

## 5.1 TRANSDUCERS

The input quantity for most instrumentation systems is nonelectrical. In order to use electrical methods and techniques for measurement, the nonelectrical quantity is converted into a proportional electrical signal by a device called transducer.

- Another definition states that transducer is a device which when actuated by energy in one system, supplies energy in the same form or in another form to a second system.
- When transducer gives output in electrical form it is known as electrical transducer. Actually, electrical transducer consists of two parts which are very closely related to Each other.
- These two parts are sensing or detecting element and transduction element. The sensing or detecting element is commonly known as sensor.
- Definition states that sensor is a device that produces a measurable response to a Change in a physical condition.
- The transduction element transforms the output of the sensor to an electrical output, as shown in the Fig 5.1.

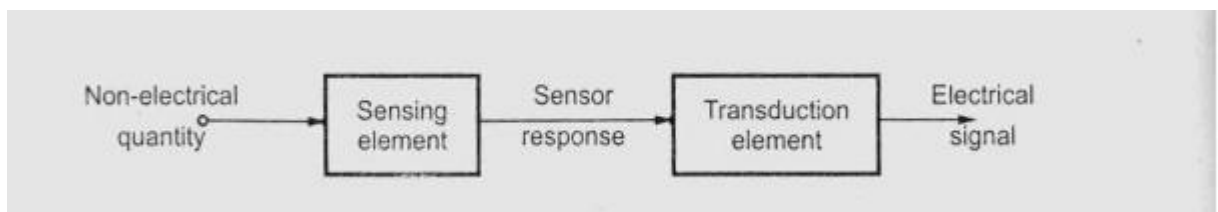


Fig 5.1.1 Transducer elements in cascade

### Classification of Electrical Transducers

Transducers may be classified according to their structure, method of energy conversion and application.

Thus, we can say that transducers are classified

- As active and passive transducer
- According to transduction principle
- As analog and digital transducer
- As primary and secondary transducer

- As transducer and inverse transducer

### Active and Passive Transducer Active Transducers

- Active transducers are self-generating type of transducers.
- These transducers develop an electrical parameter (i.e. voltage or current) which is proportional to the quantity under measurement.
- These transducers do not require any external source or power for their operation.
- They can be subdivided into the following commonly used types

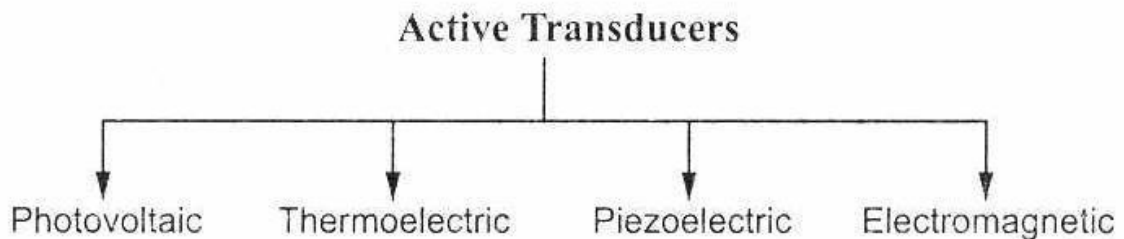


Fig 5.1.2 Active Transducers

### Passive Transducers

- Passive transducers do not generate any electrical signal by themselves.
- To obtain an electrical signal from such transducers, an external source of power is essential.
- Passive transducers depend upon the change in an electrical parameter (R, L, C).
- They are also known as externally power-driven transducers.
- They can be subdivided into the following commonly used types.

### According to Transduction Principle

The transducers can be classified according to principle used in transduction.

- Capacitive transduction
- Electromagnetic transduction
- Inductive transduction
- Piezoelectric transduction
- Photovoltaic transduction
- Photoconductive transduction

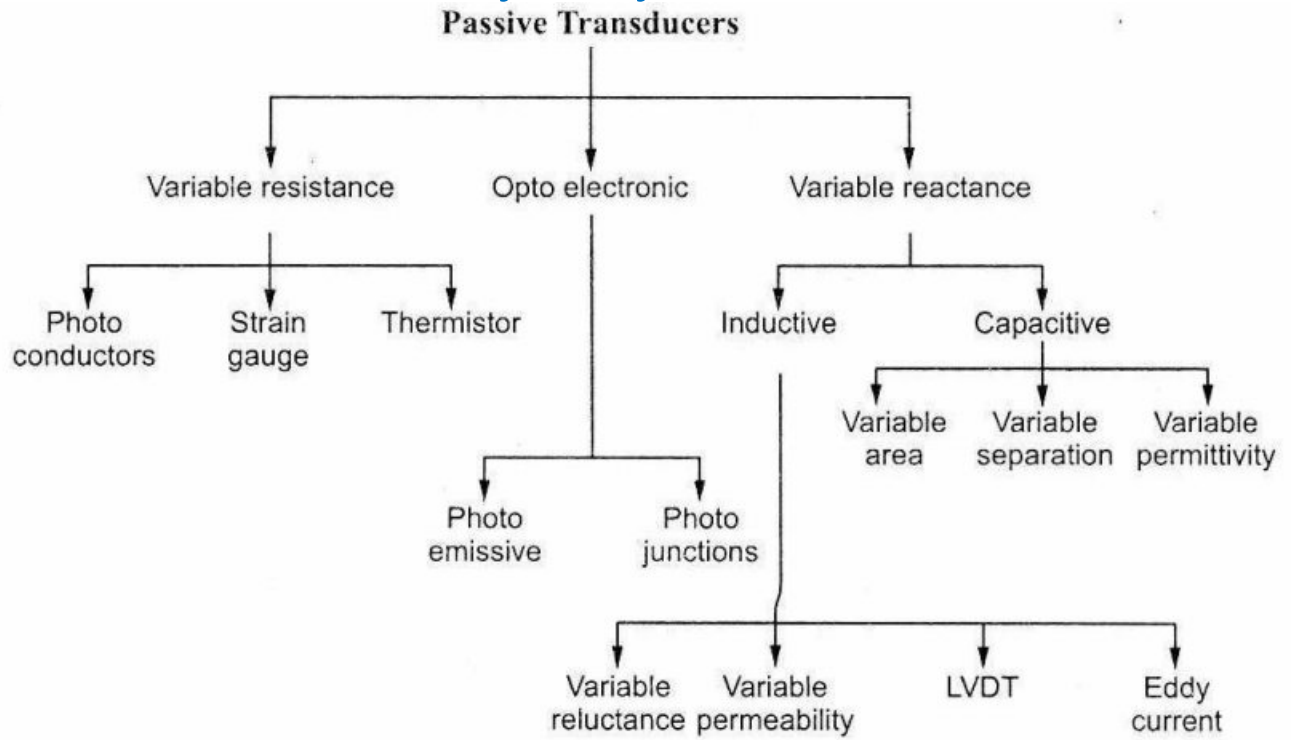


Fig 5.1.3 Passive Transducers