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TECHNICAL TERMS PRESSURE GAUGE

In the following, you will find an overview of technical terms frequently used by PCE. These are explained here in some detail.

Absolute pressure

Absolute pressure refers to a pressure of 0 in a vacuum. It is rarely necessary to measure the absolute pressure. One example of when the absolute pressure is normally measured is when a connected system is involved. However, in such cases, the pressure sensors used must be specially encapsulated.

Relative pressure

Pressure measurements are normally taken in relation to the current air pressure. When using an air pressure value of 0 bar as a reference, pressure values above that level will be positive (positive pressure) whereas pressure values below 0 will be negative (negative pressure).

Initial (offset) value

When adjusting a test device for measurement, the lowest measured value to which the device has been adjusted is called initial or offset value.

Response time

According to DIN EN 61298 and DIN EN 60770, the period of time between the beginning of the step response time and the time an output signal requires to reach and keep its final steady state within 1 % of the output span is called response time.

Final (full scale) value

When adjusting an instrument for measurement, the highest value of the measuring variable to which the device is adjusted is called the final or full scale value.

Accuracy

The accuracy indicates to what extent the displayed value and the actual value can deviate from each other.

Characteristic curve

A characteristic curve is a graphic which shows the correlation between two interdependent physical quantities which is ideally linear, i. e. a straight line.

Deviation from the characteristic curve

A marginal deviation from the characteristic curve can be equated with a high accuracy of measurement.

Hysteresis

Hysteresis is a variably delayed behaviour of an output variable in relation to the input variable, i. e. a system behaviour for which the output variable does not only depend on the input variable but also on the former condition of the output variable which means that a system can acquire one of several possible conditions, depending on its pre-history and provided that the input variable remains the same.

Deviations from linearity

A deviation from linearity is defined as the maximum deviation of the characteristic curve -determined at increasing stress- from a reference line.

Reproducibility

Reproducibility describes the degree to which, e. g. a meter supplies equal results under equal conditions.

Temperature error

The expression temperature error defines the maximum deviation of the characteristic curve from the ideal course. For measurements under different temperature conditions, this deviation lies within the temperature-compensated range.

Deviation from the characteristic curve according to IEC 60770

According to IEC 60770, the total deviation from the characteristic curve or the maximum total error consists of non-linearity, hysteresis and reproducibility. In other words: this value indicates the deviation of the initial (offset) value and the final (full scale) value from the straight line.

Types of sensors

Piezo-electric sensors

With this type of sensor, you can measure various different parameters such as pressure, force, tension, acceleration or gas. Piezo-electric pressure sensors, for example, have a thin membrane of known dimensions and a stable base to make sure that the elements are only strained by the pressure in one direction. With piezo-electric acceleration transducers, the elements are strained by means of a seismic mass due to a movement measured by the sensor. Newton’s second law of motion (F=ma) applies.

Capacitive sensors

Capacitive sensors determine their results on the basis of the change in capacity of a capacitor or capacitor sensor. Two electrodes form the plates of the capacitor the change in capacity of which is

determined. One of these plates or electrodes is deformed or moved due to the effect to be measured. This changes the space between the plates and thus the capacity.

Dielectric sensors

Dielectric sensors measure the dielectric (electrically weak or non-conductive) properties of a sensitive material and are frequently used in chemistry. A gas-sensitive layer changes its dielectric properties as well as its surface due to a reaction with a certain material (e. g. adsorption of a material to a thin insulating film). Furthermore, this type of sensor includes an element which turns the dielectric properties into an electric signal.

Full Scale Output (FSO) / range

The full scale output (FSO) is the algebraic difference between the final (full scale) value and the initial (offset) value.

Frequently used conversion factors

1 mbar = 100 Pa

1 bar = 1.,5 PSI

1 PSI = 68.95 mbar

1 N = 0.102 kp