

Transducer.

Have you ever thought that how we are able to measure things like pressure, humidity, sound etc. Do you wonder that how the heat of your body is measured by thermometer and we get digital output (in digital thermometer). Don't worry It is all related to **Transducer**. Here in this article we are going to explore Transducers and also we will understand its type & classification.

What is Transducer?

A straight question and its answer in simple words, **it is a device converting one form of energy into other**. We can also say that a device which converts physical energy to electrical signal is transducer. **The other name for transducers is PICKUPS**. They are extensively used in instrumentation field as instrumentation deals with measuring and controlling a number of variables like sound, flow, level, angle etc.

We generally prefer converting physical energy to electrical energy because of many reasons but most important reasons are:

- Amplification of electrical signal is done easily. Now suppose you want to measure some mechanical form of energy and that is very small so detecting output will be difficult and if we convert them to electrical signals it can be easily amplified as per need.
- The output when converted to electrical signals can easily be transmitted and processed.

Transducer can be divided in two parts. One is Sensing element and other is Transduction element. Sensing element is a detector which is responsible for sensing the element or it is the part which responds to phenomenon and Transduction element is used to transform the output of sensing element to electrical output. So it is dependent on sensing element, basically it is an electronic circuit.

Classification of Transducers:

There are many principles on which a transducer can work like resistive, inductive, capacitive etc. So Transducer can be categorized on the basis of four thoughts. On the basis of transduction form it's used, we can go further.

1. Primary and secondary type
2. Analog and digital type
3. Active and passive type
4. Transducer and Inverse type

Primary and Secondary Transducer:

Suppose you need to measure pressure. In this case we use bourdon tube .so bourdon tube act as primary transducer it senses the pressure and converts pressure into displacement of its free end. The displacement of free end moves core of linear variable differential transducer which produces output voltage proportional to movement of core which is proportional to movement of core which is again proportional to pressure. So we are able to measure pressure. Here bourdon tube is primary transducer and LVDT is secondary transducer.

Analog and Digital Transducer:

Transducers converting input quantity to analog output in form of pulses are analog transducers.

I.E. Strain gauge, thermocouple etc. digital transducers convert input to electrical output in form of pulses.

Active and Passive Transducer:

Active transducers are those which don't need auxiliary power source to produce output. The energy required for production of output signal is obtained from physical quantity being measured. I.E. piezoelectric crystals, tacho-generators etc.

Passive transducers are those which need an auxiliary power source to produce output.

I.E. linear potentiometer etc.

Transducers and Inverse transducer:

Transducers, as mentioned earlier convert non electrical quantity to electrical quantity whereas inverse transducer converts electrical to non-electrical quantity. This type of transducer convert electrical signal in to required form. I.E. Piezoelectric Crystal. It coverts electrical signal in to mechanical vibration.

Application of transducers:

In the real world everywhere we required transducer. So we can say more or less all electronic devices can't complete without transducer. Some examples of transducers are given below.

- In our mobile phone. Microphones, Speakers and touch screens.
- In our Computer Mouse optical sensor/ transducer is available.
- In our Clock Piezo Crystal is working.
- In our Computer Hard Disk Magnetic Sensor is installed.