

2 - Sensing - Strain gauges



Strain gauges are fixed to different places on an object to measure the strains on its surface when it is stretched or bent.

A **strain gauge** consists of a grid of fine wire bonded on a thin strip of plastic. It is glued to the surface to be monitored.

When it is **stretched** the **resistance** of the wire **increases**, and when it is **compressed** the **resistance** of the wire **decreases**. This change of resistance is because the resistance R of the wire is given by:

$$R = \frac{\rho l}{A}$$

where ρ is the **resistivity**, A is the area of cross section and l its total length. When the wire is stretched, its length increases and its c.s.a. decreases, causing its resistance to increase.

Keywords

Strain gauge
Area
Resistance
Length

2.09

2 - Sensing - Thermistor



- A **thermistor** is a type of **resistor** whose resistance changes significantly when its **temperature changes**.

- A **negative temperature coefficient (ntc)** thermistor has a resistance that decreases with increase of temperature. This is the most **common** type.

- A positive temperature coefficient (ptc) thermistor has a resistance that increases with increase of temperature.

Keywords

Thermistor
Temperature
Resistance
Sensor

2.11

2 - Sensing - Thermocouples



- A **thermocouple** consists of two dissimilar **metal** wires joined together. When there is a **temperature difference** between their two junctions, a thermoelectric **emf** is produced.

- A **thermocouple** is a source of a **temperature-dependent emf** that can be used to monitor or measure temperatures, and to switch control devices on or off according to its temperature.

- **Temperature** changes **affect** most experimental measurements.

Keywords

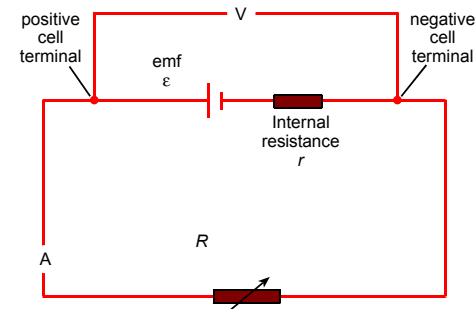
Thermocouple
Emf
Temperature
Sensor

2.10

2 - Sensing - Emf



For a source of emf ϵ with **internal resistance** r connected to a load of resistance R , as shown,
 $\epsilon = I R + I r$, where $I R$ is the potential difference across the **load resistance** and $I r$ is the lost p.d.



Keywords

Internal
resistance
Load
Emf
Lost p.d.
Terminal

2.12