



## TEMPERATURE SENSOR TERMINOLOGY

Our team has composed a list of the general terms and explanations for each to help on your journey into temperature sensors. If you are unsure about how the terms relate to your temperature sensing requirements, or you have a question that isn't answered here, please don't hesitate to contact us at [sales@ei-sensor.com](mailto:sales@ei-sensor.com). We'd be happy to explain in further detail and assist with your needs.

**ACCURACY:** Describes the variation between the measured value of a sensor versus that of its nominal specified characteristics. Expressed in degrees at one temperature or over a specified temperature range.

**AMBIENT TEMPERATURE:** The temperature of the environmental medium where the temperature sensor is immersed.

**BETA VALUE:** An arithmetic estimation of the resistance versus temperature characteristics of a thermistor, based upon two resistance versus temperature points. Beta is expressed in Kelvin (K).

**DISSIPATION CONSTANT:** The amount of applied power required to raise the body temperature of the sensor element by  $+1^{\circ}$  in a specific environment. The dissipation constant is typically expressed in milliwatts per degree Celsius ( $\text{mW}/^{\circ}\text{C}$ ).

**DRIFT:** The gradual variation of a characteristic (typically zero-power resistance) of a sensor with respect to time.

**INTERCHANGEABILITY ERROR:** The maximum measurement error between two sensors, when substituted for one another to make the same measurement.

**MAXIMUM TEMPERATURE RATING:** The maximum body temperature at which the sensor will safely survive for an extended duration. The body temperature of the sensor can be influenced by internal heating, external heating or a combination of internal and external heating. It is recommended that this temperature rating never be exceeded.

**MAXIMUM POWER RATING:** The maximum power which a sensor will safely dissipate for an extended duration.

**MAXIMUM STEADY-STATE CURRENT ( $I_{\text{max}}$ ):** The maximum continuous steady-state current ( $V_{\text{rms}}$  or  $V_{\text{dc}}$ ) that an inrush current limiting thermistor has the ability to pass. This value is typically determined based upon a maximum ambient operating temperature of  $+65^{\circ}\text{C}$ .



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**NEGATIVE TEMPERATURE COEFFICIENT (NTC):** Describes a material whose zero-power resistance decreases with a corresponding increase in its body temperature.

**POSITIVE TEMPERATURE COEFFICIENT (PTC):** Describes a material whose zero-power resistance increases with a corresponding increase in its body temperature.

**REPEATABILITY:** The capability of a sensor to provide identical readings, when subjected to duplicate conditions.

**RESISTANCE AT MAXIMUM CURRENT ( $R @ I_{max}$ ):** The nominal resistance of an inrush current limiting thermistor when being subjected to a maximum steady-state current condition.

**RESISTANCE RATIO:** The ratio of a thermistor's resistance versus temperature characteristics. This value is calculated between two specified zero-power resistance versus temperature points.

**RESISTANCE VERSUS TEMPERATURE CHARACTERISTIC:** Describes the relationship between the zero-power resistance of a thermistor and its body temperature. The best mathematical interpretation of a thermistor's resistance versus temperature characteristics is the Steinhart-Hart equation.

**ROHS:** Restriction of Hazardous Substances. Also referred to as Directive 2002/95/EC.

**SELF-HEATING:** The effect of passing current through a sensor, which results in raising the body temperature of the sensor above that of the ambient temperature.

**STABILITY:** The capability of a sensor to maintain specified characteristics, after being exposed to specific conditions. These test conditions can be stated as electrical and/or environmental.

**TEMPERATURE WATTAGE CHARACTERISTICS:** The relationship at a specified ambient temperature between the body temperature of a thermistor and the applied steady-state wattage.

**THERMAL TIME CONSTANT:** The time required for a sensor to register a change (typically 63.2%) of the difference between its initial and final body temperatures, when exposed to a step-function change in temperature under zero-power conditions.

**TOLERANCE:** The spread between the permissible minimum and maximum values of a sensor. Generally used to describe a sensor's resistance range or temperature error range.

**ZERO-POWER RESISTANCE:** The resistance value of a sensor, when measured at a specified temperature with zero-power dissipated through the sensor.



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