

# THERMISTOR

## Definition

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## Basics

A **thermistor** is a type of resistor used to measure temperature changes, relying on the change in its resistance with changing temperature. The word is a combination of *thermal* and resistor. Samuel Ruben invented the thermistor in 1930, and was awarded U.S. Patent No. 2,021,491.

**History:** The first NTC thermistor was discovered in 1833 by Michael Faraday, who reported on the semiconducting behavior of silver sulfide. Faraday noticed that the resistance of silver sulphide decreased dramatically as temperature increased. Because early thermistors were difficult to produce and applications for the technology were limited, commercial production of thermistors did not begin until the 1930s.

Assuming, as a first-order approximation, that the relationship between resistance

and temperature is linear, then:

$$\Delta R = k\Delta T$$

where

$\Delta R$  = change in resistance

$\Delta T$  = change in temperature

$k$  = first-order temperature coefficient of resistance

Thermistors can be classified into two types depending on the sign of  $k$ . If  $k$  is positive, the resistance increases with increasing temperature, and the device is called a positive temperature coefficient (**PTC**) thermistor, or **posistor**. If  $k$  is negative, the resistance decreases with increasing temperature, and the device is called a negative temperature coefficient (**NTC**) thermistor. Resistors that are not thermistors are designed to have the smallest possible  $k$ , so that their resistance remains nearly constant over a wide temperature range.

Thermistors differ from resistance temperature detectors in that the material used in a thermistor is generally a ceramic or polymer, while RTDs use pure metals. The temperature response is also different; RTDs are useful over larger temperature ranges.

Source: <http://www.juliantrubin.com/encyclopedia/electronics/thermistor.html>