

# Thermocouple pyrometers



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Thermocouple pyrometers - measure the output of a thermocouple (q. v.) placed in contact with the hot body; by proper calibration, this output yields temperature. Resistance thermometers - also called resistance temperature detectors (RTDs), are sensors used to measure temperature by correlating the resistance of the RTD element with temperature. Most RTD elements consist of a length of fine coiled wire wrapped around a ceramic or glass core. The element is usually quite fragile, so it is often placed inside a sheathed probe to protect it. The RTD element is made from a pure material whose resistance at various temperatures has been documented.

The material has a predictable change in resistance as the temperature changes; it is this predictable change that is used to determine temperature.

A liquid-in-glass thermometer - is the simplest and most commonly employed type of temperature measurement device. It is one of the oldest thermometers available in the industry. It gives fairly accurate results within the temperature range of -200 to 600°C. No special means are needed to measure temperature via these thermometers. One can read temperature readings easily with human eyes.

They find their use in variety of applications such as medicine, metrology and industry. The foremost liquid-in-glass thermometer was introduced in the year 1650 in which the liquid filled in was spirit from wine. Later on, more linear thermometers were developed with the use of mercury as a liquid inside the thermometer. Bourdon tube thermometer - an instrument for measuring temperature, especially one having a graduated glass tube with a bulb containing a liquid, typically mercury or colored alcohol, that expands and rises in the tube as the temperature increases.

Radiation pyrometer - a pyrometer for estimating the temperature of distant sources of heat; radiation is focussed on a thermojunction connected in circuit with a galvanometer

An optical pyrometer - is a device which allows contactless temperature measuring by using the incandescence color. It is based upon the fact that all black bodies do have the same incandescence color at a given temperature. It is very straightforward and allows any temperature from which a hot object emits light ( $> 500$  deg C). It is made from a small magnifying optical device (like a monocular or very small telescope) in which a small incandescent bulb is placed which image is sharp when the user views through the eyepiece (the lens(es) on the eye end of the optical device).

The background is the hot object to be gauged. The electrical current flowing through the filaments in the bulb is an indication of their temperature. This current is controlled by a potentiometer which is put between the power source (a battery) and the bulb. An ammeter is used to display the temperature. Its range is from 500 C (== 900F lower limit when an object incandesces) to 1600 C (3000 F), which is suitable for most applications.

The bimetallic thermometer - consists of a bimetallic strip by bonding together two thin strips of two different metals. The differential change in expansion of the two metals results in bending of the bimetallic strips with change in temperature.

Pyrometric cones - are used to show the temperature of the end point of firing. Pyrometric cones are commercially produced pyramids of molded glaze, made to melt at specific temperatures. Cones are available at about <https://assignbuster.com/thermocouple-pyrometers/>

forty degree intervals. Three or four cones are put in a cone plaque in the kiln, placed in a sequence of increasing melting temperature, so that when the melting temperature of the first cone is reached, it begins to melt, and bend so that by looking through the peep hole in the kiln, this can be seen. Below is a picture of Cones that have melted.

Electronic thermometers - work in a different way than the traditional mercury and glass thermometers. Electronic thermometers have the same probe (the contact point for taking temperature) as traditional thermometers, but it is not used to expand mercury.