





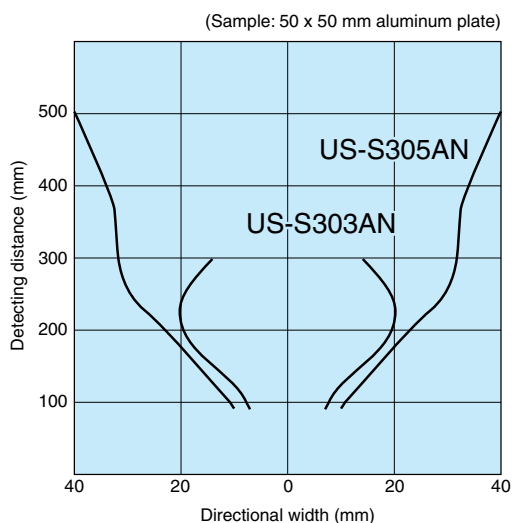
- Handy M30 cylinder
- Highly-accurate analog output
- Improved resistance to noise by the use of an ultrasonic frequency of 186 kHz

Type

Detection method	Detecting distance	Model	Operation mode	Output mode
Reflective type	 90-300mm	US-S303AN	Proportional output	Analog output
	 90-500mm	US-S305AN		

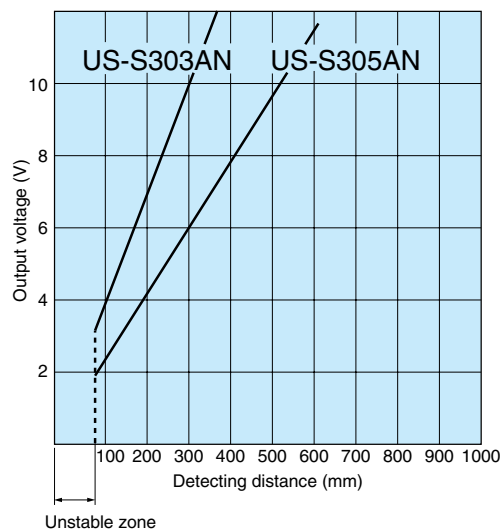
Characteristics (Typical Example)

- Activation area characteristics



Note: Normal voltage is not output unless the object passes across the central axis

- Distance-output characteristics



Rating/Performance/Specification

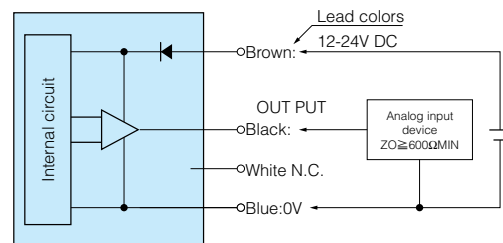
	Type	Ultrasonic	
	Model	US-S303AN	US-S305AN
Detection method	Reflective type		
Detecting distance	90-300mm±10mm	90-500mm±10mm	
Dead zone	90±10mm max.		
Detection object	100x100mm (sample object: 1-mm thick aluminum plate)		
Power supply	12-24V DC ±10% / Ripple 10% max.		
Current consumption	40mA max. (with no load)		
Response time	50ms max.		
Output voltage	3-10V (11V max.)	1.8-10V (11V max.)	
Output mode	Voltage output in proportion to distance, output current 20 mA max., minimum load resistance 600 Ω		
Minimum resolution	1mm	1mm	
Linearity	±3%FS max.		
Temperature characteristics	0.03%FS/°C		

Specification	Ultrasonic frequency	186kHz ± 10kHz
	Indicator	Power indicator (green) / Reception indicator (red)
	Connection	Connector type (cord with connector: 2 m)
	Material	Vinyl chloride
	Mass	150 g max. (including cord)
	Protective feature	Output short circuit protection, protection against reverse connection

Environmental Specification

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

Input/Output Circuit and Connection



- Applicable comparator



(ANP Series)

Dimensions (in mm)

For all models

Back panel layout

Cord with M8 connector (accessory)

Model FBC-4R2L

Wire colors
 Brown: power
 Blue: 0 V
 Black: output
 White: unused

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