

Glossary of Temperature Sensing Terms (continued)

Linearity — An instrument or transducer's deviation in response from straight line values.

Loop Resistance — The total resistance of the thermocouple materials in a thermocouple circuit or heater in a heater circuit.

Measuring Junction — The junction in a thermocouple circuit that senses the temperature of the unknown object. It is commonly referred to as the hot junction.

Mega- — A prefix meaning million, or 10^6 . The symbol is M.

Mica — A silicate mineral used mainly as an electrical and heat insulator.

Microvolt (μV) — One millionth of a volt (10^{-6} volt). In thermocouple measurements, a microvolt is the smallest common increment of output.

Millivolt (mV) — One thousandth of a volt.

Mineral-Insulated Thermocouple — A thermocouple that is manufactured by loading a metal sheath with conductors and insulators, and then compacting the entire assembly.

Negative Temperature Coefficient — A characteristic of a material in which a decrease in resistance accompanies an exposure to increased temperatures.

NEMA — An abbreviation for the National Electrical Manufacturers Association.

Nicrosil — The positive leg of a type N thermocouple. It is predominantly nickel with added chromium and silicon.

NISIL — The negative leg of a type N thermocouple. It is predominantly nickel with added silicon and magnesium.

NIST — National Institute of Standards and Technology.

Noise — Unwanted electrical interference picked up on a signal cable.

NPT — An abbreviation for American National Standard taper pipe thread.

OFHC — An abbreviation for oxygen free high conductivity copper.

Parallel Pair — A wire construction where two single conductors are laid parallel.

Platinel — An Englehard Industries trade name for a platinum thermocouple alloy with thermoelectric characteristics that closely match type K thermocouples at temperatures above 800°C .

Platinum — The negative leg in types R and S thermocouples. A noble metal, symbol Pt, with excellent chemical and heat resistance. It is more ductile than silver, gold, or copper.

Platinum 6% Rhodium — The platinum-rhodium alloy that forms the negative leg on type B thermocouple.

Platinum 10% Rhodium — The platinum-rhodium alloy that forms the positive leg on a type S thermocouple.

Platinum 13% Rhodium — The platinum-rhodium alloy that forms the positive leg on a type R thermocouple.

Platinum 30% Rhodium — The platinum-rhodium alloy that forms the positive leg on a type B thermocouple.

Platinum 67 — The platinum standard used by the NIST. Platinum 67 is used to interpolate the temperature scale between 630.74 and 1064.43°C . Previously called Platinum 27, Platinum 67 (IPTS-68) is 9 microvolts negative to Platinum 27 (IPTS-48) at 1200°C .

Positive Temperature Coefficient — A characteristic of a material in which an increase in resistance accompanies exposure to an increase in temperature.

Primary Standard — A term that applies to an instrument that meets conditions required for establishing the International Practical Temperature Scale.

Protection Tube — A tube that is designed to protect a sensor from any harsh environment or process conditions.

PTFE — An abbreviation for polytetrafluoroethylene. One of the most chemically resistant carbon based insulations.

PVC — An abbreviation for polyvinyl chloride, a thermoplastic with excellent dielectric strength and flexibility.

Rankine Temperature Scale — A temperature scale with its 0 at the absolute zero of temperature. Its degree is equal to a Fahrenheit degree, thus $T(\text{R}) = T(\text{F}) + 459.67$.

Reference Junction — The junction in a thermocouple circuit that is maintained at a constant, known temperature. It is also referred to as the cold junction and as a standard it is usually maintained at 0°C ; however, any temperature can be used.

Refractory Metal Thermocouple — A thermocouple made from materials that melt above 1935°C .

Repeatability — The ability of a sensor or system to indicate the same reading under repeated identical conditions.

Resistance — A property of conductors that determines the current produced by a given difference of potential. Dimensions, material and temperature all influence resistance.

Response Time — The time required for a sensor to reach 63.2% of the step change in temperature for a particular set of test conditions.

Rhenium — An elementary metal that when added to tungsten, forms an alloy with better ductility and improved high temperature strength over tungsten alone.

Rhodium — A platinum group metal added to pure platinum as a mild hardware and to increase high-temperature strength.

Ro — The resistance measurement taken on an RTD at 0°C .

RTD — An abbreviation for resistance temperature detector. It is a circuit element whose resistance increases with increasing temperature in a predictable manner. Platinum is the most popular material used in RTDs.

Secondary Standard — A measurement device that has been referenced to a primary standard.

Seebeck Coefficient — The rate of change of thermal emf with temperature at a given temperature.

Seebeck emf — The net thermal emf in a thermocouple under zero current conditions.

Shield — A metallic foil or braided wire layer surrounding a conductor or a group of conductors to prevent electrostatic or electromagnetic interferences from external sources.

Stability — The ability of an instrument or a sensor to maintain a consistent output with the application of a constant input.

Temperature Calibration Point — A temperature at which the output of a sensor is compared or determined by comparison against a standard.

Tera- — A prefix meaning trillion, or 10^{12} . The symbol is T.

Thermal Gradient — The distribution of differential temperatures in and across an object.

Thermistor — A contraction for thermally sensitive resistor. A thermistor is a semiconducting circuit element that typically exhibits a high negative coefficient of resistance.

Thermocouple — A temperature sensor formed by joining two dissimilar metals and applying a temperature differential between the measuring junction and the reference junction.

Thermopile — Multiple thermocouples connected in series so that alternate junctions are at the reference and measuring points. The result of this type of arrangement is an increased output for a given temperature differential.

Thermowell — A closed-end tube that will accept a temperature sensor and provide a pressure-tight connection at the well's point of installation.

Transducer — A device that receives and transmits energy. In many instances, the energy that is received is transmitted in a different form.

Transmitter — An externally powered device that transmits a signal from a thermocouple or an RTD via a two-wire current loop.

Triple Point of Water — A thermodynamic state (of water) in which the gas, liquid, and solid phases all occur in equilibrium. For water, the triple point is 0.01°C .

Twisted Pair — Two insulated conductors twisted together. Twisted wires in thermocouple circuits minimize magnetic noise produced from current carrying conductors.

Ungrounded Junction — A thermocouple junction that is fully insulated from the capped sheath end. An ungrounded junction is often specified for applications involving frequent or rapid temperature cycling, and for protection against stray emf signals.

Working Standard — A measurement device that has been referenced to a secondary standard.