

Thermocouple:

A thermoelectric device for measuring temperature consisting of two dissimilar conductors connected at two points, which generate a voltage proportional to the difference in temperature between these points.

RTD:

"Resistance Temperature Detector" is a temperature sensor that is based on the principle of metal resistance increasing with temperature.

THERMOCOUPLE ADVANTAGES:

- **SENSOR COST:** For sensors with the same physical specifications, RTDs can be 1.5 times more expensive than a similar Thermocouple.
- **TEMPERATURE:** Capability of reaching higher temperatures.
- **SPEED OF RESPONSE:** Thermocouples can be manufactured with outside sheath diameters and in wire gauges that are significantly smaller than RTDs. The smaller mass translates to faster response times as the thermocouple heats up/ cools down.
- **OTHER ADVANTAGES:** Vibration resistance, design options, point temperature measurements, thermal & mechanical shock resistance.

RTD ADVANTAGES:

- **ACCURACY:** The standard tolerance (Class B) for the DIN Curve PT 100Ω RTD is +/- .3° at 0°C. At the same temperature as Type J thermocouple would have an allowable Standard Limit of Error of +/- 1.1°C
- **STABILITY:** When used within the proper temperature range, RTDs provide extremely stable signals over long periods of time.
- **REPEATABILITY:** RTD outputs are very consistent & repeatable. Thermocouple signal drift can occur over time as function of thermal cycling and how close the thermocouple is being used at maximum temperature.
- **INTERCHANGEABILITY:** The resistance characteristics do not vary much from batch to batch, providing extremely accurate consistency of sensor signal from one manufacturing lot to another. Thermocouples, due to the inhomogeneity in the thermoelement conductors, tend to vary more widely from lot to lot than RTDs.
- **EXTENSION WIRE COST:** RTD extension wire conductors are typically copper or nickel which is considerably less expensive than the compensated extension wire that must be used with Thermocouples. Thermocouple Extension wire must be of the same calibration type as the thermocouple it is connected to.

Thermocouple Temp Range:

-328°F to 4200°F (-200°C to 2316°C)

RTD Temp Range

-328°F to 1652°F (-200°C to 900°C)

Thermocouple Technology

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