Thermocouples
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Measuring Temperature
What is a Thermocouple

- A sensor that is used to measure temperature
- Composed of two dissimilar wires joined at one end and connected to a thermocouple-capable device on the other

![Diagram of Thermocouple](attachment://thermocouple_diagram.png)
How Does a Thermocouple Work?

- A Thermocouple works by producing a voltage caused by heating or cooling the wires at one end.

The Seebeck Effect

- A temperature difference in two dissimilar metals produces a voltage.
- By interpreting the voltage we are able to find the temperature difference between the two junctions.
Cold Junction Compensation

Types of Thermocouples

- Thermocouple type is determined by the material of each metal in the two wires.
- Each type has different accuracies dependent on temperature range.
- Types T, J, E, K, and N are the most common.
- Types R, S, and B are called “Noble Metal” and are used for extremely high temperatures.

![Diagram of Thermocouple Configuration]

![Table of Tolerance of Thermocouples]
- Type K is the most common and least expensive
- Type B can measure the highest temperature
- Type E is the most accurate
Applications of Thermocouples

- Hospital thermometers
- Safety features in stove
- Steel Industry
- Manufacturing
- Power Generation
- Food Industry

Errors in Thermocouples

- Measuring temperature of the reference junction
- Junction connection
- Low input impedance of the voltmeter
- Impurities in the wire
- Aging of the thermocouple
References


Questions?