Ultrasonic level Sensor
Operation Manual

VER：V2023.08

CATALOG

Notes:

As the product is renewed continuously, it cannot be ensured that the product manual and installation manual are in line with the latest product. The Company cannot inform every client of the change (if any) in product itself and its operation instructions. Please directly contact the corporate sales personnel for any needs. The change includes but is not limited to the following:

1. Product blind area, performance parameters, functions, structure, shape, color, etc.
2. Software functions, structure, display mode, operating habit, etc.
3. Any operation on the hardware must be conducted after power off. Failures, like short circuit, caused by power-on operation are beyond the range of warranty.
4. The uncapping operations must be conducted after power off and no liquid is allowed to enter in the meter. Any failure caused by the entering in of liquid is beyond the range of warranty.

1. Introduction

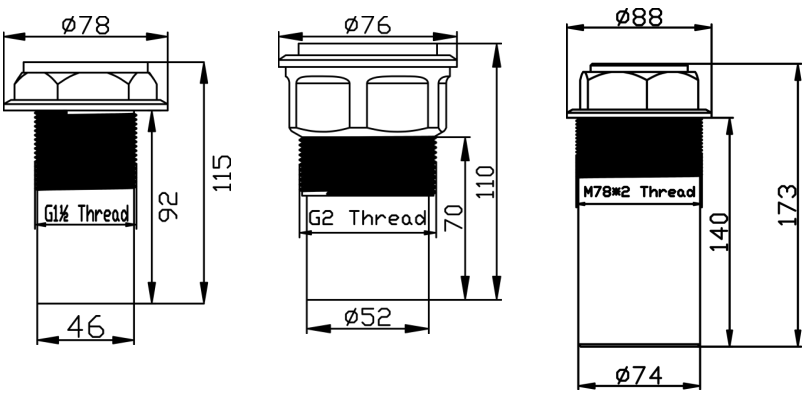
Ultrasonic level sensor (for liquid or material level measurement), it is non contact type level measuring instrument with high precision and reliability, easy to maintain and with better cost performance . It could satisfy many applications without contact with mediums.

2. Main technical parameters

Function	Parameters
Measuring range	5m、10m、15m
Accuracy	0.5%-1.0%
Resolution	1mm
Display	LCD
Analog output	4～20mA/HART
Power supply	(21.6～26.4)VDC
Ambient temperature	Display instrument:-20～+60℃, Probe:-20～+70℃
IP grade	Display instrument: IP66, probe: IP68
Probe installation	Due to range and probe type (standard or anti-corrosive)
Product power consumption	Max. 22.5mA

3. Installation Guide

3.1. Dimensions

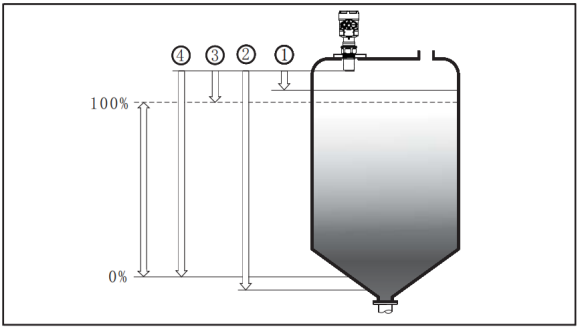


3.2. Installation Guide

- Basic requirement

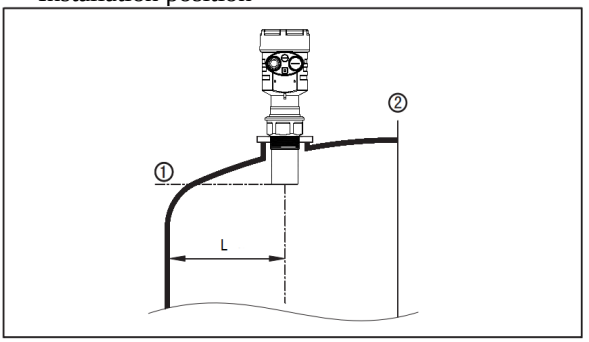
When the transducer emits ultrasonic pulses, it has a certain opening Angle. From the lower edge of the transducer to the surface of the measured medium, there should be no obstacles in the area radiated by the emitted ultrasonic beam, so the installation should avoid the facilities in the tank as much as possible, such as: ladder, limit switch, heating equipment, bracket, etc. In this case, "false echo learning" is required during installation. In addition, it must be noted that the ultrasonic beam must not intersect with the feed stream. When installing the instrument, pay attention to: the highest material level shall not enter the measurement blind area; The instrument must be kept at a certain distance from the tank wall; The instrument is installed so that the transmitting direction of the transducer is as perpendicular to the liquid level as possible. Instruments installed in explosion-proof areas must comply with the national explosion proof danger zone installation regulations. The intrinsically safe shell is aluminum. This type of instrument can be installed in the explosion-proof requirements of the occasion, the instrument must be grounded.

- Graphic description



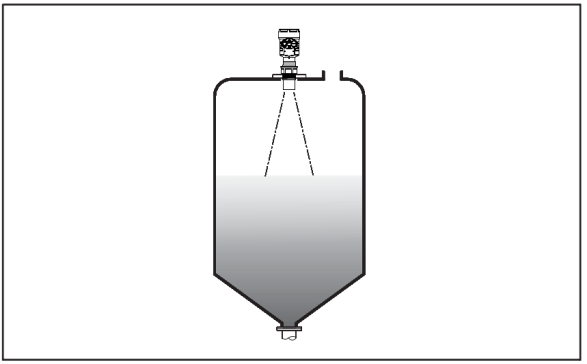
The datum for measurement is the lower edge of the probe.
1 Blind zone range (Menu 1.9)
2 Range Settings (Menu 1.8)
3 High Level adjustment (Menu 1.2)
4 Low Level adjustment (Menu 1.1)

- Installation position



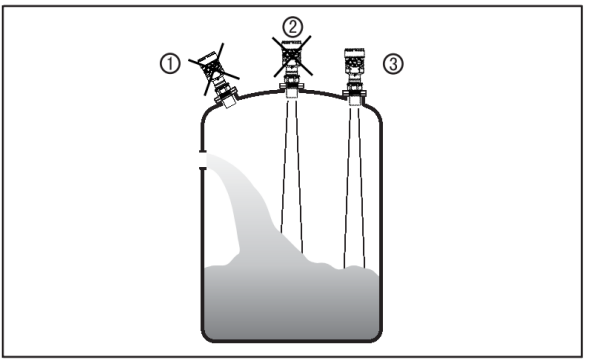
When installing ultrasonic, be careful to keep at least a certain distance from the container:
Range < 10m: L> 200mm
range > 10m: L> 500mm

1 datum
2 Center of container or axis of symmetry



For conical containers with flat tops, the best place to install the meter is in the center of the top of the container, which ensures measurement to the bottom of the container.

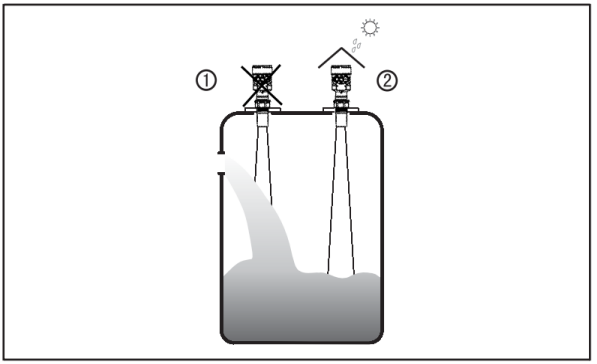
- Common installation positions correct or incorrect



1 Not OK: The sensor should be perpendicular to the surface of the measured medium.

2 Not OK: The sensor is installed on the arch or round tank top, which will cause multiple reflections and should be avoided when installing.

3 OK



1 Not OK: Do not install the meter above the feed flow to ensure that you are measuring the surface of the medium and not the feed flow.

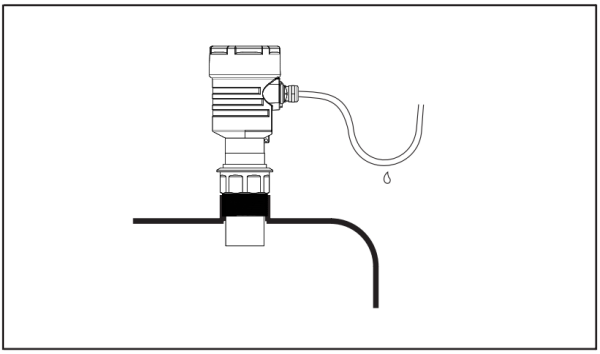
2 OK
Attention: outdoor installation should take shading and rain prevention measures.

- Installation mode description

Flange mounting

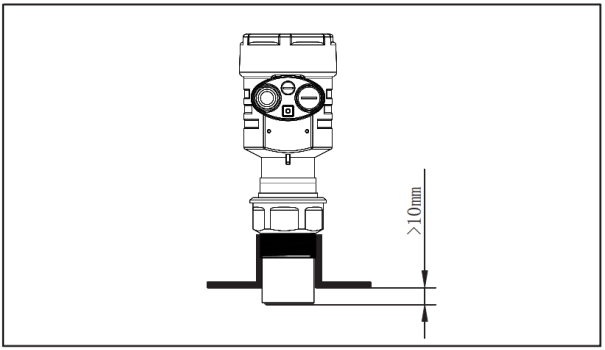
It is recommended to use a plastic flange to connect to the sensor during installation. If the flange is not threaded, place a gasket of the same inner diameter on the flange and on the lower flange, and then lock it with a matching nut.

- moisture-proof

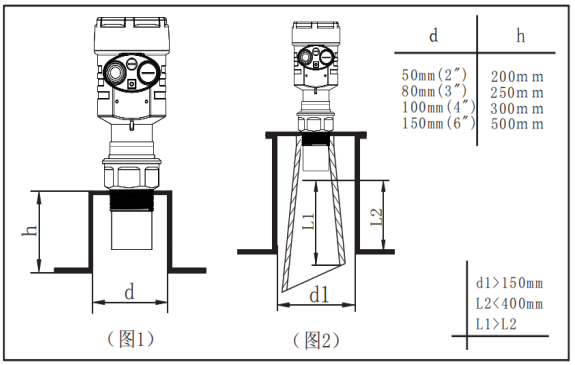


For sensors installed outdoors or in damp rooms and on cooling or heated tanks, the cable seal should be tightened to prevent moisture and the cable should be bent downward at the inlet. As shown below:

- Containers take over



Length of container nozzle: Ensure that the probe extends out of the nozzle at least 10mm

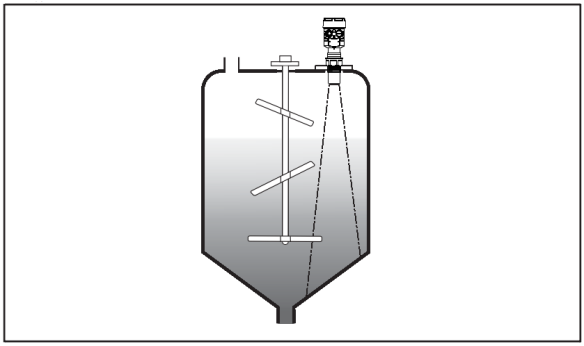


（图1）　（图2）

In the case of good reflection characteristics of the medium, when the diameter of the container nozzle is large, the nozzle length can be slightly longer than that of the transducer (figure 1).
The table on the right lists recommended values for lengths corresponding to different diameters of tubes.
In this case, the nozzle end must be smooth and free of burrs, rounding the nozzle end as much as possible. In addition, "false echo learning" must be performed.

When the reflection characteristics of the measured medium are not good, or the material level may reach to the blind area, so it is necessary to improve the installation position of the nozzle, the horn type waveguide installation mode can be used to increase the direction of the signal and reduce the influence of the nozzle on the measurement (Figure 2).

- Stirring



When there is stirring in the tank, the meter is installed as far away from the mixer as possible. After installation, "false echo learning" should be carried out in the stirred state to eliminate the false echo influence generated by the stirred blade. If foam or waves are generated due to stirring, wave guide tube installation should be used.

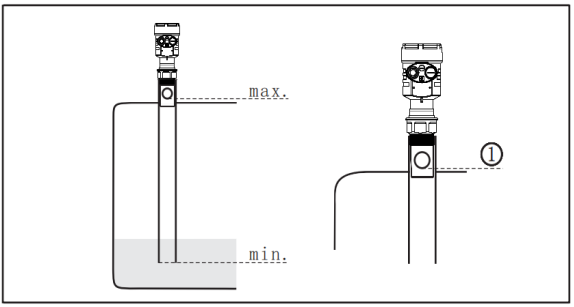
- Foam

Due to feeding, stirring or other processes in the container, foam will form on the surface of some liquid media and attenuate the emission signal. If the foam causes measurement errors, the sensor should be installed in the

guided wave tube, or the guided wave radar level meter should be used. The guided wave radar level meter, whose measurements are not affected by foam, is the best choice for this application.

- Air flow
  If there is strong airflow in the container, for example: outdoor installation, and it is very windy, or there is air turbulence in the container, the sensor should be installed in the guide tube, or the radar level meter or the guided wave radar level meter should be used.

- Wave guide tube installation



1 The diameter of the air hole (5~10) mm is installed using a guided wave tube (guided wave tube or bypass tube), which can avoid the influence of obstacles, foam and air eddy current in the container.

If the sensor is installed in the guided wave tube, the diameter of the guided wave tube should be greater than the outer diameter of the transducer (probe). Large cracks and welds must be prevented when connecting the waveguide tubes. In addition, "false echo learning" must be performed.

Note: When measuring adhesive media, do not use wave guide tube installation.

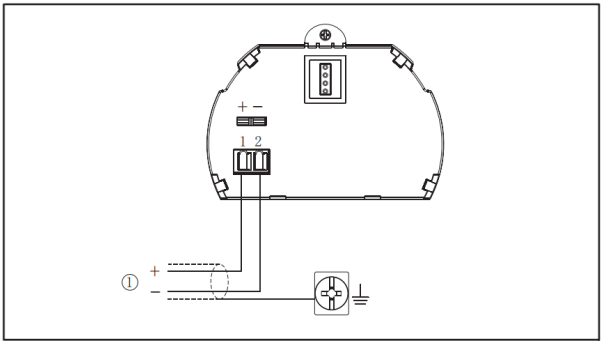
3.3. Electrical connection

★ When connecting the power supply, do not connect the AC to any other terminal except the AC terminal. Otherwise it will burn the instrument circuit or components.

- Power supply mode
  (4 ~ 20) mA/HART 2Wire power supply and output current signal share a two-core cable.

- Connection cable requirements
  The power supply cable should be shielded, and the outer diameter of the cable should be (5~9)mm to ensure the sealing of the cable inlet.

- Mode of connection



Two wire
①Power supply
and signal output

4. Instrument debugging

- Debugging methods

  This instrument has three debugging methods：

  1. Through the display screen, button on-site debugging
  2. Computer software debugging
  3. HART handheld programmer debugging

- Key function

  [ESC]Key： Exit the programming state and return to the next level menu

  [+] Key： Modify the parameter values and select the display mode

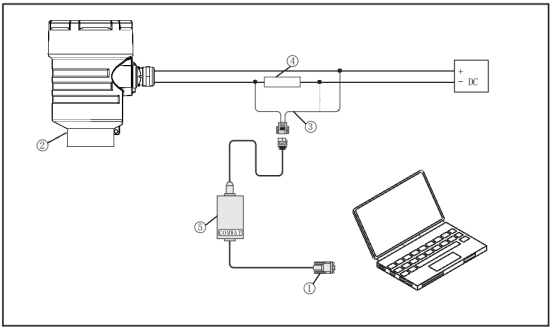
  [▶]Key： Select the edit item, select the edit parameter bit, and the content of the parameter item is displayed

  [OK]Key： Enter the programming state, confirm the edit item, confirm the parameter modification.

1 Key
2 LCD dispaly

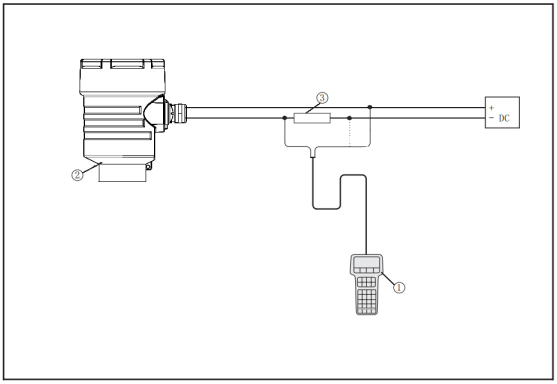
- Computer debugging

  It is connected to the host computer through HART



1 USB or RS232
2 Instrument
3 HART Adapter
4 250Ωresistor
5 Converter

- HART handheld programmer

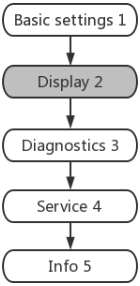


1 HART handheld programmer
2 Instrument
3 250Ω resistor

5. Menu structure

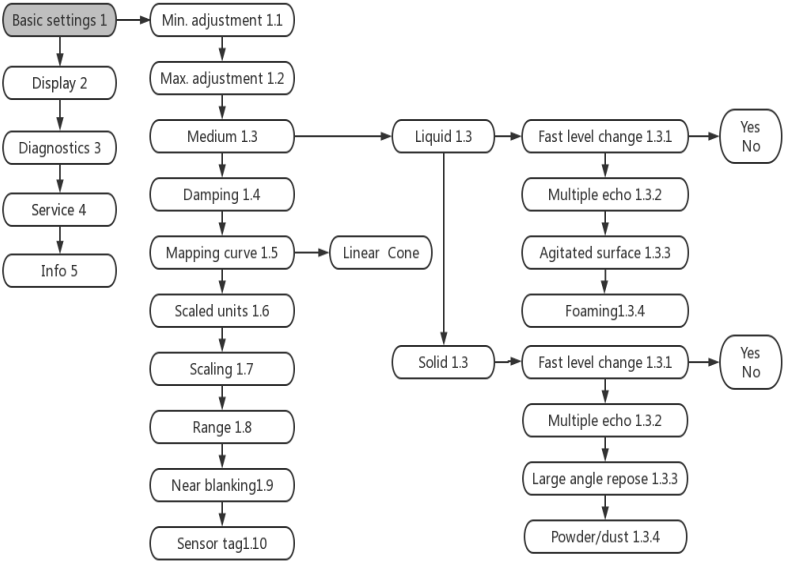
5.1. First level menu

Basic Settings, display, diagnosis, service, information. In the running state, press the OK key to enter the first-level menu, press the ▶ key to switch between menus, and press the OK key to enter the lower-level menu.



5.2. Secondary Menu - Basic settings

Basic Settings include the basic parameters of the instrument: low adjustment, high adjustment, material properties, damping time, output mapping, scalar unit, calibration, two-pass setting, blind zone range, sensor label.



The above is a list of several parameter setting methods, other parameter settings please refer to this operation method, and then not one enumeration.

5.2.1. Minimum adjustment

The low level adjustment is used for the range setting, which together with the high level adjustment determines the proportion of the linear correspondence between the current output. In the main menu, when the menu number is 1, press the OK key to enter the basic setting submenu, press the OK key to enter the programming low percentage, refer to the character/number parameter programming method in the previous parameter editing method to edit the percentage value and distance value. After editing, press OK key to confirm, press ESC key to give up programming.

5.2.2. Maximum adjustment

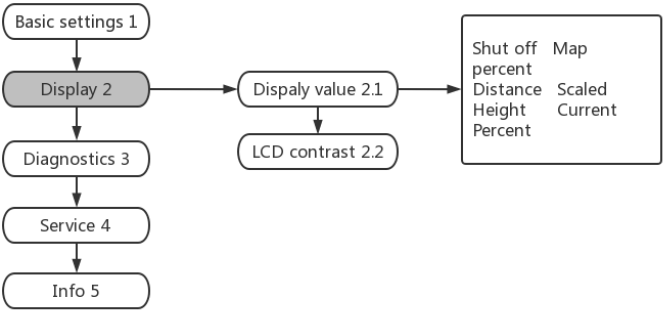
High adjustment is used for range Settings. Together with the low level adjustment, it determines the proportion of the linear correspondence of the current output. When the LCD menu number is 1.1, press the ▶ key to enter the high adjustment, at this time, press the OK key to edit the high adjustment.

5.2.3. Medium property

The Material Properties menu is used to select whether the material is solid or liquid, thereby further determining some other properties of the material that affect the measurement. When the LCD menu number is 1.2, press ▶ key to enter the material property programming, press OK key to enter the material level property selection menu, use ▶ key to move the arrow and select the material property as liquid or solid; Press 0K to confirm and enter the setting menu of level change speed of material characteristics.

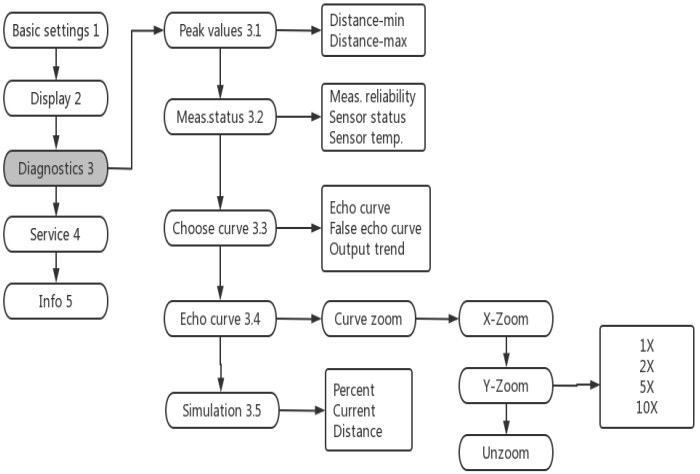
5.3. Secondary Menu - Display

Display Sets the display mode, display content and LCD contrast of the instrument.



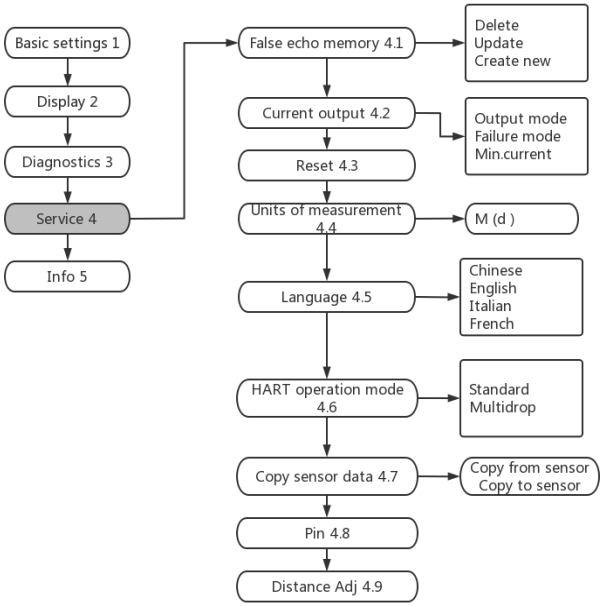
5.4. Secondary Menu - Diagnostics

Diagnosis Complete the inspection and testing function of the instrument. It mainly includes: measuring peak value, measuring state, selection curve, echo curve and simulation.



5.5. Secondary Menu - Service

Includes false echoes, current output reset, measuring units, language, HART, operating mode, copying sensor data, and Settings.



5.6. Secondary Menu - Information

Basic instrument information such as product model, serial number, production date, software version.