

5.1 Temperature Sensors

Temperature is one of the fundamental parameters indicating the physical condition of matter, i.e. expressing its degree of hotness or coldness. Whenever a body is heat' various effects are observed. They include

- Change in the physical or chemical state, (freezing, melting, boiling etc.)
- Change in physical dimensions,
- Changes in electrical properties, mainly the change in resistance,
- Generation of an emf at the junction of two dissimilar metals.

One of these effects can be employed for temperature measurement purposes. Electrical methods are the most convenient and accurate methods of temperature measurement. These methods are based on change in resistance with temperature and generation of thermal e.m.f. The change in resistance with temperature may be positive or negative. According to that there are two types

- Resistance Thermometers —Positive temperature coefficient
- Thermistors —Negative temperature coefficient

Construction of Resistance Thermometers

The wire resistance thermometer usually consists of a coil wound on a mica or ceramic former.

The coil is wound in bifilar form so as to make it no inductive. Such coils are available in different sizes and with different resistance values ranging from 10 ohms to 25,000 ohms.

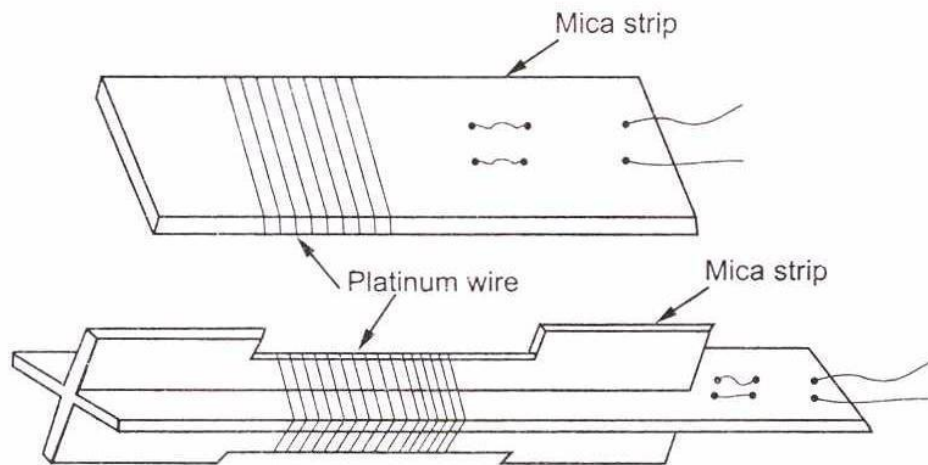


Fig 5.4.1 Resistance Thermometer

Advantages of Resistance Thermometers

- The measurement is accurate.
- Indicators, recorders can be directly operated.
- The temperature sensor can be easily installed and replaced.
- Measurement of differential temperature is possible.
- Resistance thermometers can work over a wide range of temperature from -20°C to $+650^{\circ}\text{C}$.
- They are suitable for remote indication.
- They are smaller in size.
- They have stability over long periods of time.

Limitations of Resistance Thermometers

- A bridge circuit with external power source is necessary for their operation.
- They are comparatively costly.