WIKA INSTRUMENT CORPORATION

Instruction Manual

DIFFERENTIAL PRESSURE GAUGE

Series 1500
Series 1000
Series 300

WIKA Instrument Corporation
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Lawrenceville, GA 30043
1-888-945-2872
http://www.wika.com

PLEASE NOTE: THIS EQUIPMENT HAS BEEN DESIGNED TO PROVIDE RELIABLE SERVICE; HOWEVER, BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THE EQUIPMENT, THIS INSTRUCTION MANUAL MUST BE READ, UNDERSTOOD AND OBSERVED. FAILURE TO DO SO CAN RESULT IN IMPROPER OPERATION WITH POSSIBLY HAZARDOUS CONSEQUENCES.

VERY IMPORTANT SAFETY PRECAUTION

This page titled "Very Important Safety Precautions" provides in brief, information of urgent importance relative to SAFETY in the INSTALLATION - OPERATION & MAINTENANCE of this equipment.

WARNING

TO AVOID POSSIBLE SEVERE PERSONAL INJURY, OBSERVE THE FOLLOWING SAFETY PRECAUTIONS:

WHEN USING SOLVENTS TO CLEAN FILTER PROVIDE ADEQUATE VENTILATION AND AVOID PROLONGED INHALATION OF VAPORS.

DO NOT EXCEED PRESSURE RANGE. EXCESSIVE PRESSURE MAY RUPTURE THE GLASS DIAL COVER.

IMPROPER USE OF THIS GAUGE MAY CAUSE EXPLOSION. READ INSTRUCTION BOOK BEFORE USING THIS EQUIPMENT.

TO ENSURE PROPER AND SAFE OPERATION OF THIS EQUIPMENT, USE ONLY WIKA HIGH PRECISION PARTS LISTED EXCEPT WERE COMMERCIALLY AVAILABLE PARTS ARE IDENTIFIED BY COMPLETE DESCRIPTION ON A PARTS LIST. THE USE OF UNLISTED PARTS CAN RESULT IN EQUIPMENT MALFUNCTIONS CAUSING POSSIBLE SEVERE PERSONAL INJURY.

THIS EQUIPMENT SHOULD BE INSTALLED, OPERATED AND SERVICED ONLY BY TRAINED, QUALIFIED PERSONNEL WHO ARE THOROUGHLY FAMILIAR WITH THE ENTIRE CONTENTS OF THIS INSTRUCTION BOOK.

DO NOT DISCARD THIS INSTRUCTION BOOK UPON COMPLETION OF INSTALLATION. INFORMATION PROVIDED IS ESSENTIAL TO PROPER AND SAFE OPERATION AND MAINTENANCE.

ADDITIONAL OR REPLACEMENT COPIES OF THIS INSTRUCTION BOOK ARE AVAILABLE FROM:

WIKA Instrument Corporation
1000 Wiegand Boulevard
Lawrenceville, GA 30043 USA
Tel (888) WIKA-USA (888-945-2872)
FAX (770) 338-5118

NOTE
Minor part number changes may be incorporated into WIKA products from time to that are not immediately reflected in the instruction book. If such a change apparently has been made in your equipment and does not appear to be reflected in your instruction book, contact your local WIKA sales office for information.

Please include the equipment serial number in all correspondence. It is essential for effective communication and proper equipment identification.

INTRODUCTION

This instruction book provides installation, operation, and maintenance instructions for the WIKA Differential Pressure Gauges Series 1500, Series 1000 and Series 300.

> **WARNING:** TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR DAMAGE TO THE EQUIPMENT, THIS EQUIPMENT SHOULD BE INSTALLED, OPERATED AND SERVICED ONLY BY TRAINED, QUALIFIED PERSONNEL WHO ARE THOROUGHLY FAMILIAR WITH THE ENTIRE CONTENTS OF THIS INSTRUCTION BOOK.
>
> **WARNING:** IMPROPER USE OF THIS GAUGE MAY CAUSE EXPLOSION AND PERSONAL INJURY. READ THIS INSTRUCTION BOOK BEFORE USING EQUIPMENT

General and Safety related information on the installation and use of pressure gauges should be followed. ASME B40.100 latest standards should be referenced as a guideline. A complete standard may be obtained from the AMERICAN SOCIETY OF MECHANICAL ENGINEERS; ASME, Three Park Avenue, New York, NY 10016-5990,800-843-2763 (US/Canada), 973-882-1170 (outside North America), website: www.asme.org.

INSTALLATION

Protect the instrument from shock, vibration and/or pulsating pressure changes. In some cases it may be necessary to provide shock mounted panels.

Continuous, rapid pointer motion can result in excessive wear of the mechanism parts which will cause errors in indicated pressure and possibly early fatigue of the pressure element. If the pointer motion is due to mechanical vibration, mount the gauge on a non-vibrating surface and connect to the system with flexible tubing. If the pointer motion is due to pressure pulsation, use a suitable damping device or snubber between the gauge and pressure source.

Place the gauge in a location where a minimum change in temperature will occur. Avoid location adjacent to heating units or otherwise subject to temperature changes.

Access to pressure connections is required if the filter is to be removed for cleaning (see Service).

CAUTION: Install external pressure relief valves as required to protect the case and mechanism from to damage due over pressure.

OPERATION

OVERPRESSURE PRECAUTIONS

For best performance do not subject any of these instruments to pressure above their range. Pressure in excess of 110% of range may distort the mechanism. When measuring differential pressure, the low pressure is applied to the inside of the case while the higher pressure is applied to the inside of the pressure element or capsule (see Dwg. 620.075.170.011). The maximum case working pressures which are stated on the dials are as follows:

Series 1500 & 1000	- 35 psig
Series 300, 6" dial	- 15 psig
Series 300, 2-3/4" dial	-150 psig

WARNING: TO AVOID POSSIBLE PERSONAL INJURY, DO NOT EXCEED THIS PRESSURE. EXCESSIVE PRESSURE MAY RUPTURE THE GLASS DIAL COVER.

Instrument case pressure relief valves are provided on all gauges, except the Series 300, 2 3/4" diameter case. The Series 300, 6" dial gauges have the valve installed in the side of the case, while on the Series 1000 and Series 1500 the valve is an integral part of the case back. These are emergency protective devices only. Systems should be designed and operated to limit the case pressure to that stated on the dial and as noted above.

NOTE: Do not tamper with the pressure relief valve.

The relief valves supplied with the gauges have dumping capacities which protect the case from applied pressure up to 10 times the case rating on the Series 300, 6" diameter gauges and up to 60 times the case rating on the Series 1000 & Series 1500 gauges. The Series 300, 2-3/4" dial, does not have a pressure relief device. If there is any possibility of the system pressure exceeding the maximum case pressure specified on the dial, i.e., 150 psig, install adequate relief or pressure shut-off valves.

OPERATION

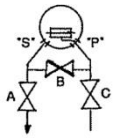
EXERCISING Before the instrument is used for precise measurements, exercise it by alternately increasing and decreasing the applied pressure over the entire range of the instrument at least three times. Maximum and minimum pressures should be held for two minute periods

READING Unless otherwise noted, the instrument is calibrated to be read with the dial in the vertical position. When the instrument has a mirror on the dial, the pointer and its image should coincide so that only the pointer may be seen. On two revolution instruments, an indicator shows the portion of the scale to be read.

All WIKA instruments are calibrated on increasing pressure. To avoid any effect of hysteresis, readings should be taken on increasing pressure. Instruments are calibrated at 23°C. Unless wide temperature changes are experienced, the effect of temperature may be neglected. For further discussion, see CALIBRATION CHECK.

PREPARATION FOR OPERATION AS ABSOLUTE PRESSURE GAUGE

When the case must be evacuated to use an instrument for absolute pressure measurements, proceed as follows:



1. Connect as above. All valves must be closed before connecting to the vacuum source.
2. Carefully open valve “A” admitting vacuum to the case. This will result in clockwise movement of the pointer.
3. When the pointer reaches the end of the scale *(or stops on scale) close valve “A” and open valve “B”. This will balance the pressure and the pointer will return to zero.
4. Repeat Steps 2 and 3 several times.

NOTE: As pressures is lowered due to alternate evacuations of the case and the capsule, clockwise pointer travel will decrease and longer case evacuation times (Step 2) will be required.

5. With valve “A” open and valve “B” closed, evacuate for 10 minutes. If pointer travel is less than 1% of range, carefully open “B”.
6. With both valves “A” and “B” now open, evacuate for at least 30 minutes. Instrument is now ready for use.

   *Instruments with a range greater than 30" Hg (or 1 atmosphere) will result in less than full scale pointer deflection.
7. Close valve “B”. Maintain zero pressure on case and admit unknown pressure thru valve “C” to capsule.

To return instrument to original condition, i.e. atmospheric pressure on both case and capsule:

1. With all valves closed, disconnect vacuum source and pressure source.
2. Carefully open valve “C”. This will cause clockwise pointer movement.
3. When pointer reaches end of scale * (or stops on scale) close “C” and carefully open “A”.
4. When pointer reaches zero, close “A”, carefully open “C”.
5. Repeat Steps 3 and 4 until pressure in case and capsule equals atmospheric pressure.

*Instruments with a range greater than 30” Hg. (or 1 atmosphere) will result in less than full scale pointer deflection.

CALIBRATION CHECK

Although great care has been taken to stabilize the instrument during manufacturing, a small zero shift could occur before the instrument is put into service.

Optimum accuracy over the entire scale may be produced when the pointer is not exactly on zero at true zero pressure. A label affixed to the instrument case indicates what, if any, the zero offset is. This figure was obtained after the instrument was exercised as described under OPERATIONS.

It should be noted that the accuracy tolerance is the same at all points on the scale, zero included. However, the deviation is never outside the guaranteed accuracy as shown in the table, PERFORMANCE CAPABILITY.

If, after the instrument has been exercised, the pointer deviation is as specified, no adjustment is necessary. A slight discrepancy may be corrected by adjusting the pointer as described below.

A complete check of calibration of an instrument requires that it be exercised as above and compared with a standard having a verified accuracy at least five times greater and a scale comparable in length to the instrument being checked,. The standard must be corrected for all its inherent errors and must be corrected to standard conditions of gravity (980.665 cm/sec^2) and temperature (0°C for mercury columns or 20°C for water columns) where applicable.

While aneroid instruments are not subject to changes in reading due to gravity, they are affected by temperature. WIKA HIGH PRECISION instruments read directly in terms of standard conditions (see preceding paragraph) at the temperature 23^{o}C unless otherwise indicated. If the calibration check is conducted at 23^{o}C, the effect of temperature on the WIKA HIGH RECISION instrument need not be considered. At any other temperature, the temperature effect listed in the table PERFORMANCE CAPABILITY must be considered. Note that this is not a correction factor but, rather, a tolerance that must be added to other tolerance being checked. When readings are taken on increasing pressures, they should fall within the specified accuracy tolerance given in the table. The difference between the up-scale reading and the down-scale reading is the hysteresis error and should fall within the specified limits.

Setting the Pointer If a calibration check shows the readings on increasing pressures at various points over the entire range are out by the same angular distance, the pointer may be reset. Adjustment is limited to a pointer movement of about 10 degrees.

Access to the pointer adjustment screw is obtained by removing a screw in the rear of the case except on the Series 300 2-3/4" dial gauge where the front bezel must be removed. See Dwgs. 620.075.100.011, 620.075.100.021, 620.075.101.011 and 620.075.102.011.

If the error is not linear and cannot be corrected with a simple pointer adjustment, the gauge should be returned to the factory for repair and/or recalibration.

Frequency of Recalibration

If, for any reason, the gauge accuracy is in doubt, recalibrate the gauge. Where the pressure measurement is critical and gauge inaccuracy can result in hazard to personnel or equipment, the gauge should be tested for accuracy on a periodic basis.

WIKA maintains a fully equipped service center staffed with trained personnel to repair and recalibrate WIKA instruments.

SERVICE

FILTER Each instrument is furnished with a filter screwed into the pressure connections. The filter screen may occasionally require cleaning. This may be done as follows:

1. Unscrew the filter plug by means of a screwdriver.
2. Clean the filter with a hot water. Reinstall the filter.

WARNING: WHEN USING SOLVENTS, PROVIDE ADEQUATE VENTILATION AND PROLONGED INHALATION OF VAPORS.

Lubrication The mechanism does not require oil. The oil will interfere with proper functioning and introduce serious errors.

CAUTION: Do not oil the mechanism.

PERFORMANCE CAPABILITY				
SERIES	**ACCURACY (1)**	**SENSITIVITY (1)**	**HYSTERISIS(1)**	**MAX. TEMP EFFECTS (2)**
1500	0.066	0.01	0.1 (3)	0.1
			0.2 (4)	
1000	0.1	0.01	0.1 (3)	0.1
			0.2 (4)	
300	0.3	0.2	—	—

(1) % Full Scale. "Full scale" is the difference between minimum and maximum dial reading. "Full scale" of an instrument with a calibrated range of 0 to 800 mm Hg is 800 mm Hg where as "full scale" of an instrument with a calibration range of 390 to 800 mm Hg is 410 mm Hg.

(2) %Full Scale per 10°F from 23^{o}C

(3) Ranges up to 200”Hg

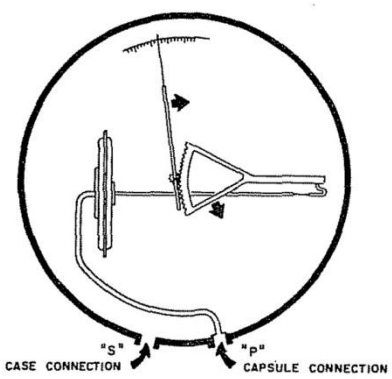
(4) Ranges 200"Hg and over

WARNING LABEL

The following warning label has been attached to the equipment and is listed below.

L2326: IMPROPER USE OF THIS GAUGE MAY CAUSE EXPLOSION & PERSONAL INJURY. READ INSTRUCTION BOOK BEFORE USING THIS EQUIPMENT.

DWG: 620.075.170.011



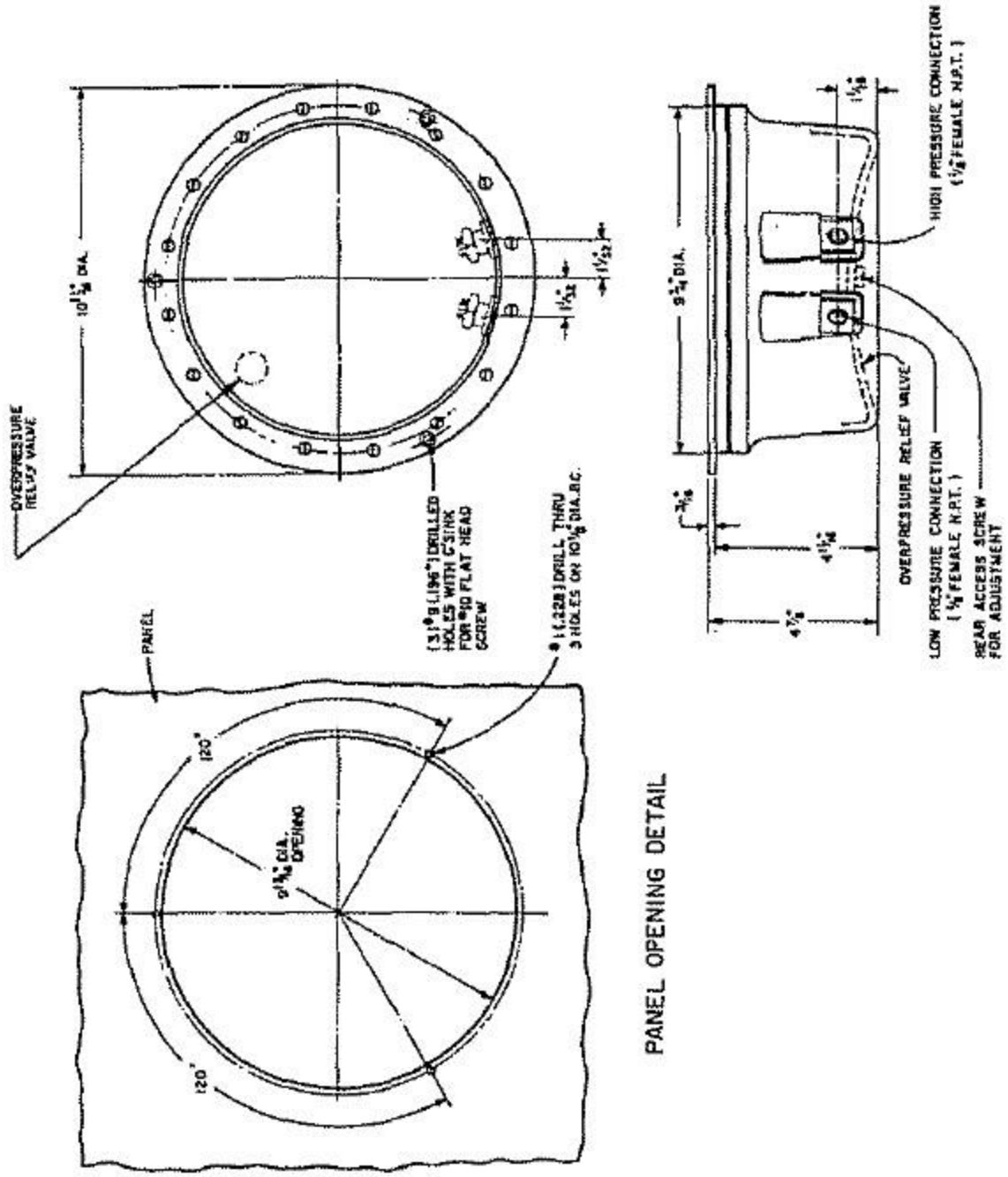
FOR GAUGE PRESSURE ---------- SYSTEM PRESSURE TO CAPSULE. CASE OPEN TO ATMOSPHERIC PRESSURE.

FOR DIFFERENTIAL PRESSURE ---------- HIGH SYSTEM PRESSURE TO CAPSULE. LOW SYSTEM PRESSURE TO CASE.

FOR ABSOLUTE PRESSURE ---------- SYSTEM PRESSURE TO CAPSULE. CASE EVACUATED TO ZERO ABSOLUTE PRESSURE.

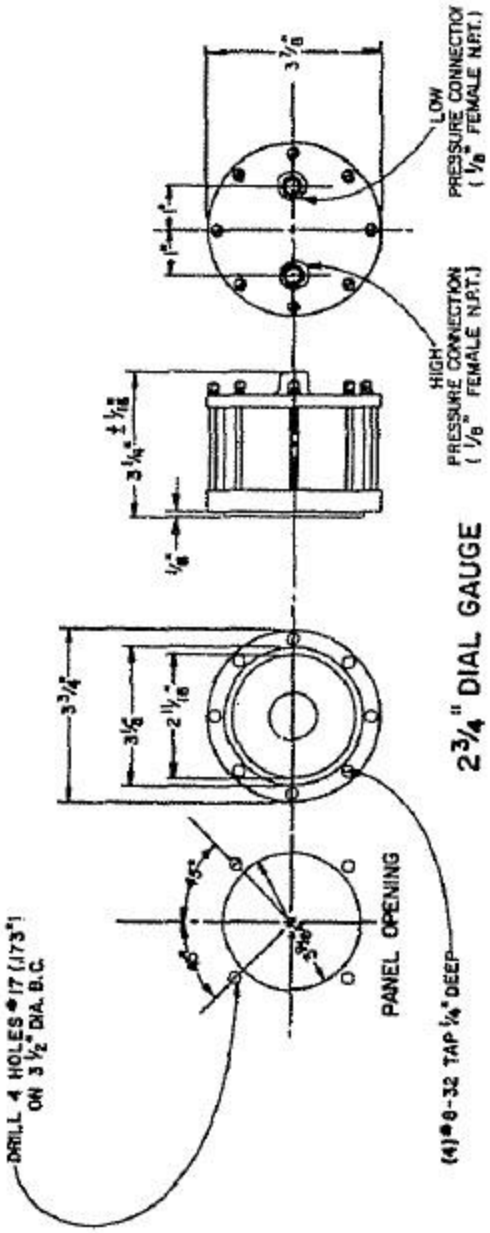
FOR VACUUM ---------- CAPSULE OPEN TO ATMOSPHERIC PRESSURE. VACUUM TO CASE.

VACUUM AND COMPOUND RANGES
VACUUM (COUNTER-CLOCKWISE POINTER). CASE(S) OPEN TO ATMOSPHERE. VACUUM TO CAPSULE (P).
COMPOUND: CASE(S) OPEN TO ATMOSPHERE, PRESSURE OR VACUUM TO CAPSULE (P).

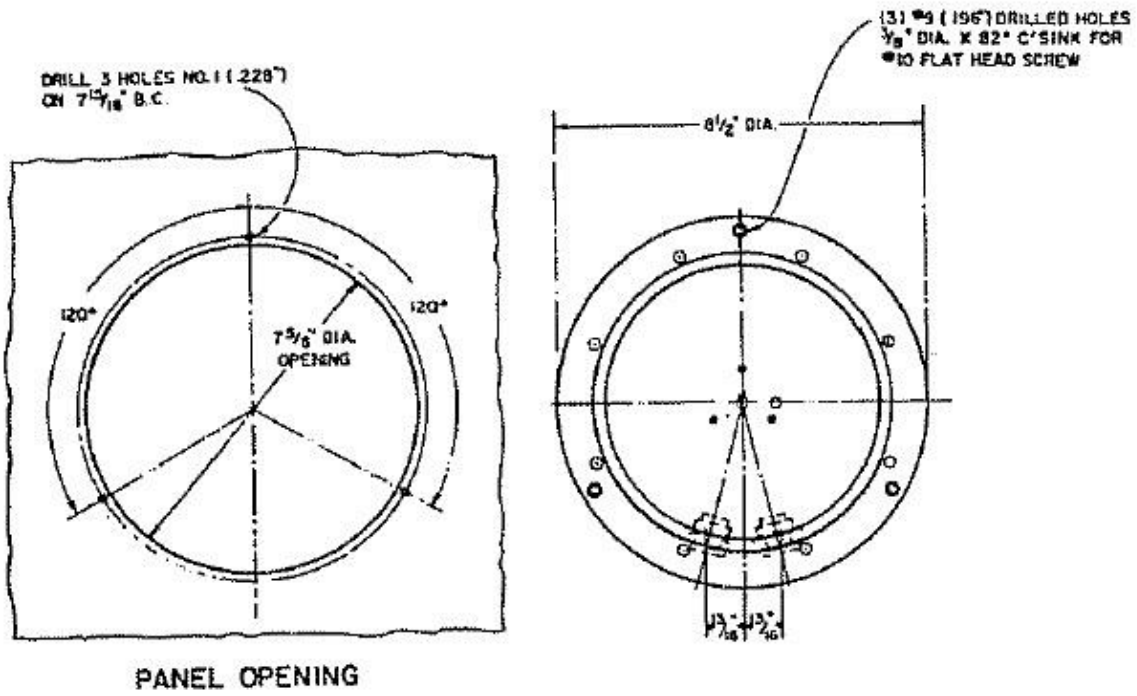


SERIES 1500 DIFFERENTIAL PRESSURE GAUGE – DIMENSIONS
DWG: 620.075.102.011

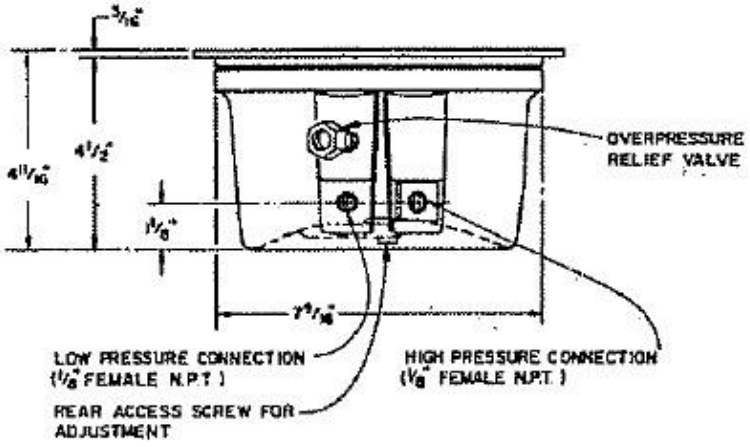
SERIES 1000 DIFFERENTIAL PRESSURE GAUGE – DIMENSIONS
DWG: 620.075.101.011



SERIES 300 DIFFERENTIAL PRESSURE GAUGE – DIMENSIONS
With *2-3/4"* Dial
DWG: 620.075.100.021



PANEL OPENING



SERIES 300 DIFFERENTIAL PRESSURE GAUGE – DIMENSIONS
With 6"· Dial
DWG: 620.075.100.011