

1. Principle of Operation



The ultrasonic level metering technology is based on the principle that the energy transducer (the sensor) emits an ultrasonic pulse train, receives and selects some echoes reflected from the medium surface, converting them into electronic signals.

The ultrasonic pulse travels at the speed of sound, and the time interval between emitting and receiving is in proportion to the distance between the sensor and the medium surface.

The formula relating the distance S , sound speed C and the transmitting time T is as following:

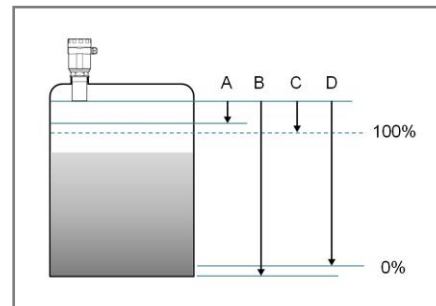
$$S = C \times T / 2$$

The overlapping of the emitting and reflecting pulse within an area close to the sensor cannot be identified and measured due to the limit width of the emitting ultrasonic pulse, the area is called Dead Zone.

The distance of the dead zone is associated with the working frequency of the Ultrasonic Level Transmitter.

The measuring reference level is at the bottom of the sensor.

- A; Dead Zone
- B; Measuring Range
- C; Full of Medium
- D; Zero Point



Features of the instrument:

- Adopting advanced microprocessor with high level ultrasonic.
- Unique echo processing technology
- False echo storage
- Internal temperature compensation
- Narrow beam
- Simple debugging and calibration

2. Product Description



UTL61

- Application: Liquid level measurement in industrial areas, especially for water treatment industry.
- Measuring range: 0.4m ... 5m for liquids
- Process connection: M66×2 or Flanges
- The housing material of the transducer: PTFE, PU/ PC
- Process temperature: -40°C ... +70°C
- Process pressure: -0.02MPa~0.1MPa
- Accuracy: $\pm 0.5\%$ of full range
- Repeatability: $\pm 0.1\%$ of full range
- Output: 4-20mA
- Power supply: 24 VDC for two wires, 24V DC/220V AC for four wires



UTL62

- Application: Liquid level measurement in industrial areas, especially for water treatment industry.
- Measuring range: 0.4m ... 10m for liquids
- Process connection: M66×2 or Flanges
- The housing material of the transducer: PTFE, PU/ PC
- Process temperature: -40°C ... +70°C
- Process pressure: -0.02MPa~0.1MPa
- Accuracy: $\pm 0.5\%$ of full range
- Repeatability: $\pm 0.1\%$ of full range
- Output: 4-20mA
- Power supply: 24V DC for two wires, 24V DC/220V AC for four wires



UTL63

- Application: Liquid level measurement in industrial areas, especially for water treatment industry.
- Measuring range: 0.5m ... 15m for liquids
- Process connection: M95×2 or Flanges
- The housing material of the transducer: PU/ PC
- Process temperature: -40°C ... +70°C
- Process pressure: -0.02MPa~0.1MPa
- Accuracy: $\pm 0.5\%$ of full range
- Repeatability: $\pm 0.1\%$ of full range
- Output: 4-20mA
- Power supply: 24V DC for two wires, 24V DC/ 220V AC for four wires

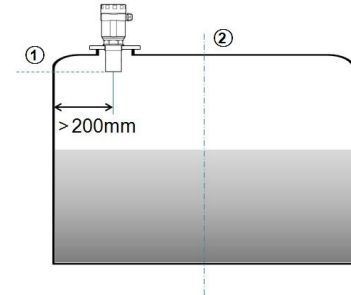
3. Installation guide

3.1 Installation position

● The installation of UTL61 and UTL62

During the installation of UTL61 and UTL62, please keep the symmetrical central line of the transmitter at least 200mm away from the inner wall of the tank, 500mm or above is as suggested.

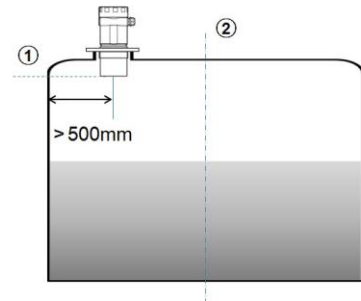
- ② The bottom line of the sensor (The emission surface of sound wave)
- ② The symmetrical central line of the tank



● The installation of UTL63

During the installation of UTL63, please keep the symmetrical central line of the transmitter at least 500mm away from the inner wall of the tank.

- ① The bottom line of the sensor (The emission surface of sound wave)
- ② The symmetrical central line of the tank



3.2 Installation

● Installation requirements

A certain distance between the meter and the inner tank wall should be kept (please see the installation position instructions for details).

There is a certain beam angle when the transducer emits ultrasonic pulse. Therefore, make sure that no obstacle A or B (e.g. ladders, level switches, heating coils, diversion trenches, etc.) is in the area of the sensing cone

Make sure that there is no crossing between the ultrasonic beam and the feeding flow.

The highest liquid level cannot get into the dead zone during installation.

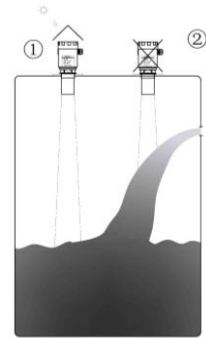
Try to install the transmitter at the position where the emitting direction of the transducer is vertical to the liquid surface.

The installation of the instruments with explosion-proof should comply with the regulations of the state on the instrument installation in dangerous area. The housing material of the intrinsically safe instrument should be aluminum, which can ensure the instrument to be installed in dangerous area. The instruments must be grounded.

● Typical wrong installation

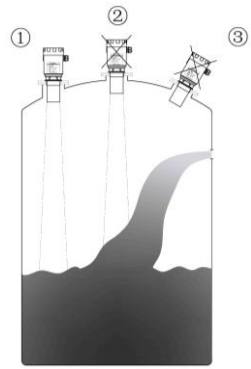
Instrument cannot be mounted above feeding inlet, which cannot measure the actual liquid level. Keep the installation place away from sunshine or rain for the outdoor installation.

- ① Correct
- ②. Wrong



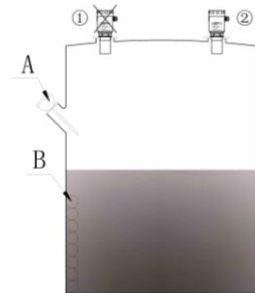
The transducer should be vertical to the liquid surface.
The instrument cannot be mounted at the middle of a tank with an arch top to avoid possible multiple echoes.

- ①. Correct
- ②. Wrong
- ③. Wrong



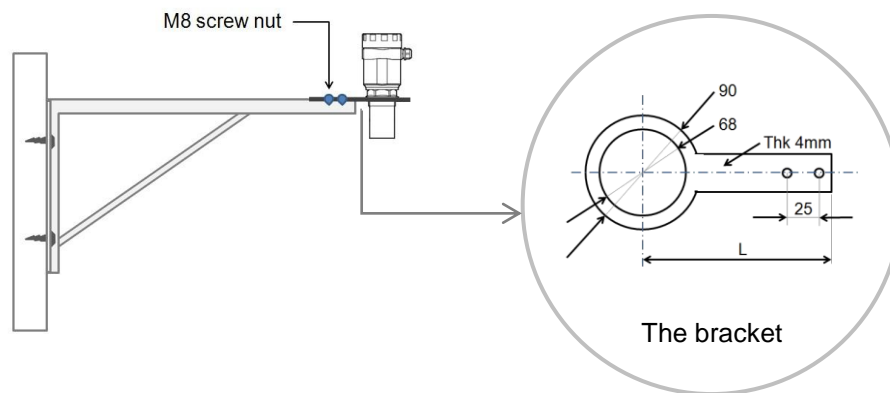
Obstacles A or B should be avoided during installation.

- ① Correct
- ②. Wrong

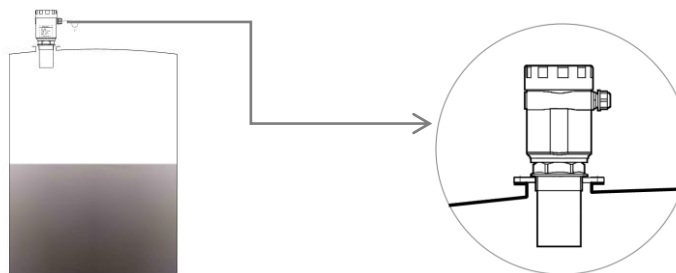


- **Installation with bracket**

UTL63 being installed with brackets

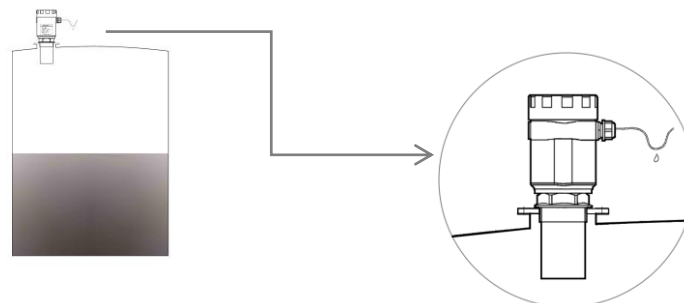


Installation with flange is also available for UTL63.



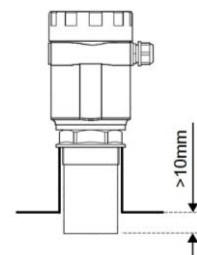
- **Damp-proof**

Cable gland should be tightened for instruments mounted at outside or damp environment, and the cable at the inlet should be bent down into U. Shown as following:



- **Mounting with extension pipe**

The length of extension pipe: Make sure that the sensor should be at least 10mm out of the vessel surface.

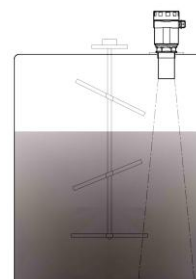


- **Foam**

Foaming of some of the liquid surface due to feeding, agitating or other process inside the vessel is to weaken the emission signal. When foaming may cause measuring error, the sensor should be installed in a stilling pipe or guided wave radar level transmitter should be used. Guided wave radar level transmitter is the best choice for this application, which will not be affected by foam.

- **Agitating**

When there is agitating within the tank, please keep the instrument away from the agitator. When there is foam or wave caused by agitating, a wave guiding pipe should be used.

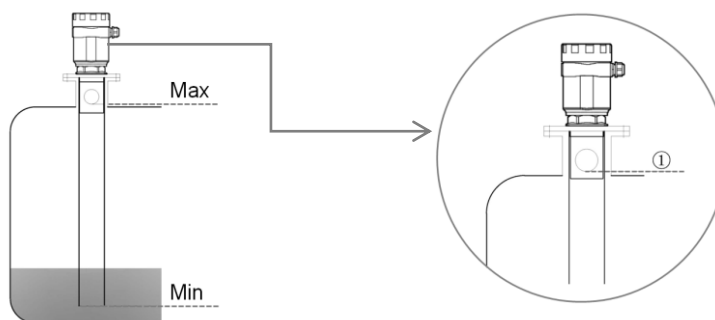


- **Air flow**

When there is strong air flow in the vessel, e.g. outdoor installation with strong wind, or there is turbulence in the vessel, the sensor is recommended to be installed with a wave guiding pipe, or pulse radar level transmitter or guided wave radar level transmitter is suggested to be used.

- **Installation with a wave guiding pipe**

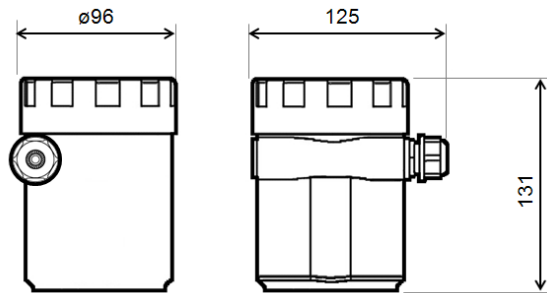
Wave guiding pipe (wave guiding pipe or by-pass pipe) with an air hole with diameter of 5mm-10mm can be used, which can avoid measurement error affected by obstacles, foam and air turbulence.



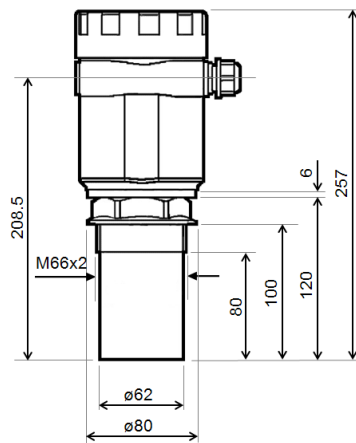
Note: Wave guiding pipe cannot be used for measurement with sticky medium.

4. Structure Dimension (Unit: mm)

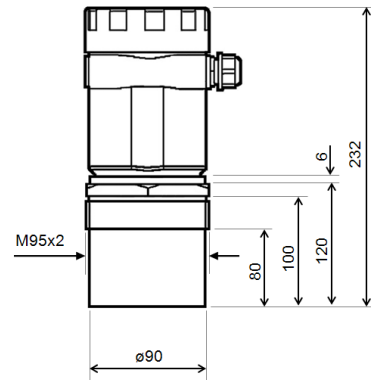
Housing material: Plastic



UTL61, UTL62



UTL63



5. Wiring

● Power supply

2-wire Power supply shares one 2-wire cable with the output signal. Please see the technical data for the actual power supply voltage.

4-wire Power supply and signal current are separate, using one 2-wire cable respectively. Please see the technical data for the actual power supply voltage.

Cable connection

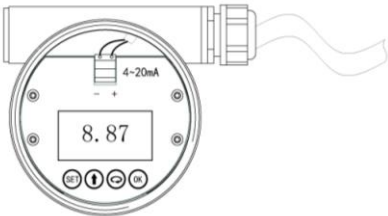
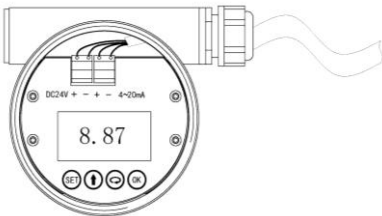
General introduction

Common 2-wire cable can be used for power supply. The outer diameter of the cable should be 5-9mm to ensure cable entry sealing. Shielded cable is recommended where there is electromagnetic interference.

4-20mA (2-wire) Shielded cable should be used for power supply

4-20mA (4-wire) Shielded cable should be used for power supply

● Wiring

	
2-wire, 24V DC for power supply	4-wire, 24V DC for power supply

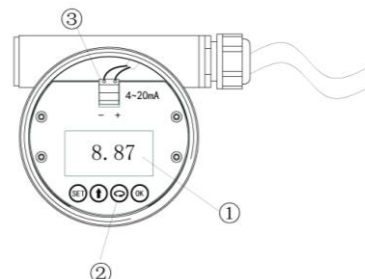
6. Calibration

Debugging methods of UTL6X:

With buttons

Debugging can be done with the 4 buttons on the display board. After debugging, the display keeps the normal working condition.

- ① LCD display
- ② Buttons
- ③ Wiring terminals



7. Technical Data

Model		UTL61	UTL62	UTL63
Process connection		Thread M66×2	Thread M66×2	Bracket or flanges
Material	Transducer	PU/ PC		
	Transducer sealing	Silicon		
	Housing	Plastic		
	Housing sealing	Silicone rubber		
	Cover window	Polycarbonate		
Weight (Depends on the process connection)		0.77 kg	0.77 kg	1.1 kg
Power	2-wire	Standard type: 16 to 36V DC		
		Intrinsically safe type: 21.5 to 26.5V DC		
		Allowed ripple: -<100Hz Uss<1V -(100~100k)Hz Uss<10mV		
	4-wire	Standard type: 24V DC/ 220V AC		
		Power consumption: max.1VA, 1W		
Cable parameter		Cable inlet / plug: 1 M20×1.5 cable entry (cable diameter 5...9mm), one blind block, M20×1.5		
		Wiring terminal: cross section 2.5mm²		
Output parameter		Output signal: 4-20mA		
		Resolution: 1.6µA		
		Error output: 20.5mA ; 22mA ; 3.9mA		
		Damping time: (0-30) s, adjustable		
Features	Dead zone	0.4m	0.4m	0.5m
	Max. measuring range	5m (Liquid)	10m (Liquid)	15m (Liquid)
	Ultrasonic frequency	50kHz	40kHz	28kHz
	Emission angle	5°	5°	3°
	Resolution	1mm		
	Repeatability	±0.1% for full range		
	Accuracy	±0.5% for full range		
	Process temperature	-40°C ... +70°C		
	Relative humidity	<95%		
	Pressure	<0.1MPa		
	Resistance to vibration	Mechanic vibration 10m/s		

8. Model selection

Ultrasonic Level Transmitter_UTL60 series (Economic Version)				
Model	UTL61		Measuring range: 0.4m.....5m for Liquids	
	UTL62		Measuring range: 0.4m.....10m for Liquids	
	UTL63		Measuring range: 0.4m.....15m for Liquids	
Transducer material/ Process temperature/ Enclosure	A		PU/ PC/ -40~70°C/ IP66	
	B		PTFE/ -40~70°C/ IP66	
	O		Others	
Process connection /material	N		No	
	D		Flange DN80 PN16/ PP	
	E		Flange DN100 PN16/ PP	
	F		Flange DN150 PN16/ PP	
	O		Others	
Electronic unit	2		4~20mA/24V DC/ 2-wire	
	3		4~20mA/24V DC/ 4-wire	
	4		4~20mA/220V AC/ 4-wire	
Housing material		P	Plastic	
Cable entry		M	M20x1.5	
		N	½" NPT	
Display		V	With	
		X	Without	