TESCA™

Tesca Technologies Pvt. Ltd.

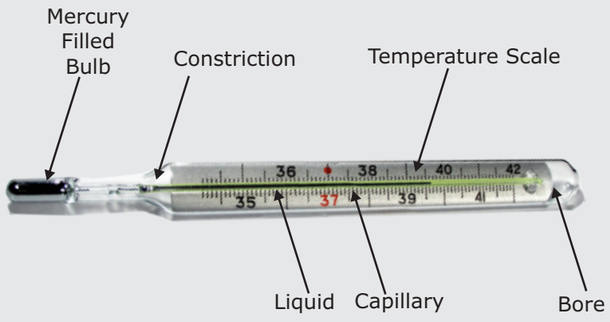
Temperature Sensor

Mercury in Glass Thermometer

Thermometer is the device used to measure temperature. The extremely fine tube (narrow bore) of a thermometer is called a capillary. The boiling point of water (or condensing point of steam) is 100° or 212°F or 373K. The freezing point of water (or melting point of ice) is 0° 32° F or 273K.

These temperatures are typically used in the calibration of thermometers and are known as the fixed points. The temperature range that is typically marked on a laboratory thermometer is -10°C to 110°C. Mercury, which is used as a thermometric liquid, has the following characteristic properties:

1. Mercury has a high boiling point of abo 357°C and therefore can be used to measure temperatures as high as 357°C.
2. Mercury has a freezing point of about -39°C and hence is suitable in thermometers to record low temperatures (although not very temperatures)
3. Mercury is opaque and has a shining silvery color of its own, making it clearly visible in the capillary tube of a thermometer.
4. Mercury needs very little heat to expand and so it can easily measure the temperature of a body without causing a decrease in the body's temperature.



Advantages

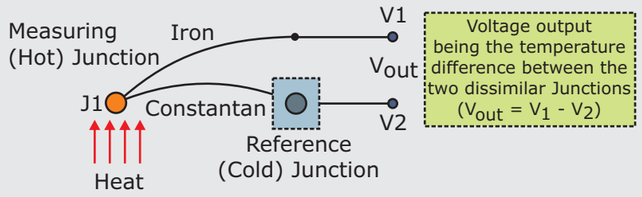
* Mercury does not sticks to the side of the glass capillary tube of a thermometer. Therefore, it allows accurate temperature measurement.
* Mercury is a good conductor of heat.
* Mercury is relatively expensive.

Disadvantages

* Manual Reading
* Limited Range

Thermocouple

Thermocouples are thermoelectric sensors that basically consists of two junctions of dissimilar metals, such as copper and constants that are welded or crimped together. One junction is kept at a constant temperature called the reference (Cold) junction, while the other at the measuring (Hot) junction. When the two junctions are at different temperatures, a voltage is developed across the junction which is used to measure the temperature.



Thermocouple Sensor Coloour Codes Extension and Compensating Loads.		
Code Type	Conductors (±)	Sensitivity
E	Nickel Chromium/ Constantan	-200 to 900°C
J	Iron/Constantan	2 to 750°C
K	Nickel Chromium Nickel Aluminimum	-200 to 1250°C
N	Nicrosil/Nisil	0 to 1250°C
T	Copper/Constantan	-200 to 350°
U	Copper/Copper Nickel Compensating for "S: and "R"	0 to 1450°C

Advantages:

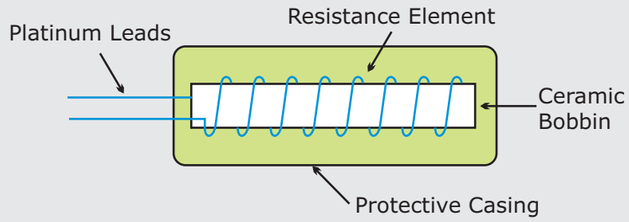
* Temperature Range
* Self Powered
* No Self-heat
* Rugged

Disadvantages:

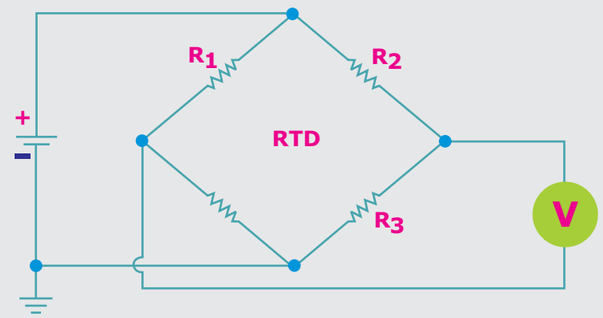
* Cold Junction Compensation
* Accuracy
* Stability
* TC Extension Leads

Resistance Temperature Detector

RTD's are precision temperature sensors made from high-purtiy conducting metals such as platinum, copper or nickel wound into a coil and whose electrical resistance changes as a function of temperature. Resistive temperature detectors have positive temperature coefficients (PTC). Pt 100 sensor, which has a standard resistance value of 100W at 0°C. A typical RTD has a base resistance of about 100Ω at 0°C, increasing to about 140Ω at 100°C with an operating temperature range of between -200°C to + 600°C.



Measurement of temperature using RTD



Advantages:

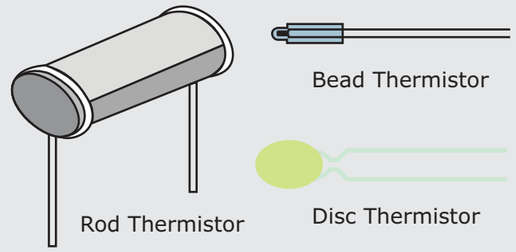
* Accuracy
* Stability
* Linearity

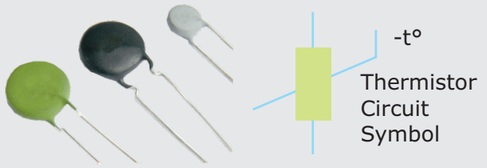
Disadvantages:

* Lead Resistance Error
* Response Time
* Vibration Resistance
* Size

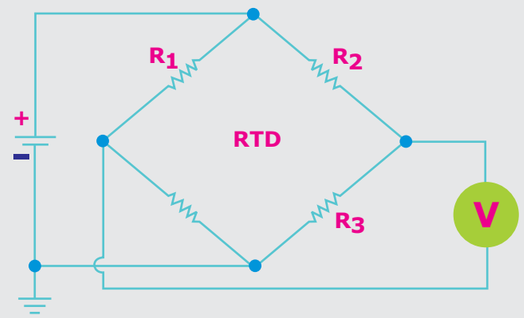
Therimester

A thermistor is a temperature-sensing element composed of sintered semiconductor material which exhibits a large change in resistance proportional to a small change in temperature. Thermistors usually have negative temperature coefficients which means the resistance of the thermistor decreases as the temperature increases. Thermistors have an accuracy of ± 0.1°C or ± 0.2°C depending on the particular thermistor mode. However thermistors are fairly limited in their temperature range, working only over a nominal range of 0°C to 100°C.





Measurement of temperature using thermister



Advantages:

* Sensitivity
* Accuracy
* Cost
* Rugged
* Flexible Packages
* Hermetic Seal
* Surface Mount

Disadvantages:

* Non-linearity
* Self-heating
* Moisture failures (non-glass only)

52002
Measurement and Control of temperature

52006
Temperature Measurement Tutor

52009A
Temperature Process Control Trainer

52011
Temperature Transducer Trainer

52033
Temperature Control System

52033A
Temperature Sensor System

52046
Study of Temperature Transducers

52066
Light & Temperature Trainer

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