User's Manual

Ultrasonic level meter

U-PM-EN2

Preface

Thank you for purchasing our ultrasonic level transmitter. Please read this manual carefully before operating and using it correctly to avoid unnecessary losses caused by false operation.

Note

- Modification of this manual's contents will not be notified as a result of some factors, such as function upgrading.
- We try our best to guarantee that the manual content is accurate, if you find something wrong or incorrect, please contact us.
- This product is forbidden to use in explosion-proof occasions.

Version

U-PM-EN2

Safety Precautions

In order to use this product safely, be sure to follow the safety precautions described.

About this manual

- Please submit this manual to the operator for reading.
- Please read the operation manual carefully before applying the instrument. On the precondition of full understanding.
- This manual only describes the functions of the product. The company does not guarantee that the product will be suitable for a particular use by the user.

Precautions for protection, safety and modification of this product

- To ensure safety of this product and the systems it controls, Please read carefully the operation manual and understand the correct application methods before putting into operation, to avoid unnecessary losses due to operation mistakes. If the instrument is operated in other ways not described in the manual, the protections that the instrument give may be destroyed, and the failures and accidents incurred due to violation of precautions shall not be borne by our company.
- When installing lightning protection devices for this product and its control system, or designing and installing separate safety protection circuits for this product and its control system, it needs to be implemented by other devices.
- If you need to replace parts of the product, please use the model specifications specified by the company.
- This product is not intended for use in systems that are directly related to personal safety.Such as nuclear power equipment, equipment using radioactivity, railway systems, aviation equipment, marine equipment, aviation equipment and medical equipment.If applied, it is the responsibility of the user to use additional equipment or systems to ensure personal safety.

- Do not modify this product.
- The following safety signs are used in this manual:

Hazard, if not taken with appropriate precautions, will result in serious personal injury, product damage or major property damage.

Warning:Pay special attention to the important information linked to product or particular part in the operation manual.

- Confirm if the supply voltage is in consistent with the rated voltage before operation.
- Don’t use the instrument in a flammable and combustible or steam area.
- To prevent from electric shock, operation mistake, a good grounding protection must be made.
- Thunder prevention engineering facilities must be well managed: the shared grounding network shall be grounded at is-electric level, shielded, wires shall be located rationally, SPD surge protector shall be applied properly.
- Some inner parts may carry high voltage. Do not open the square panel in the front except our company personnel or maintenance personnel acknowledged by our company, to avoid electric shock.
- Cut off electric powers before making any checks, to avoid electric shock.
- Check the condition of the terminal screws regularly. If it is loose, please tighten it before use.
- It is not allowed to disassemble, process, modify or repair the product without authorization, otherwise it may cause abnormal operation, electric shock or fire accident.
- Wipe the product with a dry cotton cloth. Do not use alcohol, benzine or other organic solvents. Prevent all kinds of liquid from splashing on the

product. If the product falls into the water, please cut off the power immediately, otherwise there will be leakage, electric shock or even a fire accident.

- Please check the grounding protection status regularly. Do not operate if you think that the protection measures such as grounding protection and fuses are not perfect.
- Ventilation holes on the product housing must be kept clear to avoid malfunctions due to high temperatures, abnormal operation, shortened life and fire.
- Please strictly follow the instructions in this manual, otherwise the product's protective device may be damaged.

- Don’t use the instrument if it is found damaged or deformed at opening of package.
- Prevent dust, wire end, iron fines or other objects from entering the instrument during installation, otherwise, it will cause abnormal movement or failure.
- During operation, to modify configuration, signal output, start up, stop, operation safety shall be fully considered. Operation mistakes may lead to failure and even destruction of the instrument and controlled equipment.
- Each part of the instrument has a certain lifetime, which must be maintained and repaired on a regular basis for long-time use.
- The product shall be scrapped as industrial wastes, to prevent environment pollution.
- When not using this product, be sure to turn off the power switch.
- If you find smoke from the product, smell odor, abnormal noise, etc., please turn off the power switch immediately and contact us in time.

Disclaimer

- The company does not make any guarantees for the terms outside the scope of this product warranty.
- This company is not responsible for damage to the instrument or loss of parts or unpredictable damage caused directly or indirectly by improper operation of the user.

No.	Name	Quantity	Note
1	Ultrasonic level transmitter	1	
2	Manual	1	
3	Certificate	1	

After opening the box, please confirm the package contents before starting the operation.If you find that the model and quantity are incorrect or there is physical damage in appearance, please contact us.

Contents

Chapter 1 Introduction

Ultrasonic level meter (for material and liquid level measurement) is a non-contact highly reliable and cost-effective material level measuring instrument which is easily installed and maintained.The is a smart instrument independently developed by Supmea and can meet most level measurement requirements without contacting the medium.

1.1.Operating principle

The ultrasonic wave is reflected when it meets the interface of liquid medium (solid medium) with different density, and the transmission time is measured to measure the liquid level / distance.

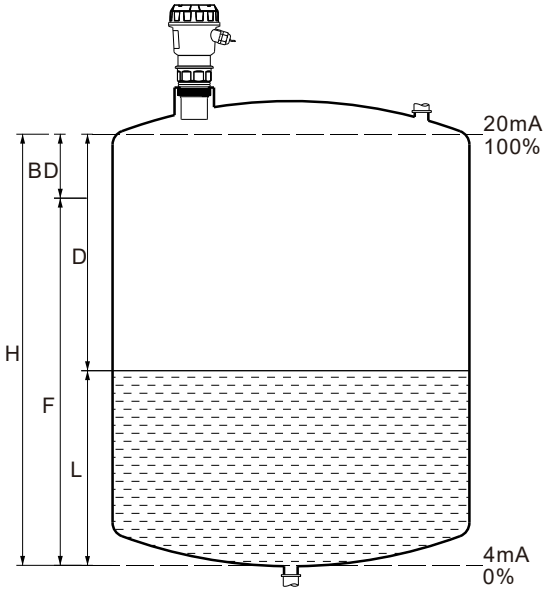


Fig.1 Measuring principle

BD: Blind distance H: Installation height F: Measuring range

D: The distance from probe emitting surface to material surface L: Level

1.2. Main Parameters

Table 1 Main Parameter

Display	2-inch black and white LCD with 128*64 resolution
Installation method	Threaded mounting/flange mounting
Ingress protection	IP65
Measuring variable	Level / Distance
Measuring range	(0~5) m / (0~10) m
Accuracy	±0.5% FS
Resolution	1mm or 0.1%FS (maximum)
Blind area	≤0.35m
Temperature compensation	Automatic temperature compensation with temperature calibration function
Ambient temperature	(-20~60) ℃
Storage temperature	(-20~70) ℃
Relative humidity	10%~85% (no condensation)
Language	Chinese/English
Current output	(4~20)mA can set the measuring range of corresponding object position/distance, the maximum load is 500Ω, and the output accuracy is 0.2%FS
Communication	Isolated RS485 Modbus-RTU Communication Protocol (Optional)
Relay output	Two independent normally open contacts with high/low setting (Hi/Lo) and 250VAC 3A Max contact capacity (optional)
Power supply	(18~28) VDC
Power consumption	5W

1.3.Product advantage

- LCD dot matrix display, simple operation
- Precision filtering algorithm to eliminate false measurement
- Selection of algorithms for various working conditions to ensure measurement accuracy
- Piezoelectric wave impact safety protection
- Automatic sound velocity and temperature compensation
- Echo curve display is helpful for field debugging and fault detection.
- Self-checking function, rich self-checking information, convenient for users to repair and debug
- Independent password function, factory and calibration can set different levels of passwords for easy management.
- A variety of display units are available
- The measuring range ratio is expanded to prevent the measured value from exceeding the measuring range and causing misjudgment.

Chapter 2 Installation

Please read this section when installing this product.

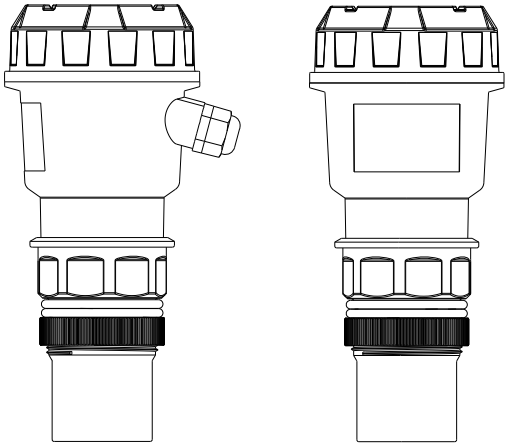
Installation precautions

- The installation method of this product is threaded installation/flange installation.
- In order to prevent the internal temperature of this product from rising, please install it in a well-ventilated location .

Avoid the following location during installation

- Location where sunlight directly hits and near hot appliances
- Location where the ambient temperature exceeds 60℃ during work
- Location where the ambient humidity exceeds 85% at work
- Near the electromagnetic generation source
- Location with strong mechanical vibration
- Location with high temperature changes and easy condensation
- Location with high quantities of lampblack, steam, moisture, dust and corrosive gases

2.1. Dimension



Side view　　Front view

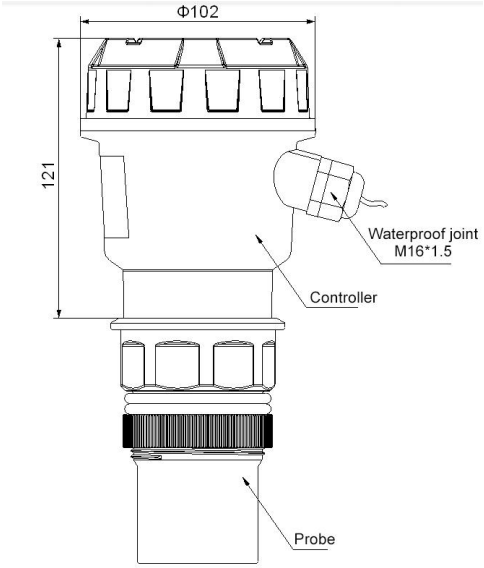


Fig.2 M60×2 or G2 Thread Sensor

2.2. Installation guide

2.2.1. Measuring liquid

（1）Flat-top tank

Flat-top tanks generally have a very short nozzle. The reference surface of the nozzle is the bottom surface of the flange. When the length of the nozzle is ≤60mm, the inner diameter of the nozzle is ≥100mm, and the inner wall of the nozzle is flat without burrs or protrusions, the probe is installed after installation. The emission surface can be measured 3cm below the bottom surface of the flange.

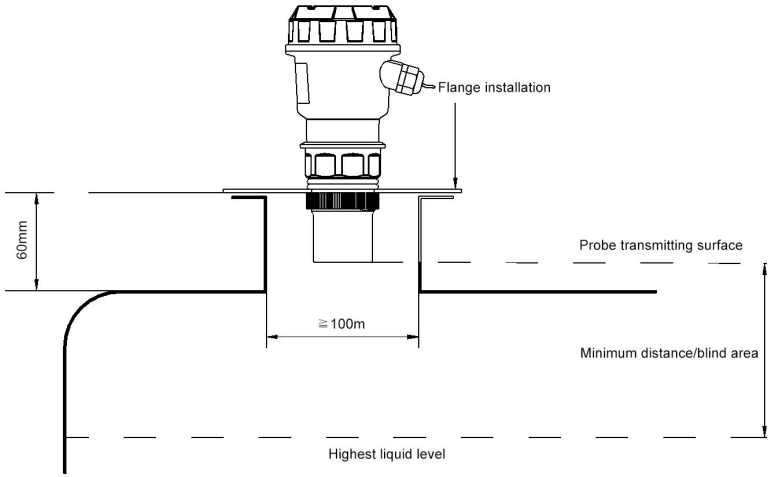


Fig.3 Flange installation - installed in a short nozzle

The most ideal installation is to directly install the instrument on a flat-top container. Without using a nozzle, the circular opening on the container can be sufficient to fix the flange or universal joint for installation. The emitting surface of the probe is below the reference plane.

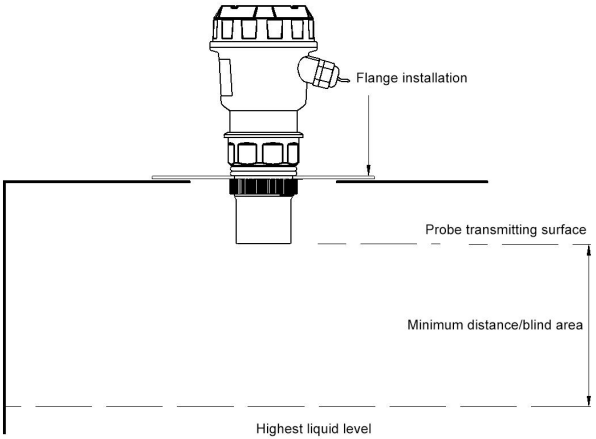


Fig.4 Flange Type (Locking Flange)-Installed on Flat Top Tank

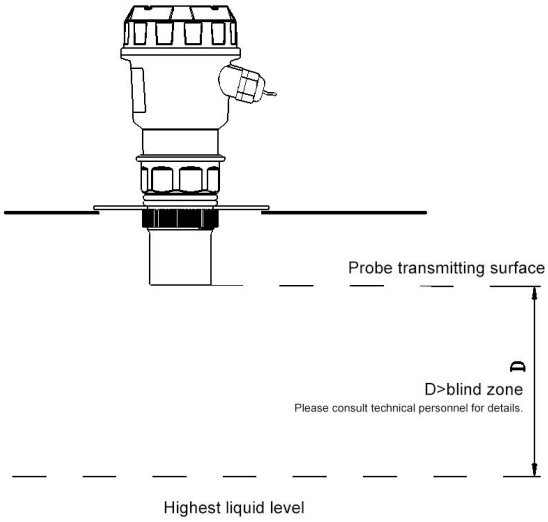


Fig.5 Flange type is installed on flat head tank without nozzle

It is installed on the same threaded nozzle as the probe. In this case, the internal diameter of the nozzle is almost the same as the external thread of the probe. The

emitting surface of the probe must extend more than 1cm beyond the nozzle and cannot be retracted into the nozzle.

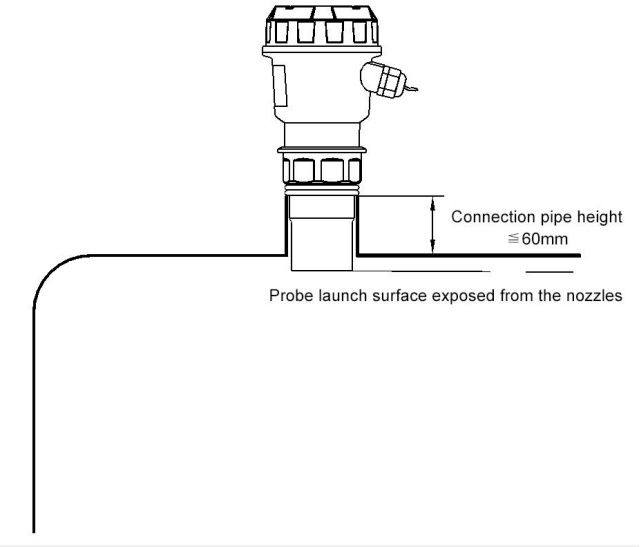


Fig.6 The probe is mounted on the threaded nozzle.

（2）Arched tank top

For arched tanks, it is better to install the instrument not at the center of the tank top, but at 1/2 or 2/3 of the radius of the tank top (on the premise of satisfying a certain distance from the tank wall). For ultrasonic pulses, the dome-shaped tank top is like a convex lens. If the probe is mounted on the focal point of the convex lens, it will receive all false echoes. Therefore, it should be avoided as far as possible to install the sensor probe in the center of the dome-shaped tank top.

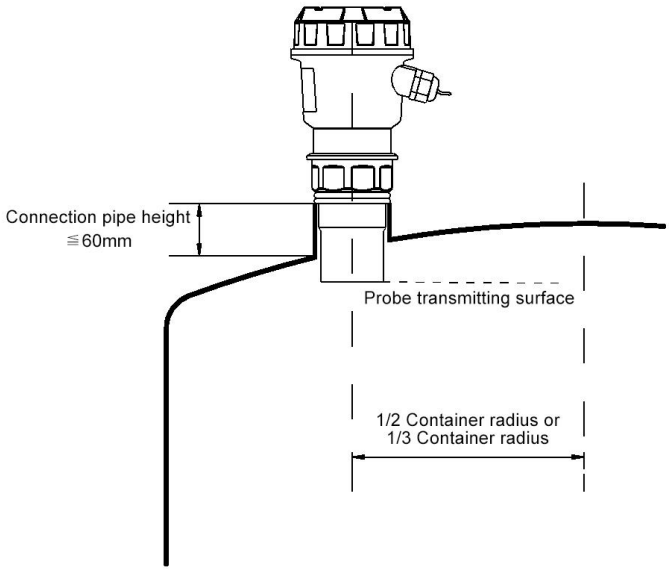


Fig.7 Installed on threaded nipple-dome roof

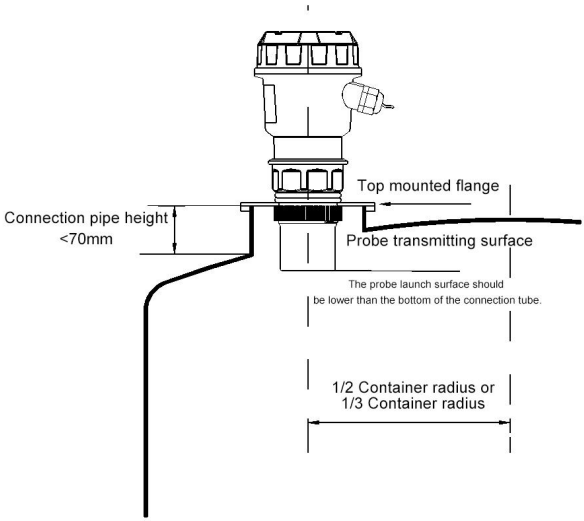


Fig.8 Installed on flange-dome roof

On the top of most arched tanks, the length of the nozzle plus flange is 150-180mm, while the probe thread in ultrasonic level meter is not as long as this (the extended probe can be customized to our company so that the emitting surface of the probe is lower than the bottom of the nozzle). Under such circumstances, we need to pay attention to the proportional relationship between the diameter and length of the nozzle.

Table 2

NO	nozzle length	Minimum size of nozzle Inner diameter	Remarks
1	150mm	100mm	The inner wall of the nozzle is free of burrs and bulges, vertical from top to bottom, and the welding seam must be polished. The joint between the nozzle and the tank top shall be polished at an oblique angle of 45℃ from the inside to the outside of the nozzle.
2	200mm	150mm	
3	250mm	180mm	
4	300mm	220mm	
5	400mm	280mm	

（3）Open tank

For open tank, the bracket can be used for installation. Attention should be paid to the bearing capacity of the bracket to keep a certain distance between the sensor and the container wall. If the inner wall of the open tank or silo is flat up and down, no hanging occurs, and no other objects are on the inner wall, then the distance between the sensor and the container wall is shown in the following table:

Table 3

Maximum range	Minimum distance from wall	Maximum range	Minimum distance from wall
5m	0.5m	10m	1.0m

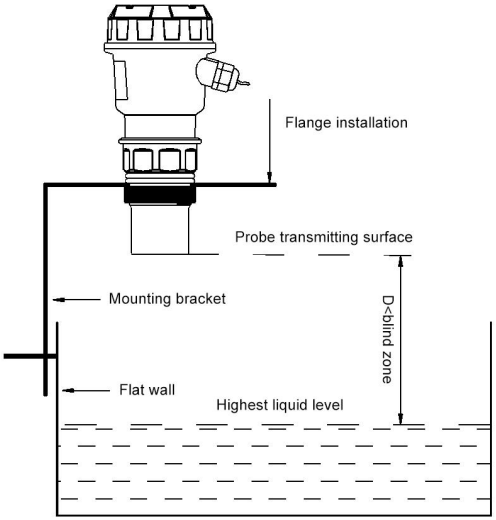


Fig.9 On the open tank - the top is mounted on one side bracket.

Since the open tank has no focusing effect, the sensor can be installed in the middle of the container.

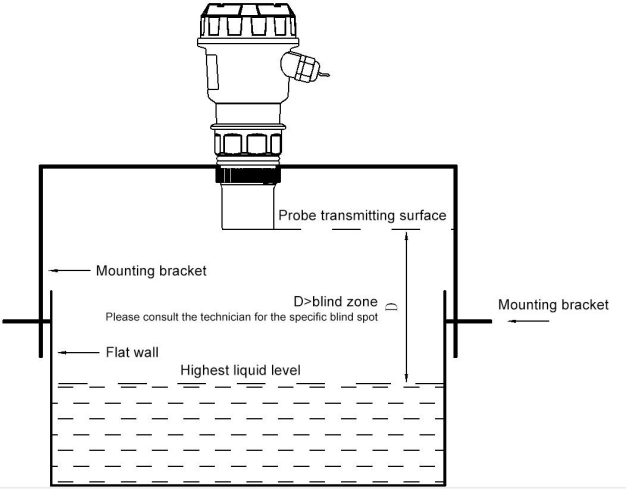


Fig.10 On Open tank -Top Center Bracket Installation

（4）Drainage wells and ordinary wells

Drainage wells are usually narrow in shaft and wellhead, and the borehole wall is uneven, which makes ultrasonic measurement very difficult. This problem can be solved by installing a section of nozzle or installing the entire measuring sleeve. It should be noted that after the sensor is placed in the nozzle, the blind area will increase by about 50 ~ 100%, and the factor of increasing the blind area should be taken into account.

Therefore, if the original probe blind area is 0.50 meters when the nozzle is used, the blind area will increase to 1.00 meters when the nozzle is placed inside the nozzle.

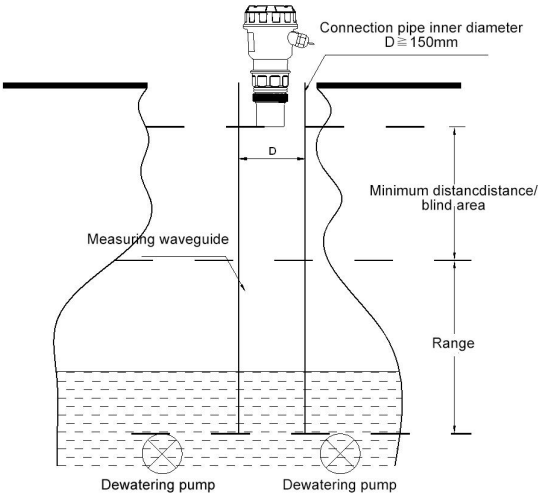


Fig.11 Nozzle used for measuring drainage well.

Ordinary water wells (including water source wells and deep water wells) generally have small diameters, and measuring sleeves can be installed to achieve the best measuring effect. The inner wall of measuring sleeves must be smooth (e.g. PVC or PE waste water pipes) and the inner diameter ≥150mm (within the measuring range of 4 meters). If the takeover exceeds 4 meters, the manufacturer shall be consulted. As long as the measuring nozzle can be kept clean, free of adhered media and free of seams inside, measurement can be made. The measuring

sleeve shall be soaked in the medium all the time so as to ensure accurate measurement in the measuring nozzle.

2.2.2. Solid measurement

（1）Flange mounting

Like measuring liquid medium, the instrument can be installed on the butt flange of the container nozzle. Since the reflection surface of the solid is different from that of the liquid and is not a plane, this problem should be considered during installation. The emitting surface of the probe should be perpendicular to the surface of the solid to be measured, and the probe should be able to protrude from the nozzle.

In the field of measuring solid, if the probe is retracted into the nozzle, the measured data will jump or "wave drop" will occur in most cases.

In order to solve this problem, a universal flange can be selected, so that as long as the flange is rotated, it is easy to align the emitting surface of the probe with the solid reflecting surface to be measured.

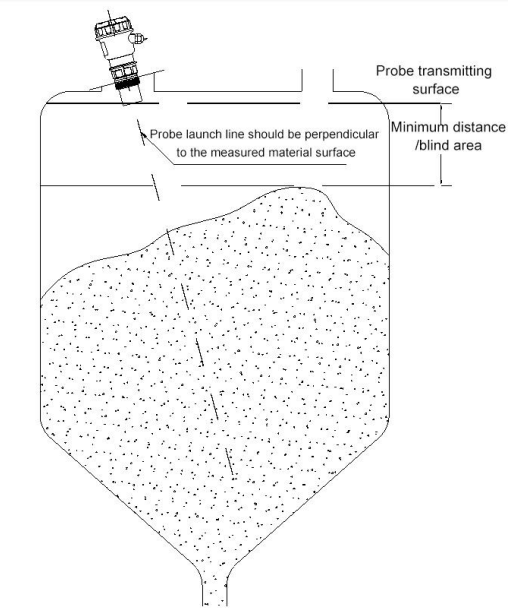


Fig.12 Installed on container flange

（2）Threaded pipe installation

When installing with a threaded nipple, the probe must be exposed more than 2cm from the bottom of the nipple.

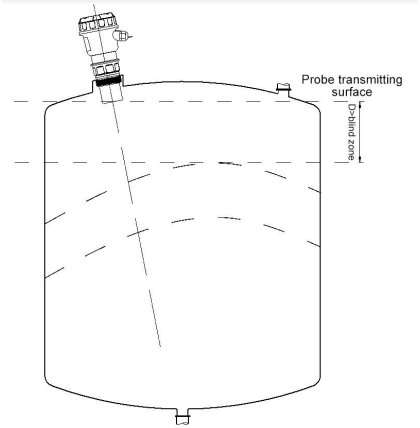


Fig.13 Threaded pipe installation

（3）Installation of frame type

Gantry frame type installation can be adopted in open tank, and the axis of the nozzle must be aligned with the container outlet or perpendicular to the medium surface.

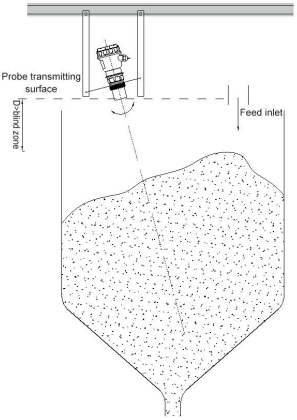


Fig.14 Installation of frame type

During the installation of the open-air material pile, the large open-air material pile needs to be measured by a plurality of meters, the meters can be fixed on the lifting frame, and the sensor probe should be aligned with the surface of the medium.

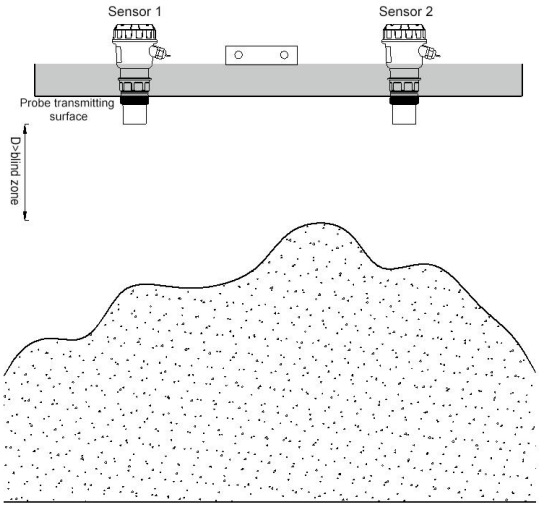


Fig.15 Measurement of open-air material pile-installation on lifting frame

2.2.3. Measuring nozzle extension method

A minimum distance between the probe of the ultrasonic level meter and the surface of the medium to be measured needs to be maintained, which is commonly referred to as blind area. However, sometimes the minimum distance cannot be guaranteed on site, so it is necessary to install an extended nozzle on the container.

（1）How to extend the nozzle.

The inner wall of the nozzle shall be kept smooth, and the nozzle shall not be immersed in the medium to prevent the medium from polluting the nozzle or adhering to the inner wall of the nozzle.

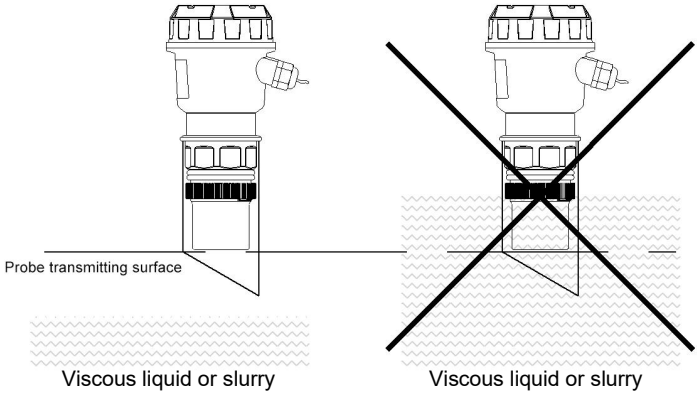


Fig.16 nozzle cannot be soaked in adhesive medium

If it is a non-adhesive medium, the extension pipe can be soaked in the medium for a long time (if it cannot be corroded by liquid or foreign matters can not adhere to the inner wall of the pipeline), so the measurement will be more accurate, because the measurement will not be affected by other devices in the container. The inside diameter of the nozzle should be as large as possible, and the chamfer-ed cut should be kept smooth. The relationship between the nozzle height L and the nozzle inner diameter φ in the following figure is shown in the following table.

Table 4

NO	Nozzle length	Minimum size of nozzle Inner diameter φ	Remarks
1	150mm	100mm	The inner wall of the nozzle is free of burrs and bulges, vertical from top to bottom, and the welding seam must be polished. The joint between the nozzle and the tank top shall be polished at an oblique angle of 45℃ from the inside to the outside of the nozzle.
2	200mm	120mm	
3	250mm	150mm	
4	300mm	180mm	
5	400mm	240mm	

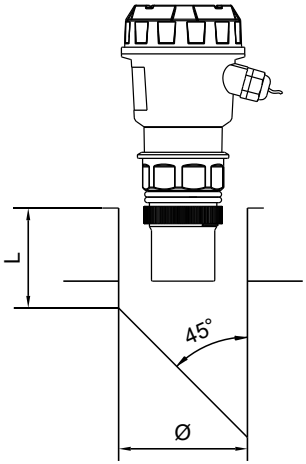


Fig.17 Extension nozzle not immersed in medium

If the extension nozzle is installed from the top of the tank to the bottom of the tank, please refer to the following table for the relationship between the inner diameter of the nozzle and the distance measured by the sensor.

Table 5

Maximum range	The minimum inner diameter of the nozzle can be larger than this inner diameter.	Maximum range	Minimum internal diameter of nozzle
5 m	150mm	10m	200mm

（2）Measure how long the solid connection is extended.

If it is measuring solid medium, unlike measuring liquid, it is necessary to use a tapered extension pipe with an angle of 25°～30°.

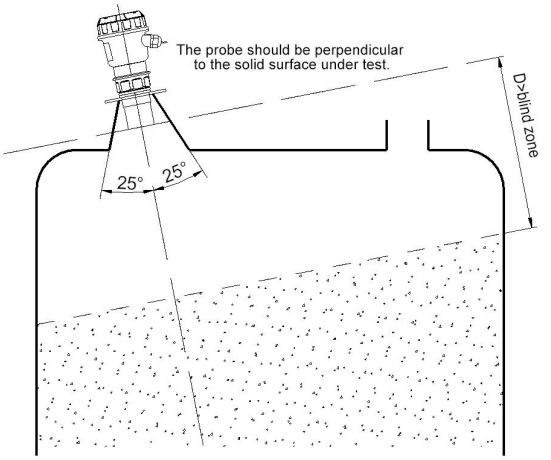


Fig.18 Extension nozzle for measuring solid medium

2.2.4. False echo blocking method

（1）Device and Installation in Container

When installing the sensor, care must be taken not to have other devices or materials blocking the ultrasonic beam. Protrusions on the inner plane of the container or obstacles like steps will have a great impact on the measurement. A refraction plate can be blocked at the protrusion to refract the false echo, thus ensuring the accuracy of the measurement.

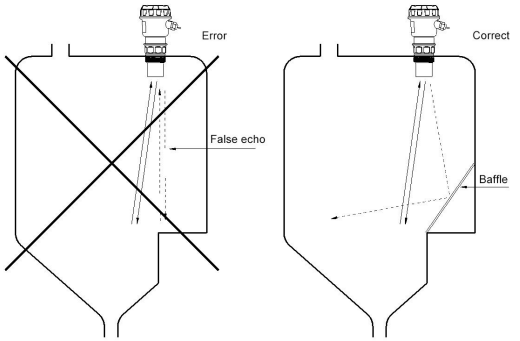


Fig.19 Step-like obstacles in the container-need to add inclined horizontal plates to refract false echoes away

If the upper surface of any object on the lower part of the container is flat, it must be blocked by a refraction plate with a certain angle for water inlet of various media.

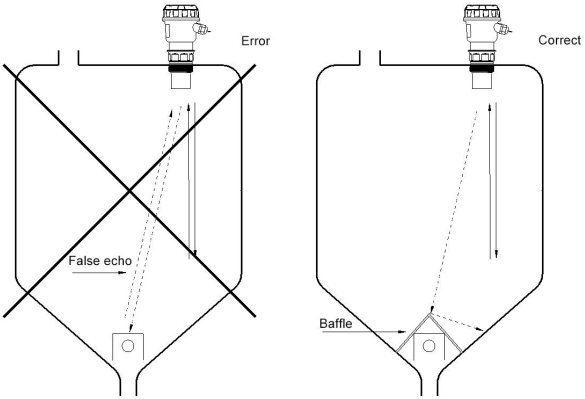


Fig.20 A projection with a flat top at the bottom of the container-a refracting plate should be added.

Devices inside the container, such as pipes and brackets, will affect the measurement. In the design of measuring points, attention must be paid to the fact that there cannot be other devices within the diffusion range of ultrasonic signals.

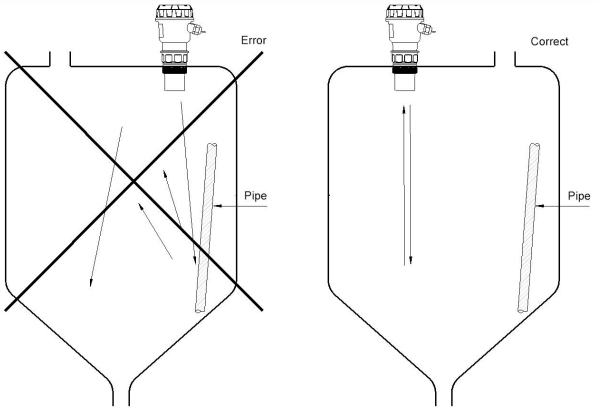


Fig.21 Obstacles in containers-pipes

The container wall has adherents-a certain distance from the adherents

（2）Common installation errors

① Bubble

If the bubbles on the surface of the medium are large and the bubble layer is thick, measurement errors will be caused and even reflected ultrasonic waves will not be received. Please take measures to prevent bubble generation, or install the sensor in the bypass pipe for measurement. Other measuring instruments can also be used, such as radar level gauge or magnetostrictive level gauge.

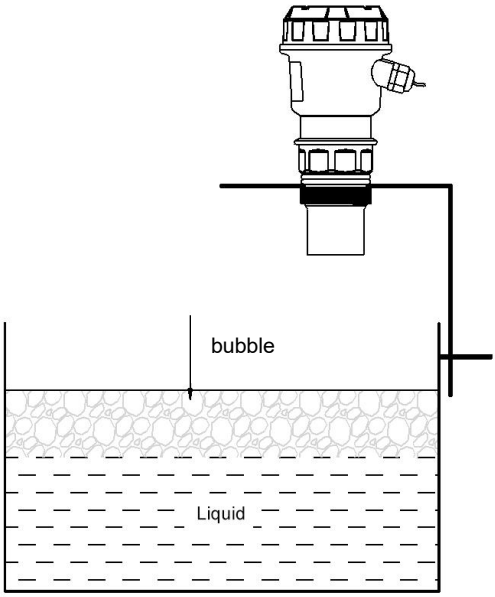


Fig.22 Location with bubbles

② The sensor installation direction is wrong

If the sensor is not installed on the surface of the medium, the measurement signal will be weakened. In order to ensure the best measurement effect, please align the axis of the sensor with the surface of the medium, that is, perpendicular to the surface of the measured interface.

③ Installed in a position with large temperature change

In locations with large temperature changes, such as intense solar radiation, measurement errors will be caused. This error will increase by 2-4% over the original measurement accuracy. Please install a sun visor to solve this problem.

④ The minimum distance to the medium is less than the blind area

If the distance between the probe and the highest position of the medium is smaller than the blind area of the meter, the measured values are all wrong.

⑤ The sensor is too close to the container wall

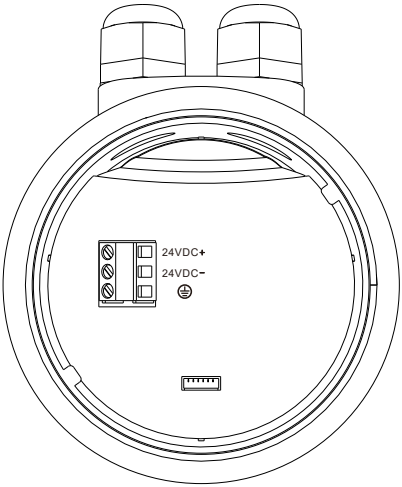
If the sensor is installed too close to the container wall, it will produce strong false echo. The uneven inner surface of the container wall, the adhered medium, rivets, screws, reinforcing ribs and welds on the inner wall of the container will all cause strong false echoes, which will be loaded on the effective echo signals. Therefore, please note: keep the distance between the sensor and the container wall according to the maximum distance to be measured. See the details in the figure below.

Table 6

Maximum range	Minimum distance from wall	Maximum range	Minimum distance from wall
5m	0.5m	10m	1.0m

For more severe measurement conditions, the distance between the sensor and the container wall should continue to be enlarged until no false echo appears.

2.3. Wiring



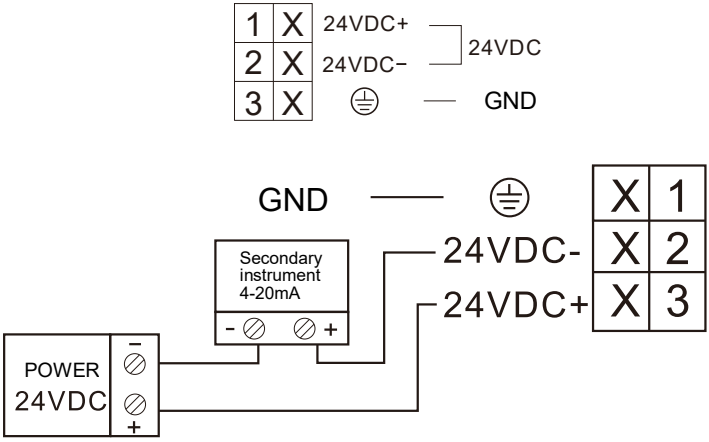


Fig.23 2-wire integrated type dimension

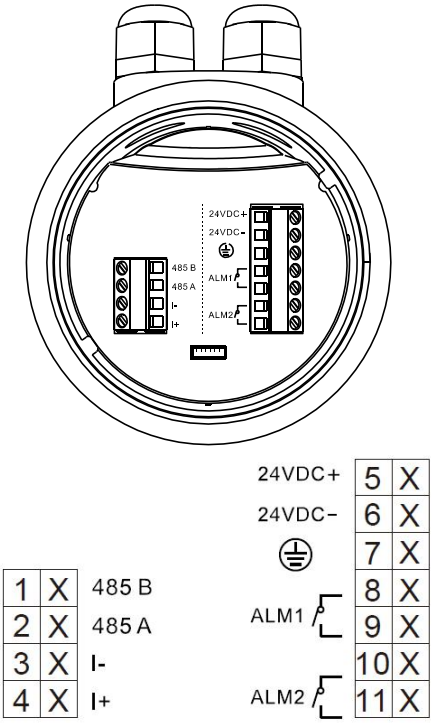


Fig.24 3-wire /4-wire integrated type dimension

1/2: 485 B/A:RS485 output B/A

3/4: I-/I+:(4~20)mA output -/+

5/6: 24VDC +/-:24V 3-wire/4-wire power supply +/-

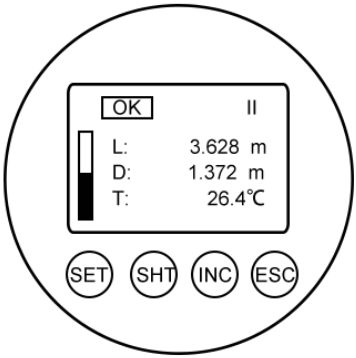
7: GND

8/9: ALM1:Alarm 1

10/11:ALM2:Alarm 1

Chapter 3 Navigation keys

3.1. Menu



Note: It takes about 30 seconds to prepare this product from start-up to normal measurement.

3.2. Navigation keys

Table 7

Identification	Name	Function
SET	Set key	1. Enter the parameter setting
		2. Switch to display each parameter item
		3. Confirm and save the new parameter values after modifying and setting the parameters
SHT	Shift key	1. Move the cursor position
		2. In the main menu interface, select the setting parameter item down
INC	Upward key	1. Make the parameter cursor position cycle from 0 to 9 or switch options
		2. Select the setting parameter item upwards in the main menu interface
ESC	Exit key	1. Exit the parameter setting interface and return to the main interface

Chapter 4 Menu and operation

● **Main menu**

Press the SET key to enter the main menu, as shown in the following figure:

<table>
<tr><td>1.Display unit
2.Com Setting
3.User parameter
4.Factory Param.
5.Calibration
6.Password
7.Self-diagnosis</td><td>In the main menu interface, you can move the cursor up and down by pressing the INC key or SHT key to switch the cursor to the parameter item to be modified, and then press the SET key to enter. The factory parameters and calibration settings can only be entered by entering the correct password. You can return to the main interface by pressing the ESC key.</td></tr>
<tr><td colspan="2">Display unit</td></tr>
<tr><td>1. Display unit
2. Com Setting
3. User parameter
4. Factory Param.
5. Calibration
6. Password</td><td rowspan="3">Level units: m, dm, cm, mm, in, ft, yd.
Degree-day: Available in Celsius (℃) and Fahrenheit (℉).
During operation, press SHT key to select, press INC key to modify, ESC key to cancel modification and return to the previous menu, SET key to confirm modification and return to the previous menu. (If no special instructions are given for other interfaces, the key operation is consistent)</td></tr>
<tr><td>【SET】
▼</td></tr>
<tr><td>Level unit: m
Temp unit:℃</td></tr>
</table>

<table>
<tr><td colspan="2">Communication parameters</td></tr>
<tr><td>1. Display unit
2. Com Setting
3. User parameter
4. Factory Param.</td><td rowspan="3">RS485 communication parameter setting
Table number: 1-254 can be set.
Baud rate: 1200, 2400, 4800, 9600, 19200 and 38400BPS are optional.
Verification: None, even and odd verification are optional.
Byte order: the floating number is specified to represent the time byte order.
Communication connection refers to 485 communication instructions.
(Note: 485 is optional)</td></tr>
<tr><td>【SET】
▼</td></tr>
<tr><td>Device ID: 001
Baud rate: 2400
Parity: None
Endian: 3412</td></tr>
<tr><td colspan="2">User parameters</td></tr>
<tr><td>1. Display unit
2. Com Setting
3. User parameter
4. Factory Param.</td><td>Measurement mode: level measurement and distance measurement are optional.</td></tr>
<tr><td>【SET】
▼</td><td></td></tr>
<tr><td>Measure mode:
Level</td><td>The output of the failure state is the current output when the ultrasonic level meter is in abnormal state, and can be selected from hold, set, maximum and minimum values. The maximum value corresponds to 22mA</td></tr>
</table>

【SET】 ▼	current output and the minimum value corresponds to 3.6mA output.
Safe level: Hold	
【SET】 ▼	
Height: 05.000 m	The installation height must be set when the measurement mode selects level measurement. The installation height is the distance from the ultrasonic probe to the lowest measuring point. When the instrument is running, the level = installation height-measuring distance.
【SET】 ▼	
Damping: 00 S	Damping time is ultrasonic sensing stabilization time, which can be set for 0~99 seconds, and the larger the stabilization time is, the longer the stabilization time is.
【SET】 ▼	
Tank shape: No celling Medium property	According to the measurement conditions, the corresponding measurement mode is selected, and the system will select different algorithms and working modes according to the unable conditions to make the system run in the best state. The shape of the tank body can be selected from open tank, bypass pipe, guide wave pipe, dome tank and flat top tank. The properties of the medium are liquid and solid.

【SET】 ▼	
Process cond: Stand Liquid	According to the measured working conditions, the corresponding process conditions are selected, and the system will select different algorithms and working modes according to the unable working conditions to make the system run in the best state. Process conditions include standard liquid, calm liquid level, disturbed liquid level, stirrer, rapid change, standard solid, solid dust, conveyor belt and test options. Standard liquid and standard solid are selected by default. The test option is used for field debugging and there is no algorithm for various working conditions.
【SET】 ▼	
Range: LRU: 00.000 m URU: 05.000 m	The current output range is set, with the low position corresponding to the value of 4mA current and the high position corresponding to the value of 20mA current.
【SET】 ▼	
Alarm1: None ON: 00.000 m OFF: 00.000 m	There are three alarm modes, high alarm, low alarm and no alarm. When high alarm is selected, when it is greater than the power-on alarm value, the power supply alarm output is turned on, and when it is less than the power-off alarm value, the power supply alarm is turned off. When low alarm is selected and is less than the power-on alarm value, the power supply alarm

	output is turned on, and when it is greater than the power-off alarm value, the power supply alarm is turned off. (Note: Alarm is optional）
【SET】 ▼	
Alarm2: None ON: 00.000 m OFF: 00.000 m	Alarm channel 2 is set with reference alarm channel 1. (Note: Alarm is optional)
【SET】 ▼	
Reset YES NO	When the working parameters of the instrument are wrong and cannot work normally, the instrument can be reinitialized by restoring the factory parameters. Note: Restoring factory parameters requires on-site debugging. Please operate carefully!
Factory Setting	
1.Display unit 2.Com Setting 3.User parameter 4.Factory Param. 5.Calibration	Enter the factory parameters by entering the password. Enter the correct password and press SET. If the password enters the next interface correctly, the password error will exit the main interface directly. Factory parameters must be changed and set by professionals, and non-professionals should not move. When instruments are part of
【SET】 ▼	

Face. Setup pwd： 0*****	other systems, it is forbidden to modify factory parameters during system operation.
【SET】 ▼	
Sensor Freq.: 50 kHz Blocking dist.:	The frequency of the sensor is the working frequency of the ultrasonic probe, and the setting range is 15-50kHz. The near blind area is the closest distance measured by the meter. When the instrument works and the measurement enters the near blind zone, the display value is 0.
【SET】 ▼	
Far threshold: 000 Near threshold:	The far threshold is the echo confirmation value when far away from the near blind area, and the near threshold is the echo confirmation value near the near blind area. When the instrument works, the echo threshold value exceeds this value and is confirmed as valid echo; otherwise, the wave is lost. The far threshold value is set between 0 and 255, and the near threshold value is set between 150 and 250. This parameter can be adjusted by professionals according to the site conditions, or the far threshold value can be set to 0 as the automatic threshold value of the instrument. The near threshold value must be set.
【SET】 ▼	

Measure range: 06.000 m	The measuring range is the maximum value measured by the instrument. Echo meters beyond this range will not be collected. It must be set according to the parameters of the ultrasonic probe, otherwise it will affect the normal operation of the instrument.
【SET】 ▼	
Level sensor: Zero: +0.000 m Coe: 1.0000	Because the inherent parameters of each probe are different, the sensor should be linearized and corrected at the factory. The method is to measure a standard distance of, for example, 1.1 meter, record the instrument display value of 1.14, then measure a standard distance of, for example, 3.0 meter, and record the instrument display value of 3.05, with the coefficient calculated as (3.05-1.14)/(3.0-1.1) 0.9947 and the zero point of 1.1-1.14*0.9947 -0.034. This parameter is factory calibration parameter and is not allowed to be changed after leaving the factory.
【SET】 ▼	
Reset YES NO	Save the factory parameter settings, select "Yes" and press the SET key to save the set parameters as factory parameters, which can be used to restore the parameters when the parameters are abnormal.

<table>
<tr><th colspan="2">Calibration settings</th></tr>
<tr><td>2. Com Setting
3. User parameter
4. Factory Param.
5. Calibration</td><td rowspan="3">To enter calibration settings, you need to enter a password. Enter the correct password and press the SET key. If the password enters the next interface correctly, the password error will exit the main interface directly. Calibration parameters must be changed and set by professionals. Non-professionals should not move. When the instrument is part of other systems, it is forbidden to modify calibration parameters during system operation.</td></tr>
<tr><td>【SET】
▼</td></tr>
<tr><td>Calibration pwd:
0***</td></tr>
<tr><td>【SET】
▼</td><td></td></tr>
<tr><td>1 Output: 4mA
Measure: 00.0000</td><td>Current calibration. When the current output has deviation, the current output can be calibrated through this interface. Relevant measuring instruments such as multimeter shall be prepared for calibration. Please do not calibrate current without measuring instruments. Calibration current: Select 4mA, then input the data measured by the standard instrument into the measured current value, move the cursor to 4mA, press INC to select 20mA, then input the data measured by the standard instrument into the measured current value, press SET to change the item, and the current zero point and current coefficient can be seen at the next interface. Calibration must be performed at the same time for 4mA and</td></tr>
</table>

	20mA, otherwise, the calibration fails.
【SET】 ▼	
I Zero: + 0.0000 I coe: 1.0000	The zero point and coefficient of current calibration, and the value calculated by the instrument during current calibration. (Note: During operation, please do not arbitrarily change the value here, which will affect the accuracy of current output)
【SET】 ▼	
Temp. zero: + 00.00 Temp. coe: 1.000	The zero point and coefficient of temperature calibration are used to correct the measurement error of temperature sensor. (Note: Please do not arbitrarily change the values here during the operation, which will affect the temperature measurement accuracy and level measurement accuracy)
【SET】 ▼	
Calib sound speed: 00.000 m S: 347.5m/s D: 0.43m	Sound speed calibration requires a standard distance measuring instrument. Given a distance, enter the standard measurement value into the value in the second row. The distance in the fourth row displays the measured value of the instrument. Press SET key to prompt successful or failed calibration. (Note: Considering the accuracy of sound velocity calibration, calibration can only be carried out when the distance is greater than 1 meter. In addition, please do not arbitrarily change the value here during operation, which will affect the accuracy of level measurement)

【SET】 ▼	
Set bias: +00.000 m	Offset, by setting the offset, the measured value can be offset. Setting it to a positive number will increase the measured distance value and a negative number will decrease the measured distance value. The maximum offset setting is 15m. Exceeding this value will prompt setting failure.
Password setting	
3. User parameter 4. Factory Param. 5. Calibration 6. Password 7. Self-diagnosis	In the password modification interface, select the factory parameter password modification by SHT key, press SET to enter, enter the correct old password, and then press SET. If it is correct, change the password to the entered new password and prompt that the password modification is successful; otherwise, prompt that the password modification fails and jump to the main menu interface.
【SET】 ▼	
Fac. Setup pwd Calibration pwd	
Fac. Setup pwd Old pwd: 0***** New pwd: *****	
【SET】 ▼	

Fac. Setup pwd Old pwd: 0***** New pwd: ***** Success!	
Calibration password modification	
Fac. Setup pwd Calibration pwd	In the password modification interface, select the calibration password modification by SHT key, press SET to enter, and enter the corresponding password. If it is correct, it will prompt that the password modification is successful, otherwise it will prompt that the password modification fails, and jump to the main menu interface.
【SET】 ▼	
Calibration pwd Old pwd: 0***** New pwd: *****	
【SET】 ▼	
Calibration Old pwd: 0***** New pwd: ***** Success!	

Self-diagnosis	
4. Factory Param. 5. Calibration 6. Password 7. Self-diagnosis	
【SET】 ▼	
1. System √ 2. Ultr. sensor √ 3. T sensor √ 4. Setup √	When "ERR" is displayed in the prompt line for normal operation of the instrument, this option can be accessed by pressing the key to inquire about the specific operation of the instrument. √ is normal and × is error. On the other hand, self-check is performed when the instrument is started. When the instrument is running, this option can also be entered to query the running status of the instrument.

Chapter 5 Troubleshooting

Table 8

Display	Reason	Remedies
No display	The power supply is not connected properly	Check the power line
	The LCD panel and the motherboard are disconnected or loosened	Check the wiring and reconnect it
	LCD screen damaged	Return to factory for maintenance
The level meter works and the screen displays "US!" , the system into a state of wave loss	The measured distance exceeds the measuring range of the level meter	Consider replacing a level meter with a larger measuring distance than the existing one
	The measured medium has strong disturbance, vibration or serious dust	After waiting for the measured medium to recover calm, the equipment will automatically resume normal measurement.
	There are strong interference sources such as frequency converters and motors nearby.	Check the surrounding environment, do a good job of electromagnetic shielding. Do not use the same power supply as the frequency converter and the motor, but also be grounded reliably.
	The probe is not aligned with the measured plane.	Reinstall the probe perpendicular to the liquid level
	There are redundant objects in the measured space, such as support rods, blanking openings, etc.	Re-select the appropriate installation location to avoid interference as much as possible.
	Liquid level enters blind area	Raise the probe installation position
	The tested medium is soft powder.	Consult the manufacturer if it is powder.
	There is foam on the surface of the tested liquid, and the foam coverage area exceeds 30% within the ultrasonic irradiation range	It is necessary to filter the foam in the water inlet part or place the ultrasonic level gauge in the wave guide to measure, so as to avoid the influence of foam.

Chapter 6 Warranty & After-sales Service

We promise to the customer that the hardware accessories provided during the supply of the instrument have no defects in material and manufacturing process. From the date of the purchase, if the user's notice of such defects is received during the warranty period, the company will unconditionally maintain or replace the defective products without charge, and all non customized products are guaranteed to be returned and replaced within 7 days.

Disclaimers:

- During the warranty period, product faults caused by the following reasons are not in the scope of Three Guarantees service
- Product faults caused by improper use by customers.
- Product faults caused by disassembling, repairing and refitting the product.

After-sales service commitment:

- We promise to deal with the customer's technical questions within 2 hours.
- For the instruments returned to the factory for maintenance, we promise to issue the test results within 3 working days and the maintenance results within 7 working days after receiving them.