The Series 7116B Spirahelic® Pressure Indicating Transmitter simultaneously provides local indication on a large, easily read analog scale while also converting that pressure into a standard two wire, 4-20 mA signal for ranges from 0-60 to 0-600 psi. Positive compatible gas pressure is measured to the accuracy of ±0.5% of full scale. The gage employs a unique triple helix Bourdon tube for precision measurement of compatible gases and liquids. The direct drive design reduces friction and mass, resulting in exceptionally good responsiveness, repeatability and accuracy. Because there are no gears, springs linkages or other complicated mechanisms, wear is practically eliminated. The electrical signal and conditioning is produced by a piezoresistive pressure cell. A 316 stainless steel connection block features convenient dual 1/4˝ female NPT and 1/2˝ male NPT pressure connection. Pressure block also includes integral filter plug to keep dirt out. Safety is assured with solid front case design and rear blowout hole.

INSTALLATION
1. Select a location free from excessive vibration where the temperature limits of 20 to 120°F (-6.7 to 49°C) will not be exceeded. Mounting surface should be vertical to match the position in which all standard gages are calibrated. Avoid locations in direct sunlight which may cause accelerated discoloration of the clear acrylic lens or where exposure to oil mist or other airborne vapors could likewise result in lens damage. Make sure that the case relief area on the rear is not obstructed. This hole is designed to direct pressure rear-ward in the event of a failure of the Bourdon tube element. See complete safety recommendations at the end of this bulletin.

2. See Fig. A for mounting hole instructions.

SPECIFICATIONS
GAGE SPECIFICATIONS
Service: Compatible gases & liquids.
Wetted Materials: Inconel® X-750 Alloy Bourdon Tube, Type 316L SS connection.
Housing: Black polycarbonate case and clear acrylic cover.
Accuracy: Grade 2A (0.5% F.S.).
Stability: ± 1% F.S./year.
Pressure Limit: 150% of full scale. Gage will maintain its specifications for overpressures up to 150% maximum range.
Normal operation should be between 25% and 75% of full scale.
Temperature Limits: 20 to 120°F (-6.67 to 48.9°C).
Size: 4-1/2˝ (114.3 mm) dial face. Design conforms to ASME B40.1.
Process Connections: Dual size 1/4˝ male NPT / 1/4˝ female NPT pressure connection. Bottom connection.
Weight: 29.5 oz (836.3 g).

TRANSMITTER SPECIFICATIONS
Accuracy: 0.5% F.S.
Temperature Limits: 20 to 120°F (-6.67 to 48.9°C).
Thermal Effect: ± 0.025% F.S./°F (0.045% F.S./°C).
Power Requirements: 10-35 VDC (2 wire).
Output Signal: 4-20 mA DC.
Zero & Span Adjustments: Externally accessible potentiometers.
Loop Resistance: DC, 0-1250 ohms.
Current Consumption: DC, 38 mA max.
Electrical Connections: Screw Terminals.
Mounting Orientation: Vertical.
Agency Approval: CE.
3. A 1/4˝ female NPT 1/2˝ male NPT pressure connection is furnished to allow you the choice of vertical (from below the gage) or horizontal piping. The unused port is plugged. When changing the pressure connection from the vertical to the horizontal position, use a minimal amount of thread sealant. Too much could block the internal pressure passage. **CAUTION:** When installing fittings or pipe always use a second wrench on the 7/8˝ connection block. **DO NOT** allow torque to be transmitted from the block to the case.

**ELECTRICAL CONNECTIONS**

**CAUTION:** Do not exceed specified supply voltage ratings. Permanent damage not covered by warranty will result. This unit is not designed for 120 or 240 volt AC line operation.

Electrical connections to the Series 7116B Spirahelic® Pressure Indicating Transmitter are made on the backside of the enclosure unit. Feed stripped and tinned leads to the terminal block screws marked 1 and 2. Refer to figure B for locations of the terminal block, span and zero adjustments.

**Wire Length**-The maximum length of wire connecting transmitter and receiver is a function of wire size and receiver resistance. Wiring should not contribute to more than 10% of receiver resistance to total loop resistance. For extremely long runs (over 1000 feet), choose receivers with higher resistances to minimize size and cost of connecting leads. When the wiring length is under 100 feet, lead wire as small as 22 AWG can be used.

**2-Wire Operation**-An external power supply delivering 10-35 VDC with minimum current capability of 40 mA DC (per transmitter) must be used to power the control loop. See Fig. C for connection of the power supply, transmitter, and receiver. The range of the appropriate receiver load resistance (RL) for the DC power supply voltage available is expressed by the formula and graph in Fig. D. Shielded two wire cable is recommended for control loop wiring. If grounding is required use negative side of control loop after receiver. See Fig. C.

**Pneumatic Calibration Test**

Use a dead weight tester or certified test gage having accuracy of 1/4% or better for ANSI Grade A gages, 0.1% or better for ANSI Grade 2A gages. The test gage range should be comparable to the range of the Series 7116B Spirahelic® Pressure Indicating Transmitter gage being checked. Connect lines from the two instruments to a tee and the third line from the tee to a controllable source of pressure. Apply pressure slowly so that the pressure equalizes throughout the system, compare readings. If the gage being tested is found to need calibration return it to the address on page 3.
Pressure Ranging
Each standard Series 7116B Spirahelic® Pressure Indicating Transmitter is factory calibrated to produce 4 mA at zero scale reading and 20 mA at full scale reading. The following procedure should be used if the pressure versus output signal relationship needs to be checked.

1. With the unit connected to the companion receiver per preceding instructions, insert an accurate milliammeter, with a full scale reading of approximately 30 mA, in series with the current loop. A controllable pressure source capable of achieving the desired range should be connected to the pressure port of the transmitter and teed into an accurate reference pressure gage or manometer. The instrument must be ranged in the same position in which it is going to be used. Vertical mounting is recommended.

2. Apply electrical power to the system and allow it to stabilize for 10 minutes.

3. With no pressure applied to the transmitter, adjust “Zero” adjustments so that loop current is 4 mA.

4. Apply full range pressure and adjust loop current to 20 mA using “Span” adjustments.

5. Relieve pressure and allow transmitter to stabilize for 2 minutes.

6. Zero and Span adjustments may be interactive so repeat steps 3 thru 5 until zero and full range pressures consistently produce loop currents of 4 and 20 mA respectively.

7. Remove the milliammeter from the current loop and proceed with final installation of the transmitter and receiver.

MAINTENANCE
No lubrication or periodic servicing is required after final installation of the Series 7116B Spirahelic® Pressure Indicating Transmitter. A periodic check of calibration is recommended following the procedure under pressure ranging and pneumatic calibration test. Except for this, these transmitters are not field serviceable and should be returned, freight prepaid, to the factory if repair is needed. Be sure to include a clear description of the problem plus any application information available.

Repairs
Field repair should not be attempted and may void warranty. Gages needing calibration or other service should be returned prepaid to:

Dwyer Instruments, Inc.
ATTN: Repair Department
102 Indiana Highway 212
Michigan City, IN 46360

Multiple Receiver Installation
An advantage of the standard 4-20 mA DC output signal used in Series 7116B Spirahelic® Pressure Indicating Transmitters is the compatibility with a wide range of receivers. Devices such as the A-701 Digital Readout, A-702 Digital Readout with alarms, an analog panel meter, a chart recorder and other process control equipment can be operated simultaneously. It is only necessary that all devices be designed for a standard 4-20 mA input, the proper polarity of input connections must be observed and the combined receiver resistance’s must not exceed the maximum for the current loop. If the receiver indicates a negative or down scale reading, the signal input leads are reversed.
are usually more critical with compressed gas media than with liquid media.

4.2 General Discussion

4.2.1 Adequate safety results from intelligent planning and careful selection and installation of gauges into a pressure system. The user should inform the supplier of all conditions pertinent to the application and environment so that the supplier can recommend the most suitable gauge for the application.

4.2.2 The history of safety with respect to the use of pressure gauges has been excellent. Injury to personnel and damage to property have been minimal. In most instances, the cause of failure is operator carelessness or misapplication.

4.2.3 The pressure sensing element in most gauges is subjected to high internal stresses, and applications exist where critical failure of catastrophic failure is present. Pressure regulators, chemical (diaphragm) seals, pulsation dampers or snubbers, syphons, and other similar items, are available for use in these potentially hazardous systems. The hazard potential increases at higher operating pressure.

4.2.4 The following systems are considered potentially hazardous and must be carefully evaluated:

(a) high pressure systems
(b) oxygen systems
(c) systems containing hydrogen or free hydrogen atoms
(d) corrosive fluid systems (gas and liquid)
(e) pressure systems containing any explosive or flammable mixture or medium
(f) steam systems
(g) (non-pressure systems)
(h) systems where high overpressure could be accidentally applied
(i) systems wherein interchangeability of gauges could result in hazardous internal contamination or where lower pressure gauges could be installed in higher pressure systems
(j) systems containing radioactive or toxic fluids (liquids or gases)
(k) systems installed in a hazardous environment

4.2.5 When gauges are to be used in contact with media having steam or uncertain corrosive effects or known to be radioactive, random or unique destructive phenomena can occur. It is important that the user should always furnish the supplier or manufacturer with information relative to the application and solicit his advice prior to installation of the gauge.

4.2.6 Fire and explosions within a pressure system can cause pressure element failure with very violent effects, even to the point of completely disintegrating or melting the pressure gauge. Violent effects are also produced when heat sources such as fires or explosions are applied.

4.2.7 Corrosion Failure. Corrosion failure occurs when the elastic element has been weakened through attack by corrosive chemicals present in either the media inside or the environment outside it. Failure may occur as pinhole leakage through the elements walls or early fatigue failure due to stress cracking brought about by chemical deterioration or embrittlement of the material. A chemical (diaphragm) seal should be considered for use with pressure media that may have a corrosive effect on the elastic element.

4.2.4 Explosive Failure. Explosive failure is caused by the release of explosive energy generated by a chemical reaction such as can result with adiabatic compression of oxygen or with pressure media that may have a corrosive effect on the elastic element.

4.3 Safety Recommendations

4.3.1 Operating Pressure. The pressure gauge selected should have a full scale pressure such that the operating pressure occurs in the middle half (25 to 75%) of the scale.

4.3.2 Use of Gauges Near Zero Pressure. The use of gauges near zero pressure is not recommended because the accuracy, tolerance may be a large percentage of the applied pressure. For this mode of use, a solid wall or partition between the elastic element and the window will not necessarily prevent parts being projected forward. A pressure gauge near zero pressure should not be used to measure 6 psi, the accuracy of measurement will be ±3 psi, or ±0.5% of the applied pressure.