MEDICIÓN DE POSICIÓN

SENSORES DE PROXIMIDAD

PRINCIPIOS DE FUNCIONAMIENTO:
- INDUCTIVOS
- ÓPTICOS
- CAPACITIVOS
- MAGNÉTICOS
- ULTRASÓNICOS

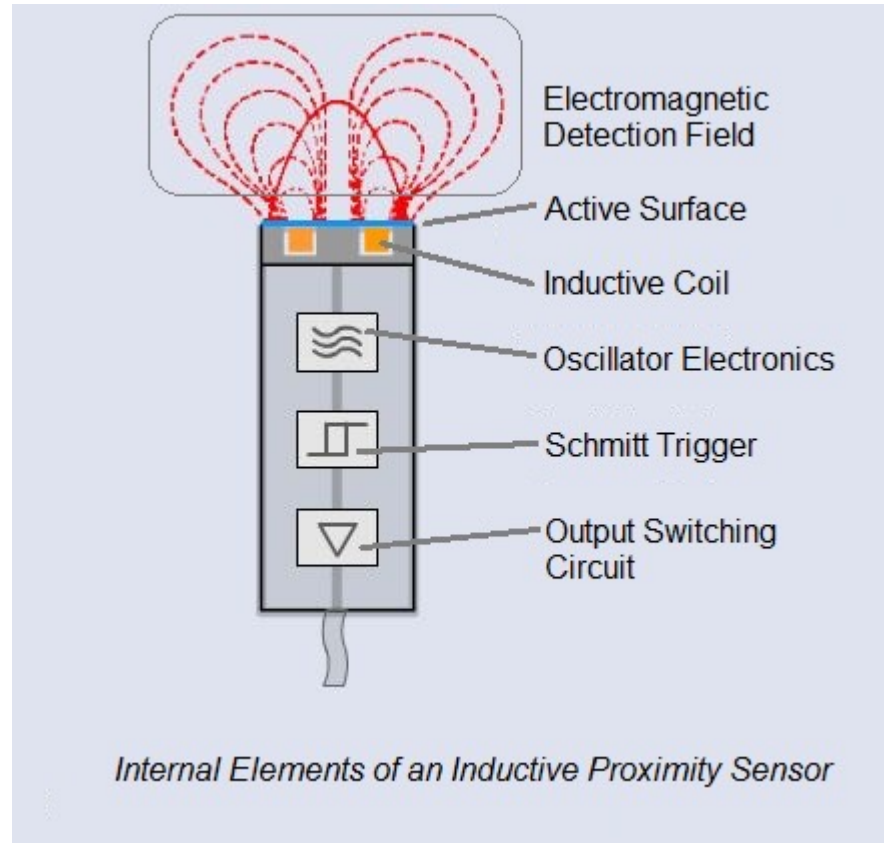SALIDA:
- ANALÓGICA: 0 – 10 V, 4 – 20 mA
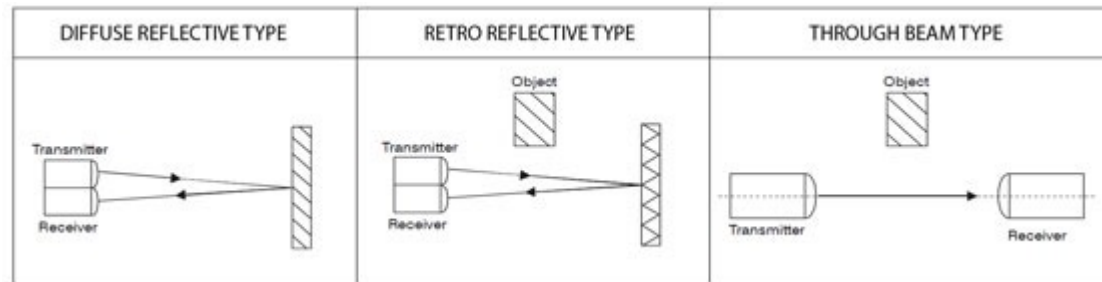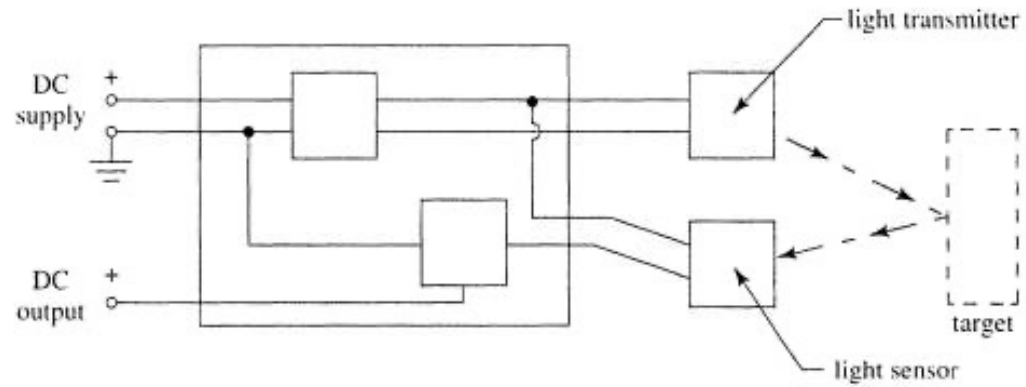- DISCRETA: ON-OFF

MOVIMIENTO:
- LINEAL
- ROTATIVO

SENSOR INDUCTIVO

Electromagnetic Detection Field

Active Surface

Inductive Coil

Oscillator Electronics

Schmitt Trigger

Output Switching Circuit

Internal Elements of an Inductive Proximity Sensor

Material	Reduction factor
Steel	1
Aluminum foils	1
Stainless steel (303)	0.85
Stainless steel (304)	0.75
Aluminum	0.4
Brass	0.4
Copper	0.3

SENSOR ÓPTICO

SENSOR CAPACITIVO

Target

Plate

Target Absent

Target Approaching Sensor

Amplitude of Oscillations

ON

Output Stage
Shown as Normally Open

OFF

SENSOR MAGNÉTICO

Magnetic flux of Magnet

Output Voltage

ΔB

Induced Magnetic flux of Coil

Induced Current

N

S

Approaching

S

Induced Current

ΔB

Moving Away

N

N

S

SENSOR ULTRASÓNICO

Tx

Sound Wave

Rx

Ultrasonic Sensor

Object
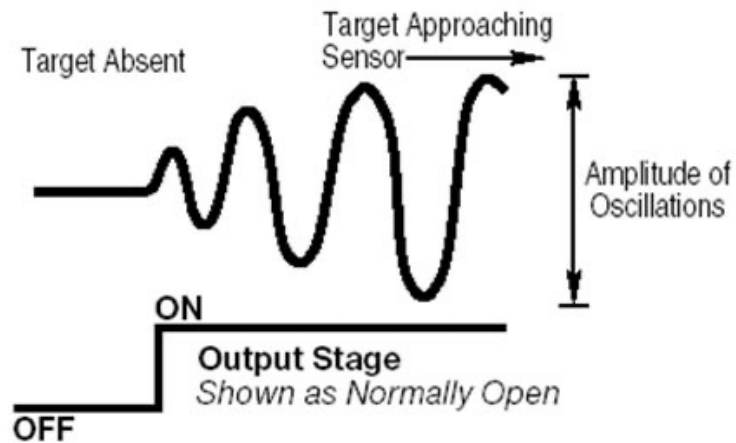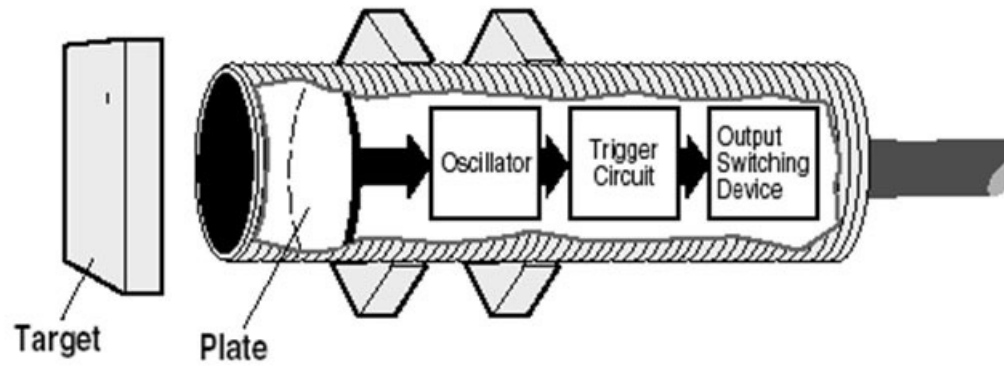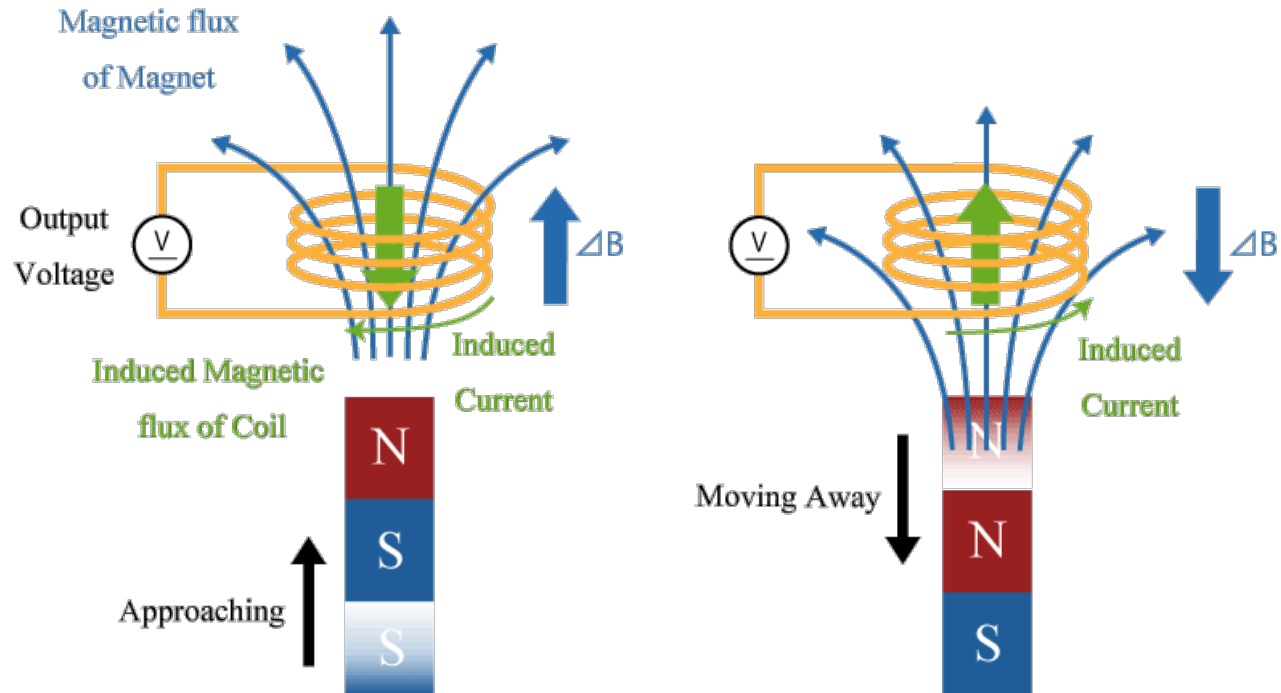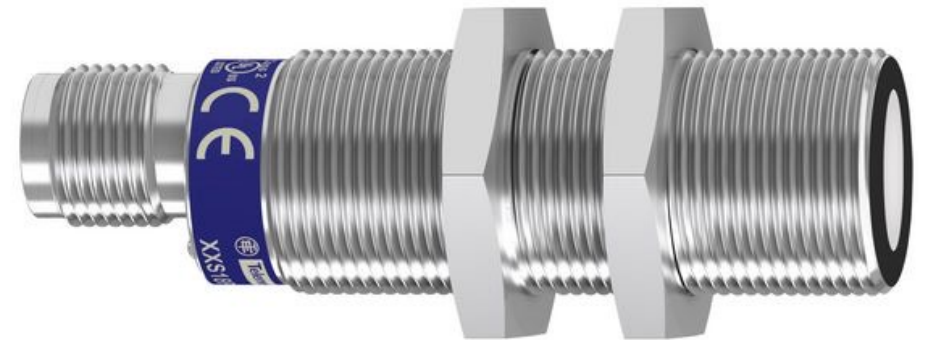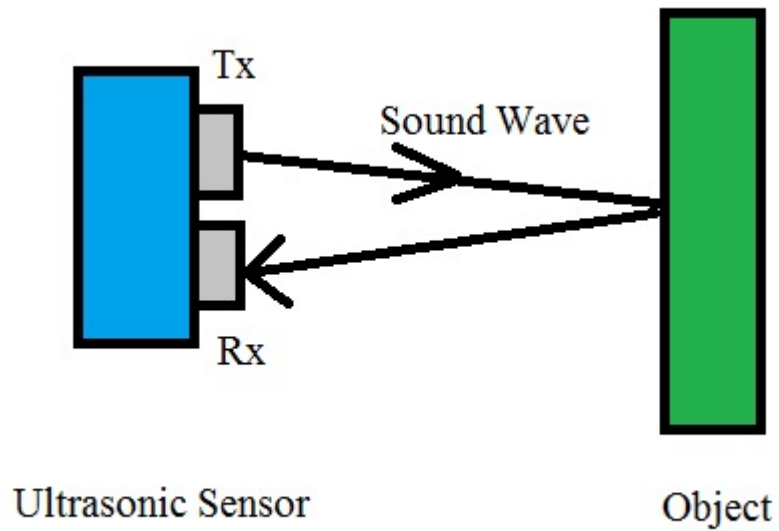
CURVAS CARACTERÍSTICAS
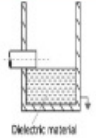
Dependencia de:

- Condiciones ambientales

- Material detectado

- Área del material detectado

- Distancia

- Desviación

- Tamaño del sensor
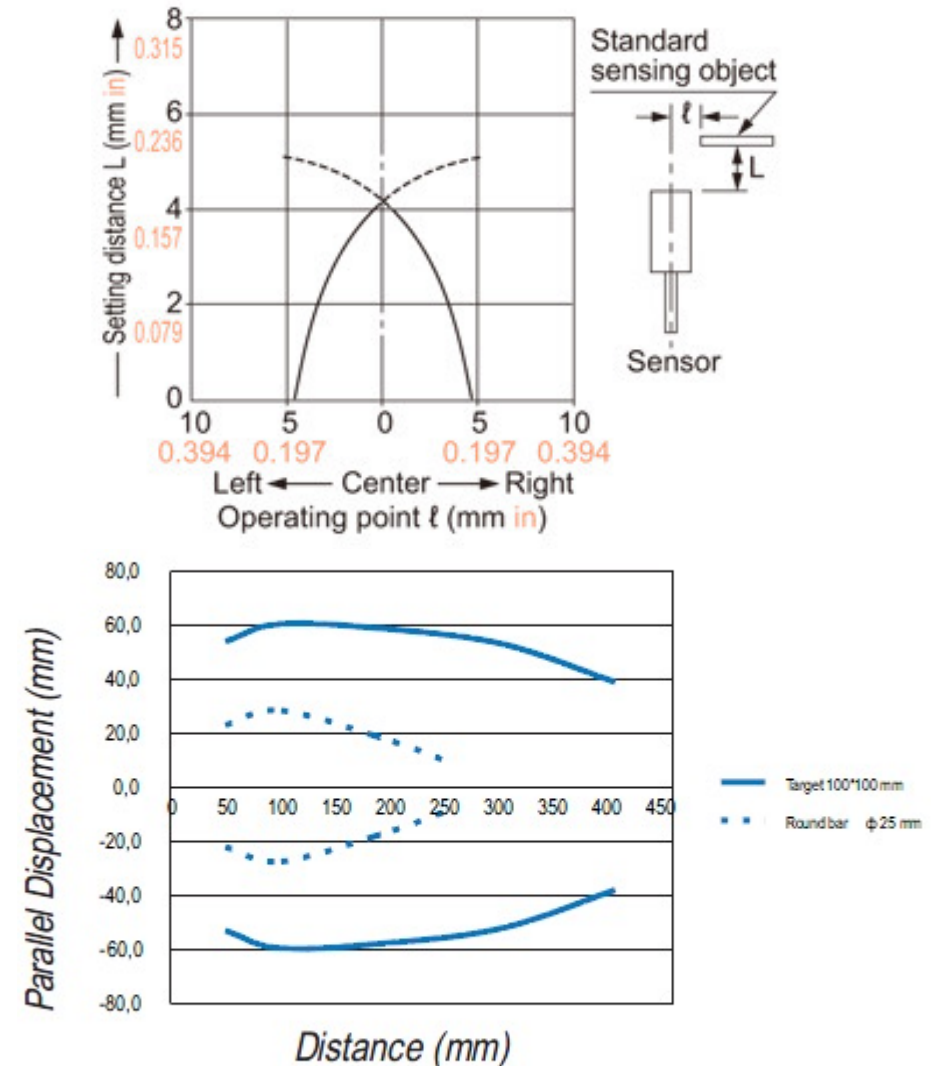
COMPARACIÓN/SELECCIÓN

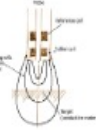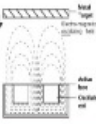| Types	Inductive sensor	Optical sensor	Magnetic sensor	Capacitive sensor	Ultrasonic sensor
Principle	It uses current induced by magnetic fields to detect nearby metal objects	An optical sensor converts light rays into an electrical signal	Based on a mechanical principle detected the magnetic field	Base on an electronic principle where an electrical field is produced on the active side	Based on an ultrasonic source and receiver in the same device
Material detected	Metallic only	All material	Magnet	All material	All material
Operating distance	Low:<50mm	Medium: <100mm	Medium: <80mm	Low:<50mm	Large:15m
Robustness to vibration	High	High	Hall-effect: High Reed-techno : Low	High	Low
Cost	Low	Medium	Low	Medium	High
Sensitivity	Any	Dust, oil, aspect of object	Hall effect-sensitive EMC Reed techno-magnetic field disturbances	Humidity& vapors	Air flow& temperature variation
Applications	1.Machine- tolls, assembly line, automative industry 2.Detection of metal parts in harsh environments 3.High speed moving parts	1.Object detection on conveyor 2.Carton counting 3.Product sorting 4.Contrast detection	1. Object detection	1. Final inspection on packaging lines 2.Measurements of the filling level of the liquids or granuals through the walls of plastic or glass tanks	1.Passage of objects on conveyor: glass bottles, cardboard Packaging 2.Filling level of liquids in a bottle or of granulatesin a plastic injection machine 3. Depth of cavity

Type	Description	Range	Target	Speed	Applications	Image
Capacitive	Constructed with two parallel plates as an open capacitor; targets induce changes in capacitance.	3-60 mm	Non-ferrous materials	Relatively slow	Close-range, non-ferrous sensing; tank liquid level detection, sight glass monitoring.	
Eddy Current	Similar to inductive sensors; could be considered high-end inductive types.	Relatively short	Ferrous materials	Average	Precision, high-resolution sensing in contaminated environments.	
Hall Effect / Magnetic	Measures the presence or absence of object based on an external magnetic field.	4-40 mm	Ferromagnetic	High	Measurement of fast rotational velocity.	
Inductive	Involve a wound iron core; coil inductance changes with presence of object within sensing range.	4-40 mm	Ferrous materials	Average	Close-range detection of ferrous materials; hazardous environments.	
Photoelectric	Use laser emitters and reflectors or receivers; targets cut off or reflect emissions.	1-60 mm	Many types	Average	Long-range detection of small or large objects; automatic faucets, color-dependent sensing.	
Ultrasonic	Similar to photoelectric types, but use sound waves instead of visible emissions.	Up to ~400 mm	Many types	Relatively high	Long-range detection of multi-colored objects with varying surface properties; machine automation, continuous level control.	