RESISTIVE TRANSDUCER (POTENTIOMETRIC TRANSDUCERS)

Resistive transducers have many and varied applications in the transduction of measurands such as displacements, mechanical strain, pressure, force and load, temperature, and fluid velocity into electrical outputs. The transduction mechanisms are based on the change in resistance brought about by the measured.

Potentiometric transducers

A potentiometric transducer is a mechanically driven variable resistor. It consists of a wire-wound fixed resistor and a wiper arm that slides over it and in so doing taps a different segment of the resistor, as shown diagrammatically in Fig. 5.8a and b, where K represents a fraction of the resistor that is tapped.

The displacement to be measured is linked by a shaft to the wiper arm, and a measure of the displacement is the fractional resistance KR or the fractional voltage KV.

This is the transduction mechanism. The resolution that one can achieve with this transducer depends on the gage of the nickel alloy or platinum wire used. For extremely fine resolution, the wire is replaced by a metallized ceramic or a film resistor.

If the resistance wire is wound on a doughnut-shaped tube, the wiper will measure angular displacements. The output voltage corresponding to a displacement, force, or pressure is a fraction of the external voltage V, and therefore it does not need any amplification to activate external circuitry.

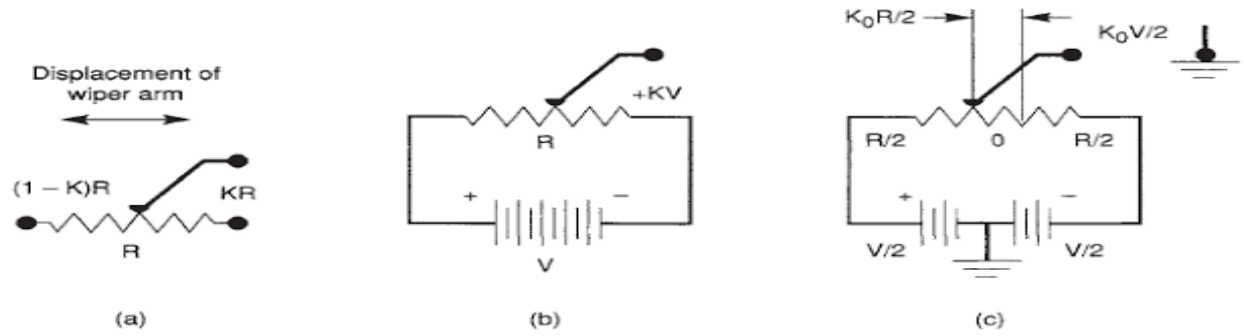

Fig 5.8 Potentiometric displacement transducers. (a) Resistance proportional to displacement or position. (b) Voltage proportional to the same measurands. (c) Displacement is measured around a null position and the output voltage is ±K0V0. K0 is referenced to the center of the resistor.

Carbon granules, packed in a small volume in the shape of a button and connected in series with a voltage source and a load resistor, have been used in the past as microphones. Using this transduction mechanism, carbon-strip strain gages were developed in the early 1930s. These were, in turn, followed by unbonded and bonded wire strain gages, foil strain gages, and semiconductor strain gages.

Source: http://mediatoget.blogspot.in/2012/05/resistive-transducer-potentiometric.html