

Technical Definitions of Terminology

Absolute pressure transducer: A transducer that has an internal reference chamber sealed at or close to 0 psia (full vacuum) and normally provides increasing output voltage for increases in pressure.

Accuracy: The combined error of nonlinearity, repeatability, and hysteresis expressed as a percent of full scale output.

Axial Load: A load applied along or parallel to and concentric with the primary axis.

BFSL: Best fit straight line. The sensitivity of a sensor is ideally a straight line but often has some small non-linearity associated with it. BFSL takes all the data points from the curve and describes a straight line through these data points such that the deviation (and hence the error) between the curve and the straight line is at a minimum.

Bridge: A Wheatstone bridge configuration utilizing four active strain gages.

Bridge resistance: The nominal value of the individual legs that make up a complete Wheatstone bridge.

Calibration: The comparison of transducer voltage outputs against the outputs of a reference standard.

Damping: The reduction of response at the resonant frequency through the use of a damping media such as oil. Usually specified as the ratio of critical damping.

Dead volume: The volume inside the pressure port of a transducer at room temperature and barometric pressure.

Deflection: The change in length along the primary axis or distance a diaphragm moves at the center between no-load and rated load conditions.

Diaphragm: The sensing membrane which is deformed when pressure is applied.

Excitation, Electrical: The voltage or current applied to the input terminals of the transducer.

Flush diaphragm: Sensing element is located on the very tip of the transducer (No pressure port).

Frequency Response: The range of frequencies over which the transducer voltage output will follow the sinusoidally varying mechanical input within specified limits.

Full scale: See Rated capacity.

Full scale output: The algebraic difference between the minimum output (normally zero) and the rated capacity.

Gage pressure: The pressure above (or below) atmospheric. Represents positive difference between measured pressure and existing atmospheric pressure. Can be converted to absolute by adding actual atmospheric pressure value.

Gage pressure transducer: A transducer which measures pressure relative to the atmospheric pressure.

Hysteresis: The maximum difference between output readings for the same measured point, one point obtained while increasing from zero and the other while decreasing from full scale. The points are taken on the same continuous cycle. The deviation is expressed as a percent of full scale.

IEEE 1451.4: IEEE 1451.4 specifies a table of self-identifying parameters that are stored within the sensor in the form of a TEDS (Transducer Electronic Datasheet). This standard directs its attention to only the TEDS part of the sensor and signal conditioning system. (As opposed to IEEE1451.2 which is for 'smart sensors'.)

Input impedance: The resistance measured across the excitation terminals of a transducer at room temperature, with no load applied, and with the output terminals open-circuited.

Insulation (isolation) resistance: The dc resistance expressed in ohms measured between any electrical connector pin or lead wire and the transducer body or case. Normally measured at 50 Vdc.

Linearity: The maximum deviation of the calibration curve from a straight line between zero and full scale, expressed as a percent of full scale output and measured on increasing measured only.

Line pressure: The maximum pressure in the pressure vessel or pipe for differential pressure measurement.

Load: The weight, torque, or force applied to the transducer.

Load buttons: The spherical shape of the top surface of a load cell where the load is applied.

Measured media: The physical quantity, property, or condition which is measured. (eg: pressure, load, weight, acceleration).

Mounted resonant frequency: the frequency at which the internal spring/mass system of an accelerometer resonates, producing a 90° phase shift in output signal vs. applied acceleration.

Output: The electrical signal measured at the output terminals which is produced by an applied input to a transducer.

Output impedance: The resistance as measured on the output terminals of a transducer at standard temperature, with no measured applied, and with the excitation terminals open-circuited.

Overrange, Safe: The maximum pressure or load which may be applied to the transducer without causing a permanent change in the performance specifications.

Phase shift: The phase angle between the output signal and the applied acceleration.

Primary axis: The axis along which the transducer is designed to be loaded; normally its geometric center line.

PSI: Pounds per square inch.

PSIA: Pounds per square inch absolute.

PSID: Pounds per square inch differential.

PSIG: Pounds per square inch gage.

Full plate: Load cell attachment which allows tension or compression force to be directed at the center line of a load cell through a threaded center hole.

Range: the measured values, over which a transducer is intended to measure specified by their upper and lower limits.

Rated capacity: The maximum measured that a transducer is designed to measure within its specification.

Repeatability: The ability of a transducer to reproduce output readings when the same measured value is applied to it consecutively, under the same conditions and in the same direction. Repeatability is expressed as the maximum difference between output readings as a percent of full scale.

Resolution: The smallest change in mechanical input which produces a detectable change in the output signal.

Sensing element: The part of the transducer which reacts directly in response to the measured.

Sensitivity: The ratio of change in transducer output to a change in the value of the measured.

Shunt Cal (R-Cal): The change in electrical output caused by placing a fixed resistor between the appropriate transducer terminals. Used “in the field” for quick calibration.

Span: The algebraic difference between the limits of the range from zero to full scale.

Specifications: The group of error limits within which each device will operate.

Strain gage: A measuring element for converting force, pressure, tension, etc., into an electrical signal.

TEDS: Transducer Electronic Datasheet. An electronic table of parameters that identify a transducer and are stored within the transducer on an EEPROM for interrogation by external electronics. TEDS is the data contained on a sensor as defined by IEEE1451.4.

Temperature, compensated: The range of temperature over which a transducer can operate up to full scale and still meet all specifications.

Temperature compensation: The utilization of supplementary devices, materials, or components within the bridge to minimize sources of error caused by changing temperature.

Temperature, operating: The range of temperature over which a transducer may be safely operated up to full scale without causing failure, but specifications may not be met.

Temperature effect on span: The change in rated output due to a change in ambient temperature. Usually expressed as +/- a percentage change in rated output per degree F change in ambient temperature, over the compensated temperature range.

Temperature effect on zero: The change in zero balance due to a change in ambient temperature. Usually expressed as +/- a percentage change in rated output per degree F change in ambient temperature over the compensated temperature range.

Transducer: A device (or medium) that converts energy from one form to another. The term is generally applied to devices that take physical phenomenon (pressure, temperature, humidity, flow, etc.) and convert it to an electrical signal.

Transmitter: A transducer that has a 4 mA to 20 mA two-wire output.

Transverse sensitivity: Signal output as a result of acceleration perpendicular to the sensitive axis. Specified as a percentage of sensitive axis output for equivalent right angle acceleration or as a decimal fraction.

True gage: A true gage transducer differs from a standard gage because it has a second diaphragm. The additional diaphragm seals the strain gages and element in a hermetic chamber, keeping moisture and potentially corrosive gasses out. Wet or dry atmospheric pressure is vented to the back side of the second diaphragm to reference barometric changes on the sensing element. Higher range units (750 psi and above) are sealed at atmospheric pressure.

Vibration error: The maximum change in output of a transducer when a specific amplitude and range of frequencies are applied to a specific axis at room temperature.

Wet/Dry differential: A differential pressure transducer or transmitter that uses a metal diaphragm at the wet port where fluids can be applied, and no diaphragm at the dry port. The dry port exposes the internal circuitry to the medium, so only clean dry gas can be applied to this port.

Wet/Wet differential: A differential pressure transducer or transmitter that has a metal diaphragm in each pressure port to permit fluid into both ports.

Wetted parts: The diaphragm and pressure port material that comes in direct contact with the medium (gas, liquid).

Zero adjustments: Used when “setting up” a transducer to adjust the output signal to zero when zero load/pressure is applied.

Zero balance: The output signal of the transducer with rated excitation and with no-load applied, usually expressed as a percent of rated output.

Zero return: The difference in zero balance measured immediately before rated load application of specified duration and measured after removal of the load, and when the output has stabilized.