

# US-N300

## Thru-beam Type Ultrasonic Sensor



Suitable for detecting transparent films or transparent bottles

### Reliable detection of transparent objects

The sensor reliably detects transparent films or transparent objects.



### Only 16 mm 0.630 in thick

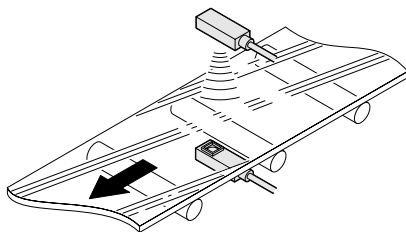
Its 16 mm 0.630 in thick compact body allows mounting in a narrow space.

### Simple operation mode selection

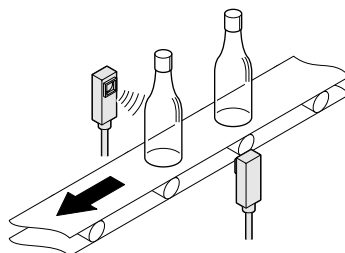
The operation mode can be selected either sound-received-ON or sound-blocked-ON simply by changing the connection of the control input wire.

## APPLICATIONS

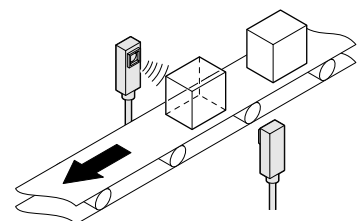
### Detecting transparent film or transparent glass



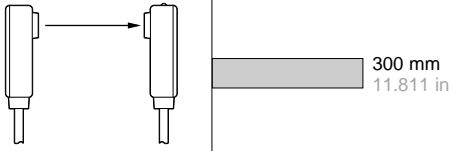
### Detecting transparent bottles



### Detecting transparent and opaque objects

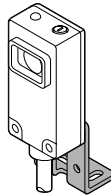


## ORDER GUIDE

Type	Appearance	Sensing range	Model No.	Output
Thru-beam 5 m (16.404 ft) cable length 2 m (6.562 ft) cable length		300 mm 11.811 in	<b>US-N300</b>	NPN transistor universal
			<b>US-N300-C5</b>	

### Accessory

- **MS-N30** (Sensor mounting bracket)



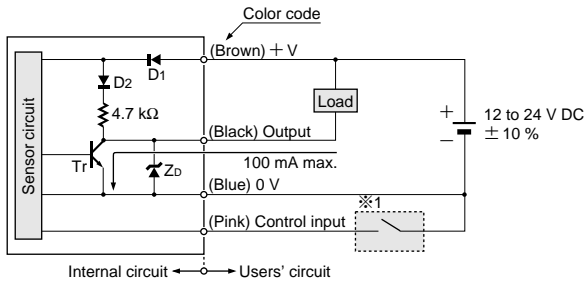
## SPECIFICATIONS

Item	Type	Thru-beam
	Model No.	<b>US-N300</b>
Sensing range		300 mm 11.811 in
Sensing object		Transparent, translucent or opaque object: 20 × 20 mm 0.787 × 0.787 in or more, Hole: 10 × 10 mm 0.394 × 0.394 in or more
Supply voltage		12 to 24 V DC ± 10 % Ripple P-P 10 % or less
Current consumption		Transmitter: 35 mA or less, Receiver: 35 mA or less
Output		NPN transistor universal • Maximum sink current: 100 mA • Residual voltage: 1 V or less (at 100 mA sink current)
	Output operation	Selectable either sound-received-ON or sound-blocked-ON by the control input
	Short-circuit protection	Incorporated
Response time		5 ms or less
Operation indicator		Red LED (lights up when the output is ON)
Sensitivity adjuster		Continuously variable adjuster
Transmission frequency		220 kHz approx.
Environmental resistance	Protection	IP62 (IEC)
	Ambient temperature	0 to + 50 °C + 32 to + 122 °F (No dew condensation), Storage: - 25 to + 70 °C - 13 to + 158 °F
	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH
	Noise immunity	Power line: 1,000 Vp, and 1 μs pulse width; Radiation: 2,000 Vp, and 1 μs pulse width (with noise simulator)
	Voltage withstandability	1,500 V AC for one min. between all supply terminals connected together and enclosure
	Insulation resistance	20 MΩ, or more, with 500 V DC megger between all supply terminals connected together and enclosure
	Vibration resistance	10 to 55 Hz frequency, 1.5 mm 0.059 in amplitude in X, Y and Z directions for two hours each
Shock resistance	100 m/s <sup>2</sup> acceleration (10 G approx.) in X, Y and Z directions for three times each	
Material		Enclosure: Polycarbonate
Cable		0.2 mm <sup>2</sup> 4-core (transmitter: 2-core) cabtyre cable, 2 m 6.562 ft long
Cable extension		Extension up to total 100 m 328.084 ft is possible, for both transmitter and receiver, with 0.2 mm <sup>2</sup> , or more, cable.
Weight		Transmitter: 80 g approx., Receiver: 85 g approx.
Accessories		<b>MS-N30</b> (Sensor mounting bracket): 1 set for transmitter and receiver, Adjusting screwdriver: 1 pc.

# US-N300

## I/O CIRCUIT AND WIRING DIAGRAMS

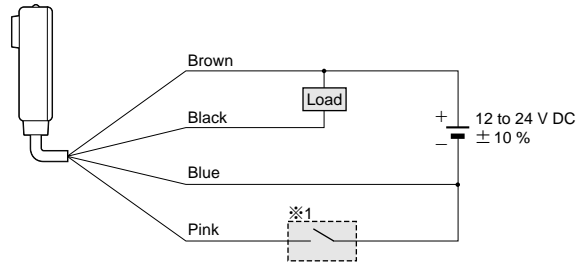
### I/O circuit diagram



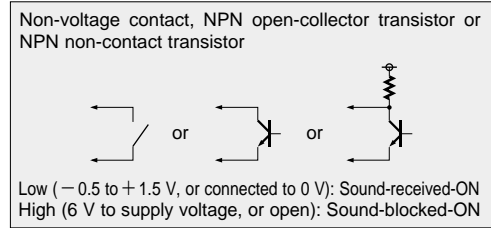
Note: The transmitter has only two power supply wires (+ V and 0 V).

Symbols ... D1: Reverse supply polarity protection diode  
 D2: Reverse current protection diode  
 ZD: Surge absorption zener diode  
 Tr: NPN output transistor

### Wiring diagram

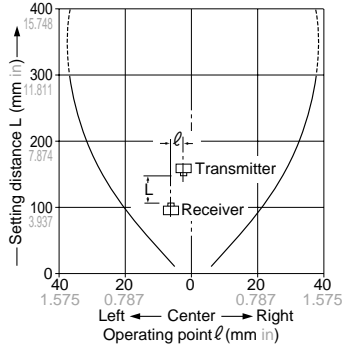


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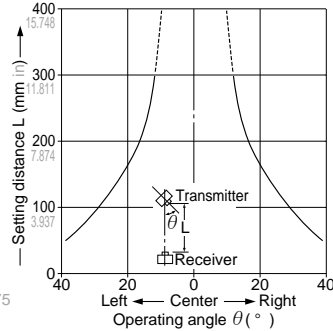


## SENSING CHARACTERISTICS (TYPICAL)

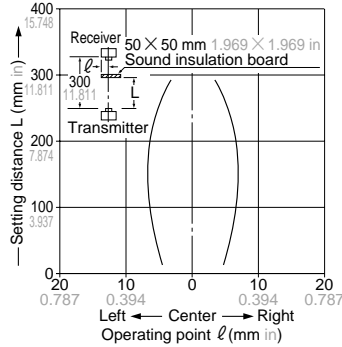
### Parallel deviation




### Angular deviation



### Sensing field

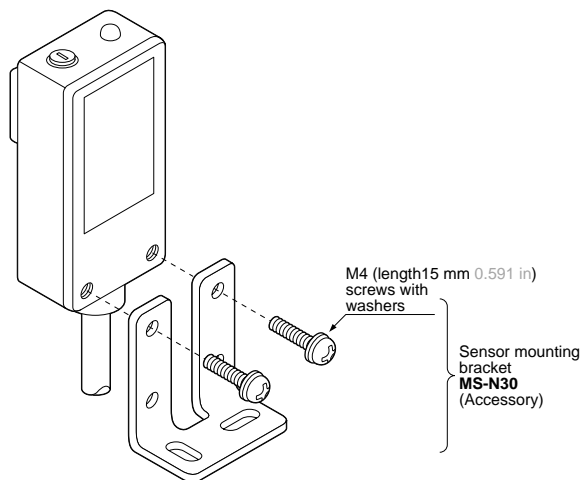


## PRECAUTIONS FOR PROPER USE

 This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal object detection sensor.

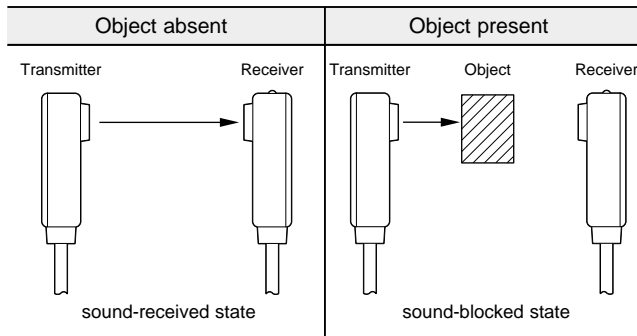
### Mounting

- The tightening torque should be 0.49 N·m or less.

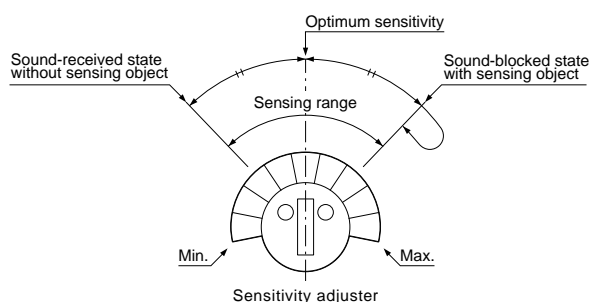


### Sensitivity adjustment

- Normally, use the sensor at the maximum sensitivity. However, if the sensing is not proper due to surrounding objects (reflection from surrounding objects, etc.), adjust the sensitivity as follows.



- Set the adjuster to Min. Then, without any sensing object, turn the adjuster gradually clockwise, while seeing the operation indicator, to determine the point where the sensor enters the 'sound-received state'.
- With a sensing object between the sensor heads, turn the adjuster further clockwise until the sensor enters the 'sound-received state' again. Then, turn the adjuster back a little to determine the point where the sensor just enters the 'sound-blocked state'.
- Set the adjuster at the center of the two points described in ① and ②, which is the optimum sensitivity position.

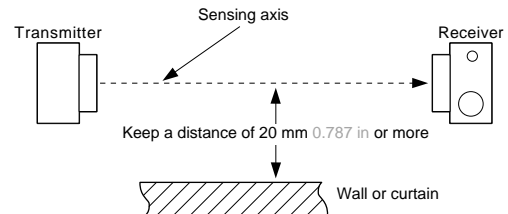


### Influence of surrounding objects

#### Influence of an object parallel to the sensing axis

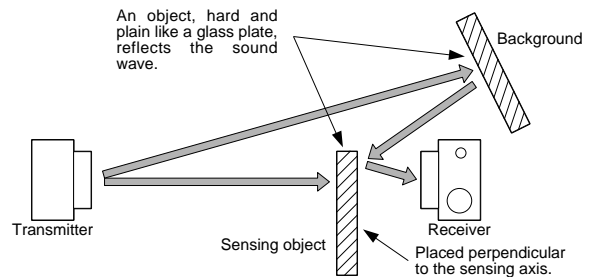
- If there is a wall or a curtain near the sensing axis, the sound reflection may cause the operation to be unstable.

#### <Countermeasure>



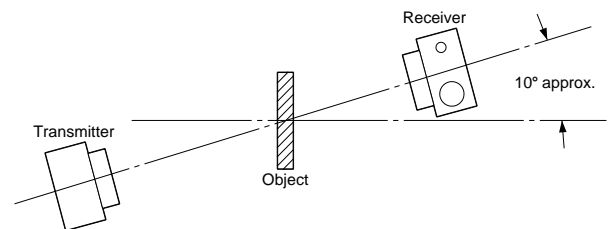
#### Influence of background objects

- If sensor heads are installed as shown in the figure below, the operation may become unstable by the reflected sound wave.



#### <Countermeasure>

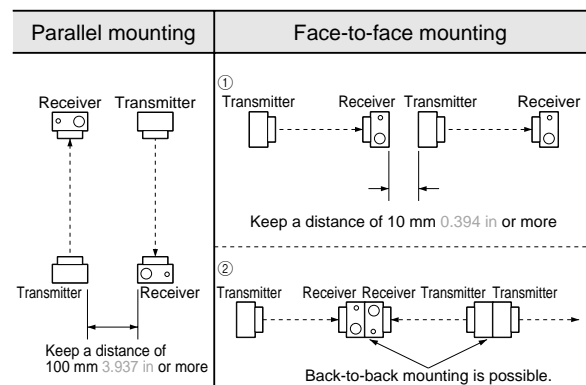
- The receiver should be placed away from the object and at an angle to it as shown below.



### Mutual interference

- When two or more sensors are mounted close together, the sensors may not enter the 'sound-blocked state' due to mutual interference.

#### <Countermeasure>



# US-N300

## PRECAUTIONS FOR PROPER USE

### Traveling speed and minimum sensing object width

- Minimum sensing object width is 20 × 20 mm 0.787 × 0.787 in in the stationary condition.

The minimum sensing width of a traveling object is related to the traveling speed and the sensor response time by the following formula.

$$W = VT + A$$

W: Minimum sensing object width (m)  
 V: Traveling speed of the object (m/sec.)  
 T: Sensor response time = 0.005 (sec.)  
 A: Minimum sensing object width in the stationary condition = 0.02 0.066 (m ft)

Example: If V = 10 m 32.808 ft /sec.  
 $W = 10 \times 0.005 + 0.02 = 0.07 \text{ m } 0.230 \text{ ft}$   
 $W = 70 \text{ mm } 2.756 \text{ in}$

### Wiring

- Make sure that the power supply is off while wiring.
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.

- In case noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of this product, connect the frame ground (F.G.) terminal of the equipment to an actual ground.

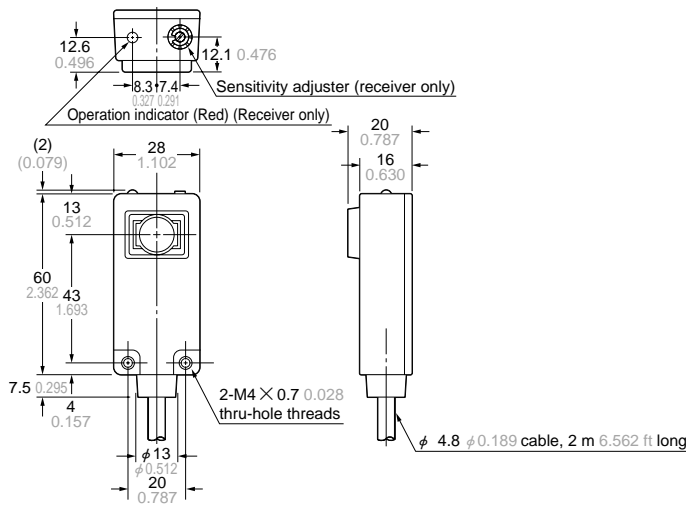
- Do not run the wires together with high-voltage lines or power lines or put them in the same raceway. This can cause malfunction due to induction.

### Others

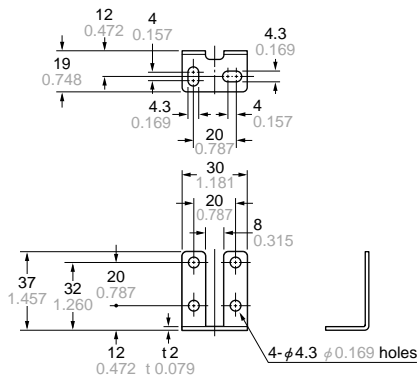
- Do not use during the initial transient time (50 ms) after the power supply is switched on.
- The ultrasonic sound propagates through the air. If the sensor is used at a place where air blows or the temperature suddenly changes (near a door, an air conditioner, etc.) the operation may become unstable. Avoid using **US-N300** at such places.
- Take care that the sensor may malfunction due to an intense extraneous sound, such as, metal impact sound.
- Do not expose the transmitting element or the receiving element to moisture or dust. It may affect the sensing operation.

## DIMENSIONS (Unit: mm in)

### US-N300 Sensor



### MS-N30 Sensor mounting bracket (Accessory)



Material: Cold rolled carbon steel (SPCC)  
 Two M4 (length 15 mm 0.591 in) screws with washers are attached.

### Assembly dimensions

Mounting drawing with the receiver

