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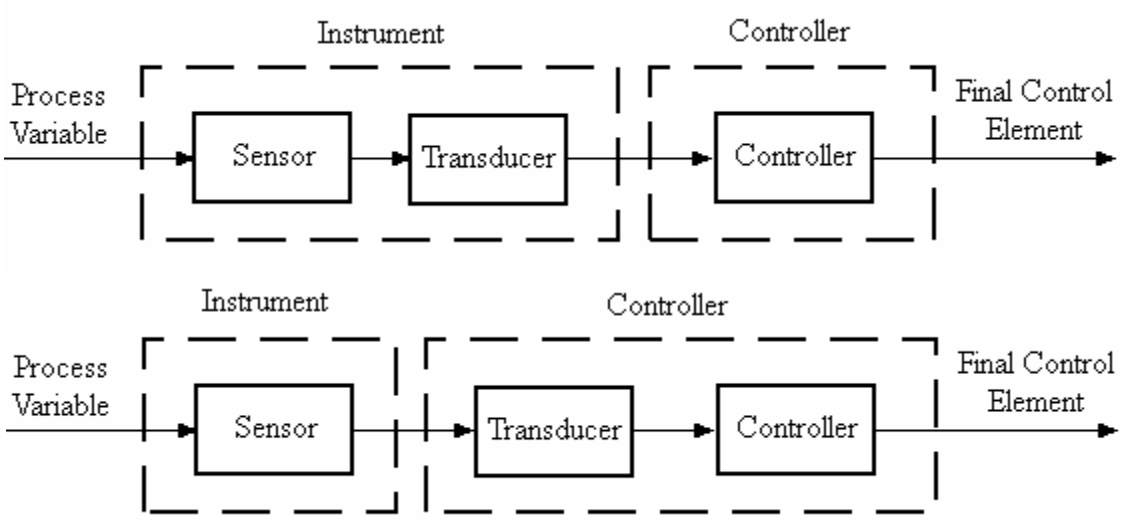
TRANSDUCERS

Sensor

A sensor is a device that has a characteristic that changes in a predictable way when exposed to the stimulus it was designed to detect.

Transducer

A transducer is a device that converts one form of energy into another.



A sensor & transducer may be packaged together Or the transducer may be part of the controller as shown in Figure.

Classification of Transducers

The classification of transducers based on the following three ways

1. Physical Effect
2. Physical Quantity
3. Source of Energy

Classification based on Physical Effect

The first classification of Transducers is based on the physical effect employed to convert the physical quantity to electrical quantity. E.g. the change in resistance (physical quantity) of a copper element in proportion to the change in temperature.

The following physical effects are generally used

- Variation in Resistance
- Variation in Inductance
- Variation in Capacitance
- Hall Effect
- Piezoelectric Effect

Classification based on Physical Quantity

The second classification of Transducers is based on the physical quantity converted i.e. the end use of the transducer after the conversion. For example, a Pressure Transducer is a transducer that converts pressure into electrical signal.

The following transducers classified based on the physical quantity & corresponding examples are

- Temperature Transducer – Thermocouple
- Pressure Transducer – Bourdon Gauge
- Displacement Transducer – LVDT (Linear Variable Differential Transformer)
- Level Transducer – Torque Tube
- Flow Transducer – Flow Meter
- Force Transducer – Dynamometer
- Acceleration Transducer – accelerometer

Classification based on Source of Energy

Transducers are also classified based on the source of energy. Under this category, there usually two types of transducers:

- Active Transducers
- Passive Transducers

Active Transducers

In Active Transducers, the energy from the input is used as a control signal in the process of transferring energy from power supply to proportional output.
For example, a Strain Gauge is an Active Transducer, in which the strain is converted into resistance. But since the energy from the strained element is very small, the energy for the output is provided by an external power supply.