

Chapter 4 Transducers and Control System Components

Defining Transducers

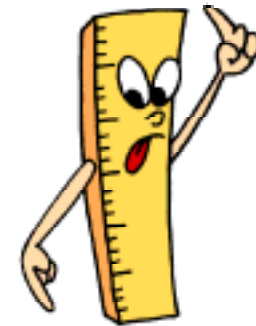
A transducer is a device that transforms one form of energy into another.

Transducers are generally made as small as possible, and the energy being transferred is small.

Conversion between input and output is done quantitatively using a calibration process.

Transducers use basic physical laws to measure physical parameters using a sensing element that is the heart of the transducer.

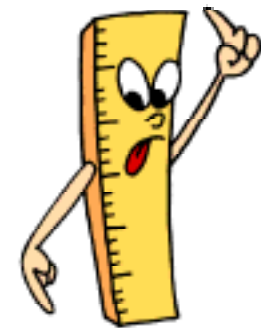
The parameters measured in a servo control systems are position and motion while the parameters measured in process control systems are temperature, flow, level, pressure, pH, viscosity, color, salinity, and others.



A typical control system

A typical transducer

What we need to
is the transfer function



Position Sensing

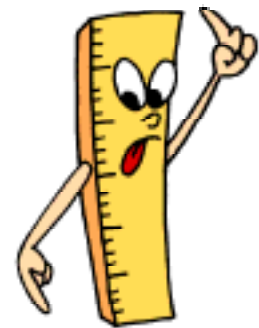
Position sensing example

Potentiometer

One turn no stops or multi-turn with stops

Two types - linear and rotary

What are the
transfer
functions?



Typical Potentiometers

Example:



LVDT - Linear Variable Differential Transformer

Three winding coupled with a movable magnetic core

Magnitude and phase of the output is controlled by the position of the core

Transfer function -

Encoders - Incremental and Absolute

Most are optical using laser, incandescent lamps, or leds

Incremental have no home position and measure only change in values

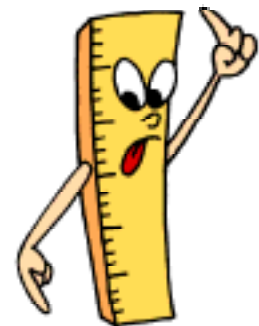
Incremental require more internal electronics

Absolute measure exact position.

Absolute are large and expensive for fine position control

Absolute do not require any conversion for digital output

How can you tell the direction that the encoders turning?



Examples of Encoders

How about the
transfer function?

