



Technology Solutions

# TEK-BAR 3110B

## Smart Differential Pressure Transmitter



PRESSURE



## Introduction

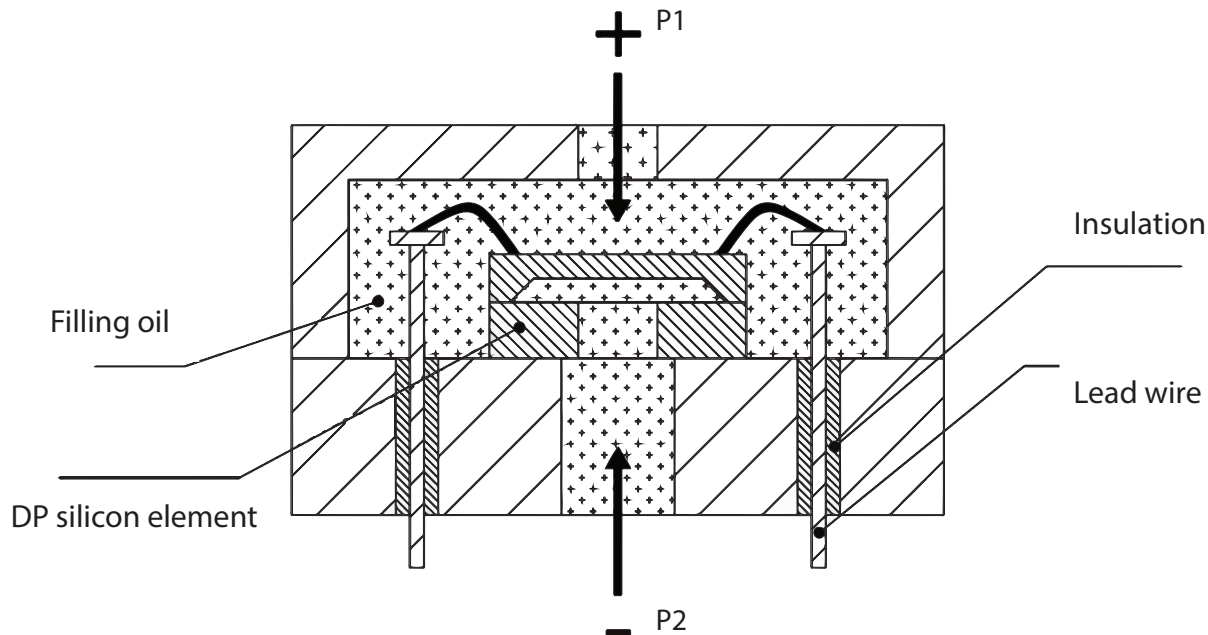
Tek-Bar 3110B Smart Differential Pressure Transmitter uses the world's advance single crystal silicon pressure sensor technology and state-of-the-art encapsulation technology. This is high performance pressure transmitter with HART communication protocol. It is used to measure liquid, gas, or steam flow; as well as liquid level, density, and pressure. It has accuracy up to 0.075% of URL and IP66 water-proof protection.

## Measuring Principle

The Tek-Bar 3110B works on the principle of mono silicon technology. The pressure sensor of the transmitter is located on the top of the metal body, away from the service fluid. This enables mechanical and thermal isolation of the sensor from the fluid in service.

When pressure is applied on the diaphragm and the two pairs of piezo-resistors, they become stressed and undergo a change in voltage resistance. This change in resistance is directly proportional to the applied pressure, which is transferred to the transmitter body using lead wires.

Built on semiconductor technology, the resistance change (piezoelectric effect) is notably higher than exhibited in standard strain gauges. Therefore, the sensitivity of mono-crystalline sensors is higher than the sensitivity of most other types.



## Benefits

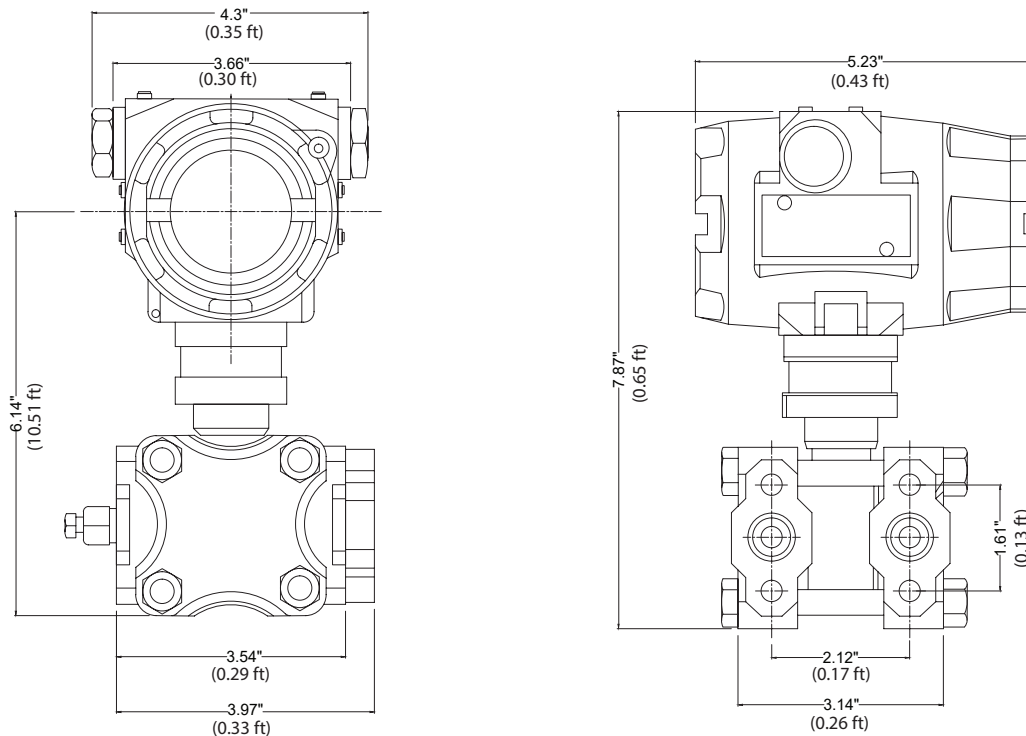
- Digital communication HART protocol.
- High performance
- High accuracy up to  $\pm 0.075\%$
- It can be used to measure liquid, gas, and steam flow as well as liquid level, density, and pressure
- Various Output: 4-20 mA, digital signals with HART® Communication (Modbus RS485)
- Multiple temperature and linearity compensation to improve accuracy
- Fully-sealed and fully isolated silicon pressure sensor
- Superior stainless steel process flange
- Dual diaphragm overload protection, it can easily cope with overload tests

## Applications

- It is used in various industries like food and beverages, chemical, water and waste water industries.
- It is used to measure liquid, gas, or steam flow as well as liquid level, density, and pressure.

## Dimensional Drawing

### Drawing and Dimension with Display



## Specifications

|                                 |                                                                  |
|---------------------------------|------------------------------------------------------------------|
| Pressure Type                   | Differential Pressure                                            |
| Reference Accuracy              | ±0.075% F.S., optional Enhanced Accuracy of ±0.065%, ±0.04%      |
| Diaphragm Materials             | Hastelloy C                                                      |
| Measuring Range                 | 24" w.c. to 1450 psid                                            |
| Stability                       | ±0.2% URL/5 year                                                 |
| Working Temperature             | -40°F to 185°F (-40°C to 85°C)                                   |
| Working Humidity                | 5 to 100% RH at 104°F                                            |
| Output Signal                   | 4 mA to 20 mA with HART® Communication (Modbus RS485)            |
| Electrical Connection           | ½" female NPT conduit                                            |
| HART Loop Resistance            | 250 to 550 ohm                                                   |
| Process Connection              | ¼" NPT Female                                                    |
| Approvals                       | CE, CSA                                                          |
| Weight (Excluding Option Items) | 8.81lb (without mounting bracket and process connection adapter) |
| Testing Standard                | GB / T28474 / IEC60770                                           |

## Damping Time

|                                                                             |                    |
|-----------------------------------------------------------------------------|--------------------|
| Damping time of amplifier                                                   | 0-100 s adjustable |
| Diaphragm capsule (isolated diaphragm and silicon oil filling) damping time | ≤0.2 s             |
| Start-up after power off                                                    | ≤6 s               |
| Normal services after data recovery                                         | ≤3 s               |

## Environmental Conditions

|                     |                                                               |
|---------------------|---------------------------------------------------------------|
| Working Temperature | -40 °F to 185 °F (-40 °C to 85 °C),                           |
|                     | Integrated LCD display: -4 °F to 158 °F (-20 °C to 70 °C)     |
| Storage Temperature | -40 °F to 230 °F (-40 °C to 110 °C),                          |
|                     | Integrated LCD display: -40 °F to 185 °F (-40 °C to 85 °C)    |
| Media Temperature   | Silicon oil filling: -40 °F to 248 °F (-40 °C to 120 °C)      |
|                     | Fluorocarbon oil filling: -49 °F to 320 °F (-45 °C to 160 °C) |
| Working Humidity    | 5-100% RH at 104 °F                                           |

## Power Supply

|                       |                                                              |
|-----------------------|--------------------------------------------------------------|
| Standard              | 10.5-55 VDC                                                  |
| HART Protocol         | 16.5-55 VDC, communication load resistance 250 Ω             |
| Load Resistance       | 0-2119 Ω for working condition, 250- 600 Ω for HART protocol |
| Transmission Distance | <3281 ft                                                     |
| Power Consumption     | ≤500 mW at 24 VDC, 20.8 mA                                   |

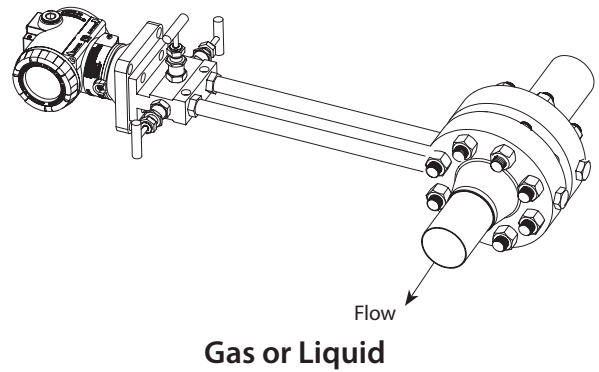
## Measuring Range and Limit

| Nominal value          | Smallest calibrated span | Lower range limit(LRL)    | Upper range limit(URL)   | Static pressure limit | High pressure side overload limit | Low pressure side overload limit |
|------------------------|--------------------------|---------------------------|--------------------------|-----------------------|-----------------------------------|----------------------------------|
| 24 w.c.<br>(6 kPa)     | 0.80 w.c.<br>(200 kPa)   | -24.11 w.c.<br>(-6 kPa)   | 24.11 w.c.<br>(6 kPa)    | 3625 psid<br>(25 MPa) | 3625 psid<br>(25 MPa)             | 2320 psid<br>(16 MPa)            |
| 160 w.c.<br>(40 kPa)   | 1.60 w.c.<br>(400 kPa)   | -160.74 w.c.<br>(-40 kPa) | 160.74 w.c.<br>(40 kPa)  | 5801psid<br>(40 MPa)  | 3625 psid<br>(25 MPa)             | 2320 psid<br>(16 MPa)            |
| 1000 w.c.<br>(250 kPa) | 10 w.c.<br>(2.5 kPa)     | 1000 w.c.<br>(-250 kPa)   | 1000 w.c.<br>(250 kPa)   | 5801psid<br>(40 MPa)  | 3625 psid<br>(25 MPa)             | 2320 psid<br>(16 MPa)            |
| 145 psid<br>(1MPa)     | 40 w.c.<br>(10 kPa)      | -72.5 psi<br>(-500 kPa)   | 145 psid<br>(1 MPa)      | 5801psid<br>(40 MPa)  | 3625 psid<br>(25 MPa)             | 2320 psid<br>(16 MPa)            |
| 435 psid<br>(3 MPa)    | 120 w.c.<br>(30 kPa)     | -72.5 psi(-<br>500 kPa)   | 435.11 psid<br>(3 MPa)   | 5801 psid<br>(40 MPa) | 3625 psid<br>(25 MPa)             | 2320 psid<br>(16 MPa)            |
| 1450 psid<br>(10 MPa)  | 401 w.c.<br>(10 kPa)     | -72.5 psi<br>(-500 kPa)   | 1450.11 psid<br>(10 MPa) | 5801psid<br>(40 MPa)  | 3625 psid<br>(25 MPa)             | 2320 psid<br>(16 MPa)            |

## Installation

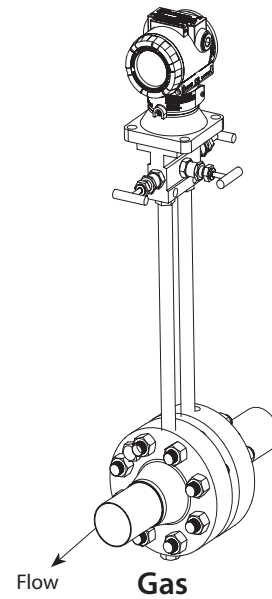
### Liquid Flow Measurement

- Place taps to the side of the line to prevent sediment deposits on the transmitters process isolators
- Mount the transmitter beside or below the taps so gases can vent into the process line
- Mount drain/vent valve upward to allow gases to vent



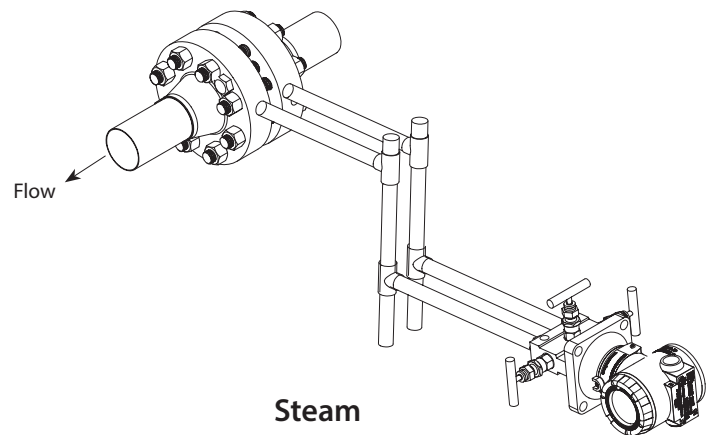
### Gas Flow Measurement

- Place taps in the top or side of the line
- Mount the transmitter beside or above the taps so liquid will drain into the process line



### Steam Flow Measurement

- Place taps to the side of the line
- Mount the transmitter below the taps to ensure that the impulse piping will stay filled with condensate
- In steam service above 250 °F (121 °C), fill impulse lines with water to prevent the steam from contacting the transmitter directly and to ensure accurate measurement at start-up



**Note:** For steam or other elevated temperature services, it is important that temperatures at the process connection do not exceed the transmitters process temperature limits.

## Model Chart

|                        |                 |                            |           |        |    |   |                                  |                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------|-----------------|----------------------------|-----------|--------|----|---|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Example                | Tek-Bar 3110B-D | 3                          | WP        | 1      | HC | 1 | BA                               | Tek-Bar 3110B-D-3-WP-1-HC-1-BA                                                                                                                                                                                                                                                                                                                                                                      |
| Series                 | Tek-Bar 3110B-D |                            |           |        |    |   |                                  | Smart Differential Pressure Transmitter                                                                                                                                                                                                                                                                                                                                                             |
| Range Options          |                 | 1<br>2<br>3<br>4<br>5<br>6 |           |        |    |   |                                  | 0 - 24" w.c. (30:1 Turndown, Adj. Range: -24" to +24" w.c.)<br>0 - 160" w.c. (100:1 Turndown, Adj. Range: -160" to +160" w.c.)<br>0 - 1000" w.c. (100:1 Turndown, Adj. Range: -1000" to +1000" w.c.)<br>0 - 145 psid (100:1 Turndown, Adj. Range: -72 to +145 psid)<br>0 - 435 psid (100:1 Turndown, Adj. Range: -72 to +435 psid)<br>0 - 1450 psid (100:1 Turndown, Adj. Range: -72 to +1450 psid) |
| Approval Rating        |                 |                            | WP<br>CSA |        |    |   |                                  | General Purpose NEMA 4X/IP66<br>CSA; CSA Class I Div I Explosion-proof                                                                                                                                                                                                                                                                                                                              |
| Process Connections    |                 |                            |           | 1<br>X |    |   |                                  | ¼" NPT Female<br>Diaphragm Seal                                                                                                                                                                                                                                                                                                                                                                     |
| Diaphragm Material     |                 |                            |           |        | HC |   |                                  | Hastelloy C                                                                                                                                                                                                                                                                                                                                                                                         |
| Electrical Connections |                 |                            |           |        |    | 1 |                                  | ½" NPT Female                                                                                                                                                                                                                                                                                                                                                                                       |
| Options                |                 |                            |           |        |    |   | CC<br>FC<br>BA<br>BF<br>TAG<br>O | Custom Calibration with 5 point Calibration Certificate<br>Factory Configuration, No Certificate<br>Stainless Steel Bracket (Angle type) with SST Bolts<br>Stainless Steel Bracket (Flat type) with SST Bolts<br>Custom Etching of the Name Plate (Must specify on P.O.)<br>½"-14 NPTF, Oval Flange Process Connection Adapter (Includes 2 O-rings, an adapter, and 2 bolts)                        |

## Popular Models

| Model Number        | Description                                |
|---------------------|--------------------------------------------|
| 3110B-D-1-WP-1-HC-1 | DP Pressure Transmitter, 0-24" w.c., LCD   |
| 3110B-D-2-WP-1-HC-1 | DP Pressure Transmitter, 0-160" w.c., LCD  |
| 3110B-D-3-WP-1-HC-1 | DP Pressure Transmitter, 0-1000" w.c., LCD |
| 3110B-D-4-WP-1-HC-1 | DP Pressure Transmitter, 0-145 psid, LCD   |
| 3110B-D-5-WP-1-HC-1 | DP Pressure Transmitter, 0-435 psid, LCD   |
| 3110B-D-6-WP-1-HC-1 | DP Pressure Transmitter, 0-1450 psid, LCD  |

# Customer Service & Support



Tek-Trol is a fully owned subsidiary of TEKMATIION LLC. We offer our customers a comprehensive range of products and solutions for process, power and oil & gas industries. Tek-Trol provides process measurement and control products for Flow, Level, Temperature & Pressure measurement, Control valves & Analyzer systems. We are present in 15 locations globally and are known for our knowledge, innovative solutions, reliable products and global presence.