Operating Instructions

Absolute and Differential Pressure
Integral Sensor
Pirani and Diaphragm Gauges
Battery and AC Powered Models

Part No.: V795027
Revised: Sept. 13
$10.00

INTRODUCTION

These compact vacuum measurement instruments offer the precision and high resolution of digital electronics at the same price as analog instruments. The low 125 ^{o}C operating temperatures in our Pirani type gauge tube (half that of thermopile gauges), enhances stability as does a unique temperature compensation network. Our extremely rugged sensor is constructed with a solid, inert, noble metal that maintains its calibration over long periods. Because no gold is used, these gauges are compatible with both mercury and oil pumps.

INSTRUMENTS COVERED BY THIS MANUAL

Absolute Pressure Instruments

- Diaphragm Manometer 1 to 1500 Torr (AC Powered)
- Diaphragm Manometer 1 to 1500 Torr (Battery Powered)
- Pirani Gauge 1 to 1200 milliTorr (12 VAC Powered)

Differential Pressure Instruments

- Diaphragm ±19.99 In. H_2O (AC Powered, 90 to 240 VAC)
- Diaphragm ±19.99 In. H_2O (9VDC, Alkaline Battery)
- Diaphragm ±19.99 mmHg, ±19.99 Torr (AC Powered, 90 to 240 VAC)
- Diaphragm ±19.99 mmHg, ±19.99 Torr (9VDC, Alkaline Battery)

Silicon sensor components wetted materials are Pyrex, ceramic, silicon, epoxy, RTV and nickel.

Note: The differential pressure diaphragm gauges will operate in any orientation, but due to their high sensitivity a zero shift may occur with different mounting orientations. A small zero adjustment may be required if, after final installation and with no pressure differential, the display does not read zero.

UNPACKING INSTRUCTIONS

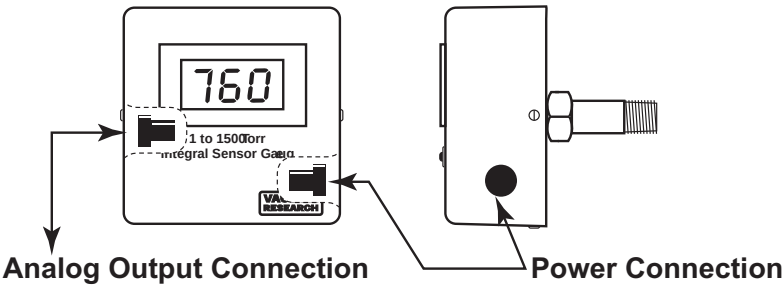
The instruments are carefully packaged to protect them during shipment. Use reasonable care when removing them from the shipping box.

Inspect the instruments when you receive them. Should an instrument show any signs of damage, file a claim with the carrier immediately. Do not destroy the shipping container. It will be required by the carrier as evidence to support claims. Call the factory immediately for instructions on return and repair of the instruments.

Please fill out and return the Warranty Registration card so that we can register your instrument in our warranty records.

INSTALLATION / OPERATING INSTRUCTIONS

Your Self-Contained Vacuum Gauge has been calibrated at the factory using N.I.S.T. Traceable Vacuum Gauges. All you need to do is install the instrument in your vacuum system. Thread the tube into a 1/8 inch NPT female fitting (or other fitting or flange as per your instrument), in the vacuum system. The preferred mounting is with the open end pointing down so as to be self draining to any condensation. However, mounting in any position is acceptable. An appropriate thread sealant is required to insure that the threaded connection will not leak. Teflon thread tape may be used to seal the threads if care is used so it will not shred off and get inside the tube or vacuum system. It is better to use mini-seal or an epoxy sealer on the threads.



AC Powered Models

The **1500 Torr Diaphragm Gauge** is shipped with a power line cord and will operate from 90 to 240V, 50/60 Hz without any modification.

The **1200 mTorr Pirani Gauge** requires 55mA @ 12 VAC which is provided by the power supply shipped with the vacuum gauge.

Analog Output for Differential Models

- **±19.99 In. H_2O (AC powered):** ±1.999 VDC into 2000 Ohm load or higher
- **±19.99 In. H_2O (Battery powered):** ±1.999 VDC into 2000 Ohm load or higher
- **±19.99 mm Hg (AC powered):** ±1.999 VDC into 2000 Ohm load or higher
- **±19.99 mm Hg (Battery powered):** ±1.999 VDC into 2000 Ohm load or higher

All analog outputs on differential pressure gauges are (+) or (-) 1.999 VDC full scale

Adjusting Zero and Span

Adjusting Zero and Span for 1 to 1200 mTorr Pirani Gauge

This method requires a high vacuum system and a precision calibration "standard" such as a capacitance manometer.

NOTE: If a reference tube or precision calibration standard are not available, but you feel there is a need to calibrate the instrument, then pump to hard vacuum and set the zero only. Do not attempt to make the reading agree with other typical analog thermocouple or Pirani gauges upscale as this will result only in degraded performance of this gauge.

The procedure below lists ranges and settings for a 1200 mTorr instrument as an example.

To set zero and span using a capacitance manometer for the 1200 millitorr instrument requires a high vacuum system capable of pressures less than 1×10^{-4} Torr, and a precision calibration "standard" such as a capacitance manometer with a 1 Torr or 10 Torr head.

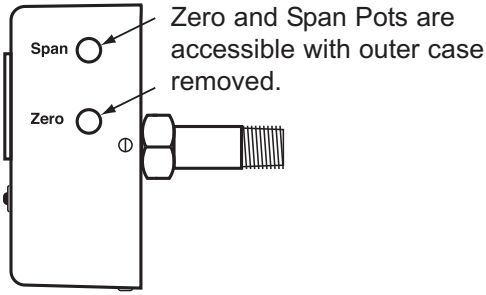
First, pump the tube to hard vacuum and hold it there for about 20-30 minutes to thoroughly outgass the tube. Adjust the zero adjustment until it reads 000 on the meter.

Second, raise the pressure to 900 mTorr (for instruments of other ranges choose a pressure near mid-scale),and hold that pressure constant. Adjust the span adjustment pot to read the same pressure as the calibration standard. The instrument is now calibrated. If the span adjustment was far off, repeat the procedure.

The span adjustment permits you to trim the instrument for precise indication at a critical pressure, increasing the absolute accuracy at that point, although possibly sacrificing tracking at other points on the scale. The 900 mTorr point is best for all-around average tracking throughout the 1 to 1200 mTorr range.

Adjusting Zero and Span for 1 to 1500 Torr Diaphragm Gauges, 1 to 1500 Torr Absolute AC & Battery Power

There are only 2 calibration adjustments that are normally necessary to re-standardize the instrument; a "zero" adjustment for hard vacuum, and a span adjustment to set up scale tracking at some known pressure.



1. Pump the transducer to "hard vacuum." (The term "hard vacuum" refers to any pressure lower than 0.1 Torr (100 mT). This is a "relative zero" below which the transducer no longer changes output. It need not be known as long as you are sure it is this low.) Adjust the ZERO pot until the meter reads 0.

2. Vent the transducer to atmosphere. Call the nearest airport weather station and obtain the immediate barometric pressure. Ask for "station pressure" not altimeter setting. Multiply the figure you are given for barometric pressure by 25.4 to convert to mmHg (Torr) from inches Hg. Then, adjust the SPAN pot until the display reads that pressure.

For example, If you are in Pittsburgh and you are at 636 ft altitude on a standard day the following is true: at sea level the Std. Barometer is 29.92 in Hg = 760 Torr (29.92 X 25.4 = 759.968 Torr).

This is the altimeter setting for an aircraft, so that at landing the plane's altimeter reads 636 ft. (At sea level the altimeter reads 000.)

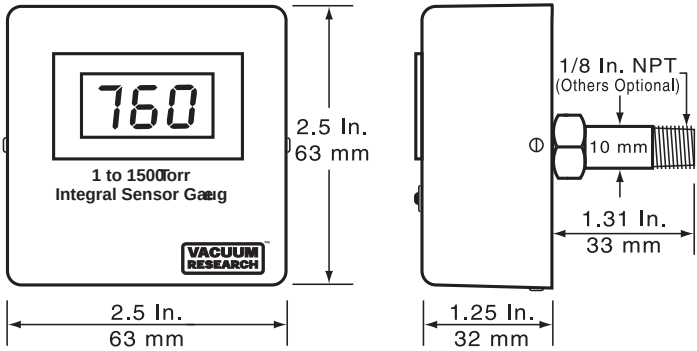
Station pressure is actually 29.24 in Hg.

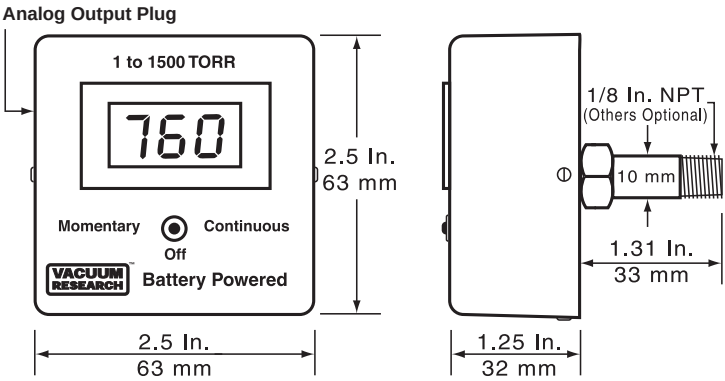
(29.24 X 25.4 = 742.696 Torr).

Multiply the station pressure by 25.4 to convert inches Hg. to Torr and adjust the span to read the calculated number which in the above example is 743 Torr.

To obtain this information, look in the phone book under U.S. Government, Transportation Dept., and call the number for “Pilot One Call Briefing” or Flight Service Station (FSS). Ask for the “Station Pressure.” Tell them your application is for industrial calibration purposes.

Dimensions





Vacuum Research Corp.
2419 Smallman Street • Pittsburgh, PA 15222 USA
(800) 426-9340 • (412) 261-7630 • FAX: (412) 261-7220
e-mail: VRC@vacuumresearch.com