

# ELECTRONIC MEASUREMENT & INSTRUMENTATION (BEC-29)



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UNIT- 2  
Lecture-2  
**Transducers**

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# Resistive Transducer

- Resistive transducers are those in which there is change in resistance due to some physical phenomenon. The change in value of resistance with a change in length of the conductor can be used to measure displacement.
- Strain gauges work on the principle that resistance of the semiconductor or conductor changes when strained. This can be used for measurement of force, displacement and pressure.
- Potentiometers: consist of a resistance element provided with a sliding contact called wiper. The motion of sliding contact can be rotational or translatory.

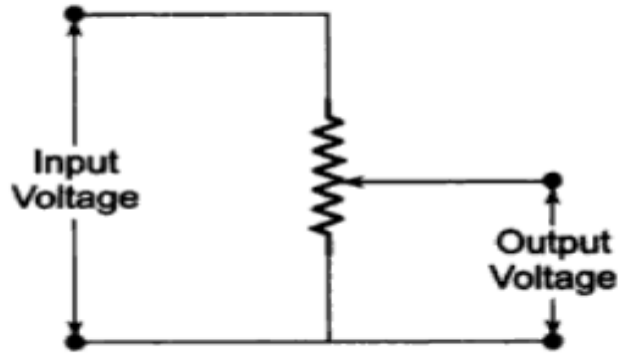
## Advantages of Potentiometer:

- They are inexpensive.
- Simple to operate.
- They are useful for measurement of large amplitudes of displacement.
- Electrical efficiency is very high.

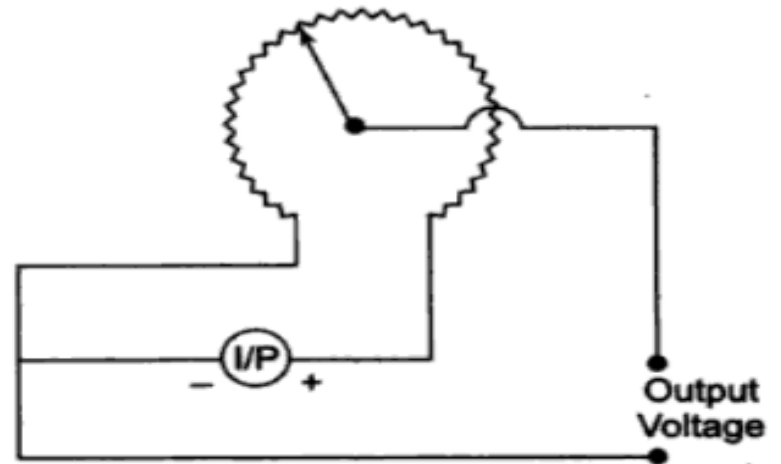
## Disadvantages of Potentiometer:

- A large force is required to move the sliding contacts.
- Wear and tear of sliding contacts.

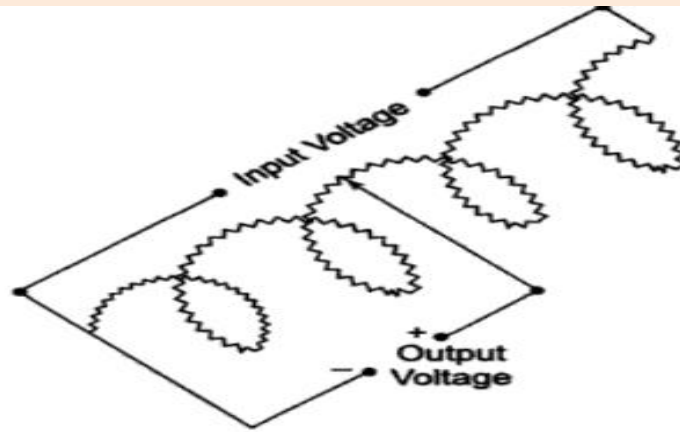
# Contd..



(a)



(b)



(c)

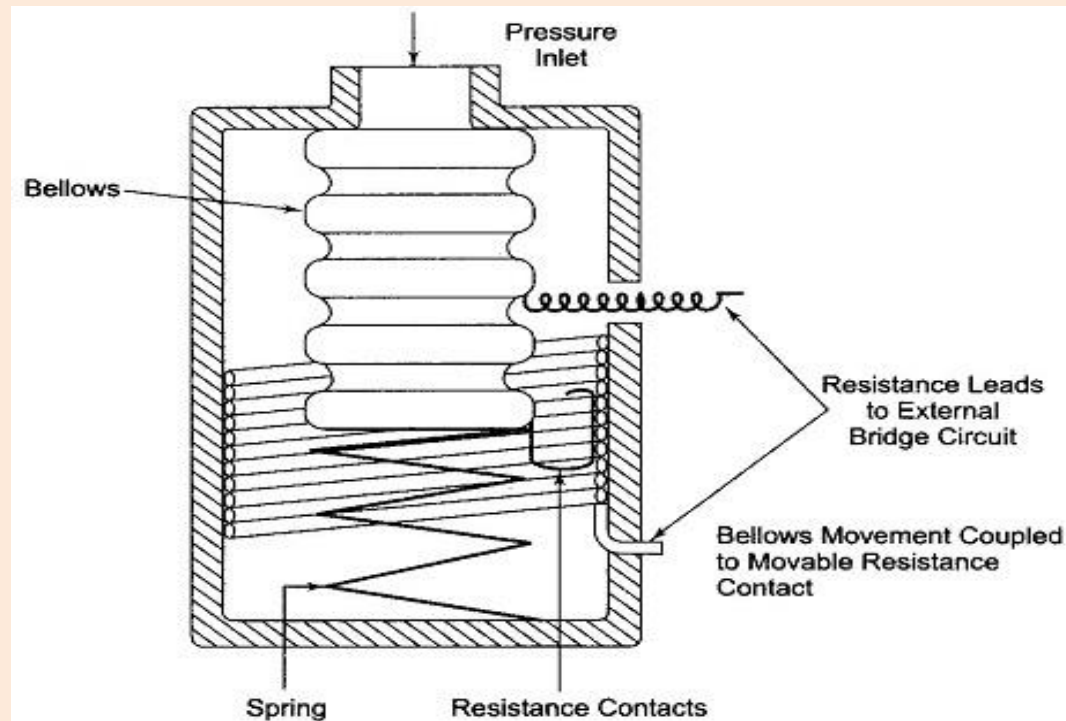
(a) Translatory Type (b) Rotational Type (c) Helipot (Rotational)

Activate V  
Go to Setting

Acti  
Go to

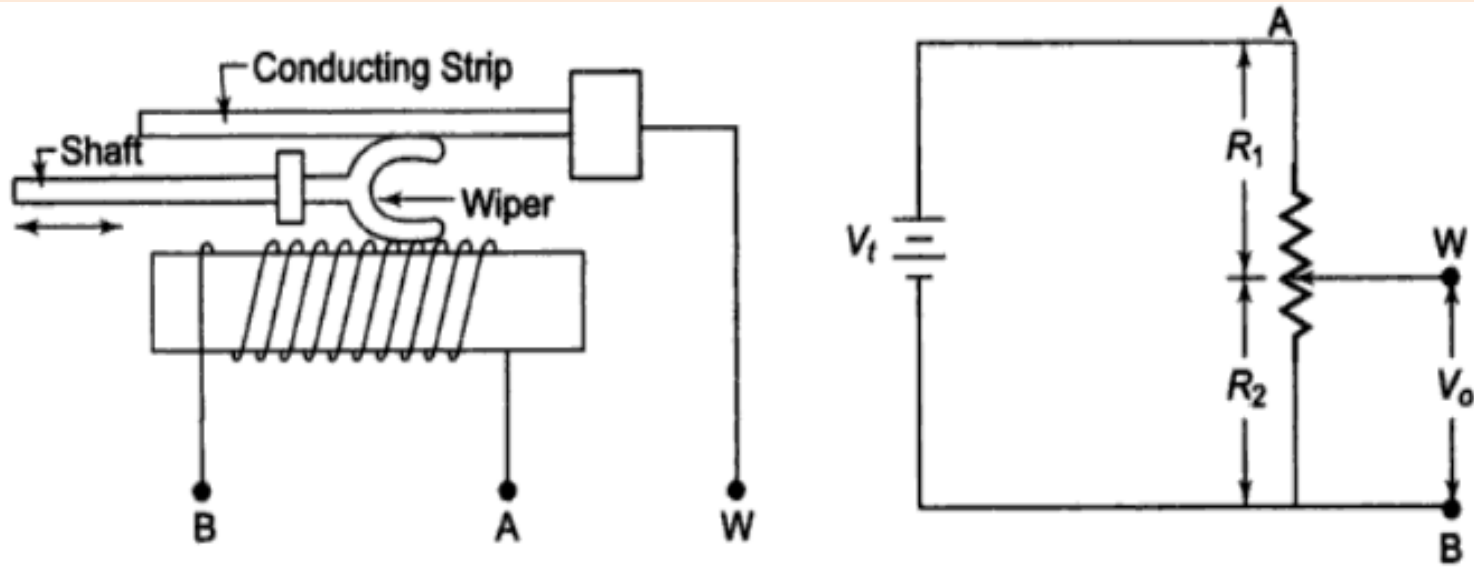
# Resistance Pressure Transducer

- Works on the principle that change in the pressure causes change in the resistance of sensing element.
- They are two types: **Electromechanical resistance** and **Strain gauge transducer**.
- Electromechanical transducer: change of stress, pressure, position and displacement is applied to a variable resistor.
- Strain gauge: pressure acts directly on the resistor.



# Resistive Position Transducer

- Works on the principle that the physical variable under measurement causes a resistance change in the sensing element.



$$v_o = \frac{R_2}{R_1 + R_2} v_t$$

$$\frac{v_o}{v_t} = \frac{R_2}{R_1 + R_2}$$



# Assignment Questions

- Explain with diagram the functions of resistive transducers.
- Explain with diagram potentiometer used as a transducer.
- State the advantages and disadvantages of potentiometer.
- Explain with diagram the operation of resistive pressure transducer.
- Explain with diagram the operation of resistive position transducer.

# Conceptual Questions

- Potentiometric resistance transducer measures \_\_\_\_\_
  - a) linear displacement
  - b) rectangular displacement
  - c) square displacement
  - d) triangular displacement
- Resistance potentiometer consists of \_\_\_\_\_
  - a) capacitive element
  - b) resistive element
  - c) inductive element
  - d) no elements
- Resistance transducer has \_\_\_\_\_
  - a) medium efficiency
  - b) low efficiency
  - c) high efficiency
  - d) zero efficiency

## Contd..

- Resistance potentiometers convert mechanical displacement into \_\_\_\_\_
  - a) electrical signal
  - b) chemical signal
  - c) physical output
  - d) kinetic energy
- What is a helipot?
  - a) inductive element
  - b) helicopter
  - c) helipad
  - d) resistive element

**THANK YOU**