北京格莱普科技有限公司
BEIJING GALLOP TECHNOLOGY CO.,LTD.

# Ultrasonic level sensor Catalogue

Thank you for choosing our company upgraded version of the series of ultrasonic level meter!

## 1、 Outline

The instrument in my company independently developed proprietary technology for ultrasonic treatment system core, the use of advanced chip, electronics hardware, combined with high intelligence software echo analysis and processing technology to ensure the accuracy of detection and authenticity, to achieve ultra-fast digital signal processing functions, and includes a number of patented technology, simple operation, easy installation and maintenance, and has a stable and reliable, high precision, long life, and other characteristics, suitable for water treatment and chemical industry monitoring, and measuring the level height, measured distance. In today's era can completely replace similar imported instruments, etc. in order to facilitate the users to use and maintain.

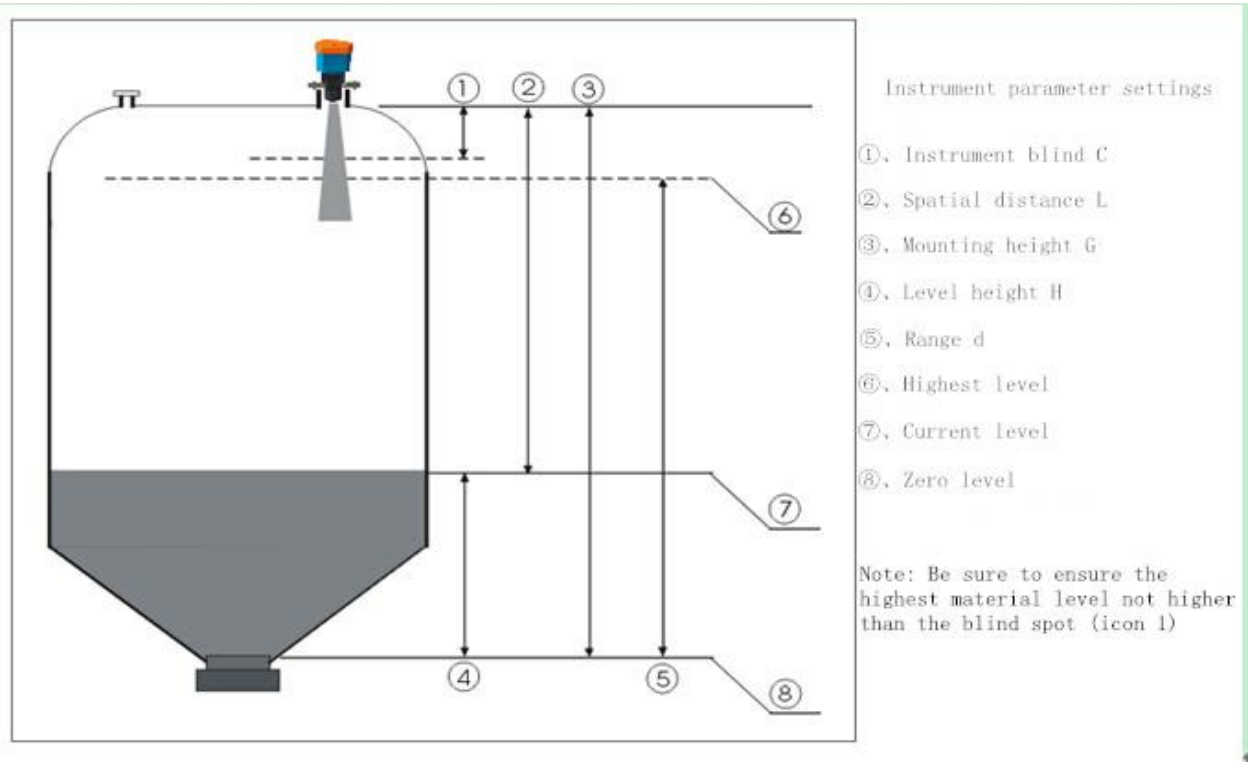
Instrument can be used to connect to a display table or a variety of DCS system via 4 ~ 20mA, switch control, RS485 (Modbus protocol, etc.), for automated operation industry, providing real-time monitoring data.

### Feature：

- Intelligent processing patented sonic technology to a variety of anti-interference waves
- Non-contact instrument
- lightning protection against short circuit moment
- Data storage for 100 years long
- Non-contact, wear-free, pollution-free, long life, low failure
- Automatic gain, energy concentration, complex environment conducive

## 2、Schematic diagram of the installation parameters and calculation principles

Principle: The sensor sends an ultrasonic pulse beam is reflected back through the emitting surface detection surface, and was received by the sensor time t, combined with the speed of sound S (temperature variations, etc.) characteristics. This principle can be achieved through measurement and calculation.
Calibration: installation by the user to enter height G and range d




Picture 1

Mounting height G :( probe mounting height to the height of the tank bottom)

Level height H :( level or material level height)

Spatial distance L: (probe to test surface area)

Instrument blind C: (the emitting surface area below a short)

Formula：

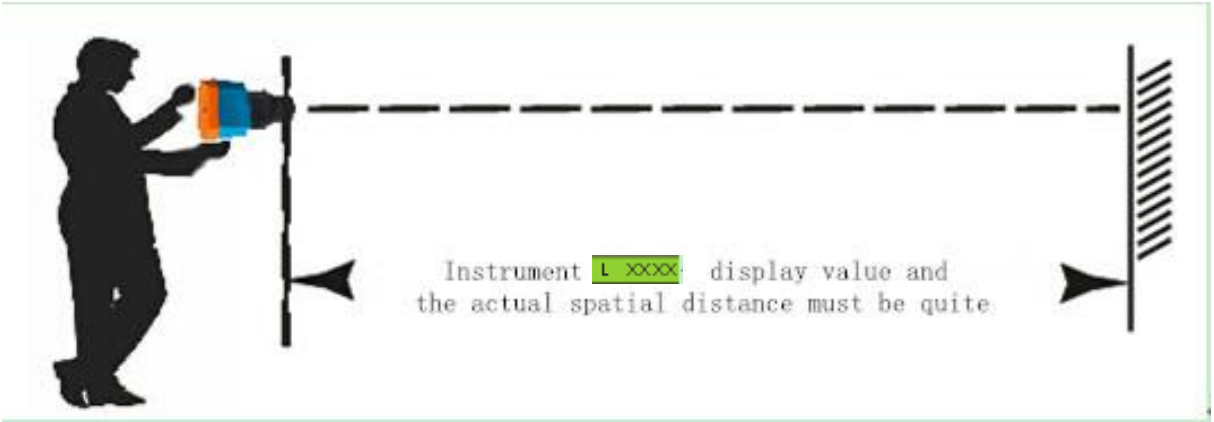
1、Ranging：L=S*T/2； S=331.45+0.61*n℃

2、Level：H=G-L

3、Export：P=H/d*16+4 或 P=L/d*16+4 （Note: P output current in mA）

## 3、Meter inspection procedures：

Before the instrument must be used to set or view the spatial distance is accurate. It was to test the quality and the use of the instrument is suitable environmental conditions unique reference value of the instrument, regardless of the setting of the parameters.



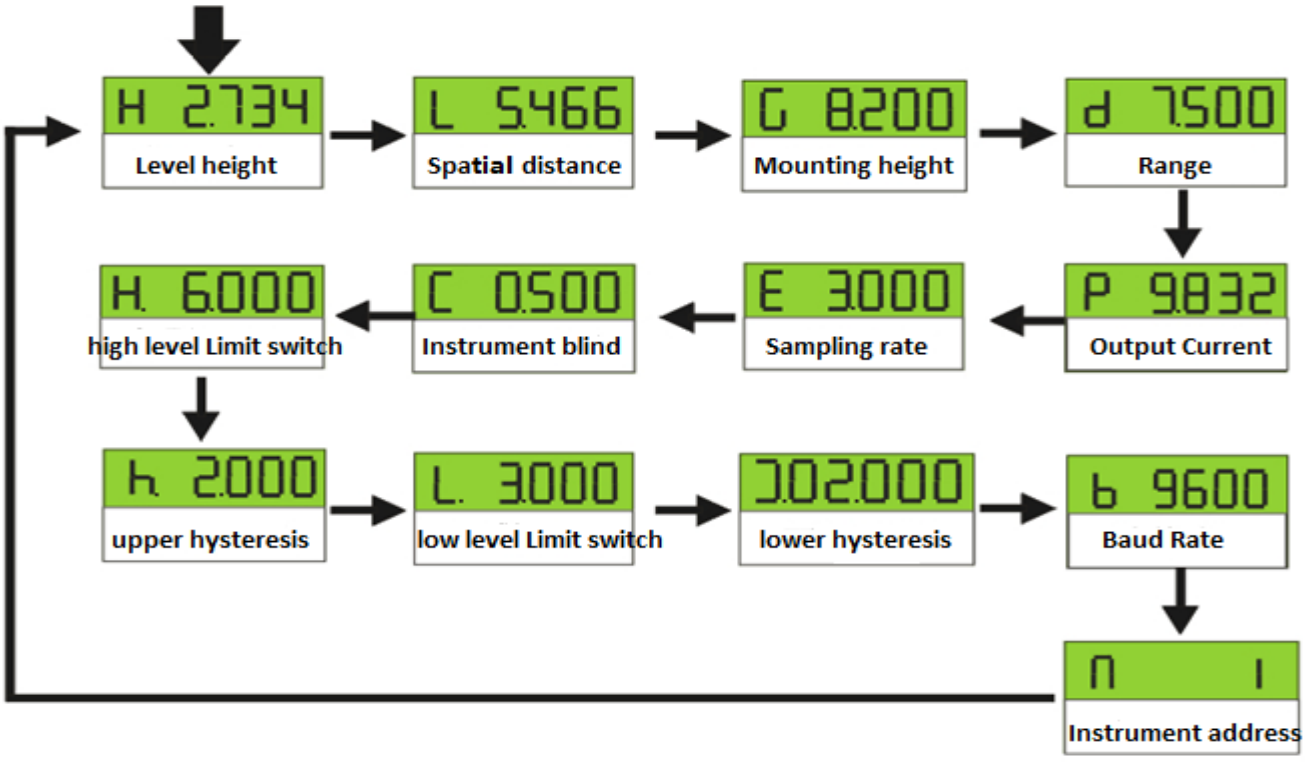
To do: on the mouth after launch electric meter vertical is on the test surface, press the shift key ( ) to switch to the air distance display screen L xxxx ， to see whether the value of the instrument air distance display approximately equal to the actual distance value; moving the instrument or the test surface, Check the meter displays the amount of change is equal to the movement distance value; if are about equal, indicating the instrument as well as a good working condition, you can enter the next step debugging, use; otherwise find out the reasons and so on. (Because there is a certain degree of emission of ultrasonic propagation angle and blind, so try to open or low material level in the blind zone detection or outside, so as to ensure normal conditions throughout.)

## 4、Instrumentation keyed surface parameter view, Set Description

**Key Description：**


**Menu Use：**

Work mode: the instrument is in default after power-up mode, the working mode short press Shift ( )key to cycle through the various operating parameters of the instrument, there is no key operation for about 10s, then the meter automatically returns to the display level height or distance air interface (depends on the current measurement mode). Various operating parameters interface is as follows (unit: m):




Note: Where there is no wire H.-h.-L.-J.-b-n

Setting Mode: working mode, press the OK button (SET) about 3s to enter setup mode, this mode sampling pause, followed by the display of each parameter setting menu, long press the OK button to save the changes and exit about 3s setting mode returns mode.

Parameter Description：

After entering the setting mode, modify interface parameters to be modified current flicker bit, single press set the number (▲) button to modify this bit value, one-touch shift (◀) key to move to the next position can be modified; single by design set (SET) key to save and modify the current parameters of the next parameter modification interface.

| Code | Menu | Explanation |
|---|---|---|
| G08.000 | Mounting height | （Reference parameters, as shown in Figure 1:After setting the benchmark installation height G intact, instruments Equation 2 calculates the liquid level） |
| d08.000 | Range | （And analog output proportional to:<br>When the H or L and span d is equal, that the full-scale analog output 20mA; the other three output according to the formula） |
| H----- | Liquid level measurement mode | （Display, analog output level corresponding） |
| L----- | Measuring the tial distance mode | （Display, an analog output corresponding to the distance） |
| E03.000 | Sampling rate | （Odd bit values: the larger the sample value, the stronger immunity. The general value of 3 or 5） |
| H.06.000 | Limit switch control | （Switching point value） |
| h.02.000 | Limit switch hysteresis | （Point down control segment value） |
| L.03.000 | Limit switch control | （Switching point value） |
| ].02.000 | Limit switch hysteresis | （Points up the value of the control section） |
| b 9600 | Baud rate | （Modbus communication speed RS485 communication） |
| n 001 | Instrument address | （Communication response Instrument Number） |
| Note: Where there is no wire H.-h.-L.-].-b-n | | |

Generally only the face value of the instrument to set the reference (ie mounting height) a parameter to meet your job requirements. (Of course, the production process due to the instrument probe discrete, so that the emission surface have a very slight deviation, the measurement reference plane setting request (mounting height) may have to modify the deviation at higher values.)

The factory default instrument for measuring the liquid level measurement mode, the mode of display interface

is shown： 

Secondary parameters :( recommended default setting, the setting of special conditions)

Any interface long press the shift key at the same time for about three seconds after pressing the OK button to enter the setting mode, this mode you can set the parameters as follows：

| Code | Menu | Explanation |
|---|---|---|
| C 0.500 | Blind | （Set the meter blind） |
| A 0.000 | Automatic Gain | 0 - Off Automatic Gain<br>1- Turn on Automatic Gain |

**5、Digital communication protocol format (2-wire no such function)**

Instrument using standard Modbus RTU protocol format for communication, baud rate 2400 to 38400 optional, 8 data bits, no parity.

Under the MODBUS RTU mode, each frame includes Modbus address field, functional domains, data fields and check domain. Send or receive between two characters each time interval must not exceed 1.5 times the character transmission time. If the two characters more than 3.5 times the interval character transmission time, the agreement is considered a data has been received, a new data transmission begins.

| Start | Address code | Function code | Data | CRC checksum | Storp |
|---|---|---|---|---|---|
| 3.5T | 1 Byte | 1 Byte | N*1 Byte | 2 Byte | 3.5T |

**Modbus Protocol frame**

Address code: meter number, ranging from 1 to 255.

Function code: Function code needs to be achieved, such as Read Holding Registers function code 03.

Data: data content sent as an address register to read the number and so on.

Check: CRC16 checksum, LSB first.

The instrument is currently available only temporarily inquiry Read Holding Registers function code 03 support.

**Data Description：**

| Address | Description | Data Types |
|---|---|---|
| 0x0000 | Liquid level | Float |
| 0x0002 | Air distance | Float |
| 0x0004 | Mounting height | Float |
| 0x0006 | Range of the instrument | Float |
| 0x0008 | Instrument blind | Float |
| 0x000A | Output Current | Float |
| 0x000C | Alarm limit | Float |
| 0x000E | Limit hysteresis | Float |
| 0x0010 | Alarm limit | Float |
| 0x0012 | The lower hysteresis | Float |

Instrument return variable for 32 single-precision floating-point type, accounting for 4 bytes, using the IEEE standard way to represent. Each standard Modbus holding register is two bytes, so each float variable occupies two holding registers, the address stored in the low 16 high, high address stored in the low 16. Such as air distance variable is stored in the table start address register is 0x0002, set the air distance is 100.54 (decimal), the corresponding hexadecimal representation for 0x42C9147B, the address is stored in register 0x0002 0x42C9, address 0x0003 register holds 0x147B.

Communication Command：

Function code 03: Read Holding Registers

**Send：**

| Address code | Function code | Register address high byte | Register address low byte | The number of high byte register | The number of low byte register | CRC checksum low byte | CRC checksum high byte |
|---|---|---|---|---|---|---|---|

**Response：**

| Address code | Function code | Returns the number of data bytes | A high Byte data 1 | A low Byte data 1 | …… | A high byte data N | A low byte data N | CRC checksum low byte | CRC checksum high byte |
|---|---|---|---|---|---|---|---|---|---|

Description: Address code: Instrument number, can be user-set, ranging from 1 to 255

Register Address: variable starting address, reference data shows

Number of registers: the number of registers to be read, the value is equal to the number of variables to be read bytes / 2;

Returns the number of bytes of data: the number of bytes read into the variable

For example: Read the air distance, refer to the table, air distance variable is single-precision floating-point, four-byte, representing the holding register start address is 0x0002, set height is 100.54 air, instrument number is 1, then read process is as follows:

**send：**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 01 | 03 | 00 | 02 | 00 | 02 | 65 | CB |

Response：

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 01 | 03 | 04 | 42 | C9 | 14 | 78 | 31 | 57 |

Simultaneously read multiple variables, simply send the starting address of the first variable, and the need to read the register number (variable number of bytes / 2), the instrument will return multiple variables simultaneously.

Error handling: If the instrument receives the wrong communication request, it returns the corresponding error code according to the error content.

Error response：

| Address code | Function code +0x80 | Error Codes | CRC checksum low byte | CRC checksum high byte |
|---|---|---|---|---|

Description: Communication error function code when requesting a return to the highest position, such as 0x03 becomes 0x83 (0x03 + 0x80) returns.

Error code:

01: unsupported feature code

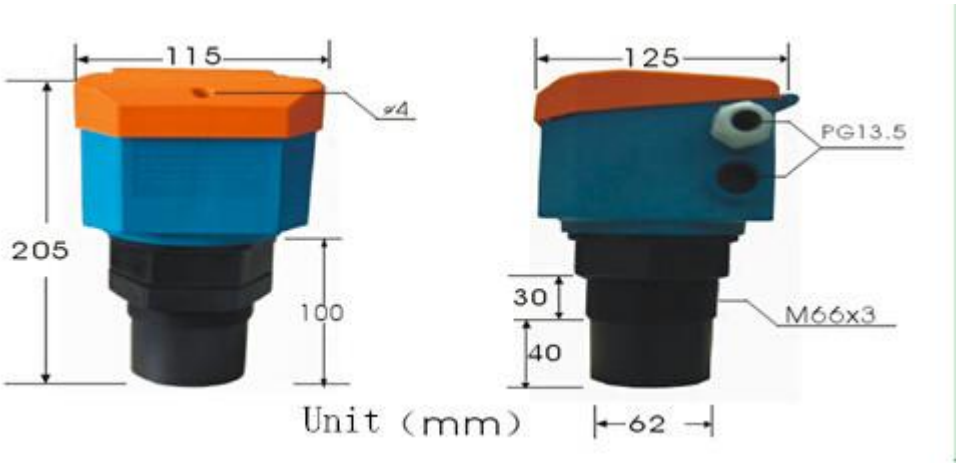
02: Register address error

03: Data contents of the error

## 6、Technical Specifications

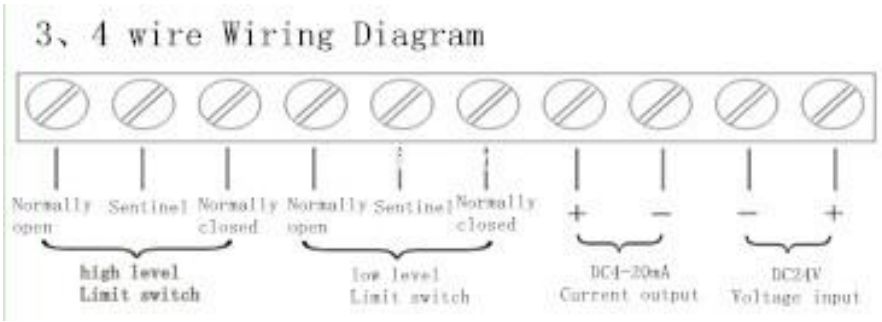
| Parameters | Performance | Parameters | Performance |
|---|---|---|---|
| Range | 0.5～30m | Accuracy | 0.25%，0.5% |
| Supply voltage | 220VAC Or 24VDC | Resolution | 1～5mm |
| Show | 6 LCD | Launch angle | 6°～12° |
| Blind | 0.20～0.9m | Frequency | ～40KHZ |
| Analog Output | 4～20mA | Digital Output | RS485 |
| Maximum load | 750 Ohm | Switching output | <125V;0.5A |
| Ambient temperature | -20～+55℃ | Degree of protection | IP65，IP67 |
| Mounting thread | M66x3、G2 | Housing material | PA6、 ABS |

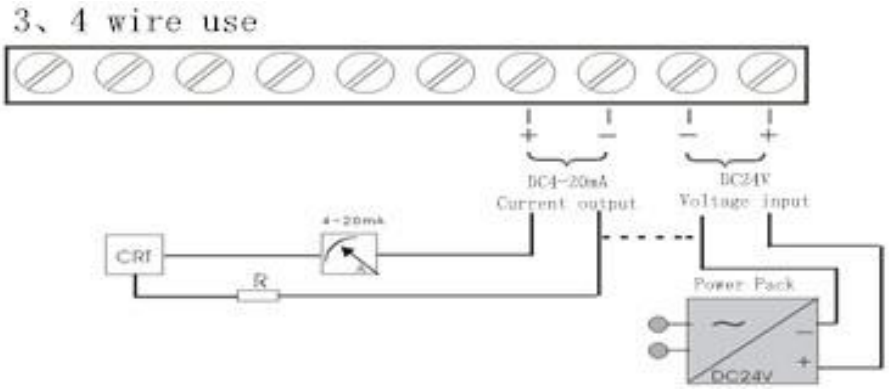
7、Meter structure size

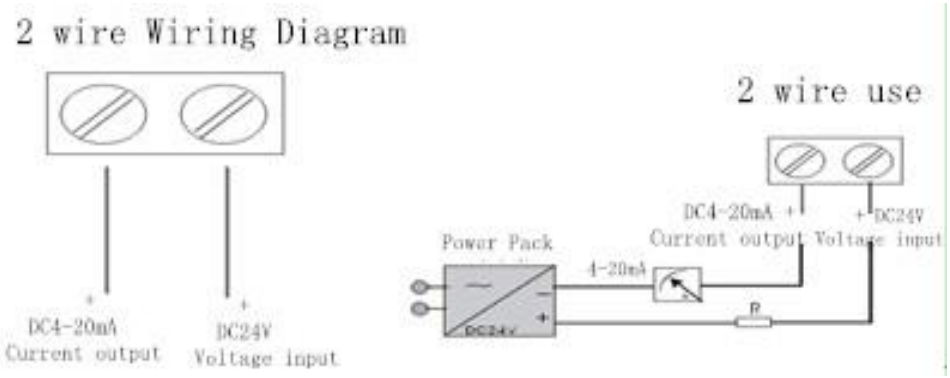


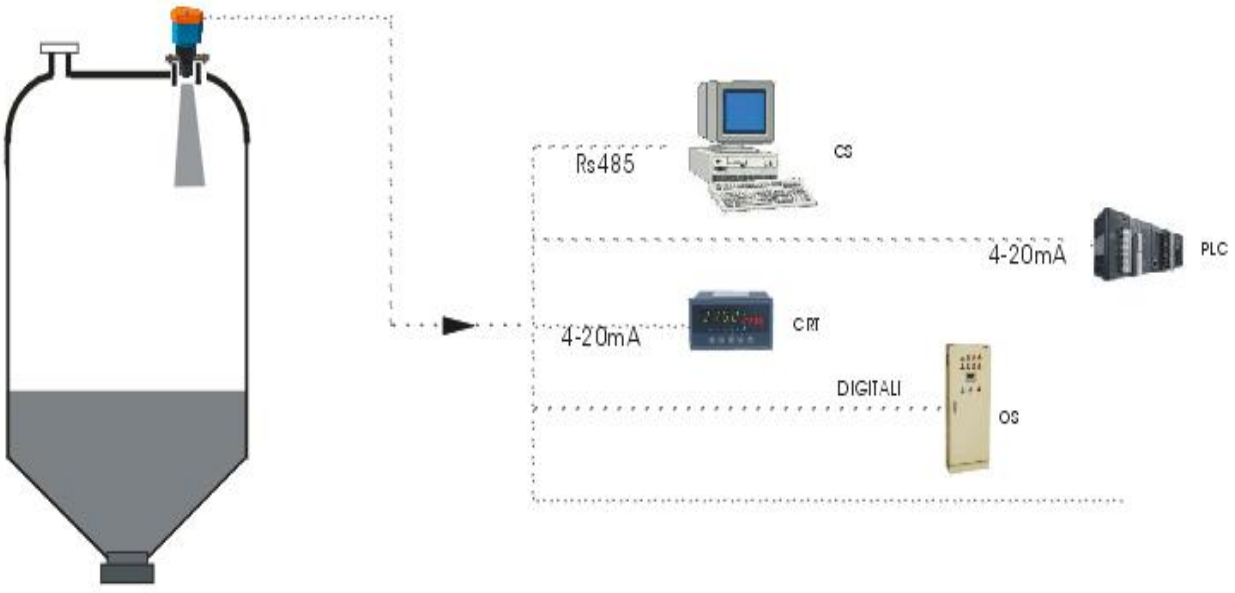


8、Wiring and other industrial use






**Connection with other data exchange platform**

## 9、Abnormal instrument analysis and processing

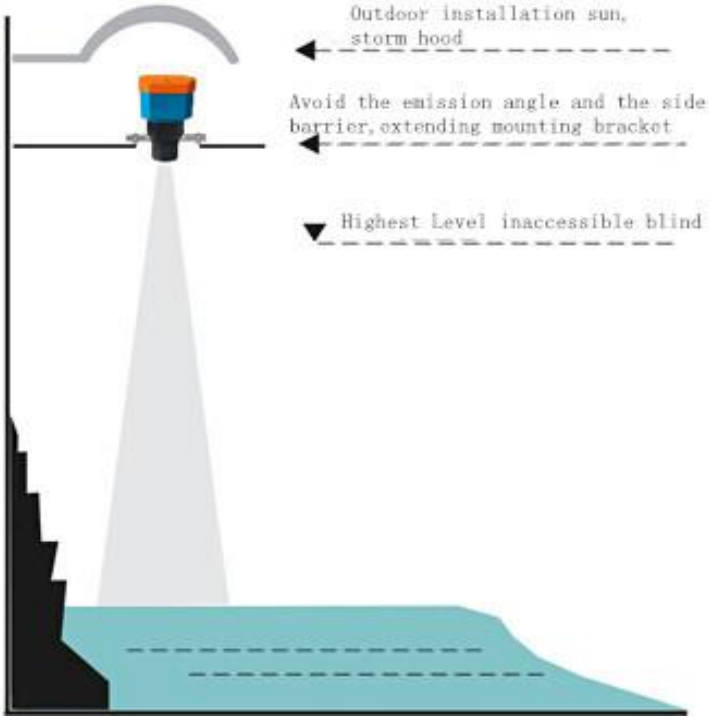
| Anomalies | Analyze the reasons | Treatment options |
|---|---|---|
| Instrument does not display, black | （1）Wiring error<br>（2）Power is not normal | Check the power supply wiring polarity, voltage, current, the circuit meets the requirements. |
| Instrument display H ------<br>Or L FFFFF<br>(Spill code: that there is no echo) | (1) the wiring is good<br>(2) whether the vertical installation<br>(3) power is small<br>(4)The instrument is too wet or flooded<br>(5)whether there is detected the media surface foam, floating debris, smoke, dust, etc; | Close analog field<br>instrumentation whether echo (back test procedures) is digitally. If properly handled or change the installation environment. |
| Instability instrument display, digital bounce, digital fixed, or inconsistent with the actual gap is too large | (1) Supply voltage inferior instability<br>(2) Level height into the blind<br>(3)the level of the top or side obstacles<br>(4)installation of port settings or location does not meet the requirements<br>(5)electromagnetic, high intensity pulse interference<br>(6)and the mounting bracket resonance | Improve supply;<br>Heightening install stagger blind use;<br>Change the installation location, avoiding obstacles, riser<br>installation;<br>Grounding, shielding measures；<br>Installation of anti-vibration<br>rubber gasket installation etc. |
| Analog signals, digital signals, the digital output is not normal, etc | (1) Analog output is greater than 20mA<br>(2) PFFFFF<br>(3)The analog output is too small<br>(4) No analog output<br>(5) No digital signal output<br>(6)the digital signal output intermittent, unstable<br>(7)No switching output | Display overrange<br>The load is too large, the supply voltage is too low<br>Use the loop connection is disconnected；<br>Wiring and instrumentation address number, baud rate and protocol format is consistent<br>Whether this function, work<br>overload, must be used within the scope of |
| Tip: When you can not find the reason repeatedly, please contact the manufacturer to communicate when necessary | | |

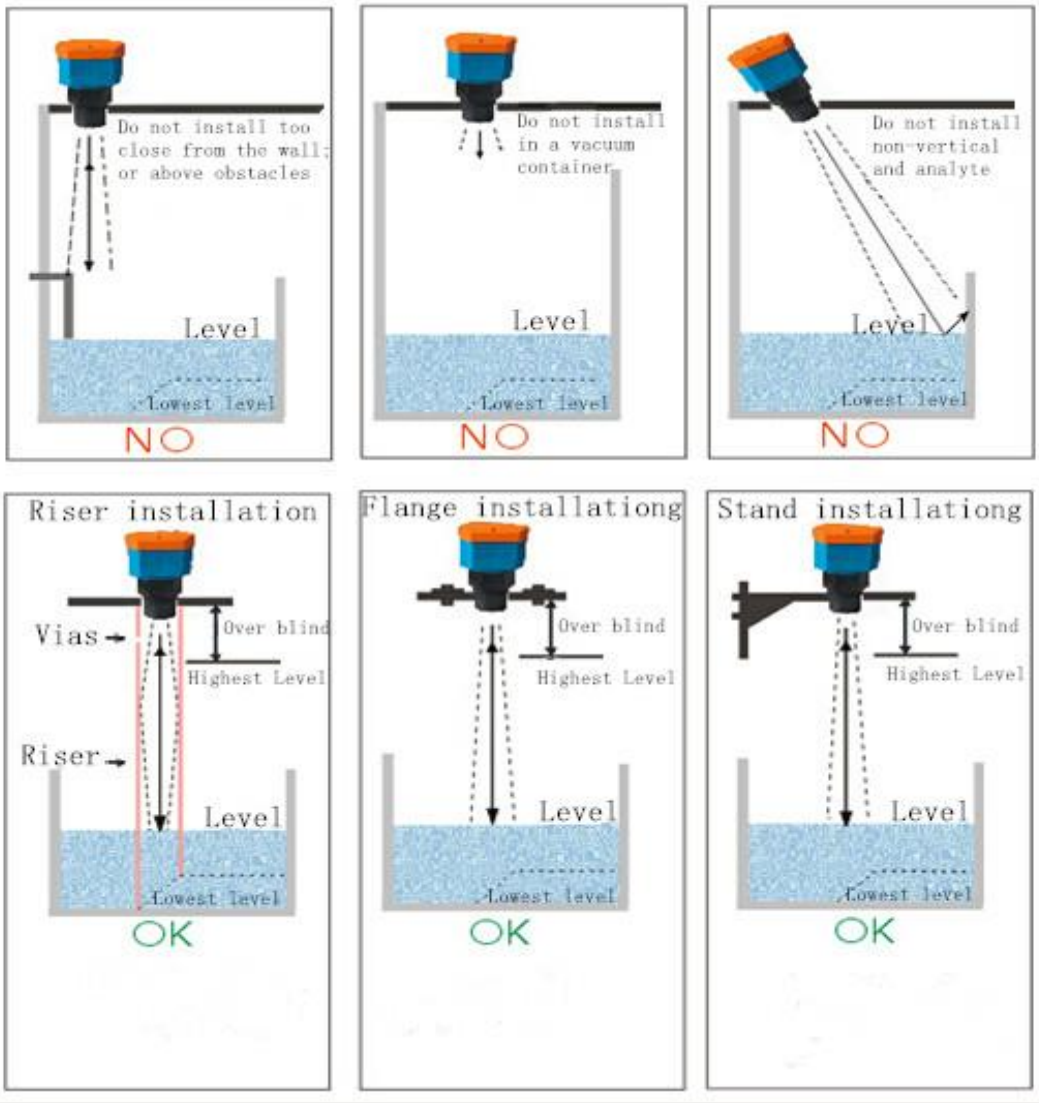
## 10、Conditions using the installation issues

In order to ensure the life of the instrument, be sure to install outdoor installation shade from the storm cover, be sure to keep the instrument dry indoor use, ventilation. There are faint moisture, corrosive air environment is important to note the use of the seal (cap, waterproof connectors and other special circumstances, it is necessary to increase with the use of sealant or rubber cement seal).

Due to the presence of ultrasonic level meter launch angle and blind, so I chose to stagger blind installation location and emission angle from the side, not too close to the highest media, side edge, so as not to affect the normal operation of the instrument.

(Blind side and launch angle from the reference instrument generally 10% to about 5% in the range)


Outdoor installation sun,
storm hood
Avoid the emission angle and the side
barrier, extending mounting bracket
Highest Level inaccessible blind


Do not install too
close from the wall;
or above obstacles
Level
Lowest level
NO
Do not install
in a vacuum
container
Level
Lowest level
NO
Do not install
non-vertical
and analyte
Level
Lowest level
NO
Riser installation
Vias
Over blind
Highest Level
Riser
Level
Lowest level
OK
Flange installationg
Over blind
Highest Level
Level
Lowest level
OK
Stand installationg
Over blind
Highest Level
Level
Lowest level
OK