SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF MECHANICAL ENGINEERING

SENSORS AND INSTRUMENTATION

Guess Today's Topic????

zero order performance

- In a measurement system, the zero order performance refers to the ability of the system to accurately measure the lowest possible signal or input value, i.e., the value corresponding to zero on the measurement scale. The generalized performance of zero order in a measurement system is usually characterized by two main parameters:

zero order performance

- Zero offset error: This refers to the deviation of the measurement system's output from the true zero input value. Ideally, the output of the measurement system should be zero when the input value is zero. However, due to various sources of error such as noise, drift, and bias, the output may have a non-zero value even when the input value is zero. The zero offset error is usually expressed as a percentage of the full-scale range of the measurement system.

zero order performance

- Zero drift: This refers to the change in the zero offset error over time due to various factors such as temperature changes, aging of components, and environmental factors. A measurement system with high zero drift will exhibit a significant change in zero offset error over time, which can lead to inaccurate measurements and reduced reliability.

zero order performance

- To ensure accurate and reliable measurements, it is important to minimize both the zero offset error and the zero drift in a measurement system. This can be achieved through careful calibration and periodic maintenance of the system.

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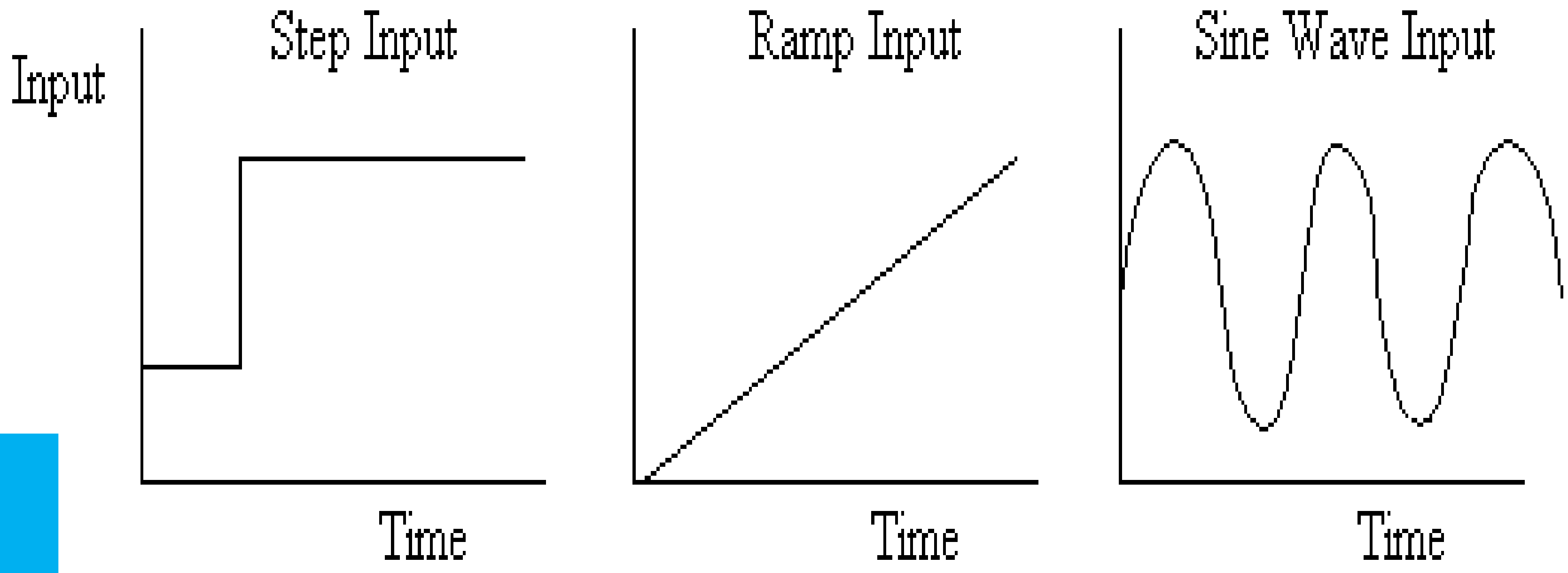


zero order performance

Since n = 0 for a zero-order instrument, reduces to an algebraic equation:

$$y = Kx(t)$$

where K (= b/a0) is called the static gain. the output is always proportional to the input, so there is no error in the output due to the dynamic response. Of course, there will be static errors of the types we have discussed previously.
An example of a zero-order instrument is an electrical resistance strain gauge. The input strain causes the gauge resistance to change by an incremental amount R according to the relationship [2] R = FR

where F is the gauge factor and R is the resistance of the gauge wire in the unstrained condition. Since the instrument itself, the gauge wire, is experiencing the input strain directly, there is no dynamic response error in the output.

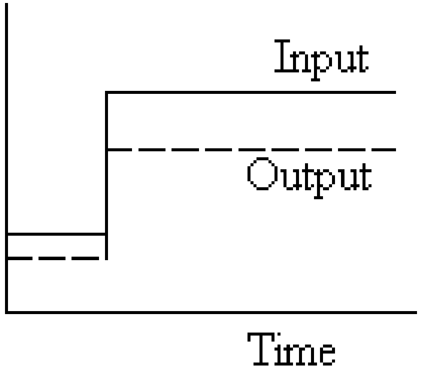
zero order performance

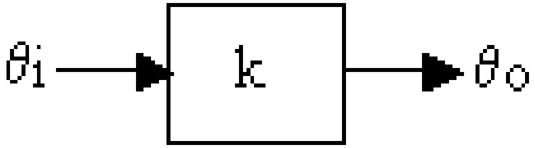
Zero Order Systems are defined as follows. The output of a zero order system is proportional to the input. At all times, the output is equal to the input multiplied by some constant of proportionality.

Output θo = k x Input θi
θo = kθi

Where k is a proportionality constant.

Example – rheostat, potentiometer. The voltage/resistance (output) instantly changes when the wiper is moved (input).






Thank you