

Piezo applications product group

Airborne ultrasonic sensors

This ultrasonic sensor will radiated ultrasonic waves in the air. Then it, receiving a reflected wave from the object, measure the distance to the presence detection and object of the object. Ultrasonic is reverberated also in the transparent objects. That means it can be applied to those that can not be detected by light. Since the method of the transmission and reception can be selected, it offers a wide sensor of applications.

Features of the ultrasonic sensors

- High sound pressures & sensitivity
- Small & lightweight
- High accuracy & reliability
- Low power consumption
- Temperature, humidity, dirt, etc. environment resistance



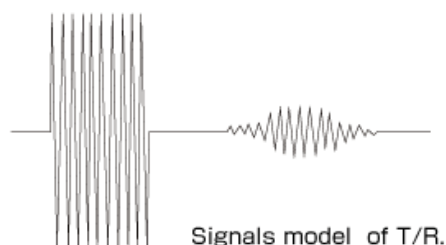
Functions of the ultrasonic sensors

- Space transfer of the signals
- Measurements of transfer times
- Detections of the continuous signals
- Apply of the Doppler effects
- Pulse reflection time measurement
- Measurements of Karman vortexflows



Mounting methods of the sensor

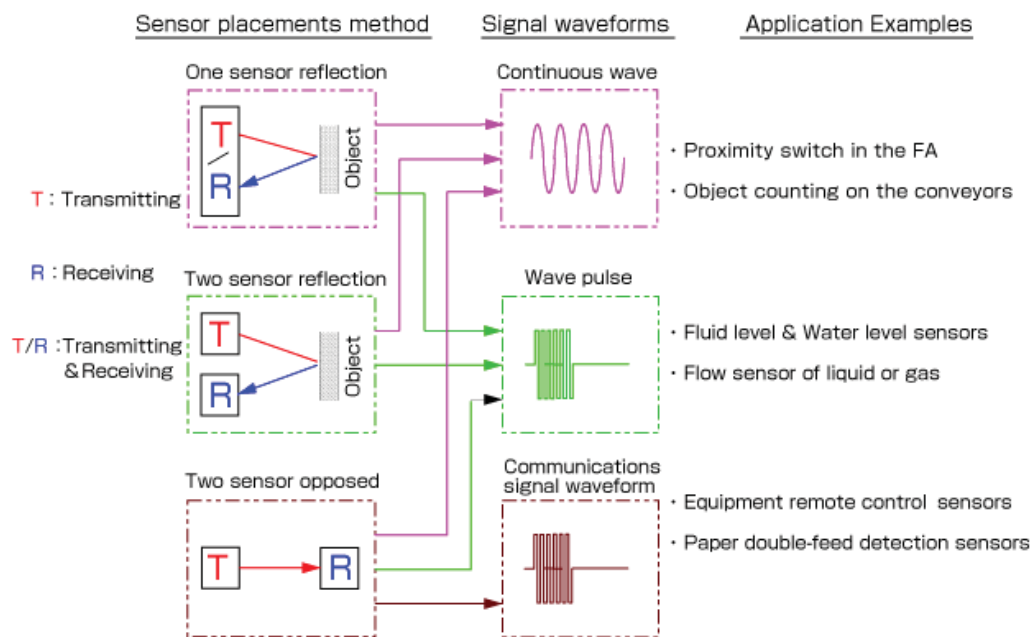
- One sensor reflection method (T/R, dual-purpose)
 - Two sensor reflection method (T/R, single-purpose)
 - Two sensor opposed method (T/R, single-purpose)
- [Notes, T; transmitted, R; received]



Typical Applications

- Distance measurement
- Object counting on the belt conveyors
- Proximity switch in the FA facilities
- Flow sensor of liquid or gas
- Fluid level sensors & Water level sensors
- Intrusion alarm sensors
- Automatic opening and closing door sensors
- Equipment remote control sensors
- Paper double-feed detection sensors

Placement method of the ultrasonic sensor



FUS Series / low-frequency type

Types		FUS-40BT	FUS-40BR	FUS-40CT	FUS-40CR	FUS-40E
Designs		Drip-proof type		Open type		Open type
Transducers		For transmitting	For receiving	For transmitting	For receiving	T/R dual-purpose
Nominal frequency	kHz	40				40
Transmitting SPL	dB or more (0 dB = 2×10^{-5} Pa)	105	-	118	-	-
Receiver sensitivity	dB or more (0 dB = 1V/Pa)	-	-57	-	-46	-
T/R sensitivity	dB or more	-				-43 at 30 cm
SPL & sensitivity band	kHz以上	2 (100 dB)	2 (-60 dB)	6 (105 dB)	6 (-54 dB)	-
Capacitance	pF	2600				2000
Directionality	deg.	80		50		40
Maximum input voltage	V	15	-	15	-	100
		(r.m.s)				(Pulse Vpp.)
Detection distance	m	0.2~3		0.2~6		0.2~4
Resolutions	mm	9		9		9
Operating temp. limits	°C	-20~70				-25~70
Storage temp. range		-35~80				-40~85
High-temp. preservation		80°C 500h				-
Low-temp. preservation		-35°C 500h				-
Humidity resistance		60°C 90~95%RH 500h				
Durability	Sensitivity variation Within 3dB	60°C 85% 10Vr.m.s 500h				-
Impact resistance		Dropped from a height of 1m on the hard wooden board 3 times				
Vibration resistance		Freq: 10Hz → 55Hz → 10Hz; Cycle: 1 min.; Total amplitude: 1.5mm; Conditions: XYZ each 1 h				
Outer diameter		φ 17.8		φ 16		φ 16
Height	mm	11		12		12

FUS Series / High-frequency type

Types		FUS-110A	FUS-200A	FUS-300A	FUS-400A	FUS-300A-P
Designs		Matching layer type				Matching layer type
Transducers		T/R, dual-purpose				T/R, dual-purpose
Nominal frequency	kHz	110	200	300	400	300
Transmitting SPL	dB or more (0 dB = 2×10^{-5} Pa)	-				-
Receiver sensitivity	dB or more (0 dB = 1V/Pa)	-				-
T/R sensitivity	dB or more	-54 at 40 cm	-56 at 20 cm	-66 at 15 cm	-74 at 10 cm	130mVp-p at 15cm
SPL & sensitivity band	kHz以上	-				-
Capacitance	pF	600	380	260	200	1700
Directionality	deg	7	7	6	6	9 ~ 13
Maximum input voltage	V	80	60	40	40	50
Detection distance	m	0.4~2.5	0.2~1.2	0.1~0.6	0.08~0.3	-
Resolutions	mm	3	2	1.2	1	1.2
Operating temp. limits	Sensitivity variation Within 3dB	-20~60				-20~70
Storage temp. range		-35~70				-30~70
High-temp. preservation		70°C 500h				85°C 240h
Low-temp. preservation		-35°C 500h				-40°C 240h
Humidity resistance		60°C 90~95%RH 500h				60°C 90~95%RH 240h
Durability		-				70°C 12Vp-p 500h
Impact resistance		Dropped from a height of 1m on the hard wooden board 3 times				100G, 3-axis, each 3 times
Vibration resistance	mm	Freq: 10Hz → 55Hz → 10Hz, Cycle: 1 min, Total amplitude: 1.5mm, Conditions: XYZ each 1 h				55~500Hz 0.1mm, 100~500 Hz
Outer diameter		φ37	φ19	φ13	φ10	φ9.9
Height		17.2	10.8	8.8	7.4	7.3

Notes on use

- The sensor has directivity. Note the mounting and direction.
- The negative terminal is connects to the case, and have been shielded. Please note the connection method. (except for the FUS-40E.)
- The sensor may be caused the noise by the impacts. Please use to holds the sensors in buffer material as foamed rubber.
- There is a possibility that the insulation resistance is lowered. Avoid DC voltage is applied for a long time.
- This sensor can not be used in water.
- For improvement, it may want to change the specifications without notice.