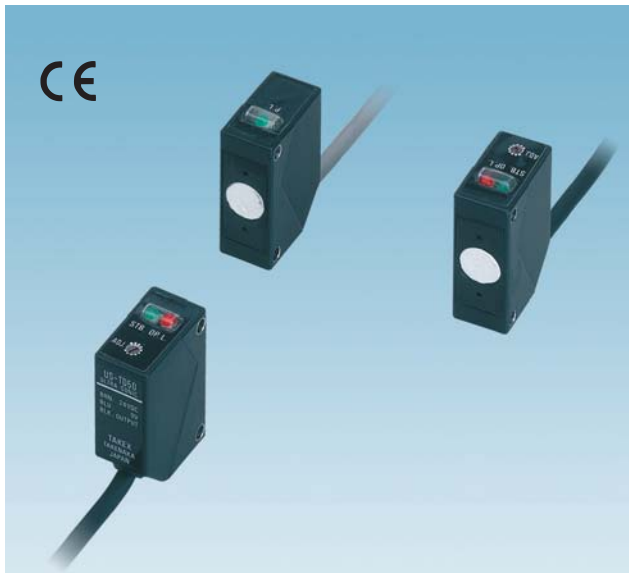




# US-T50/R25

Ultrasonic Sensors



- Microminiature ultrasonic element translates to compact sensor size
- Through-beam model is ideal for detecting transparent packaging or container
- Reflective model is suitable for detecting either a black sheet or a transparent container

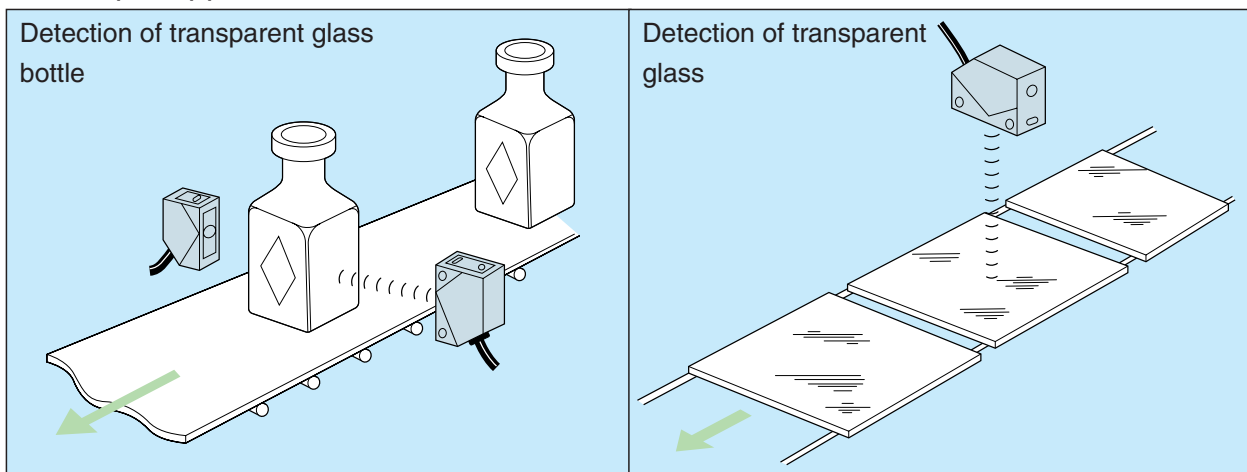
## Type

Detection method	Detecting distance	Model	Operation mode	Output mode
Through-beam type	 500mm	<b>US-T50</b> ※	Wave-OFF	NPN open collector output *1
Reflective type	 60-250mm	<b>US-R25</b>	Wave-ON	

\*The model No. for the through-beam type is a set model No. For prices of the transmitter and receiver for separate purchase, see the Price List at the end of this book.

\*1 For ordering a PNP output mode type, add PN at the end of the model No.

## Sample Applications



# US-T50/R25

## Rating/Performance/Specification

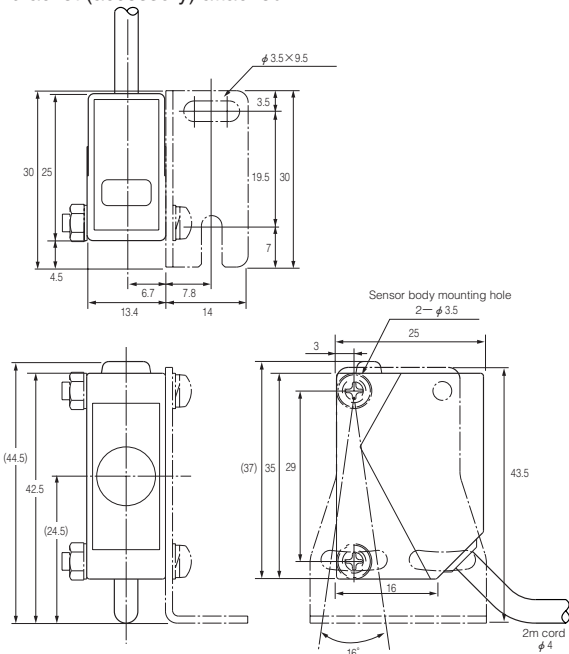
	Model	Set model US-T50		US-R25
		Transmitter model US-TE50	Receiver model US-TD50	
Rating/performance	Detection method	Through-beam type		Reflective type
	Detecting distance	500mm max.		60-250mm
	Detection object	10 x 30mm		30 x 30mm*
	Power supply	24V DC $\pm 10\%$ / Ripple % max.		
	Current consumption	TE50:25mA max. TD50:15mA max.		25mA max.
	Response time	10ms max.		ON: 30 ms max. / OFF: 50 ms max
	Output mode	NPN open collector output Rating: sink current 100 mA (30 VDC) max.		
	Operation mode	Wave-OFF		Wave-ON
	Operating angle	20°		-
	Hysteresis	-		10% max.
Specification	Ultrasonic frequency	360kHz $\pm 15$ kHz		
	Indicator	Operation indicator (red LED) / Stability indicator (green LED)		
	Volume	Sensitivity adjustment		Distance adjustment
	Connection	Permanently attached cord ( $\phi 4$ ) Transmitter: 0.2 mm <sup>2</sup> x 2 cores, 2 m Receiver: 0.2 mm <sup>2</sup> x 3 cores, 2 m		Permanently attached cord ( $\phi 4$ ) : 0.2 mm <sup>2</sup> x 3 cores, 2 m
	Mass	80 g max. (transmitter/receiver)		80 g max.
		(*) *Sample object: 1-mm thick aluminum plate		

## Environmental Specification

Environment	Specification
Ambient temperature	-10 - +55 °C (non-freezing)
Ambient humidity	35-85%RH (non-condensing)
Ambient wind speed	1m/s max.
Protective structure	IP54 (no drops of water allowed on head)
Vibration	10-55 Hz / 1.5 mm amplitude / 2 hours each in 3 directions
Shock	500 m/s <sup>2</sup> / 3 times each in 3 directions (ultrasonic element excluded)

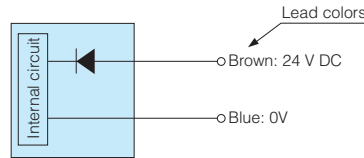
## Dimensions (in mm)

For all models (transmitter/receiver)  
(Dotted lines show the dimensions with the mounting bracket (accessory) attached)

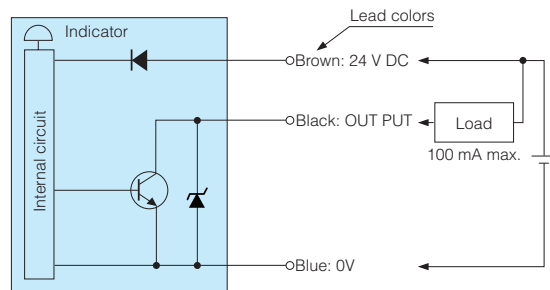


## Input/Output Circuit and Connection

### Model US-TE50



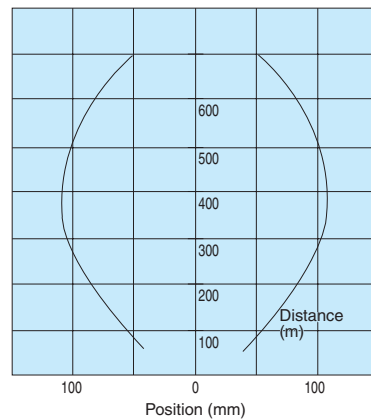
### Model US-TD50 Model US-R25



## Characteristics (Typical Example)

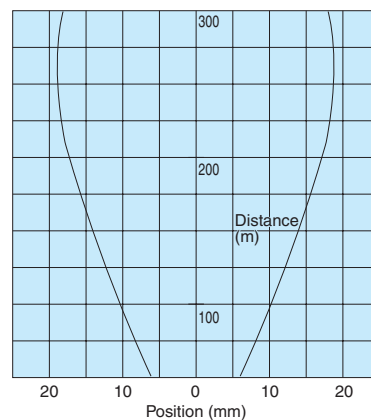
### • Directional characteristics

#### US-T50



### • Activation area characteristics

#### US-R25



# Ultrasonic Sensors

## For Correct Use

### Notes on use of ultrasonic sensors

#### • Installation location and external disturbance

- Although a circuit is employed that uses ultrasonic waves with high oscillation frequency for distinction from external sounds, do not install the sensor in a place subject to frequent sound of glass cutting, sound generated from air nozzles, high-frequency clanks, etc.
- Ultrasonic sensors use air as the transmission medium and places subject to localized temperature change or significant change in convection (air from air conditioner or heat generator) must be avoided.
- While the sensor is waterproofed, note that water on the ultrasonic element (white part on the front of the sensor) may reduce the sensitivity. Also absorption of water may cause deterioration.

#### • Interference

- Adjacent installation or installation of more than one sensor in a small space may cause interference.
- Prevent faulty operation due to irregular reflection caused by spread of ultrasonic waves especially by side lobe.

### Installation adjustment and objects

#### • Through-beam type

- Through-beam type offers high sensitivity and reflection on walls or floor may make it difficult to block the signals sufficiently. Apply noise absorbing materials or reduce the sensitivity with the adjustment.

#### • Reflective type

- Certain limitations apply to objects detectable with reflective type. With objects that may function as noise absorbing materials, soft cloths, sponges, etc., operating distance may be significantly reduced or the sensor may not be activated.  
Transparent or black objects offer the same detecting distances as objects of other colors.  
With objects with polished surfaces like mirrors, the reflected sound waves may not return to the sensor depending on the angle of the passing object.

- Air nozzles may cause variation of the detecting distance. Provide sufficient measures for noise in a place with many nozzles.

#### • Reflective type analog output

- Certain limitations apply to detectable objects.  
With objects that may function as noise absorbing materials, soft cloths, sponges, etc., operating distance may be significantly reduced or the sensor may not be activated. Use hard objects such as iron plate to check the operation at the same distance.  
Transparent or black objects offer the same detecting distances as objects of other colors. Objects with polished surfaces like mirrors, the reflected sound waves may not return to the sensor depending on the angle of the passing object.
- Detection at the center of ultrasonic wave axis offers normal distance output. For detection of passing objects, set the sensor so that the detection occurs as close to the central axis as possible. The central axes of the sensor and the ultrasonic wave may be apart by a few degrees.
- **Dead zone**  
Ultrasonic sensors measure the distance from the object by measuring the time before the reflected ultrasonic waves are received. Reverberation is present in the vicinity of the ultrasonic element and the reception operation is stopped for a certain period for avoiding its effect. In a very short range, reflection and reception of waves may occur more than once between the object and sensor, which generates higher output than for the actual detecting distance and prevents the generation of normal output in proportion to the detecting distance. To avoid such situations, do not use the sensor in the short distance, which is specified as a dead zone.
- **Running time**  
After power-up, it takes about 30 minutes before the analog output stabilizes. For measurement or operation requiring accuracy, supply power well in advance.
- **Sensor mounting**  
Ultrasonic waves spread over a large angle and the angle of the object may significantly affect detection. Be sure to mount the sensor in such a way that it faces the surface to be detected at right angles except for objects that reflect waves diffusely such as fine particles.

## Major Applications of Ultrasonic Sensors

Classification	Application
Detection of passage or presence, counting	<ul style="list-style-type: none"> <li>• Detection of passage of bottles or corrugated cardboard</li> <li>• Detection of sheets</li> <li>• Detection of papers</li> <li>• Presence of wood materials or processed goods</li> <li>• Presence of glass plates</li> </ul>
Level detection	<ul style="list-style-type: none"> <li>• Detection of level of fine particles in hopper</li> <li>• Detection of level of grain, feedstuff, etc.</li> <li>• Detection of height of piles</li> <li>• Detection of chemicals, etc. in hopper</li> <li>• Detection of water level</li> </ul>
Sorting	<ul style="list-style-type: none"> <li>• Sorting by height of packages</li> <li>• Detection of height of vehicles</li> </ul>
Constant rate feeding/positioning	<ul style="list-style-type: none"> <li>• Detection of stopping position of unmanned carriages</li> <li>• Detection of sag or winding length of rolled materials</li> </ul>
Safety/alert	<ul style="list-style-type: none"> <li>• Prevention of collision of cranes</li> <li>• Detection of height of vehicles</li> <li>• Detection of height of piles of goods</li> <li>• Detection of ingress</li> </ul>