

PRODUCT INFORMATION**GAUGE, ABSOLUTE, DIFFERENTIAL, COMPOUND AND VACUUM**

It is important to understand the “type” of pressure that is required for an application. The terms “vacuum,” “absolute” and “compound” are usually the basis for this misunderstanding; often demonstrated by incorrectly combining terms such as “absolute vacuum” or “compound vacuum.” First, let’s identify and define the 5 basic pressure types. Dial gauge configurations will be referenced for each pressure type because they serve as the best means of illustration.

- 1) **Gauge Pressure.** Because gauge pressure gauges allow the surrounding ambient pressure to effect both sides of the sensing element, the effects of barometric pressure are essentially negated. Therefore, a “gauge pressure” gauge with an open inlet port will start with the pointer at zero, which means that the gauge is indicating “no pressure in excess of barometric.” Gauge pressure dial gauges usually position the zero point at approximately 7:00 on the dial and rotate in the clockwise direction.
- 2) **Vacuum.** Vacuum gauges measure negative pressures, i.e. the removal of atmospheric pressure. Using “gauge pressure zero” as the starting point, the gauge will indicate the “vacuum level” in positive numbers as more pressure is removed. Vacuum gauges usually position zero at 5:00 on the dial and rotate counter clockwise. Most vacuum gauges are rated to a full scale of 30 In Hg or 15 psi. Remember that since “vacuum” is simply the removal of atmospheric pressure, the highest level of vacuum that can be achieved on a given day is equal to the barometric pressure. (You can only remove what’s there to remove in the first place!). Customers often comment that they cannot get the gauge to read “all the way down to 30 In Hg, therefore the gauge is not working properly .” In most cases, the reason that they cannot achieve a 30 In Hg vacuum reading is that the existing barometric pressure is less than 30 In Hg, thus a 30 In Hg vacuum reading is unachievable.
- 3) **Compound Pressure.** Starting at “gauge pressure zero ,” a compound gauge simply combines the vacuum indication of the straight vacuum gauge with the gauge pressure indication of a gauge pressure gauge. The position of the zero is dependent upon the full scale rating of the pressure side. The pointer will travel in the counterclockwise direction for vacuum indications, and clockwise for pressure indications.
- 4) **Differential Pressure.** Starting at “gauge pressure zero,” a differential pressure gauge simply measures the difference between 2 input pressures. A differential dial gauge looks like a gauge pressure gauge, except it has a second inlet port.

5) Absolute Pressure. Unlike “gauge pressure,” an absolute gauge does not allow ambient pressure to affect both sides of the sensing element. To achieve a true absolute reading, an absolute pressure gauge must have the atmosphere removed from around one side of the sensing element (referred to as an “evacuated reference”). The result is that an absolute gauge with an open inlet port will indicate the barometric pressure (which is usually between 14 and 15 psi). This will allow the user to either apply pressure causing the gauge to read above the barometric pressure value, or remove pressure (pull vacuum) causing the gauge to read below the barometric reading. “Absolute zero” should be achievable under full vacuum, since the starting point is the actual barometric reading, and a full vacuum will remove all of this existing pressure. On absolute dial gauges, the zero point will be positioned at 7:00 on the dial and the pointer will rotate clockwise when pressure is applied, and counterclockwise when pressure is withdrawn. Many customers will refer to “absolute” gauges as “vacuum” gauges because they are using them in vacuum applications, so there is likely to be confusion regarding which pressure type is required. Also, please keep in mind that “Torr” is a unit of measure equal to millimeters of mercury (mm Hg) absolute. Please note that although all of the Heise electronic absolute pressure instruments have an evacuated reference for true absolute pressure indication, the Heise dial mechanical pressure gauge does not. Therefore, an absolute Heise dial gauge is not self barometrically compensating and must be manually adjusted to indicate the existing barometric pressure value prior to use.

Illustrating the different pressure types can be accomplished much easier by depicting a dial gauge for each example, even if the focus of the inquiry is a digital indicator or transducer. The following drawings illustrate the various dial gauge configurations for 4 of the 5 pressure types. Since Heise dial gauges are not available for differential pressure indication, there is no illustration for differential pressure. By employing the following tricks, you’ll be able to feel confident that you and your customer have reached a “meeting of the minds .”

Although it may be time consuming, the quickest way to cut through the confusion is to have the caller draw their own illustrations. By forcing the caller to actually follow along and create their own illustrations, they are more likely to understand than if you simply fax them preexisting illustrations. The narrative would sound like this . . .” On a piece of paper, draw 4 circles, approximately 2 inches in diameter. On the first circle, draw in marks at 7:00 and 5:00. Label the 7:00 mark with a zero, and the 5:00 mark with a 100 (or another value which is more relevant to the call). Draw in a pointer pointing to the zero mark at 7:00. Mark this picture “Gauge Pressure.” On the second circle, draw in a line at 7:00 marked “30 IN Hg ,” and a line at 5:00 marked “zero.” Draw in a pointer at the 5:00 “zero” position. Mark this picture “Vacuum.”

Note that each one of the pictures represents a gauge that is not under pressure or vacuum. Go back and review the definition of each pressure type. It’s important that the customer fully understand his specification prior to placing an order. Since all Heise products are built to order, an incorrect specification can result in a costly restocking charge. The few extra minutes spent drawing pictures and explaining the pressure types will always pay dividends in the end, and your customers will really appreciate your efforts and the free education!

TYPES OF PRESSURE GAUGES



PRESSURE GAUGE

A gauge to measure and indicate pressure using ambient* pressure as a datum point.



VACUUM GAUGE

A gauge to measure and indicate pressure below ambient,* using ambient pressure as the datum point.



COMPOUND GAUGE

A gauge to measure and indicate pressure both above and below ambient* pressure, using ambient pressure as the datum point.

*Ambient pressure equals pressure surrounding the measuring element, generally atmospheric pressure



ABSOLUTE PRESSURE GAUGE

A gauge to measure and indicate pressure above zero absolute pressure, using absolute zero pressure as the datum point.

The Heise Absolute Pressure Gauge does not incorporate automatic barometric pressure compensation. The barometric pressure at the time of use must be set into the gauge by using the external dial adjuster.