The Dwyer Series 7000 Spirahelic® Pressure Indicating Transmitter provides local indication on a large, easy-to-read analog scale while also converting that pressure into a standard two wire 4-20 mA output signal. Positive pressure of compatible gases or liquids is measured with 1/2% of full scale accuracy. The gage employs a triple helix Bourdon tube movement with direct drive design to reduce friction and mass for exceptional responsiveness, repeatability and accuracy. Because there are no gears, springs, linkages or other complicated mechanisms, wear is practically eliminated. The electrical output signal is produced by a piezoresistive pressure sensor mounted on the pressure block. The pressure block also includes an integral filter plug to protect the gage interior from dirt and other particulates. Safety is assured with a solid front case design and a 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. The 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 rearward in the event of failure or the Bourdon tube element. See complete safety recommendations in this bulletin.

2. Cut a 4.94˝ (125 mm) mounting hole and drill (3) 7/32˝ (5.56 mm) bolt holes on a 5.38˝ (137 mm) bolt circle as shown in drawing above. Attach gage to panel with (3) 3/16˝ bolts of appropriate length.

3. Two 1/4˝ female NPT pressure connections are furnished to allow a choice of vertical or horizontal piping. The unused port should be plugged. Use a minimal amount of thread sealant. Too much could block the internal pressure passage.

SPECIFICATIONS

GAGE SPECIFICATIONS

Service: Compatible gases & liquids
Wetted Materials: Inconel® X-750 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./yr.
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˝ dial face (114.3 mm), Design conforms to ASME B40.1.
Process Connections: Two 1/4˝ female NPT field selectable back or bottom connection.

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 Approvals: CE.
CAUTION: When installing fittings or pipe always use a second wrench on the 1" pressure block DO NOT allow torque to be transmitted from block to the gage case.

PNEUMATIC CALIBRATION TESTER
Use a dead weight tester or certified test gage with .125% or better accuracy. The test gage range should be comparable to the range of the Spirahelic® Pressure Indicating Transmitter being checked. Connect the 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 pressure equalizes throughout the system. Compare readings, if gage being tested is found to need calibration, return it, freight prepaid to the factory.

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 7000 Spirahelic® Pressure Indicating Transmitter are made at the rear of the pressure gage. Feed stripped and tinned leads to the terminal block screws shown below, refer to Figure A for locations of the terminal block, span and zero adjustments.

2-Wire Operation - A 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 Figure B for connection of the power supply, transmitter, and receiver. The range of the appropriate receiver load resistance (R_L) for the DC power supply voltage available is expressed by the formula and graph in Figure C. Shielded two wire cable is recommended for control loop wiring. If grounding is required use negative side of control loop after receiver see Figure B.

PRESSURE RANGING
Each standard Series 7000 Spirahelic® Pressure Indicating Transmitter is factory calibrated to produce a 4 mA output signal at zero pressure and a 20 mA signal at full scale. Use the following procedure to check or adjust the output signal calibration.

1. With the unit connected to its companion receiver and power supply, an accurate milliammeter should be inserted in series with the current loop. A controllable pressure source capable of achieving the necessary full scale pressure should be connected to the pressure port of the transmitter and teed to an accurate pressure gage or manometer. The instrument should be calibrated in the same position in which it will 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” control so that loop current is 4 mA.

4. Apply full scale pressure and adjust “Span” control so that loop current is 20 mA.

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

6. Zero and Span controls are slightly interactive so repeat steps 3 through 5 until zero and full scale pressures consistently produce loop currents of 4 and 20 mA respectively.

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

MULTIPLE RECEIVER INSTALLATION
An advantage of the standard 4-20 mA DC output signal provided by the 7000 Spirahelic® Pressure Indicating Transmitter is that any number or receivers can be connected in series in the current loop. Thus, an A-701 digital readout, an analog panel meter, a chart recorder, process controlling equipment, or any combination of these devices can be operated simultaneously. It is necessary only that each be equipped with a standard 4-20 mA input and proper polarity of the input connections be observed when inserting the device into the current loop. If any of the receiving devices displays a negative or downscale reading this indicates that the signal input leads are reversed.

MAINTENANCE
Upon final installation of the Series 7000 Spirahelic® Pressure Indicating Transmitter and the companion receiver, no routine maintenance is required. A periodic check of the system calibration is recommended. The Series 7000 Spirahelic® Pressure Indicating Transmitter is not field serviceable and should be returned freight prepaid, to the factory (listed below) if repair is required (field repair should not be attempted and may void warranty).

Dwyer Instruments, Inc.
Attn: Repair Department
102 Highway 212
Michigan City, IN 46360
4 SAFETY

4.1 Scope

This Section of the Standard presents certain information to suppliers, and manufacturers toward minimizing the hazards that could result from misuse or misapplication of pressure gauges will be considered.

The user should become familiar with all sections of this Standard, as all aspects of safety cannot be covered in this Section. Consult the manufacturer or supplier for advice whenever there is uncertainty about the safe application of a pressure gauge.

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 pertaining 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 use of pressure gauges has been excellent. Injury to personnel and damage to property has been limited. In most instances, the cause of failure has been misuse or misapplication.

4.2.3 Corrosion Failure. Corrosion failure occurs when the elastic element has been weakened through the attack by corrosive chemicals present in either the media inside or the environment outside it. Failure may occur as pinhole leakage through the walls or early failure due to stress cracking brought about by chemical deterioration on the 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.

4.3.8.4 Chemical Gauge. Specific applications for pressure gauges exist where hazards are known. In many instances, requirements for design, construction, and use of gauges for these applications are specified by federal agencies or Underwriters Laboratories, Inc. Some of these specific service gauges are listed below. It is not intended to be all inclusive, and the user should always advise the supplier of all application details.

4.3.8.2 Acetylene Gauges. A gauge designed to indicate acetylene pressure. It shall be constructed using materials that are compatible with commercially available acetylene. The gauge may bear the inscription ACETYLENE on the dial.

4.3.8.3 Ammonia Gauges. A gauge designed to indicate ammonia pressure and to withstand the corrosive effects of ammonia. The gauge may bear the inscription AMMONIA on the dial. It may also include the equivalent saturation temperature scale markings.

4.3.8.4 Chemical Gauge. A gauge designed to indicate the pressure of corrosive fluids, or both. The primary material(s) in contact with the pressure medium may be identified on the dial. It may be equipped with a protective cover (diaphragm or bellow), seal, pulsation damper, or pressure relief device, or a combination thereof. These devices help reduce potential damage to personnel and property in the event of gauge failure. They may, however, also reduce accuracy.

4.3.8.5 Oxygen Gauge. A gauge designed to indicate oxygen pressure. Cleanliness shall comply with Level IV (see Section 5). The dial shall be clearly marked with a universal symbol and/or USE NO OIL in red color (see para. 7.2.7.1).

4.4 Reuse of Pressure Gauges

It is not recommended that pressure gauges be moved from one application to another. If it be necessary, however, the following must be considered.

4.4.1 Chemical Compatibility. The consequence of incompatibility can range from contamination to explosive failure. For example, moving an oil service gauge to oxygen service can result in explosive failure.

4.4.2 Partial Fatigue. The first installation may involve pressure pulsation that has expended most of the gauge life, resulting in early fatigue in the second installation.

4.4.3 Corrosion. Corrosion of the pressure element is usually detected by the factor of strength sufficient to cause early failure in the second installation.

4.4.4 Other Considerations. When reusing a gauge, all guidelines covered in the Standard relative to application of gauges should be followed in the same manner as when a new gauge is selected.