Series 7214D & 7314D Spirahelic® Gages employ a unique triple-wound helical/spiral Bourdon tube, formed from Inconel® X-750 material for exceptionally wide media compatibility and reliability. Units provide ASME Grade 3A accuracy (1/4%), readable on both a large 6” (7214D), 8.5” (7314D) analog dial and a 42 digit liquid crystal display. A 316 SS connection block includes dual 1/4” NPT female ports for a choice of vertical or horizontal piping. Block includes an integral filter plug to prevent dirt or other foreign material from entering the gage. Gage fits standard ASME 9.0” (229mm) panel cut out.

Physical Data

Size: 6” (7214D), 8.5” (7314D). Size conforms to ASME B40.1

Accuracy: ASME Grade 3A (1/4% of full scale)

Pressure Connections: 1/4” NPT female, duplicated back and bottom

ASME Specifications: Conforms to ASME B40.1

Housing: Impact resistant mineral filled nylon

Position: Calibrated for mounting with scale in vertical position

Wetted Parts: Inconel® X-750 Bourdon tube, 316 SS connection block

Movement: Direct drive of pointer

Temperature Limits: 20 to 120°F (-6.7 to 48.9°C)

Overpressure: 150% of full scale. Recommended operation should be between 25 and 75% of full scale.

Finish: Black

Weight: 7214D-21 oz. (595 grams) 7314D-1 lb, 11 oz. (765 grams)

Accessory: (1) 1/4” NPT pipe plug

Electrical

Power Supply: 10-35 VDC; 16-26 VAC

Warm-Up Time: 10 minutes

Current Consumption: DC: 38 mA max.; AC: 76 mA max.

Series 7214D & 7314D Models and Ranges

<table>
<thead>
<tr>
<th>Model Number</th>
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<th>Range, PSI</th>
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<tr>
<td>7214D-G100</td>
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<td>7214D-G200</td>
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<td>7214D-G300</td>
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<tr>
<td>7214D-G600</td>
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Installation

1. Select a location free from excess vibration where the temperature limits of 20 to 120°F (-6.7 to 48.9°C) will not be exceeded. Mounting surface should be vertical to match the temperature limits of 20 to 120°F (-6.7 to 48.9°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 can 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 the case relief area on the rear is not obstructed. This hole is designed to direct pressure rearward in the event of a Bourdon tube failure. See complete safety recommendations on the back of this sheet.


2. Make a panel cutout of 6.5” (165.1mm) for Series 7214D gages. Make a panel cutout of 9” (229mm) for Series 7314D gages. See drawing above for bolt circle diameters and bolt hole sizes.

3. Two 1/4” NPT female pressure connections are provided allowing a choice of vertical (below gage) or horizontal piping. Plug unused port. Use 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 1” connection block. Do Not allow torque to be transmitted from the block to the gage 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 VAC line operation.

Electrical connections to the Series 7214D & 7314D Spirahelic® Pressure gage with digital display are made to the electrical terminal strip on the rear of the case. See drawing above. It is not necessary to observe polarity when making electrical connections. Do observe the maximum VDC and VAC limits listed at left.

Calibration Test

To check calibration, use a dead weight tester or certified test gage with accuracy of 0.1% or better for ASME Grade 3A gages. The test gage range should be comparable to the range of the Spirahelic® gage being tested. Connect lines from the two instruments to a tee and a third line from the tee to a control-able source of pressure. Apply pressure slowly so pressure can equalize throughout the system. Compare readings. If gage being tested is found to need calibration, return it freight prepaid to the address below.

Maintenance

No lubrication or periodic servicing is required. Keep case exterior and lens clean. Use only cleaners compatible with acrylic plastic.

Repairs

Field repair is not recommended and can void warranty. Gages needing calibration or other service should be returned freight prepaid to:

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

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The material is excerpted from a standard titled "ANSI/ASME B40.1-1985" as published by The American Society of Mechanical Engineers, 345 East 47th St. New York, NY 10017. This information is furnished to assist the user of Dwyer Spirahelic® gauges in properly evaluating their suitability for the intended application and conditions.

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, so that the manufacturer 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 has been minimal. In most incidents of failure, blame is placed on misuse or misapplication.

4.2.3 One feature sensing element in most gauges is subjected to high internal stresses, and applications exist where the possibility of catastrophic failure is present. Pressure regulators, chemical (diaphragm) seals, pulsation dampers or snubbers, syphon, and other similar items, are available to reduce the possibility of failure in pressure systems. The hazard potential increases at higher operating pressures.

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

(a) compressed gas 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) nonsteady 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 known or uncertain corrosive effects or known to be radioactive, random or unique destructive phenomena can occur. In such cases the user should advise the manufacturer or supplier with information relative to the application and solicit his advice regarding 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 failure occurs due to:

(a) hydrogen
(b) contamination of a compressed gas
(c) formation of acetylene in steel welder joints by steam or other heat sources
(d) weakening of soft soldered or silver brazed joints caused by heat sources such as fires

4.2.7 Fatigue Failure. Fatigue failure caused by gas pressure generally occurs on the inside to the outside along a highly stressed edge radius, appearing as a small crack that propagates along the edge of the gauge. Fatigue failures are more critical with compressed gas media than with liquid media. Fatigue cracks usually release the media fluid slowly so case pressure buildup can be avoided by preventing the gauge element from being subjected to the fluid pressure. However, in high pressure elastic elements where the yield strength approaches the ultimate strength of the material, the condition of case failure could result in explosive failure.

4.2.8 Pressure Connection. Overpressure failure is caused by the application of internal pressure greater than the rated limits of the elastic element and is accompanied by case failure. The pressure gauge is installed in a high pressure port system of the effects of overpressure failure, usually more critical in case failure of fluid filled gauges. Those fast acting systems, are unpredictable and may cause parts to be propelled in any given stress relief openings will not always expel expelled parts.

4.2.9 Placing a restricter in the pressure gauge inlet will not alter the inherent design but will help control flow of escaping fluid following rupture and reduce potential of secondary effects.

4.2.10 A gas pipe or tube can be ruptured, say for oxides or alkali metals, and hydrogen or free hydrogen atoms may result from misuse or misapplication of pressure gauges. An explosion is the most likely result from misuse or misapplication of the elastic element walls or early fatigue failure due to stress embrittlement of the material.

4.2.11 A chemical (diaphragm) seal should be considered for use with pressure media that may have a corrosive effect on the elastic element.

4.2.12 Explosive failure is caused by the release of explosive energy generated by a chemical reaction such as can result with adiabatic compression of oxygen in the presence of flammable gases. The pressure increase caused by a chemical reaction is generally accepted that there is no limitation of the magnitude or effects of this type of failure. For this mode of failure, a solid wall or partition between the elastic element and atmosphere must necessarily prevent parts being projected forward.

4.2.13 Gauges. Pressure Indicating Dial Type-Partially Open Bourdon Tube

4.2.13.1 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. The full scale pressure of the gauge selected should be approximately two times the intended operating pressure.

4.2.13.2 Overpressure Gauges Near Zero Pressure

The use of gauges near zero pressure is not recommended in the absence of the gauge being used for a large percentage of the applied pressure. If, for example, a 0 to 100 psi gauge is used for pressures 6 psi or more, the accuracy of measurement will be ±50% of the applied pressure. In addition, the scale of a gauge is overloaded if the pressure results in inaccuracies when measuring pressures that are a small percentage of the gauge span.

4.2.13.3 Compatibility With the Pressure Medium

Failure in a compressed gas system can be expected to produce violent effects.

4.2.13.4 Modes of Elastic Element Failure

There are four basic modes of elastic element failure:

(a) Chemical Compatibility

The elastic element is generally a thin walled member, which of necessity operates under high stress conditions and must, therefore, be carefully selected for compatibility with the pressure medium being measured. Non-compatible material elements is imperative to every type of chemical attack. The pressure gauge manufacturer considers many factors, including the concentration, temperature, and contamination of the medium. The user should inform the manufacturer of all installation conditions so that the appropriate element materials can be selected.

4.2.13.5 Restrictor

Addition to the factors discussed above, the capability of a pressure element is influenced by the design, material, and manufacture of the joints between its parts.

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. The full scale pressure of the gauge selected should be approximately two times the intended operating pressure.

4.3.2 Use of Gauges Near Zero Pressure

The use of gauges near zero pressure is not recommended in the absence of the gauge being used for a large percentage of the applied pressure. If, for example, a 0 to 100 psi gauge is used for pressures 6 psi or more, the accuracy of measurement will be ±50% of the applied pressure. In addition, the scale of a gauge is overloaded if the pressure results in inaccuracies when measuring pressures that are a small percentage of the gauge span.

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4.3.5 Restrictor

Addition to the factors discussed above, the capability of a pressure element is influenced by the design, material, and manufacture of the joints between its parts.

4.3.6 Chemical Compatibility. The consequence of chemical compatibility is an explosion to cause failure. For example, moving an oil service gauge to oxygen service can result in explosion failure.

4.3.7 Partial Fatigue. The first installation may involve pressure pulsation that has expanded over time due to the suddenness of the second installation.

4.3.8 Corrosion. Corrosion of the pressure element assembly in the first installation may be sufficient to cause early failure in the second installation.

4.3.9 Material Compatibility. Using a new gauge, all guidelines covered in the Standard relative to application of gauges should be followed in the same manner. The new gauge is selected.