

Fisher® i2P-100 Electro-Pneumatic Transducer

The Fisher i2P-100 electro-pneumatic transducer, shown in figure 1, uses a converter module that converts a milliampere input to a proportional pressure output. Both the current input and pressure output range are user-configurable in the field. The converter module uses small parts of minimum mass, which are balanced symmetrically around a pivot point at the center of the mass. This balanced arrangement results in a high performance instrument that reduces sensitivity to vibration.

An integral pneumatic relay provides the high capacity necessary to drive pneumatic control valve/actuator assemblies without additional boosters or positioners. The transducer also provides stable, accurate operation when its output is transmitted to small volume chambers, such as a pneumatic positioner or other pneumatic instrument. Reduced sensitivity to vibration, combined with high capacity and first order lag characteristics, make the i2P-100 transducer suitable for direct mounting on control valve/actuator combinations.

Features

- **Low Pneumatic Supply Consumption**—The transducer has low pneumatic supply consumption which lowers operating costs.

- **Approved for use with Natural Gas**—The i2P-100 is approved for use with natural gas as the pneumatic supply.

- **Single Sealed Device**— The i2P-100 has been tested in accordance with ANSI/ISA Standard 12.27.01 (Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids) as a single sealed device.

- **High Output Capability and Rangeability**— The integral output relay volume of the transducer is adequate to drive valve/actuator combinations without requiring a positioner or volume booster. Selectable user field-configurable dip switch setting for output range of 0.14 to 2.3 bar (2 to 33 psi).

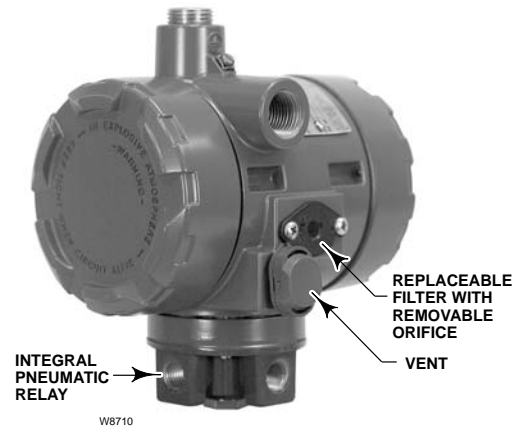


Figure 1. Fisher i2P-100 Electro-Pneumatic Transducer

- **Split Range**—Selectable user field-configurable two-way split range, using either half of the standard input signal.

- **Corrosion Resistant**—Separate housing compartments isolate the electronics from the pneumatic process. The electronics module is encased in a rugged plastic shell which helps to prevent damage to the electronics. The printed wiring board and dip switches are conformal coated to help prevent corrosion. Converter module coils have corrosion resistant coating and all flexures are gold plated to provide protection from hostile environments.

- **Tolerant of Dirty Supply Medium**—Free-flow pilot stage design and large internal air passages provide excellent tolerance to dirty pneumatic supply, by reducing the effects of contaminant buildup and erosion. The removable primary orifice and replaceable 5 micron filter are easy to remove for service and maintenance (see figure 1).

- **Easy Maintenance**—Modular electronics and converter modules contained in separate housing compartments, isolating the electronics from the process, allow for easy replacement in the field for reduced maintenance time and costs.



i2P-100 Transducer



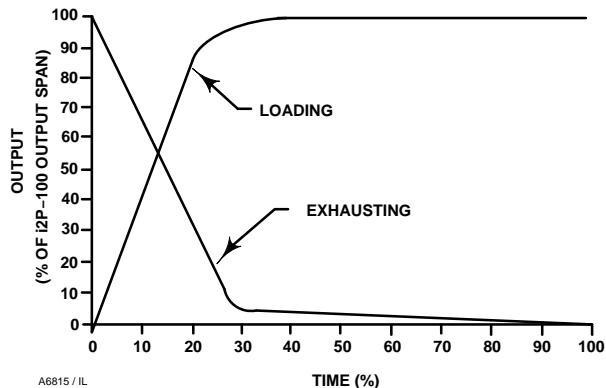
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Figure 2. Fisher i2P-100 Electro-Pneumatic Transducer Mounted on a Rotary Actuator



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Figure 4. Fisher i2P-100 Electro-Pneumatic Transducer Mounted on a Sliding-Stem Actuator



A6815 / IL

Figure 3. Output-Time Relationships

- Vibration Resistance**—The transducer, used in a standard valve/actuator mounted application, exhibits an output shift of less than 1 percent of span when tested to ISA S75.13.

Valve Stroking Time

Figure 3 shows relative times for loading and exhausting an actuator. Stroking time depends upon the size of the actuator, travel, relay characteristics

and the magnitude and rate of change of the input signal. If stroking time is critical, contact your Emerson Process Management sales office.

Installation

Refer to figure 5 for location of standard mounting holes in the housing. See figures 2 and 4 for typical mounting configurations. Standard mounting hardware is provided for mounting on the actuator, a pipestand, or surface mount. Field wiring connections are made to the terminal block accessible under the housing cap, via the 1/2 NPT conduit connection. Dimensions are shown in figures 5, 6, 7, and 8.

Ordering Information

To determine what ordering information is required, refer to the Specifications table. Carefully review the description of each specification. Specify the desired choice whenever there is a selection available. Also, specify options that are applicable to the application.

Product Bulletin

62.1:i2P-100
June 2010

i2P-100 Transducer

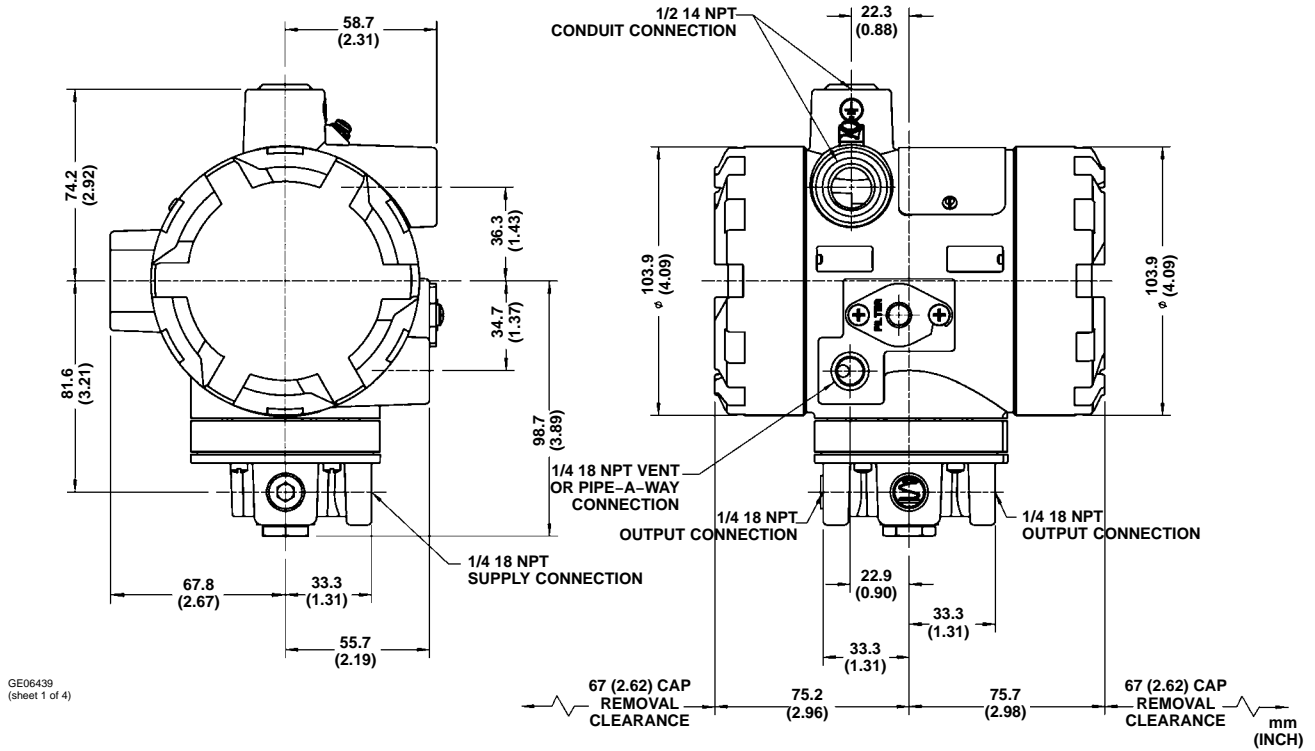


Figure 5. Dimensions

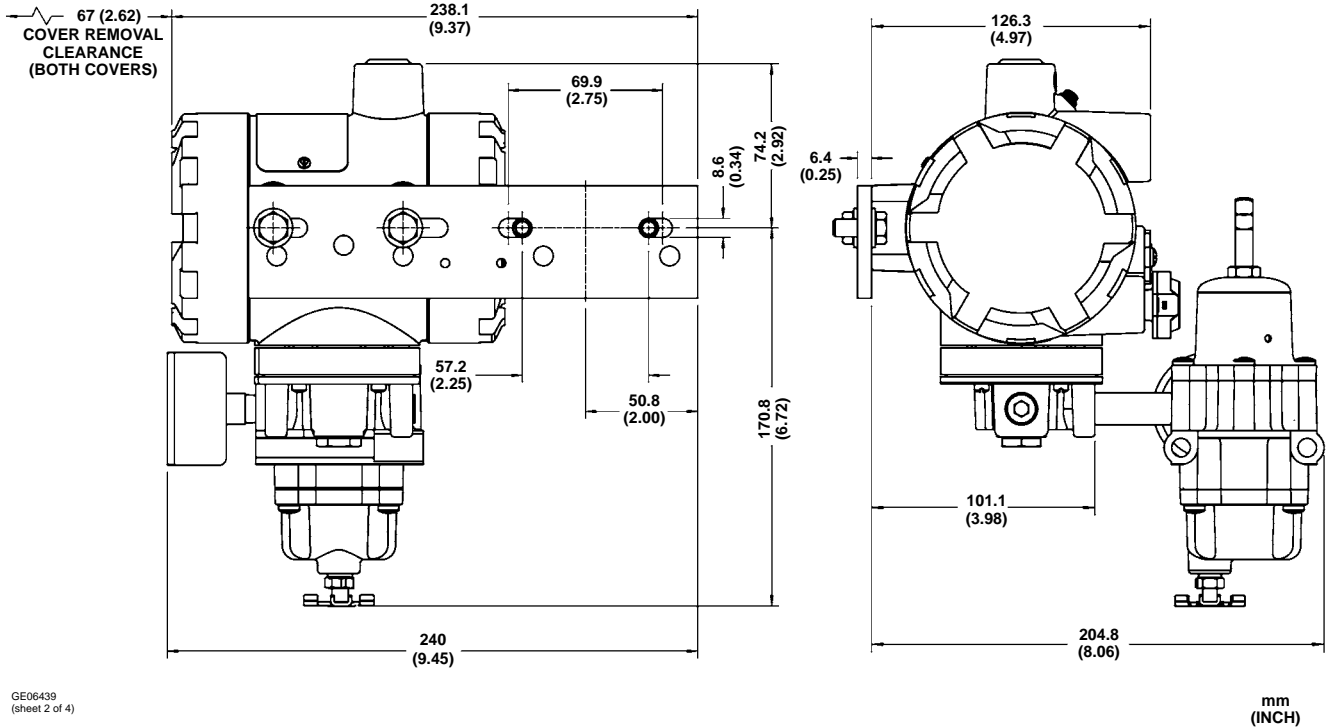
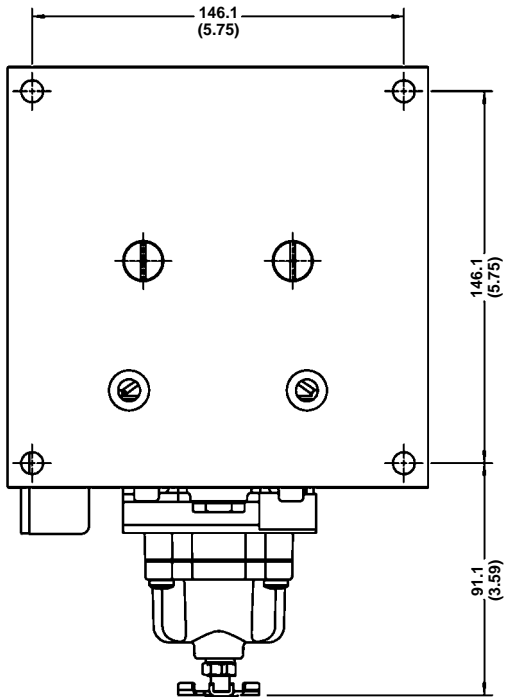


Figure 6. Dimensions with Optional Fisher 67 Filter-Regulator (Yoke/Bracket Mounted)

i2P-100 Transducer



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(sheet 3 of 4)

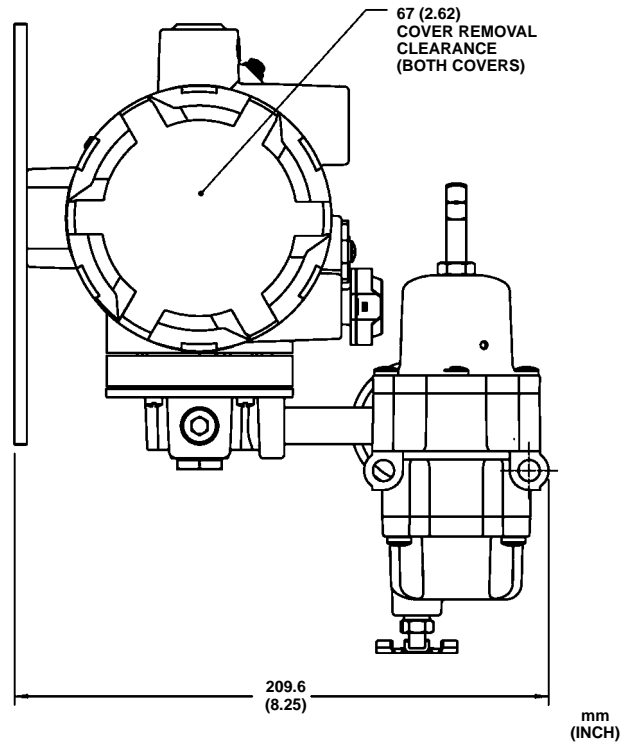
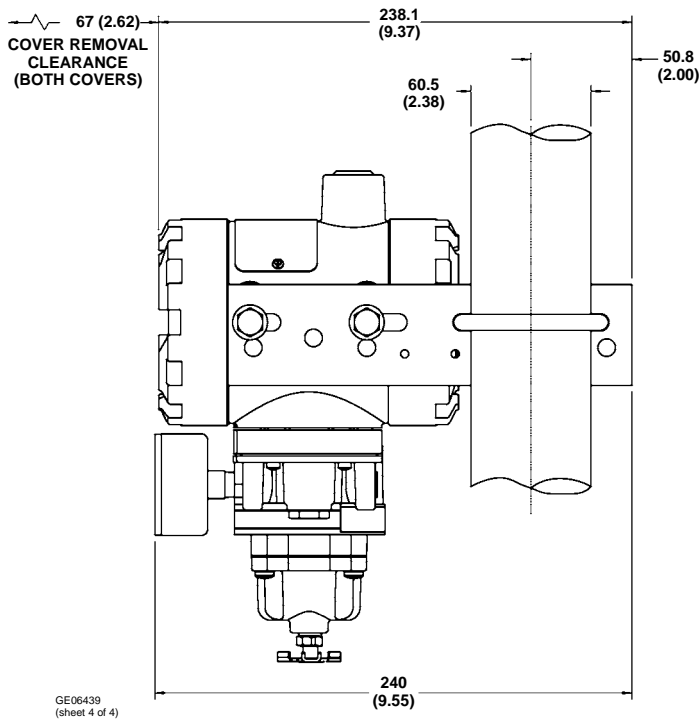


Figure 7. Dimensions with Optional Fisher 67 Filter-Regulator (Surface/Wall Mounted)



GE06439
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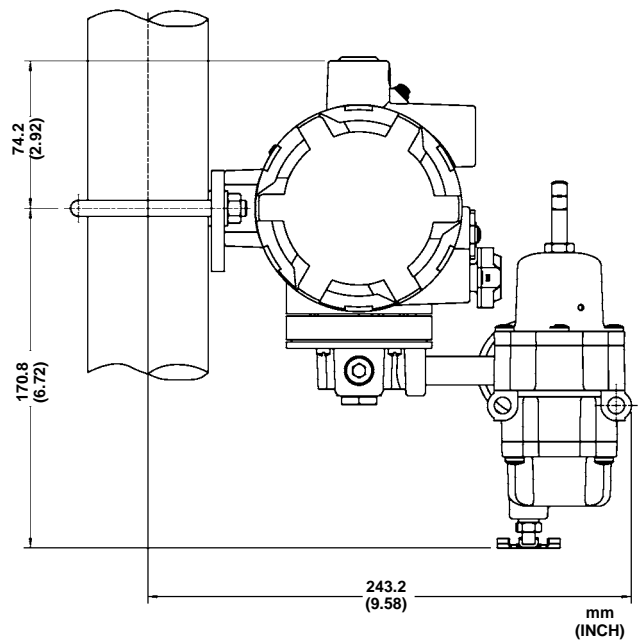


Figure 8. Dimensions with Optional Fisher 67 Filter-Regulator (Pipestand Mounted)

Specifications

Input Signal

Available as standard with 4–20 mA.
User configurable by dip switch for split ranging, see table below.

Output Signal

Available as standard 0.2 to 1.0 bar (3 to 15 psig), 0.4 to 2.0 bar (6 to 30 psig), or 0.14 to 2.3 bar (2 to 33 psig). User configurable by dip switch selection and zero and span potentiometer adjustment, see table below.

| INPUT SIGNAL | OUTPUT PRESSURE | |
|----------------|-----------------|---------|
| | Bar | Psig |
| 4 to 20 mA DC | 0.2 to 1.0 | 3 to 15 |
| | 0.4 to 2.0 | 6 to 30 |
| | 0.14 to 2.3 | 2 to 33 |
| 4 to 12 mA DC | 0.2 to 1.0 | 3 to 15 |
| 12 to 20 mA DC | 0.2 to 1.0 | 3 to 15 |

Equivalent Circuit

The i2P-100 equivalent circuit is a series circuit consisting of a constant voltage drop (battery) of approximately 4 VDC and a total resistance of 40 ohms. Input is shunted by two 6.8 V zener diodes (see figure 9).

Supply Pressure⁽¹⁾

Recommended: 0.34 bar (5 psi) higher than upper range limit of output signal

Maximum: 3.4 bar (50 psig)

Medium: Air or Natural Gas⁽²⁾

Average Steady State Flow Rate

See table 2

Maximum Output Air Capacity⁽³⁾

8.04 normal m³/hr (300 scfh) at 1.4 bar (20 psig) supply pressure

Performance⁽⁴⁾

Reference Accuracy: ±1.0% of full scale output span; includes combined effects of hysteresis, linearity, and deadband

Independent Linearity: ±0.75% of full scale output span

Hysteresis: 0.4% of full scale output span

Frequency Response: Gain is attenuated 3 dB at 6 Hz with transducer output signal piped to a typical instrument input

Temperature Effect: ±0.14% per degrees Celsius (±0.075 per degrees Fahrenheit) of span

Supply Pressure Effect: 0.2% of full scale output span per psi supply pressure change)

Vibration Effect: Less than 1% of full scale output span when tested to ISA S75.13

Electromagnetic Compatibility

Meets EN 61326-1 (First Edition)

Immunity—Industrial locations per Table 2 of EN 61326-1 Standard. Performance is shown in table 1 below.

Emissions—Class A

ISM equipment rating: Group 1, Class A

Operating Ambient Temperature Limits⁽¹⁾

–40 to 85°C (–40 to +185°F)

Electrical Seal

Single sealed device per ANSI/ISA 12.27.01

Electrical Classification

Hazardous Area:

CSA — Intrinsically Safe, Explosion proof, Type n, Dust-Ignition proof

FM— Intrinsically Safe, Explosion proof, Type n, Non-incendive, Dust-Ignition proof

ATEX— Intrinsically Safe & Dust, Flameproof & Dust, Type n & Dust

IECEx— Intrinsically Safe, Flameproof, Type n

Refer to tables 3, 4, 5, and 6 for specific approval information.

Approved for use with natural gas⁽²⁾

Electrical Housing:

When Remotely Vented

No Remote Venting

CSA—Type 4X Encl.

CSA—Type 3 Encl.

FM— NEMA 4X

FM— NEMA 3

ATEX—IP66

ATEX—IP64

IECEx—IP66

IECEx—IP64

Construction Materials

Housing: ■ Low-Copper aluminum with polyurethane paint

O-rings: Nitrile

Diaphragms: Nitrile

Specifications (continued)

Adjustments⁽⁵⁾

Zero and Span: Trim potentiometers (20 turn) for zero and span adjustments are located under the housing cap.

Switch: Allows input signal split range and user-configurable 0.14 to 2.3 bar (2 to 33 psig) output.

Connections

Supply and Output Pressure: 1/4 NPT internal connection

Vent: 1/4 NPT internal

Electrical: ■ Standard 1/2 NPT

Wire Size: 18 to 22 AWG

Mounting Position

■ Actuator ■ pipestand or ■ surface

Approximate Weight

2.5 kg (5.5 lbs)

Options

■ Output pressure gauge ■ M20 or PG13 conduit adapter

NOTE: Specialized instrument terms are defined in ANSI/ISA Standard 51.1 – Process Instrument Terminology

1. The pressure and temperature limits in this document and any applicable standard or code limitation should not be exceeded.

2. This product is approved for use with natural gas. Natural gas should contain no more than 20 ppm of H₂S.

3. Normal m³/hour--Normal cubic meters per hour (0°C and 1.01325 bar, absolute). Scfh--Standard cubic feet per hour (60°F and 14.7 psig).

4. Performance values are obtained using a transducer with a 4 to 20 mA DC input signal and a 0.2 to 1.0 bar (3 to 15 psig) output signal at an ambient temperature of 24°C (75°F).

5. For other ranges, zero and span adjustments needed.

Table 1. EMC Summary Results—Immunity

| Port | Phenomenon | Basic Standard | Test Level | Performance Criteria ⁽¹⁾ |
|--------------------|-------------------------------|----------------|---|-------------------------------------|
| Enclosure | Electrostatic discharge (ESD) | IEC 61000-4-2 | 4kV Contact 8kV Air | A |
| | Radiated EM field | IEC 61000-4-3 | 80 to 1000 MHz @ 10V/m with 1 kHz AM at 80% 1400 to 2000 MHz @ 3V/m with 1 kHz AM at 80% 2000 to 2700 MHz @ 1V/m with 1 kHz AM at 80% | A |
| I/O signal/control | Burst (fast transients) | IEC 61000-4-4 | 1 kV | A |
| | Surge | IEC 61000-4-5 | 1 kV (line to ground only, each) | A |
| | Conducted RF | IEC 61000-4-6 | 150 kHz to 80 MHz at 3 Vrms | A |

Specification limit = ±1% of span
1. A=No degradation during testing. B = Temporary degradation during testing, but is self-recovering.

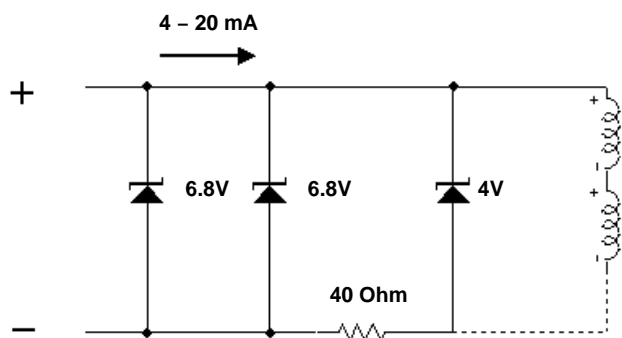


Figure 9. Equivalent Circuit

Table 2. Average Steady State Flow Rate

| SUPPLY PRESSURE | | OUTPUT PRESSURE | | STEADY STATE FLOW RATE ⁽¹⁾ | |
|-----------------|-----|-----------------|----------|---------------------------------------|-------|
| Psi | Bar | Psi | Bar | Scfh | m3/hr |
| 20 | 1.4 | 3-15 | 0.2-1.0 | | |
| | | 3 | 0.2 | 2.7 | 0.08 |
| | | 9 | 0.62 | 4.22 | 0.12 |
| | | 15 | 1.0 | 5.76 | 0.16 |
| 35 | 2.4 | 6-30 | 0.4-2.0 | | |
| | | 6 | 0.4 | 3.41 | 0.10 |
| | | 18 | 1.2 | 6.58 | 0.19 |
| | | 30 | 2.0 | 9.84 | 0.28 |
| 38 | 2.6 | 2-33 | 0.14-2.3 | | |
| | | 2 | 0.14 | 2.38 | 0.07 |
| | | 17.5 | 1.21 | 6.43 | 0.18 |
| | | 33 | 2.3 | 10.7 | 0.30 |

1. Normal m³/hour--Normal cubic meters per hour (0°C and 1.01325 bar, absolute). Scfh--Standard cubic feet per hour (60°F and 14.7 psig).

Product Bulletin

62.1:i2P-100
June 2010

i2P-100 Transducer

Table 3. Hazardous Area Classifications—CSA (Canada)

| Certification Body | Certification Obtained | Entity Rating | Temperature Code | Enclosure Rating |
|--------------------|---|--|--|--------------------|
| CSA | Intrinsically Safe Ex ia IIC T3/T4/T5 per drawing GE07471 Ex ia Intrinsically Safe Class I, II, III Division 1 GP A,B,C,D,E,F,G per drawing GE07471 | Vmax = 30 VDC Imax = 150 mA Pi = 1.0 W Ci = 5 nF Li = 0 mH | T3 (Tamb ≤ 85°C) T4 (Tamb ≤ 81°C) T5 (Tamb ≤ 46°C) | CSA Type 4X Encl.* |
| | Explosion Proof Ex d IIC T5/T6 Class I, Division 1 GP, A,B,C,D T5 | --- | T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C) | CSA Type 4X Encl.* |
| | Type n Ex nC IIC T5/T6 | --- | T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C) | CSA Type 4X Encl.* |
| | Class I, Division 2, GP A,B,C,D T5 Class II, Division 1 GP E,F,G T5 Class II, Division 2, GP F,G T5 Class III | --- | T5 (Tamb ≤ 85°C) | CSA Type 4X Encl.* |

*When remotely vented.

Table 4. Hazardous Area Classifications—FM (United States)

| Certification Body | Certification Obtained | Entity Rating | Temperature Code | Enclosure Rating |
|--------------------|---|--|--|------------------|
| FM | Intrinsically Safe Class I Zone 0 AEx ia IIC T3/T4/T5 per drawing GE07470 Class I, II, III Division 1 GP A,B,C,D,E,F,G per drawing GE07470 | Vmax = 30 VDC Imax = 150 mA Pi = 1.0 W Ci = 0 nF Li = 0 mH | T3 (Tamb ≤ 85°C) T4 (Tamb ≤ 81°C) T5 (Tamb ≤ 46°C) | NEMA 4X* |
| | Explosion Proof Class I Zone 1 AEx d IIC T5/T6 Class I, Division 1, GP A,B,C,D T5/T6 | --- | T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C) | NEMA 4X* |
| | Type n Class I Zone 2 AEx nC IIC T5/T6 | --- | T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C) | NEMA 4X* |
| | Class I, Division 2, GP A,B,C,D T5/T6 Class II, Division 1 GP E,F,G T5/T6 Class II, Division 2, GP F,G T5/T6 Class III | --- | T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C) | NEMA 4X* |

*When remotely vented.

Table 5. Hazardous Area Classifications—ATEX

| Certificate | Certification Obtained | Entity Rating | Temperature Code | Enclosure Rating |
|-------------|---|--|--|------------------|
| ATEX | Intrinsically Safe Ⓢ II 1 GD Gas Ex ia IIC T3/T4/T5 Dust T95°C (Tamb ≤ 85°C) | Ui = 30 VDC Ii = 150 mA Pi = 1.0 W Ci = 0 uF Li = 0 uH | T3 (Tamb ≤ 85°C) T4 (Tamb ≤ 81°C) T5 (Tamb ≤ 46°C) | IP66* |
| | Flameproof Ⓢ II 2 G D Gas Ex d IIC T5/T6 Dust T95°C (Tamb ≤ 85°C) | --- | T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C) | IP66* |
| | Type n Ⓢ II 3 G D Gas Ex nC II T5/T6 Dust T95°C (Tamb ≤ 85°C) | --- | T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C) | IP66* |

*When remotely vented.

i2P-100 Transducer

Table 6. Hazardous Area Classifications—IECEX

| Certificate | Certification Obtained | Entity Rating | Temperature Code | Enclosure Rating |
|-------------|---|--|--|------------------|
| IECEX | Intrinsically Safe Gas Ex ia IIC T3/T4/T5 | Ui = 30 VDC Ii = 150 mA Pi = 1.0 W Ci = 0 uF Li = 0 uH | T3 (Tamb ≤ 85°C) T4 (Tamb ≤ 81°C) T5 (Tamb ≤ 46°C) | IP66* |
| | Flameproof Gas Ex d IIC T5/T6 | --- | T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C) | IP66* |
| | Type n Gas Ex nC IIC T5/T6 | --- | T5 (Tamb ≤ 85°C) T6 (Tamb ≤ 75°C) | IP66* |

*When remotely vented.

Note

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