1Z9 E)
7. Customer Tag - Data Plate: 32 characters, maximum
8. Software Tag - Database:
   – Version -D: 12 characters, maximum
   – Version -T: 8 characters, maximum
   – Versions -F: 32 characters, maximum
   – Versions -A and -V: Not applicable

OTHER M&I PRODUCTS

Invensys Process Systems 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 Foxboro web site at:

www.foxboro.com/instrumentation

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Facsimile: 1-508-549-4999

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