

Data Sheet

E2F Explosion-Proof Pressure Transducer For Hydrogen Applications

FEATURES

- Flameproof approval for explosion-proof, hazardous applications
- FM, CSA, ATEX and IECEx approvals
- IP66/67 Ingress rating
- Thick sensing diaphragm using proven CVD technology:
 - 316L Stainless steel ranges to 5000 psi/350 bar
 - A286 Stainless steel ranges to 20,000 psi/1400 bar
- External magnetic offset & span adjustment
- Barometric pressure ranges available (standard & custom ranges)
- SIL 3 capable

TYPICAL USES

- Hydrogen filling stations
- Hydrogen compressors
- Hydrogen storage tanks
- Reactor vessels
- Fuel cells for vehicles



E2F
Pressure Transducer



PERFORMANCE SPECIFICATIONS

Reference Temperature: 70 °F ±3.6 °F, (21 °C ±2 °C)

Static Accuracy: ±0.25% of span, ±0.50% of span, ±1.0% of span,
Terminal Point Method includes:
hysteresis, linearity, repeatability, offset and span

Stability: ±0.25% year at reference conditions

ENVIRONMENTAL SPECIFICATIONS

Thermal Coefficients: Offset: ±0.005% /°F from -40 °F to 257 °F
(±0.009% /°C from -40 °C to 125 °C)
Span: ±0.005% /°F from -40 °F to 257 °F
(±0.009% /°C from -40 °C to 125 °C)

Temperature Limits: Storage: -58 °F to 257 °F (-50 °C to 125 °C)
Operating: -40 °F to 176 °F (-40 °C to 80 °C)
Media: -40 °F to 176 °F (-40 °C to 80 °C)

Humidity: 0-100% (non-condensing)

FUNCTIONAL SPECIFICATIONS

Response Time (Output) 4 ms

Gauge/Compound Pressure Ranges: Vac to 20,000 psig/Vac to 1400 bar

Shock: 80 g, 6 ms, Haversine

Vibration: Random: 10 g RMS 20-2000 Hz

Proof Pressure: 1.2X - 1.5X

Burst Pressure: 5X - 8X

KEY BENEFITS

- Highly configurable
- Easy calibration of offset and span
- SIL Certified

ELECTRICAL SPECIFICATIONS

Circuit Protection: Reverse polarity protected

SUPPLY VOLTAGE

9-36 Vdc: 4-20 mA, 20-4 Ma (2-wire), 0-5 Vdc, 1-5 Vdc, 1-6 Vdc,
0.1-5 Vdc, 0.5-4.5 Vdc

14-36 Vdc: 0-10 Vdc, 1-11 Vdc, 0.1-10 Vdc

Adjustability: ±5% of span non-interactive offset & span

Supply Current: <8 mA (Vout)

Current Source/Sink for Voltage Output 1 mA (source)/ 0.1 mA (sink) MAX.

Withstand/Breakdown 100 Vdc/Vac, optional 500 Vdc/Vac

Data Sheet

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PHYSICAL SPECIFICATIONS

Ingress Rating: IP66 (NEMA 4X) (STD.)
IP67 (IP69K Consult Factory)

WETTED MATERIAL

| Diaphragm: | Sensor: | Material |
|------------|---------|----------------------|
| | B | 316L Stainless steel |
| | D | A286 Stainless steel |

Process Connection: 316L Stainless steel

NON-WETTED MATERIAL

Housing: 316L Stainless steel

EMC TESTING

EMC: Directive 2014/30/EU, and EN61326-1,
EN61326-2-3 (Industrial Env.)

| Immunity: | Standard | Level |
|-----------|---------------------------------|---|
| | 61000-4-2 (ESD) | ±4 kV/±8 kV (Contact/Air) |
| | 61000-4-3 (Radiated RF) | 10 V/m to 1 GHz, 3 V/m to 2 GHz, 1 V/m to 2.7 GHz |
| | 61000-4-4 (EFT/Burst) | ±1 kV (5/50 ns, 5 kHz) |
| | 61000-4-5 (Surge) | ±1 kV, Earth to Shield over all I/O lines |
| | 61000-4-6 (Conducted RF) | 3 V (0.15 to 80 MHz) |
| | 61000-4-8 (Line Freq. Magnetic) | 30 A/m |

Emissions: EN 55011 (CISPR 11) Class A, Group 1 & FCC (47 CFR 15)

HAZARDOUS AREA CERTIFICATIONS

Explosion Proof/Flameproof/Dust Ignition Proof Installations

FM:

Class I Division 1, Groups A, B, C, D T4, -40°C < Ta < 80°C
Class II Division 1, Groups E, F, G T4, -40°C < Ta < 80°C
Class III T4, -40°C < Ta < 80°C

Class I, Zone 1, AEx db IIC T4 Gb -40°C < Ta < 80°C
Class II, Zone 21, AEx tb IIIC T135°C Db -40°C < Ta < 80°C

CSA:

Class I, Division 1, Groups A, B, C and D T4
Class II, Division 1, Groups E, F and G T135°C
Class III, Division 1, T135°C

Ex db IIC T4 Gb
Ex tb IIIC T135°C Db

ATEX:

II 2 G Ex db IIC T4 Gb -40°C < Ta < 80°C
II 2 D Ex tb IIIC T135°C Db -40°C < Ta < 80°C

IECEX:

Ex db IIC T4 Gb -40°C < Ta < 80°C
Ex tb IIIC T135°C Db -40°C < Ta < 80°C

TABLE 1: PROOF & BURST PRESSURE MULTIPLIERS

| Sensor Range | B Sensor - 316L SS | | D Sensor - A286 SS | |
|-------------------|--------------------|-------|--------------------|-------|
| | Proof | Burst | Proof | Burst |
| (psi) | | | | |
| 30 | | | | |
| 45 | 1.4X | 8X | | |
| 50 | 2.2X | 8X | | |
| 60 | 1.8X | 8X | | |
| 75 | 1.5X | 8X | | |
| 100 | 1.5X | 8X | | |
| 150 | 1.5X | 8X | | |
| 200 | 1.5X | 8X | | |
| 300 | 1.5X | 8X | | |
| 500 | 1.2X | 5X | | |
| 750 | 1.2X | 5X | | |
| 1000 | 1.2X | 5X | | |
| 1500 | 1.2X | 5X | | |
| 2000 | 1.2X | 5X | | |
| 3000 | 1.2X | 5X | | |
| 5000 | 1.2X | 5X | 2.4X | 5X |
| 7500 | | | 1.6X | 5X |
| 10000 | | | 1.2X | 5X |
| 15000 | | | 1.7X | 5X |
| 20000 | | | 1.3X | 5X |
| (Compound) | | | | |
| V&30# | | | | |
| V&45# | 1.5X | 8X | | |
| V&60# | 1.5X | 8X | | |
| V&100# | 1.5X | 8X | | |
| V&150# | 1.5X | 8X | | |
| V&200# | 1.5X | 8X | | |
| V&300# | 1.5X | 8X | | |

Data Sheet

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| ORDERING CODE | Example: | E2F | B | 3 | C | F02 | 42 | CF | X | 10 | F | 100# | -XNH |
|---|----------|-----|---|---|---|-----|----|----|---|----|---|------|------|
| Model | | | | | | | | | | | | | |
| E2F - Flame proof | | E2F | | | | | | | | | | | |
| Sensor Materials - See Table 2 on page 4 for more options | | | | | | | | | | | | | |
| B - 316L Stainless steel | | | B | | | | | | | | | | |
| D - A286 Stainless steel | | | | | | | | | | | | | |
| Accuracy | | | | | | | | | | | | | |
| 3 - 0.25% span | | | | 3 | | | | | | | | | |
| 5 - 0.50% span | | | | | | | | | | | | | |
| 7 - 1.00% span | | | | | | | | | | | | | |
| Calibration Chart | | | | | | | | | | | | | |
| N - Without calibration chart | | | | | | | | | | | | | |
| C - With calibration chart | | | | | C | | | | | | | | |
| Pressure Connections - See Table 3 on page 5 for more options | | | | | | | | | | | | | |
| F02 - (1/4 NPT Female) | | | | | | F02 | | | | | | | |
| Output Type | | | | | | | | | | | | | |
| 05 - 0-5 Vdc | | | | | | | | | | | | | |
| 10 - 0-10 Vdc | | | | | | | | | | | | | |
| 11 - 1-11 Vdc | | | | | | | | | | | | | |
| 12 - 0.1-10 Vdc | | | | | | | | | | | | | |
| 13 - 0.1-5 Vdc | | | | | | | | | | | | | |
| 15 - 1-5 Vdc | | | | | | | | | | | | | |
| 16 - 1-6 Vdc | | | | | | | | | | | | | |
| 24 - 20-4 mA | | | | | | | | | | | | | |
| 42 - 4-20 mA | | | | | | | 42 | | | | | | |
| 45 - 0.5-4.5 Vdc non-ratiometric | | | | | | | | | | | | | |
| 00 - Custom | | | | | | | | | | | | | |
| Electrical Connections - See Table 4 on page 6 for more options | | | | | | | | | | | | | |
| CF - (1/2 NPT conduit w/flying leads) | | | | | | | | CF | | | | | |
| Mating Connector | | | | | | | | | | | | | |
| X - Without mating connector | | | | | | | | | X | | | | |
| Cable Length | | | | | | | | | | | | | |
| Max cable length of 30 ft for outputs 05, 10, 11, 12, 13, 15, 16 and 45. Max cable length of 99 ft for outputs 24 and 42. | | | | | | | | | | | | | |
| 00 - No cable | | | | | | | | | | | | | |
| XX - 01 to 99 | | | | | | | | | | 10 | | | |
| Unit of Length | | | | | | | | | | | | | |
| F - Feet | | | | | | | | | | | F | | |
| M - Meter | | | | | | | | | | | | | |
| N - Inches | | | | | | | | | | | | | |
| 0 - No cable | | | | | | | | | | | | | |
| Pressure Ranges - Coding example only | | | | | | | | | | | | | |
| 100# - 100 psig | | | | | | | | | | | | 100# | |
| Options (if choosing an option(s) must include an "X") | | | | | | | | | | | | | |
| NN - Paper tag | | | | | | | | | | | | | -X_ |
| NH - Stainless steel tag | | | | | | | | | | | | | NH |
| 6B - Cleaned for oxygen service | | | | | | | | | | | | | |
| 6W - Cleaned per ASME B40.100 Level IV, NOT marked for oxygen service | | | | | | | | | | | | | |
| 1L - SIL certification for E2 series transducer | | | | | | | | | | | | | |

| Accessory | Part Number |
|--|-------------|
| Offset and Span Adjustment Magnet | 266A143-01 |
| Accessories must be ordered separately | |

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TABLE 2 - SENSOR PRESSURE RANGE

| psi | Sensor Material | | bar | Sensor Material | | inHg | Sensor Material | |
|--------|-----------------|-----------|---------|-----------------|-----------|---------|-----------------|-----------|
| | B 316L SS | D A286 | | B 316L SS | D A286 | | B 316L SS | D A286 |
| 30# | • | | 1.6BR | • | | 50IM | • | |
| 45# | • | | 2BR | • | | 100IM | • | |
| 50# | • | | 2.5BR | • | | 200IM | • | |
| 60# | • | | 4BR | • | | 300IM | • | |
| 75# | • | | 6BR | • | | 500IM | • | |
| 100# | • | | 10BR | • | | 1000IM | • | |
| 150# | • | | 16BR | • | | V&30IM | | |
| 200# | • | | 20BR | • | | V&60IM | • | |
| 250# | • | | 25BR | • | | V&100IM | • | |
| 300# | • | | 40BR | • | | V&200IM | • | |
| 500# | • | | 60BR | • | | | | |
| 750# | • | | 100BR | • | | | | |
| 1000# | • | | 160BR | • | | | | |
| 1500# | • | | 200BR | • | | | | |
| 2000# | • | | 250BR | | • | | | |
| 2500# | • | | 400BR | | • | | | |
| 3000# | • | | 600BR | | • | | | |
| 5000# | • | • | 1000BR | | • | | | |
| 7500# | | • | 1400BR | | • | | | |
| 10000# | | • | V&1.6BR | • | | | | |
| 15000# | | • | V&2BR | • | | | | |
| 20000# | | • | V&4BR | • | | | | |
| V&30# | • | | V&6BR | • | | | | |
| V&45# | • | | | | | | | |
| V&60# | • | | | | | | | |
| V&100# | • | | | | | | | |
| V&150# | • | | | | | | | |
| V&200# | • | | | | | | | |
| V&300# | • | | | | | | | |



What Does It Mean?

Ashcroft's TruAccuracy™ specification is exclusively based on terminal point methodology instead of statistically derived schemes like 'best fit straight line'.

TruAccuracy™ means the Ashcroft E2F has ±0.25% accuracy out of the box. Zero and span setting errors are already included in the ±0.25% accuracy spec.

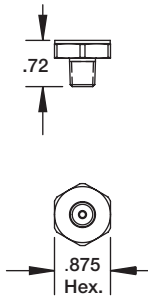
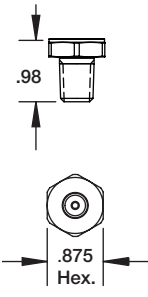
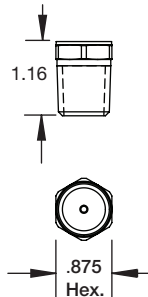
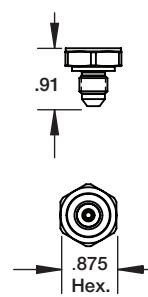
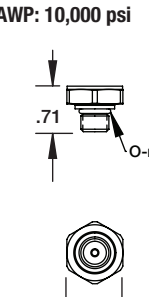
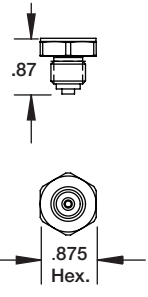
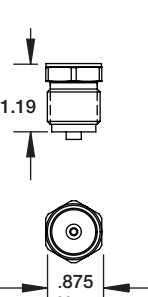
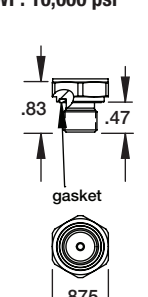
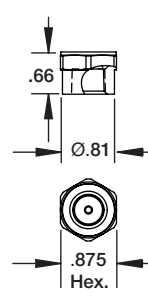
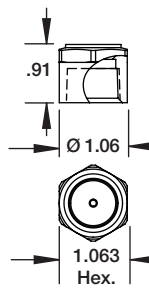
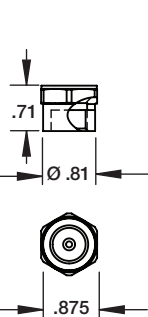
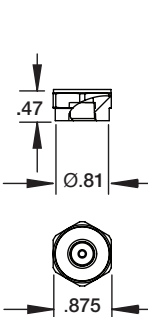
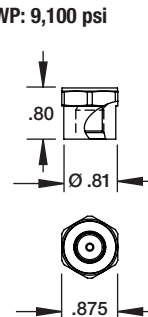
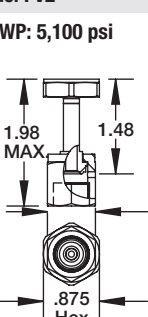
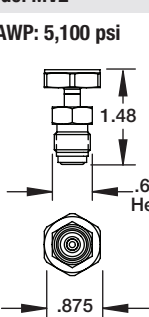
The E2F is ready to be installed with no additional calibration adjustments required.

A unit from another manufacturer advertised as ±0.25% best fit straight line may actually be a ±1.25% to ±2.25% device. Using best fit straight line method, the accuracy spec does not include zero and span setting errors, which can be as much as ±1.00% each.

Data Sheet

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TABLE 3 - PRESSURE CONNECTION DIMENSIONS

| | | | | |
|---|---|---|--|--|
| <p>1/8 NPT Male Code: M01</p> | <p>1/4 NPT Male Code: M02</p> | <p>1/2 NPT Male Code: M04</p> | <p>7/16-20 UNJF-3A 37° Flare (SAE AS4395) Code: M76</p> | <p>7/16-20 UNJF-2A SAE-Male (SAE J1926 O-Ring Boss seal) Code: MEK</p> |
| <p>MAWP: 20,000 psi</p> | <p>MAWP: 20,000 psi</p> | <p>MAWP: 10,000 psi</p> | <p>MAWP: 20,000 psi</p> | <p>MAWP: 10,000 psi</p> |
|  |  |  |  |  |
| <p>G1/4 B-Male (EN837-1) Code: MG2</p> | <p>G1/2 B Male (EN837-1) Code: MG4</p> | <p>G1/4 A-MALE (stud end DIN 3852-E G1/4) Code: MGA</p> | <p>1/4-18 NPT Female Code: F02</p> | <p>1/2-14 NPT Female Code: F04</p> |
| <p>MAWP: 20,000 psi</p> | <p>MAWP: 20,000 psi</p> | <p>MAWP: 10,000 psi</p> | <p>MAWP: 10,000 psi</p> | <p>MAWP: 5,000 psi</p> |
|  |  |  |  |  |
| <p>9/16-18 UNF-2B Female Code: F09</p> | <p>1/8 -27 NPT Female Code: F01</p> | <p>7/16-20 UNF-2B SAEJ1926 Code: FRW</p> | <p>9/16-18 Female Swivel Nut (compatible with 1/4 VCR® fitting) Code: FV2</p> | <p>9/16-18 Male Swivel Nut (compatible with 1/4 VCR® fitting) Code: MV2</p> |
| <p>MAWP: 25,000 psi</p> | <p>MAWP: 10,000 psi</p> | <p>MAWP: 9,100 psi</p> | <p>MAWP: 5,100 psi</p> | <p>MAWP: 5,100 psi</p> |
|  |  |  |  |  |

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TABLE 4 - ELECTRICAL CONNECTION DIMENSIONS

Maximum temperature range listed

**½ NPT Conduit
With Flying Leads**

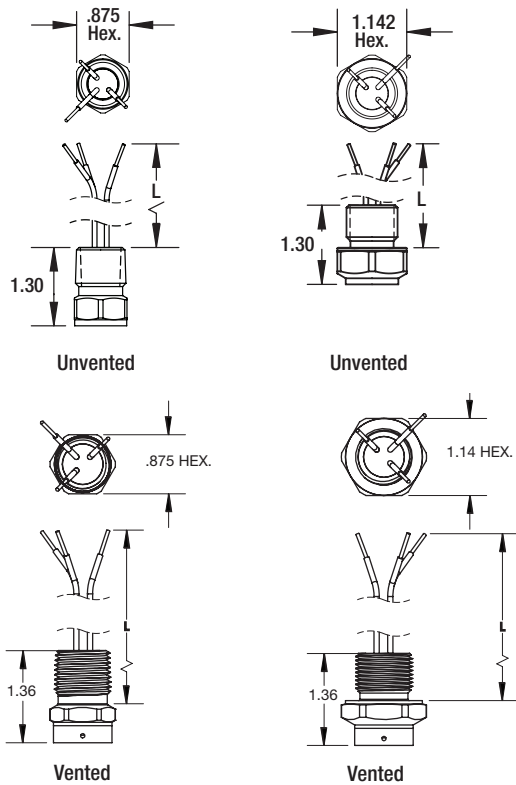
Code: CF
IP67 (NEMA 4X)

-40 °F to 176 °F (-40 °C to 80 °C)

**M20 Conduit
With Flying Leads**

Code: MF
IP67 (NEMA 4X)

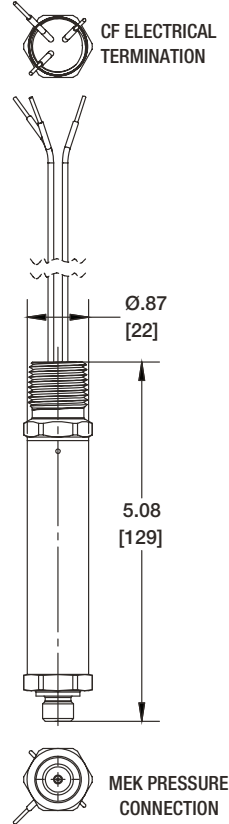
-40 °F to 176 °F (-40 °C to 80 °C)



Vented conduit supplied on units
with pressure range ≤ to 500#

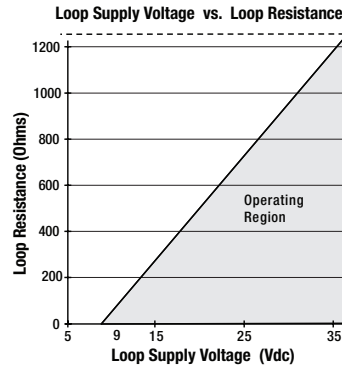
DIMENSIONS

For reference only, consult Ashcroft for specific dimensional drawings



LOOP SUPPLY VOLTAGE CHART

FOR TRANSMITTERS WITH 4-20 mA OUTPUT SIGNAL,
THE MINIMUM VOLTAGE AT THE TERMINAL IS 9VDC



$V_{MIN} = 9V + (0.022 \times A \times R_{LOOP})$ (*includes a 10% safety factor)
 $R_{LOOP} = R_{SENSE} + R_{WIRING}$
 $R_{LOOP} = \text{Loop Resistance (Ohms)}$
 $R_{SENSE} = \text{Sense Resistance (Ohms)}$
 $R_{WIRING} = \text{Wire Resistance (Ohms)}$

NOTE: See power supply requirement chart
for maximum supply voltage limits