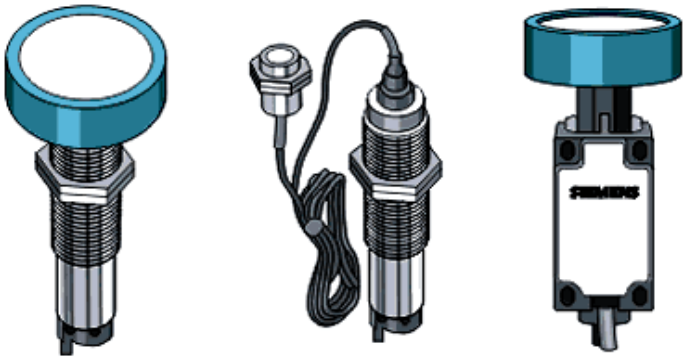
Sensores Ultrasónicos

Sensores de proximidad ultrasónicos



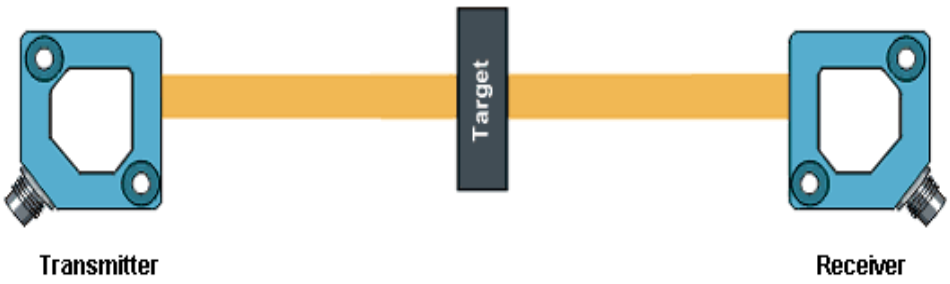
Los sensores de proximidad ultrasónicos usan un transductor para enviar y recibir señales de sonido de alta frecuencia.

Cuando un objetivo entra al haz, el sonido es reflejado de regreso al sensor, haciendo que se habilñite o deshabilite el circuito de salida

Sensores Ultrasónicos

Thru-Beam Mode

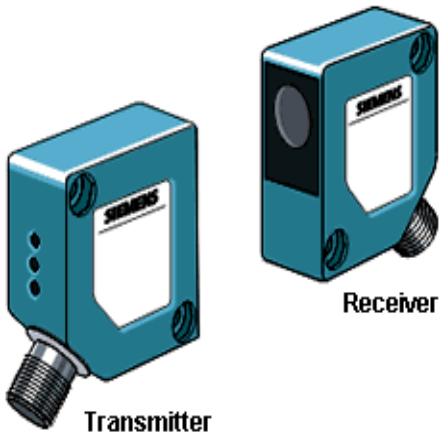
Thru-beam sensors have a transmitter, which emits ultrasonic pulses, and a receiver. If the beam between the transmitter and the receiver is interrupted the output of the receiver switches state.



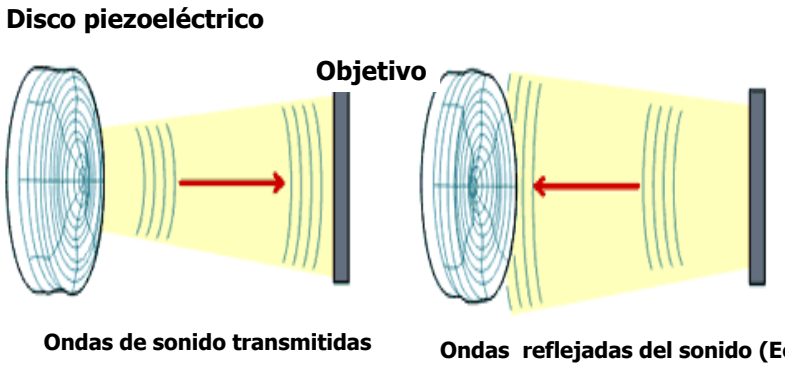
Sensores Ultrasónicos

Thru-Beam

Thru-Beam sensors consist of a transmitter and a receiver. The transmitter sends a narrow continuous tone When a target is positioned between the transmitter and the receiver, the tone is interrupted, causing the output of the receiver to change state.

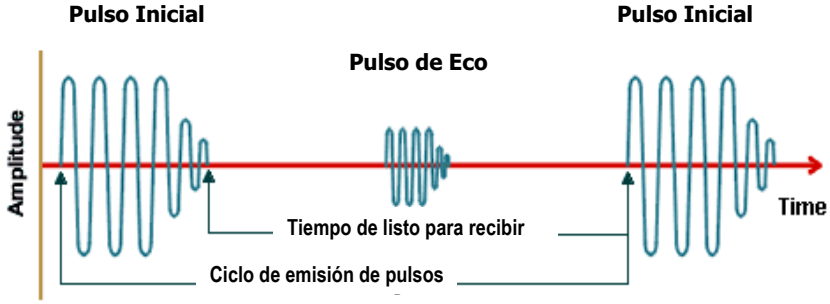


Principio de operación de los sensores ultrasónicos



El sensor tiene un disco piezoeléctrico montado en su superficie, el cual produce ondas de sonido de alta frecuencia.
Cuando los pulsos transmitidos pegan con un objeto reflector de sonido, se produce un eco.
La duración del pulso reflejado es evaluado en el transductor.
Cuando el objetivo entra dentro del rango de operación preestablecido, la salida del interruptor cambia de estado.
Cuando el objetivo se sale del rango preestablecido, la salida regresa a su estado original.

Pulso emitido

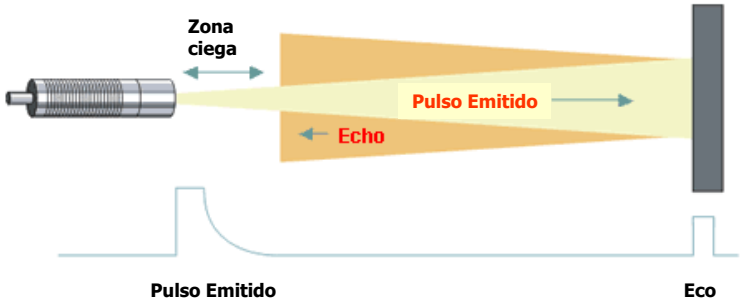


El pulso emitido es un "burst" corto de energía ultrasónica de gran amplitud.

El pulso de eco es típicamente de amplitud más baja.

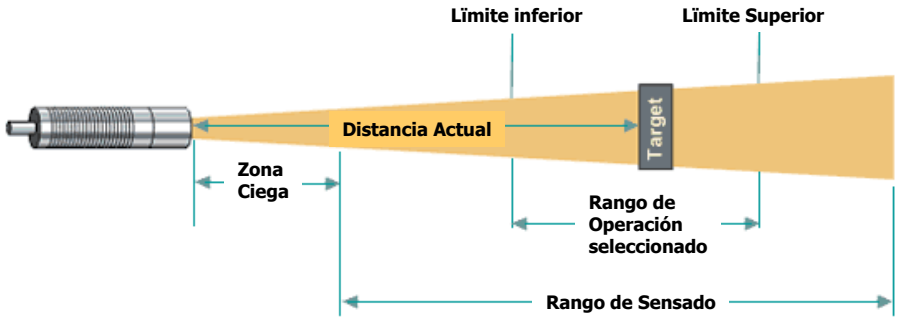
El intervalo de tiempo entre la señal transmitida y su eco es directamente proporcional a la distancia entre el objeto y el sensor.

Zona ciega



- Directamente enfrente del sensor hay una zona ciega.
- Dependiendodel sensor la zona ciega es de 6 a 80 cm del frente del sensor.
- Un objeto colocado en la zona ciega produce una salida inestable.

Definición del rango



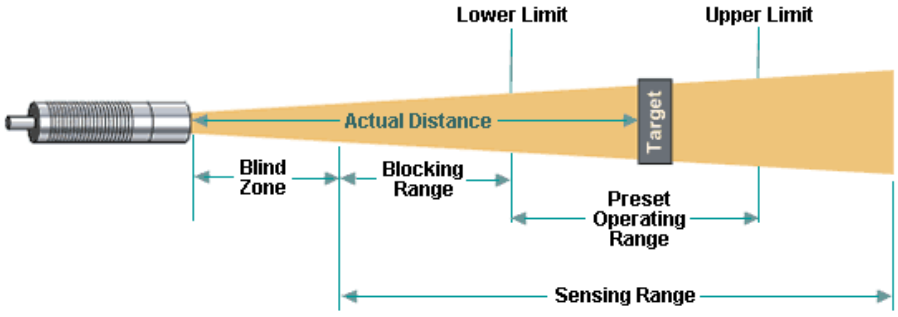
El rango de operación puede ajustarse en términos de su ancho y posición dentro del rango de sensado.

El límite superior puede ser ajustado en todos los sensores . El límite inferior solo se puede ajustar en ciertos tipos.

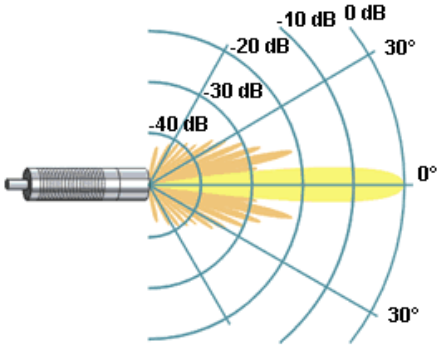
Los objetos colocados más allá del límite superior no producen ningún cambio en la salida del sensor.

Blocking Range

A blocking range also exists on some sensors. This is between the lower limit and the blind zone. An object in the blocking range prevents identification of a target in the operating range.



Patrón de Radiación

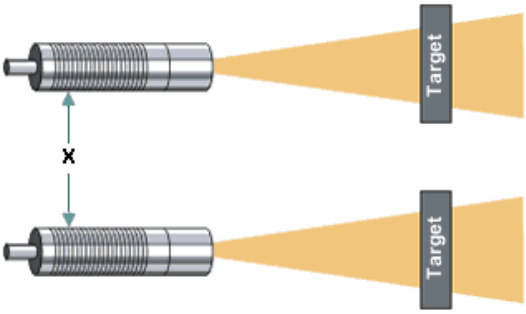


El patrón de radiación de un sensor ultrasónico consiste de un cono principal y varios cono vecinos.

El ángulo aproximado del cono principal es de aproximadamente 5 grados

Parallel Sensors

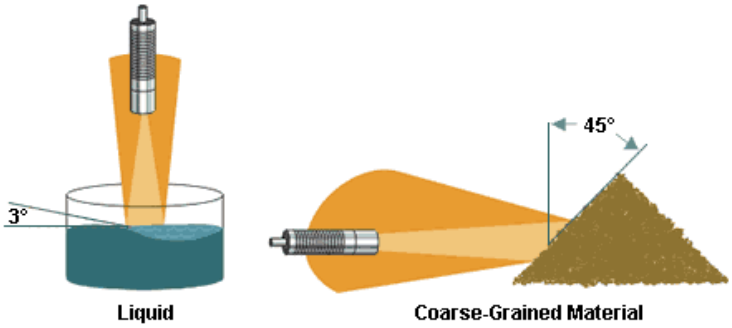
Free zones must be maintained around sensors to allow for neighboring cones. For example, two sensors with the same sensing range are mounted parallel to each other. The targets are perpendicular to the sound cones. The distance between the sensors is determined by the sensing range. For example, if the sensing range is 6 cm, the sensors must be located at least 15 cm apart.



Sensing Range (CM)	X (cm)
6-30	>15
20-130	>60
40-300	>150
60-600	>250
80-1000	>350

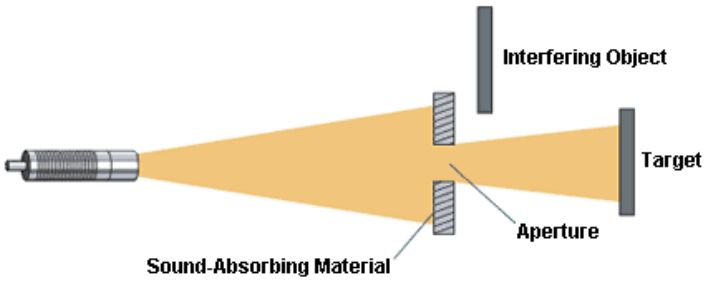
Sensing Liquids & Coarse-Grained Materials

Liquids, such as water, are also limited to an angular alignment of 3 degrees. Coarse-grained materials, such as sand, however, can have an angular deviation of as much as 45 degrees. This is because the sound is reflected over a larger angle.



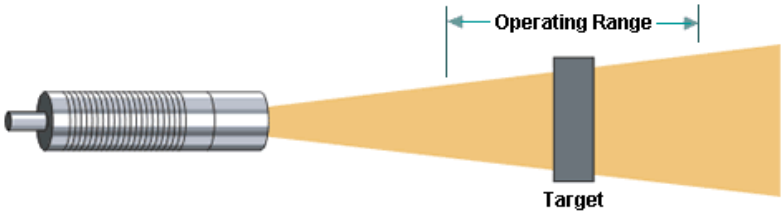
Blanking out Objects

An object may be located in the vicinity of the sound cone that causes improper operating of the sensor. These objects can be blanked out by using an aperture made of a sound absorbing material such as rock wool. This narrows the sound cone and prevents pulses from reaching the interfering object.



Diffuse Mode

Sonar sensors can be set up to operate in diffuse, reflex, and thru-beam modes. Diffuse mode is the standard mode of operation. In this mode, objects traveling in any direction into the operating range of the sound cone will cause the sensor to switch output states.

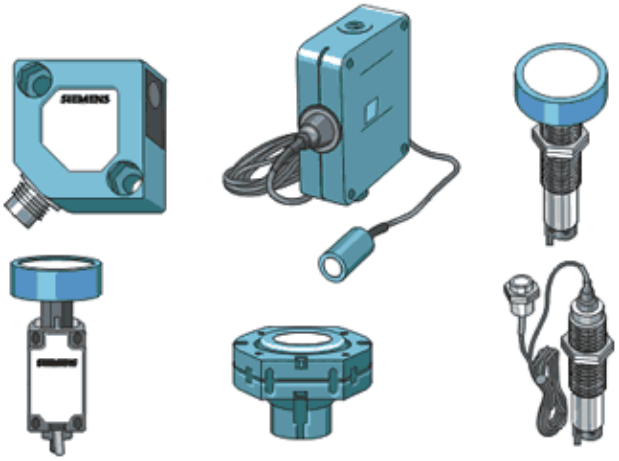


Influencia del Medio Ambiente

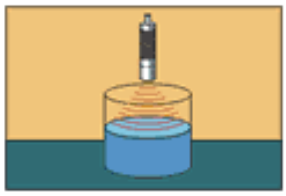
Condition	Effect
Temperature	Sound wave speed decreases with increase in air temperature.
Pressure	Sound wave speed decreases with increase in atmospheric pressure. Sound speed decreses 3.6% between sea level and 3 km above sea level.
Vacuum	Ultrasonic sensors will not operate in a vacuum.
Humidity	Sound wave speed increases as humidity increases. This can cause targets to appear closer when using ultrasonic sensors.
Air Currents	Wind speed greater than 50 k/hr can affect operation.
Gas	Measuring errors occur when used in gases other than atmosphere.
Precipitation	Ultrasonic sensors are not affected by normal rain or snow, but the transducer surface should be kept dry.
Paint Mist	Paint mist should not be allowed to settle on the transducer surface.
Dust	Dusty environments can lower sensor range 25-33%.

Ultrasonic Proximity Sensor Family

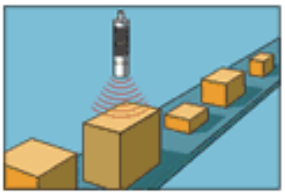
The ultrasonic proximity sensor family consists of a thru-beam sensor, compact range sensors, and modular sensors.



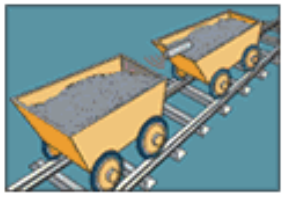
EJEMPLOS DE APLICACIÓN



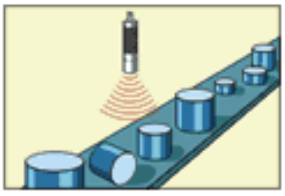
Level Measurement in Large Vessels



Height Sensing

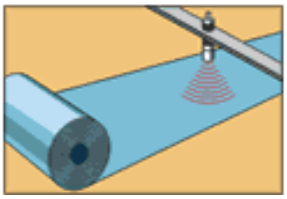


Anti-Collision



Quality Control

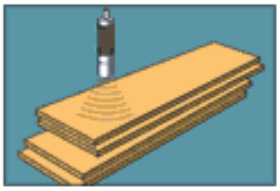
Level Measurement in Small Bottles



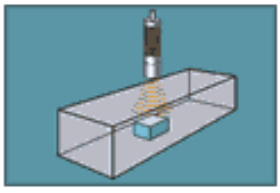
Breakage Sensing

EJEMPLOS DE APLICACIÓN

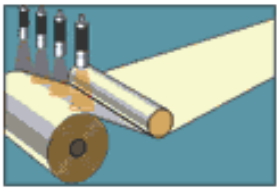
Bottle Counting



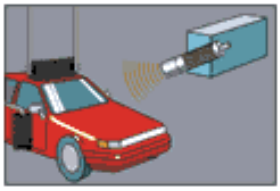
Stack Height Sensing



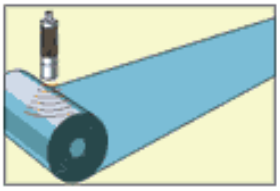
Object Sensing



Contour Recognition



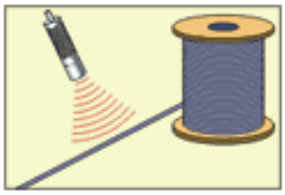
Vehicle Sensing and Positioning



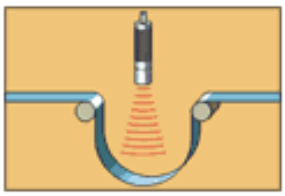
Diameter Sensing and Strip Speed Control

EJEMPLOS DE APLICACIÓN

People Sensing



Wire and Rope Breakage Monitoring



Loop Control