

SENSORS





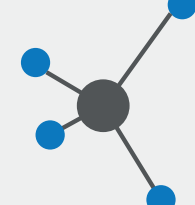
What is a sensor?

A sensor is device that collects information about the world around it. Sensors operate on the principle of transduction: the conversion of energy from one form to another.

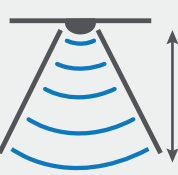


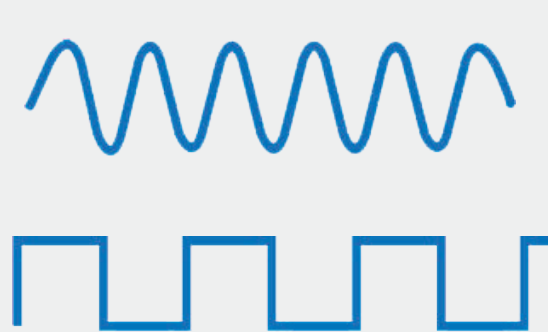




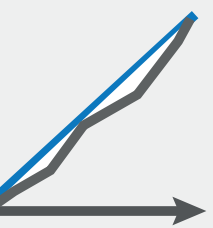
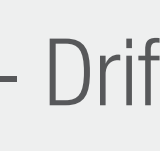
Classification of sensors

- **Level 1:** Proprioceptive / Exteroceptive
- **Level 2:** Contact / Non-contact
- **Level 3:** Active / Passive
- **Level 4:** Type of detection (contact, sound, electromagnetic spectrum or chemical concentration)

What can they detect?

- Presence 
- Temperature 
- Location or dimensions 
- Color 
- Chemical composition 

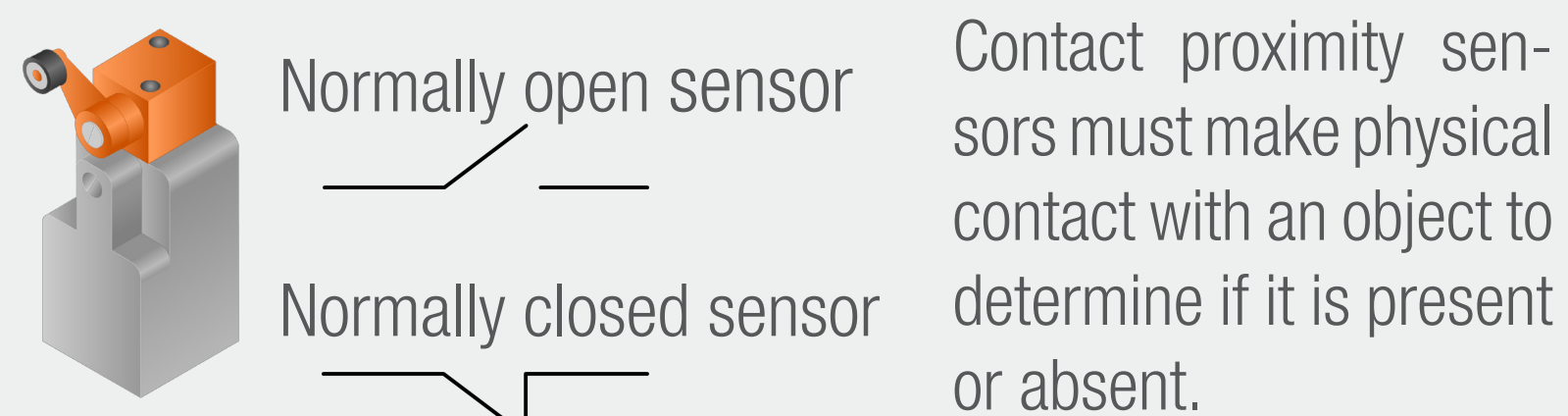
Characteristics of sensors

- Measuring range 
- Repeatability 
- Response time 
- Types of signal output: Analog or digital 
- Resolution 
- Precision and accuracy 
- Offset or Zero deviation 
- Sensitivity 
- Linearity 
- Drift 

Types of sensors

Proximity sensors

Contact proximity sensors



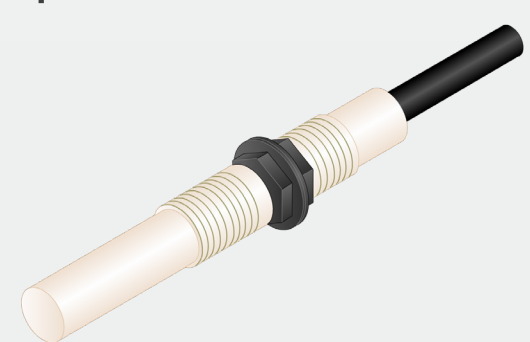
Non-contact proximity sensors

They are able to detect the presence of nearby object without any contact.

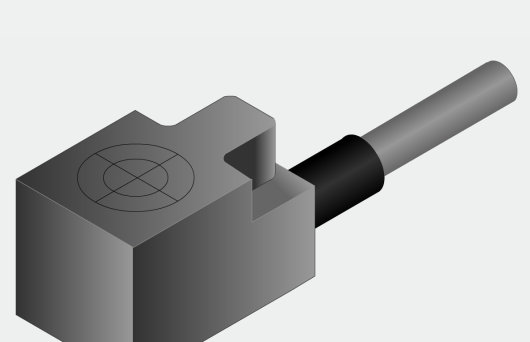
Magnetic sensors



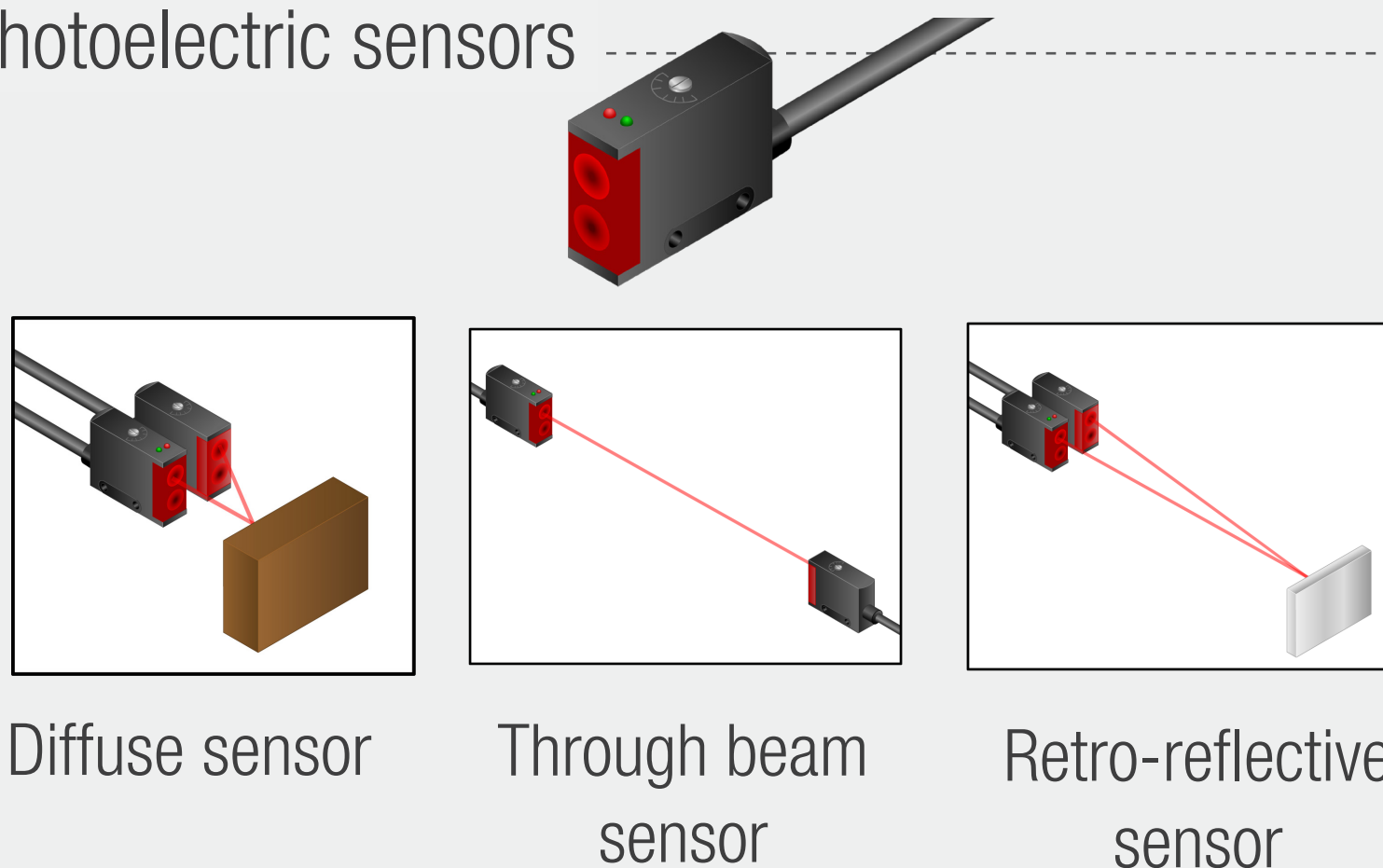
Capacitive sensors



Inductive sensors



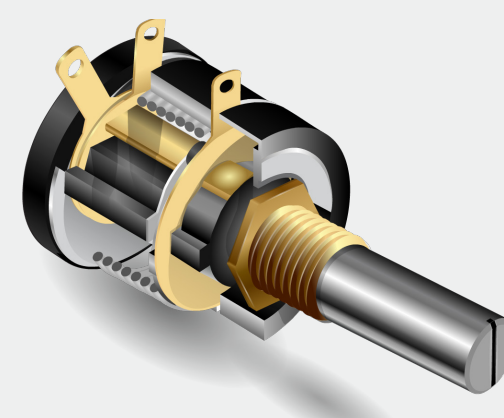
Photoelectric sensors



Position, speed and acceleration sensors

Position

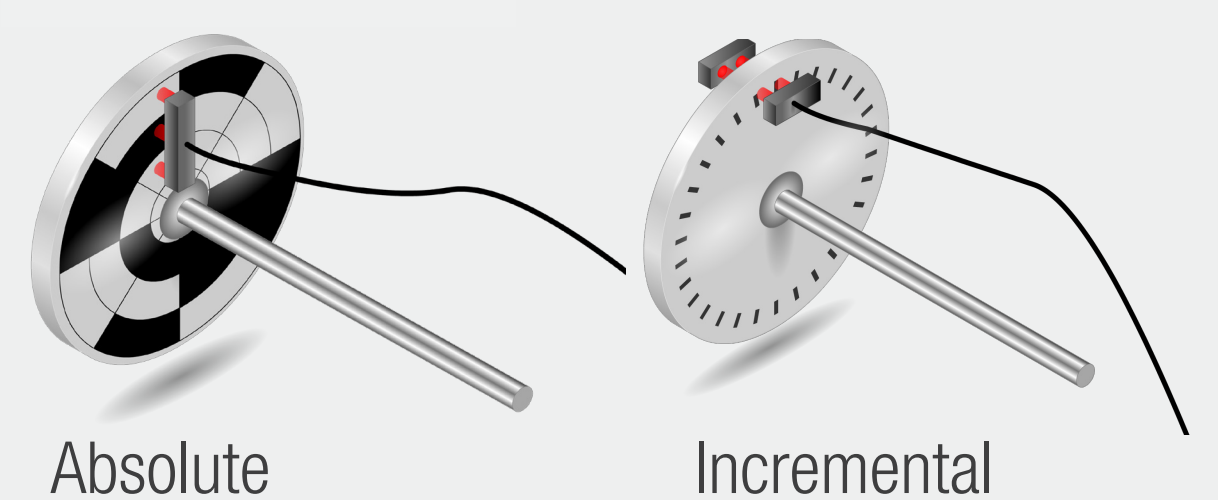
Potentiometer



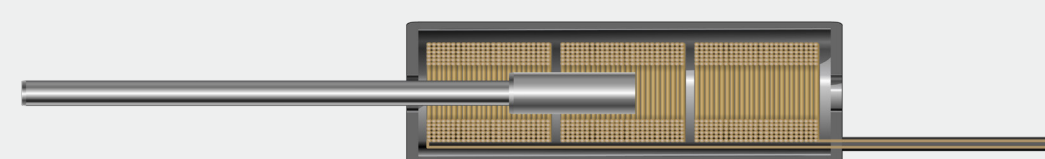
Linear encoder



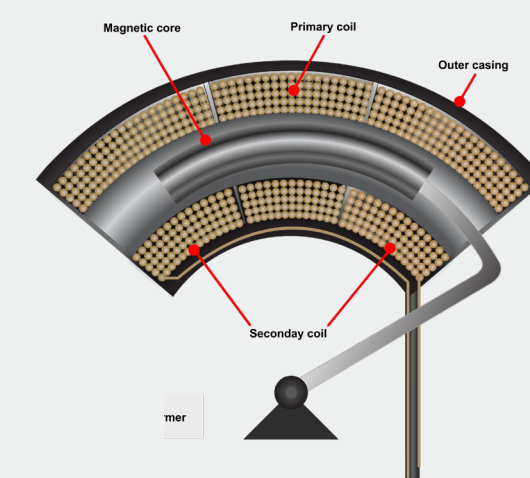
Rotary encoder



Linear variable differential transformer (LVDT)



Rotary variable differential transformer (RVDT)



Speed

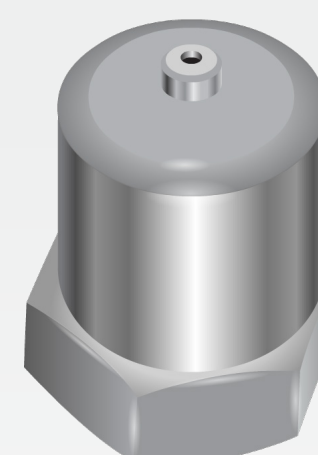
There are many sensors to measure the speed: Linear and rotary encoders, LVDT, RVDT, etc.

Acceleration

Acceleration sensors are used to measure forces on an object that are a result of:

- Fall
- Tap
- Tilt
- Shock
- Vibration

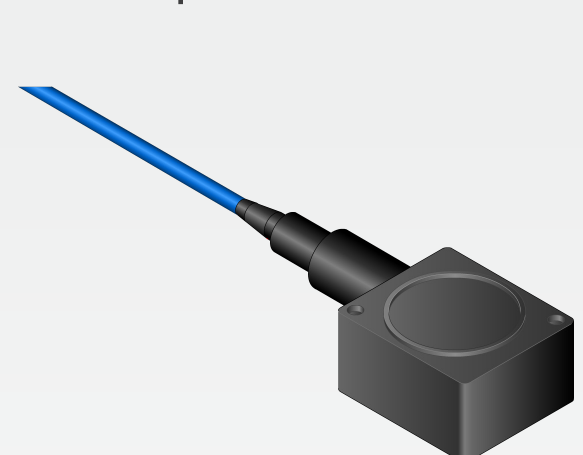
Piezoelectric



Hall effect



Capacitive



Process control sensors

