Ultrasonic Proximity Sensor

Features

- Capable of long distance measurement.
- Highly accurate measurement.
- Integrated temperature sensing component for stable measurement.
- Anti Interference feature.
- High resolution 12-bit D/A converter.

Selection Guide / L–01

Brief–introduction / L–02

Application / L–03

Note & Wiring / L–04

Instructions / L–05

M18 series / L–07

M30 series / L–07

U B T 30 – 1M N A – D 4 Y V1

1: Sensor type
U: Ultrasonic Proximity Sensor

2: Housing Material
B: Nickel–plated brass
S: Stainless steel
P: Plastic

3: Housing Shape
T: Threaded cylindrical type
L: L–shaped (Threaded cylindrical type)
S: Rectangular type

4: Dimensions
Cylindrical only (diameter)
18: M18mm
30: M30mm
46: ϕ46mm*M30mm
.....
Other type
PK:W28*H28*L30
.....

5: Sensing Distance
350: 80–350mm 1M: 0.1–1m 3M: 0.25–3m .....

6: Output Mode
P: PNP
N: NPN

7: Output State
A: N.O. B: N.C.
I: 4–20mA
V: 0–10V
A/I: N.O. + 4–20mA
B/I: N.C. + 4–20mA

8: Operating Voltage
D: DC 10–30V
C: DC 15–30V

9: Cores / Pins
Cable Connection:
4: 4–core
.....
Connector Connection:
4: 4–pin
.....

10: Protection
Y: short circuit , overload protection and reversed polarity protection

11: Connection
Cable type: 2: 2m 3: 3m 5: 5m 10: 10m
.....
Connector type:
V1: M12 connector (4 pins)
T: Terminal connection
.....

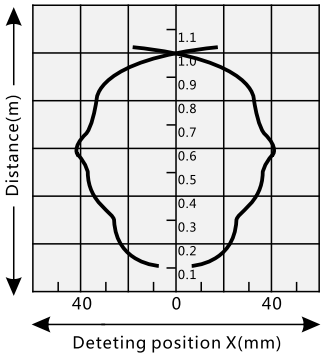
Definition

Ultrasonic Proximity Sensor

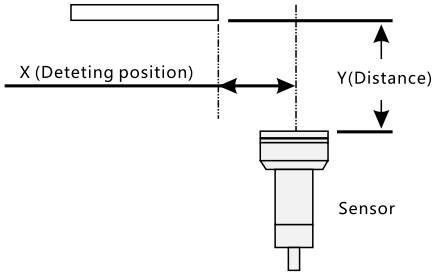
Ultrasonic sensor is developed by the characteristic of ultrasound.Ultrasound is a mechanical wave with higher vibration frequency than sound waves. It is generated by the vibration of transducer chip under voltage excitation . It has many characteristics like high frequency , short wave length , little diffraction phenomena, directional propagation and so on . Meanwhile ,ultrasound has strong ability to penetrate liquids and solids . Especially for transparent solids , it can penetrate thickness up to several meters . When meeting impurities or interface , there will be remarkable reflection echoes . And it will cause doppler effect when meets moving objects . Proximity sensors taking advantages of ultrasound characteristics are called ultrasonic sensors . They are widely used in industrial application , national defense , biomedicine and so on .

Characteristics(Typical example)

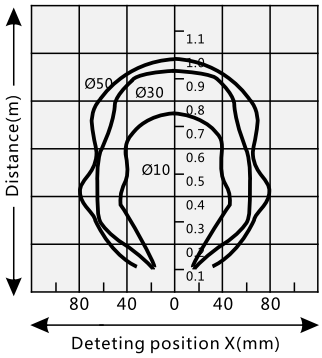
Response Curves: Detecting Position (flat plate)



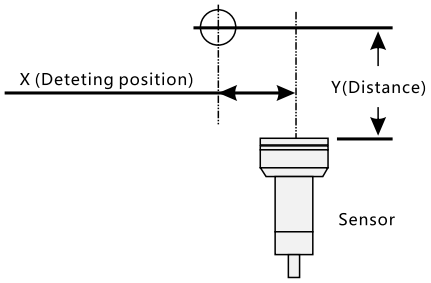
Flat plate (100x100x2mm)



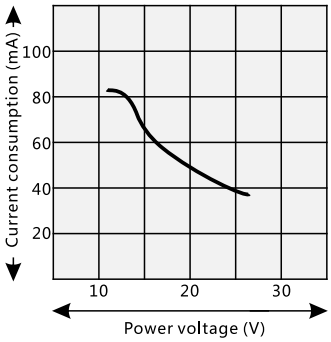
Response Curves: Detecting Position (round bar)



Round bar (length: 400 mm)



Current Consumption-Voltage Curves

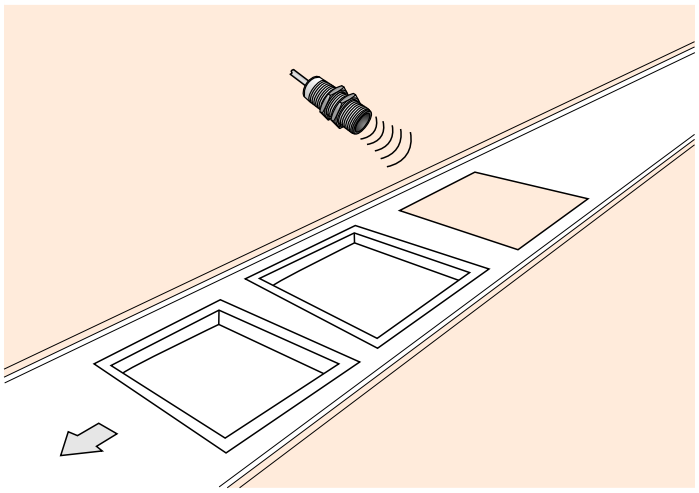


Surface temperature of detection object

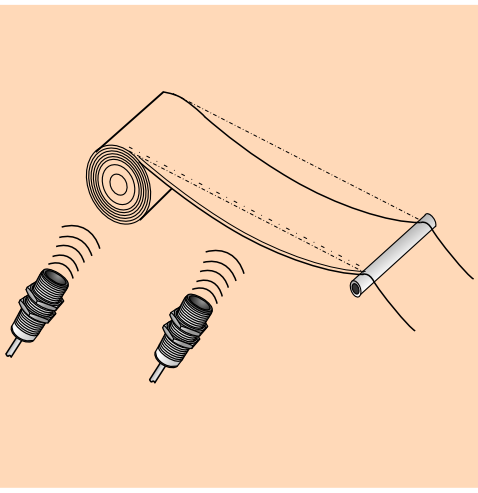
When surface temperature of detection object is over 100℃ ,ultrasound reflection will be extremely attenuated .
Be sure to test the operation before putting the sensor into use .

● Application example

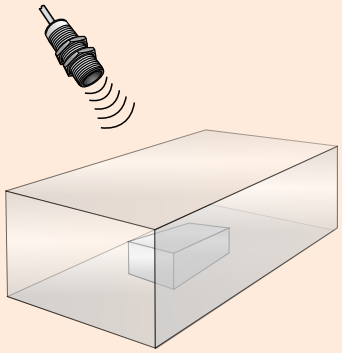
Detecting the tray existing or not



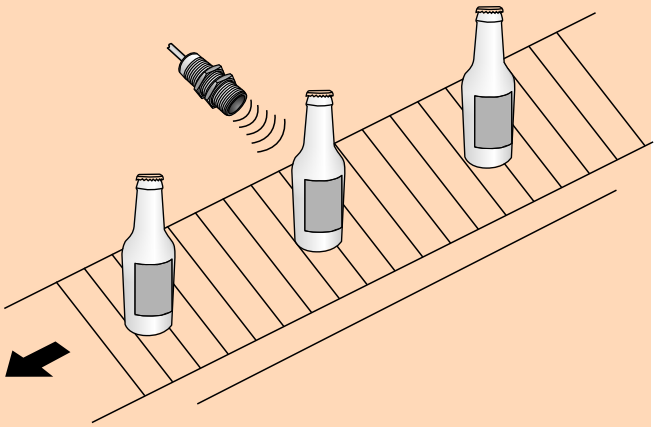
Detecting the target straight or not



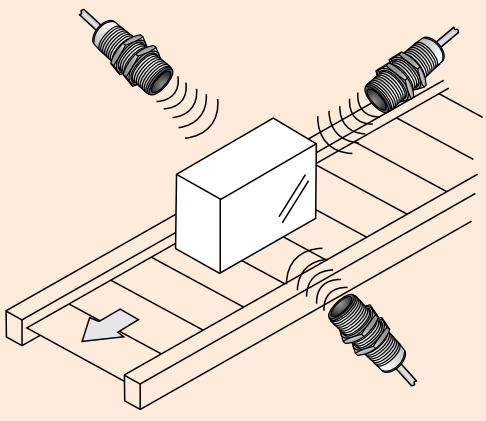
Object detecting



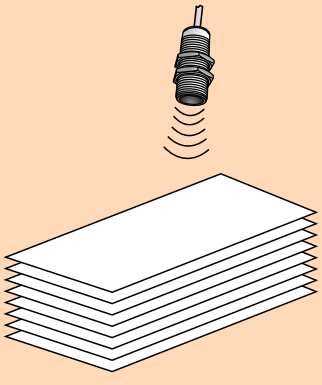
Detecting liquid or filler in the bottle



Detecting the dimension of passing object



Stacking detection



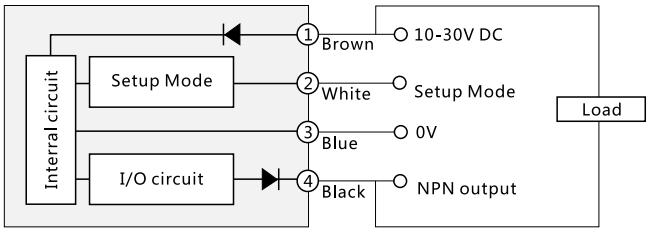
Note

Warning: **This sensor can not be used for protection from death or injury as it is not a life-saving equipment . Meanwhile ,when used for safety applications , ensure the safety operation because a complete safety system includes detection section and control section .**

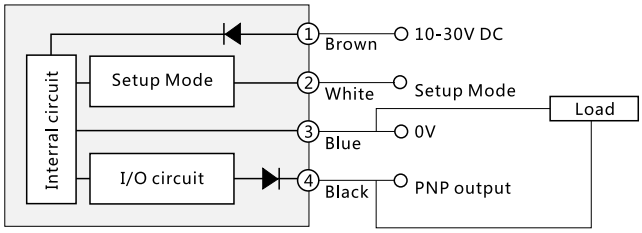
Input/Output Circuit and Connection

Cable with M18 connector

I/O circuit(NPN)

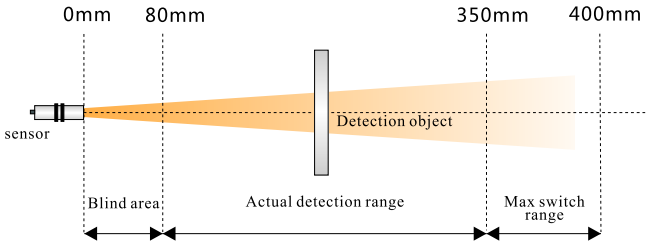


I/O circuit(PNP)



Operation range(M18)

The picture below specify the using and detection range of this sensor. The higher the temperature and humidity is, the greater the sound wave damping will be , the detection range will be smaller. On the contrary , the lower the temperature and humidity is, the smaller the sound damping will be , the detection range will be larger correspondingly.



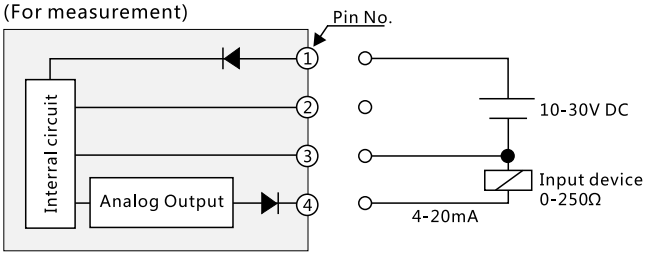
Notes:
Above data is acquired under standard metal plate100mm*100mm , mounting angle of Ultrasonic proximity sensor is 90±3°. If the detection object is sound-absorption material, the detection range will be smaller. Set the max switch range according to the actual detection object to meet the detection requirements.

Cable with M30 connector

Pin arrangement	Pin No.	Description	Core colors
	①	Power supply(+)	Brown
	②	I/O	White
	③	0V	Blue
	④	Analog Output	Black

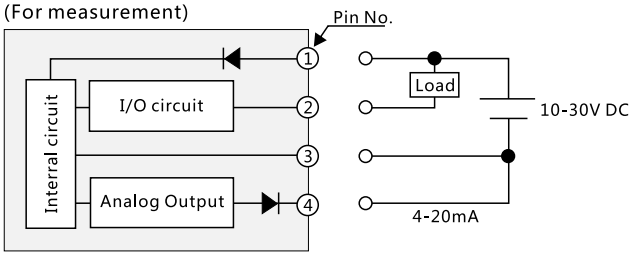
Analog Output

(For measurement)



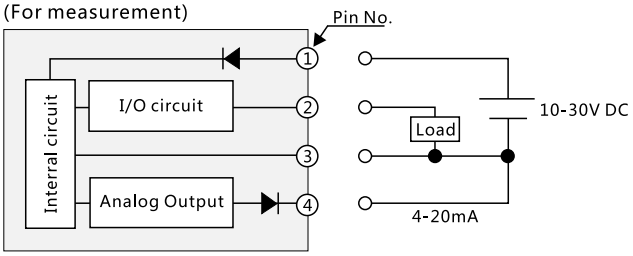
I/O circuit(NPN)+Analog Output

(For measurement)

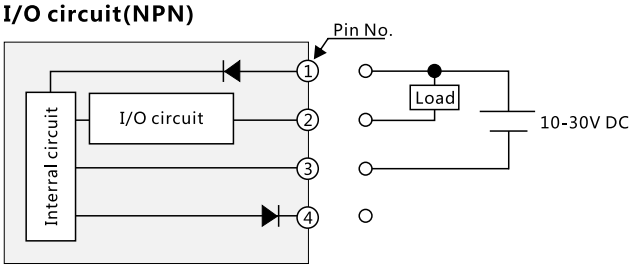


I/O circuit(PNP)+Analog Output

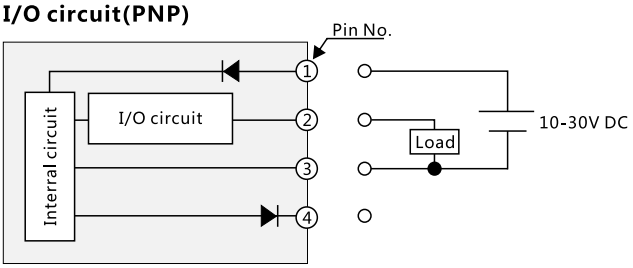
(For measurement)



I/O circuit(NPN)



I/O circuit(PNP)



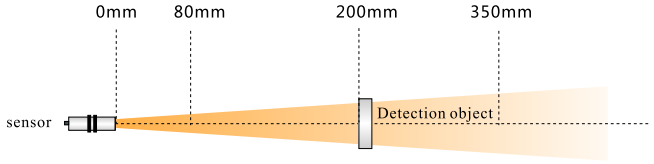
M18 Instructions

Teaching procedure

Be sure to follow the instructions in the operation manual provided for correct use .

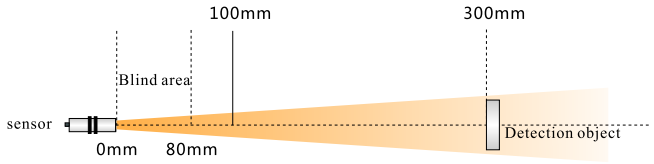
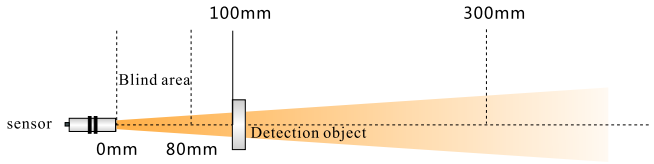
1、Normal operation state: when an object is detected, the red indicator flares. If there is no object, the red indicator extinguishes.
2、Regular detecting mode setting

Example: when an object is placed within 200mm from the sensor, there is a output signal. If the distance between the object and the sensor is larger than 200mm, there is no output(take NPN output as an example)

Item	Process , operation and indicator
①	Place an object in parallel at 200mm , and ensure the sensor can detect it 
②	Connect white wire with blue wire, waiting for dozens of seconds, the red indicator will be flashing. Then disconnect white wire with blue wire , the red indicator will be flashing quickly
③	Connect white wire with blue wire again, then disconnect immediately, the red indicator will stop flashing. The setting is finished. Users can detect the setting is correct or not at this time

3、Window detection mode setting

Example: when an object is placed within 100mm-300mm to sensor, there is a output signal. Otherwise , there is no output (take NPN output as an sample)

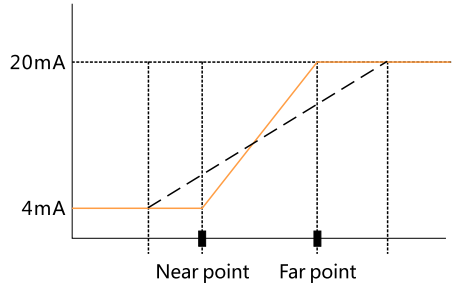
Item	Process , operation and indicator
①	Place an object in parallel at 300mm , and ensure the sensor can detect it 
②	Connect white wire with blue wire, waiting for dozens of seconds, the red indicator will be flashing. Then disconnect white wire with blue wire , the red indicator will be flashing quickly
③	Place an object in parallel at 100mm , and ensure the sensor can detect it 
④	Connect white wire with blue wire again, then disconnect immediately, the red indicator will stop flashing. The setting is finished. Users can detect the setting is correct or not at this time

M30 Instructions

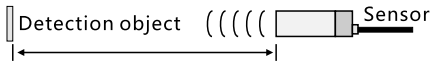
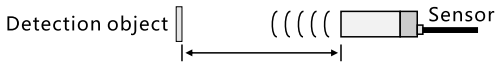
Teaching procedure

Be sure to follow the instructions in the operation manual provided for correct use .

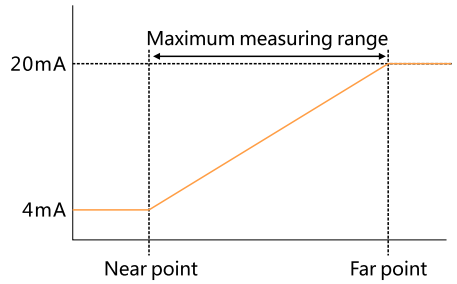
Range setting



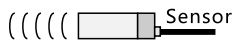
Current output between 4-20 mA is available between arbitrary 2 points within the measuring range.
(The factory setting is maximum measuring range.)

Item	Process , operation and indicator	Item	Process , operation and indicator
①	Assemble the detection object at the far point of the measuring range. 	④	Assemble the detection object at the near point of the measuring range. 
②	Press and keep the SET button for about 3 seconds(3-6 seconds). 20mA ✲ mid ✲ Flashes simultaneously 4mA ○ RUN ●	⑤	Press the SET button once (more than 0.5 seconds) Indicator mid and 20mA become off , then release immediately . 20mA ○ mid ○ Show current measuring conditions 4mA ○ RUN ●
③	Release the SET button. 20mA ✲ mid ✲ Flashes alternatively 4mA ○ RUN ●	⑥	Output setting at both near point and far point between 4-20mA.

Default setting

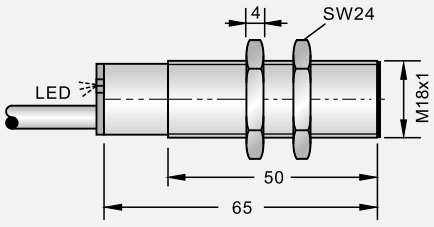


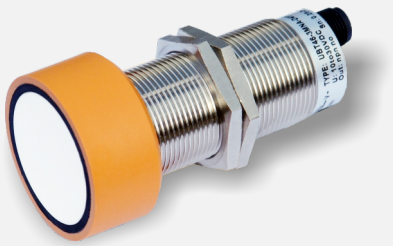
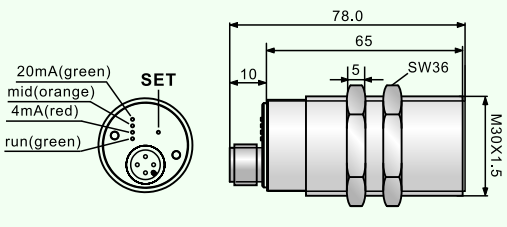
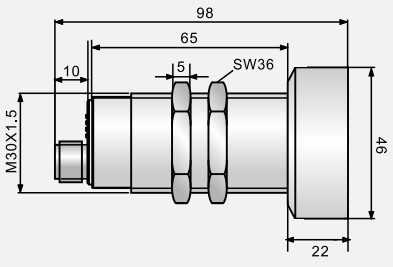
Restoration of maximum measurement range setting(factory setting)

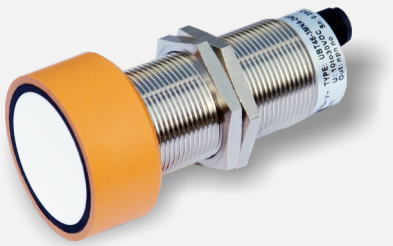
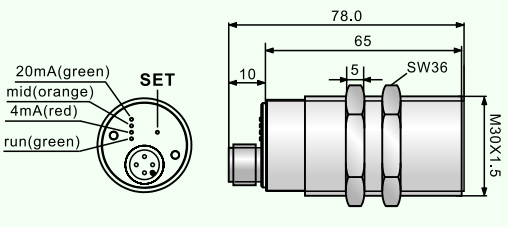
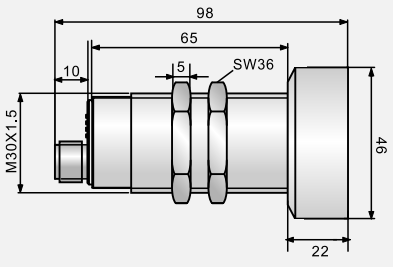
Item	Process , operation and indicator	Item	Process , operation and indicator
①	When there is no detection object ,(no incoming wave signal), press and keep the SET button for about 3 seconds. No detection object  20mA ✲ mid ✲ Flashes simultaneously 4mA ○ RUN ●	③	When there is no detection object (no incoming wave signal) , press SET button once . Indicator mid and 20mA become off , then release immediately .
②	Release the SET button. 20mA ✲ mid ✲ Flashes alternatively 4mA ○ RUN ●	④	The maximum measuring range setting for the model is restored and the output between 4-20mA for near and far points becomes available. 20mA ○ mid ○ Previous setting data are lost 4mA ○ RUN ● Show current measuring conditions

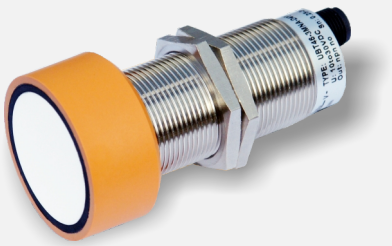
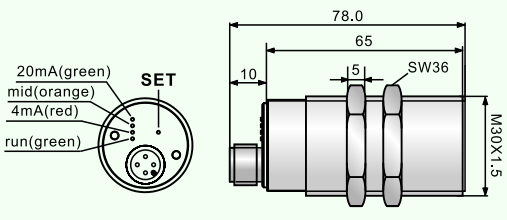
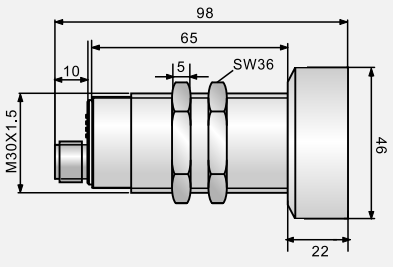
PICTURE

M18x1, L65

DC-4 wires NPN N.O.	**UBT18-350NA-D4Y2**
DC-4 wires NPN N.C.	**UBT18-350NB-D4Y2**
DC-4 wires PNP N.O.	**UBT18-350PA-D4Y2**
DC-4 wires PNP N.C.	**UBT18-350PB-D4Y2**
Operation mode	Proportional output
Output mode	I/O circuit
Measuring method	Ultrasonic reflection
Sensing distance	0.08-0.35m
Sensing object	100x100mm(2mm thick aluminum plate)
Supply voltage	10-30V DC
Power consumption	<1W
Response speed	150ms
Output type	NPN/PNP
Minimum resolution	0.9mm(0.1% F.S.)
Linearity	±1% F.S.
Ultrasonic frequency	≈300KHZ
Display	RUN : red
Protective feature	Output short circuit protection, power supply output protection against reverse connection
Auxiliary function	Anti interference, temperature correction
Operating temperature	±1% F.S. (Max.)Output value in temperature 23℃ ; -10...+55℃(non-freezing)
Ambient humidity	35 - 85%RH (no condensation)
Ambient wind speed	<1m/s
Dielectric withstanding	1000V AC 50/60Hz 1 min
Insulation Resistance	≥50MΩ(500V DC)
Anti-vibration	10...55Hz(amplitude 1.5mm)X、Y、Z direction each 2 hours
Anti-impact	500m/s^2 (50G) X、Y、Z direction, each 3 times
Protection	IP67
Connection	Cable: φ4.8mm 2M
Housing material	Case : nickel-plated brass ; sensing face : nylon, urethane, glass epoxy
Accessories	Operation manual,washers, nuts
Dimensional drawing	
Remark	

PICTURE	M30x1.5, L78 	ϕ46*M30x1.5, L98 
Current output: 4–20mA	**UBT30-1MI-D4YV1**	**UBT46-3MI-D4YV1**
Operation mode	Proportional output	
Output mode	Analog output	
Measuring method	Ultrasonic reflection	
Sensing distance	0.1-1M	0.25-3M
Sensing object	100x100mm(2mm thick aluminum plate)	
Supply voltage	10-30V DC	
Power consumption	<1W	
Response speed	150ms	380ms
Output type	4-20mA current output(applicable load:0-250Ω)	
Minimum resolution	0.9mm(0.1% F.S.)	
Linearity	±1% F.S.	
Ultrasonic frequency	≈200KHZ	
Display	RUN: (green) 4mA: (red) mid: (orange) 20mA: (green)	
Protective feature	Output short circuit protection, power supply output protection against reverse connection	
Auxiliary function	Anti interference, temperature correction	
Operating temperature	±1% F.S. (Max.)Output value in temperature 23℃ ; -10...+55℃(non-freezing)	
Ambient humidity	35 - 85%RH (no condensation)	
Ambient wind speed	<1m/s	
Dielectric withstanding	1000V AC 50/60Hz 1 min	
Insulation Resistance	≥50MΩ(500V DC)	
Anti–vibration	10...55Hz(amplitude 1.5mm)X、Y、Z direction each 2 hours	
Anti–impact	500m/s^2 (50G) X、Y、Z direction, each 3 times	
Protection	IP67	
Connection	M12 connector, LEDx4	
Housing material	Case : nickel-plated brass ; sensing face : nylon, urethane, glass epoxy	
Accessories	Operation manual,washers, nuts	
Dimensional drawing		
Remark		

	M30x1.5, L78	ϕ46*M30x1.5, L98
PICTURE		
DC-4 wires NPN N.O.	UBT30-1MNA-D4YV1	UBT46-3MNA-D4YV1
DC-4 wires NPN N.C.	UBT30-1MNB-D4YV1	UBT46-3MNB-D4YV1
DC-4 wires PNP N.O.	UBT30-1MPA-D4YV1	UBT46-3MPA-D4YV1
DC-4 wires PNP N.C.	UBT30-1MPB-D4YV1	UBT46-3MPB-D4YV1
Operation mode	Proportional output	
Output mode	I/O circuit	
Measuring method	Ultrasonic reflection	
Sensing distance	0.1-1M	0.25-3M
Sensing object	100x100mm(2mm thick aluminum plate)	
Supply voltage	10-30V DC	
Power consumption	<1W	
Response speed	150ms	380ms
Output type	NPN/PNP	
Minimum resolution	0.9mm(0.1% F.S.)	
Linearity	±1% F.S.	
Ultrasonic frequency	≈200KHZ	
Display	RUN: (green) 4mA: (red) mid: (orange) 20mA: (green)	
Protective feature	Output short circuit protection, power supply output protection against reverse connection	
Auxiliary function	Anti interference, temperature correction	
Operating temperature	±1% F.S. (Max.)Output value in temperature 23℃ ; -10...+55℃(non-freezing)	
Ambient humidity	35 - 85%RH (no condensation)	
Ambient wind speed	<1m/s	
Dielectric withstanding	1000V AC 50/60Hz 1 min	
Insulation Resistance	≥50MΩ(500V DC)	
Anti-vibration	10...55Hz(amplitude 1.5mm)X、Y、Z direction each 2 hours	
Anti-impact	500m/s^2 (50G) X、Y、Z direction, each 3 times	
Protection	IP67	
Connection	M12 connector, LEDx4	
Housing material	Case : nickel-plated brass ; sensing face : nylon, urethane, glass epoxy	
Accessories	Operation manual,washers, nuts	
Dimensional drawing		
Remark		

	M30x1.5, L78	ϕ46*M30x1.5, L98
PICTURE		
Double output	UBT30-1MNA/I-D4YV1	UBT46-3MNA/I-D4YV1
Double output	UBT30-1MNB/I-D4YV1	UBT46-3MNB/I-D4YV1
Double output	UBT30-1MPA/I-D4YV1	UBT46-3MPA/I-D4YV1
Double output	UBT30-1MPB/I-D4YV1	UBT46-3MPB/I-D4YV1
Operation mode	Proportional output	
Output mode	Analog Output+I/O circuit	
Measuring method	Ultrasonic reflection	
Sensing distance	0.1-1M	0.25-3M
Sensing object	100x100mm(2mm thick aluminum plate)	
Supply voltage	10-30V DC	
Power consumption	<1W	
Response speed	150ms	380ms
Output type	4-20mA current output(applicable load:0-250Ω) and NPN/PNP	
Minimum resolution	0.9mm(0.1% F.S.)	
Linearity	±1% F.S.	
Ultrasonic frequency	≈200KHZ	
Display	RUN: (green) 4mA: (red) mid: (orange) 20mA: (green)	
Protective feature	Output short circuit protection, power supply output protection against reverse connection	
Auxiliary function	Anti interference, temperature correction	
Operating temperature	±1% F.S. (Max.)Output value in temperature 23℃ ; -10...+55℃(non-freezing)	
Ambient humidity	35 - 85%RH (no condensation)	
Ambient wind speed	<1m/s	
Dielectric withstanding	1000V AC 50/60Hz 1 min	
Insulation Resistance	≥50MΩ(500V DC)	
Anti-vibration	10...55Hz(amplitude 1.5mm)X、Y、Z direction each 2 hours	
Anti-impact	500m/s^2 (50G) X、Y、Z direction, each 3 times	
Protection	IP67	
Connection	M12 connector, LEDx4	
Housing material	Case : nickel-plated brass ; sensing face : nylon, urethane, glass epoxy	
Accessories	Operation manual,washers, nuts	
Dimensional drawing		
Remark		