

INTRODUCTION TO SIGNAL CONDITIONING

Introduction:

The primary objective of industrial process control is to control physical parameters such as temperature, pressure, flow rate, level, force, light intensity, and so on. The process control system is designed to maintain these parameters near some desired specific value.

As these parameters can change either spontaneously or because of external influences, we must constantly provide corrective action to keep these parameters constant or within the specified range.

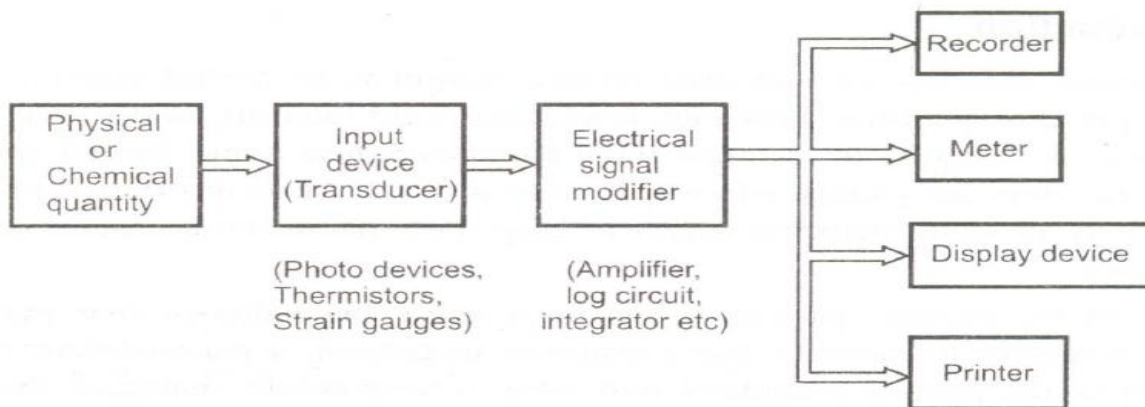
To control the process parameter, we must know the value of that parameter and hence it is necessary to measure that parameter. **In** general, a measurement refers to the transduction of the process parameter into some corresponding analog of the parameter, such as a pneumatic pressure, an electric voltage, or current. A **transducer** is a device that performs the initial measurement and energy conversion of a process parameter into analogous electrical or pneumatic information. Many times further transformation or signal enhancement may be required to complete the measurement function. Such processing is known as **signal conditioning**.

Electronic aided measurement:

For any measurement system., the first stage detects the physical quantity to be measured this is done with the help of suitable transducer. The next stage converts this signal into an electrical form. The second stage is used to amplify the converted signal such that it becomes usable and suitable for the last stage which is signal conditioning stage. The last stage includes various elements used for different purposes such as indicating, recording, displaying, data processing and control elements.

^ typical electronic aided measurement system is as shown in the Fig

The first stage is the input device which is nothing but a transducer which converts measurand into an usable form i.e. electrical signal. In other words, the quantity measured is encoded as an electrical signal. The next stage modifies the electrical signal in the form suitable for the output or read-out devices. Generally the most frequently used electronic circuits are amplifiers, with parameter adjustments and automatic compensation circuits specially used for temperature variation. of the input device and non-linearities of the input device. The output is obtained from read-out devices such as meter, recorder, printer, display units etc.



In general, the quantity which is measured by using transducer can be encoded in different ways. For example, as a physical or chemical quantity or property, as a characteristics of the electrical signal, as a number. The property or different characteristics used to represent a data is called **data** domain.

The electronic aided measurement system represents the measurement of physical quantity faithfully in the analog or digital form of it obtained from the signal conditioning circuits. For passive transducers, the signal conditioning circuit mainly' includes excitation and amplification circuitry, while for active transducers, only amplification circuitry is needed and the excitation is not needed. Depending on the type of the excitation either a.c. or d.c. source, we have a.c. signal conditioning system and d.c. signal conditioning system.

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