



**2024
PRODUCT
INTRODUCTION**

Ultrasonic Level Meter

www.aoboinstrument.com

CONTENTS

I. Measuring Principle	3
II. Technical Parameter	4
III. Instrument Introduction	6
IV. Installation Guide	7
4.1 Installation location description	7
4.2 Install	8
V. Instrument Debugging	12

Company Profile

Weifang AOBO Instrument Technology Development Co., Ltd., founded in 2002, with registration capital of 10 million RMB, is a "High-Tech" and "Double-Software Certification" enterprise specialized in "flow measurement and intelligent measurement & control" industry, integrating R&D, production, sales and service.

The company has a core R&D team for computer software and technology, automatic intelligent control, HVAC engineering design and flow measurement. It has the ability to provide customers with specific solutions and complete sets of products according to their different needs, based on years of practical experience. Especially in the heating industry, by the customer's recognition, has a high reputation in the industry.

The products are mainly used in the measurement and control of "steam, liquid, gas, sewage and tap water"; and especially suitable for energy monitoring and energy-saving control in many industries, such as thermal power plants, thermal companies, residential heating, petroleum, chemical industry, papermaking, food, coating, printing & dyeing and HVAC.

Since its foundation, based on self-developed and leading technology, reliable quality, high-quality service and good reputation, our company has been warmly accepted by customers, and become a designated supplier for many central enterprises and listed companies.

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I. Measuring Principle

The principle of ultrasonic level meter is that the ultrasonic pulse is sent by the transducer (probe). When the surface of the tested medium is reflected back, some reflected echoes are received by the same transducer and converted into electrical signals.

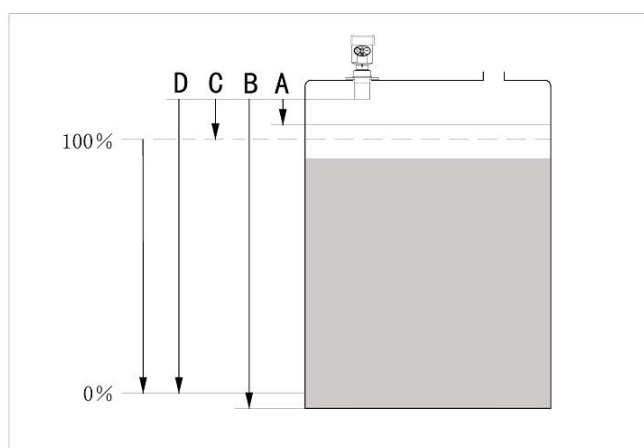


Ultrasonic pulses travel at acoustic speed, and the time interval from the launch to the reception of the ultrasonic pulses is proportional to the distance from the transducer to the surface of the medium being measured. The relation between the distance value S and the sound velocity C and the transmission time T can be expressed in terms of formulas:

$$S = C * T / 2$$

Since the launch of the ultrasonic pulse with a certain width, the distance of reflection wave transducer in small region and emission wave overlap, not recognized, can not measure the distance value, this area is known as the measuring blind area, relevant work frequency and size of ultrasonic liquid level meter blind.

The base level of the measurement is the lower edge of the probe.



A. Blind area
B. Range
C. Full charge
D. Zero point

•Characteristic

Advanced microprocessor is adopted

Unique echo processing technology

False echo storage function

Built in temperature compensation

Small beam

Simple debugging and calibration

II. Technical Parameter

• General data

Process connection

5m	Thread M66×2
10m	Thread M66×2
15m	Bracket or flange

Material Science

-Transducer	PA66+GF30
-Transducer seal	Silica gel
-Shell	Aluminum
-Case seal	Silicon rubber
-Top window	Polycarbonate
-Ground terminal	Stainless steel

Weight

-5 m and 10 m	2kg (Depends on process connections)
-15m	6kg (Depends on process connections)

• Supply voltage

Two wire system

Standard type	16~36V DC
Intrinsically safe	21.5~26.5V DC
Power waste	max.22.5mA
Allowable ripple	
-<100Hz	U _{ss} <1V
-(100~100k)Hz	U _{ss} <10mV

Four wire system

Standard type	24V DC/220V AC
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Power waste max.1VA, 1W

• Cable parameter

Cable inlet / plug M20*1.5 cable inlet (cable diameter 5-9mm),
1 blind blocks M20*1.5.

Spring connection terminal For the wire cross section 2.5 mm²

• Output parameter

Output signal 4~20mA

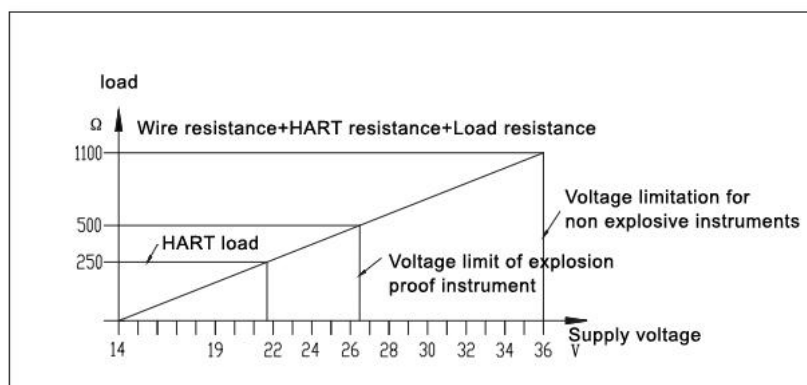
4~20mA/HART

Resolving power 1.6μA

Fault output 20.5mA; 22mA; 3.9mA

Damping time 0-30s, Adjustable

Load resistance diagram of two wire system



Characteristic parameter

Blind area

5m 0.2m

10m 0.3m

15m 0.5m

Ultrasonic frequency

5m 50kHz

10m 40kHz

15m 28kHz

Measurement interval >2s (Depends on the parameter settings)

Adjustment time	>3s (Depends on the parameter settings)
Emission angle	
5m/10m	5°
15m	3°
Resolving power	1mm
Repeatability	±3mm
Accuracy	±0.5% (Full scale)
Process temperature	-40~70°C

III. Instrument Introduction

ABDT-CS21/22-5m



Application: Liquid level measurement, solid particle measurement

Measuring range: standard probe: corrosion sealed probe:

Liquid (0.3 ~ 5) m	liquid (0.3 ~ 4) m
Solid (0.3 ~ 2) m	solid (0.3 ~ 1.5) m

Process connections: M66 x 2 or flange

Transducer shell material: PA66+GF30 or PVDF

Process temperature: (-40 ~ 70) °C

Process pressure: (-0.02 to 0.1) MPa

Accuracy: ± 0.25% (full scale)

Signal output: (4~20) mA/HART

Power supply: two wire system 24V DC

Four wire system 24V DC/220V AC

Explosion proof grade: Exd IIC T4 Gb

ABDT-CS21/22-10m



Application: Liquid level measurement, solid particle measurement

Measuring range: standard probe: corrosion sealed probe:

Liquid (0.4 ~ 10)m	Liquid (0.4 ~ 8)m
Solid (0.4 ~ 4)m	Solid (0.4 ~ 3.5)m

Process connections: M66 x 2 or flange

Transducer shell material: PA66+GF30 or PVDF

Process temperature: (-40 ~ 70) °C

Process pressure: (-0.02 to 0.1) MPa

Accuracy: ± 0.25% (full scale)

Signal output: (4~20) mA/HART

Power supply: two wire system 24V DC

Four wire system 24V DC/220V AC

Explosion proof grade: Exd IIC T4 Gb

ABDT-CS21/22-15m



Application: Liquid level measurement, solid particle measurement

Measuring range: standard probe: corrosion sealed probe:
 Liquid (0.5 ~ 15)m liquid (0.5 ~ 12)m
 Solid (0.5 ~ 6)m solid (0.5 ~ 5)m

Process connections: M66 x 2 or flange

Transducer shell material: PA66+GF30 or PVDF

Process temperature: (-40 ~ 70) °C

Process pressure: (-0.02 to 0.1) MPa

Accuracy: $\pm 0.25\%$ (full scale)

Signal output: (4~20) mA/HART

Power supply: two wire system 24V DC

Four wire system 24V DC/220V AC

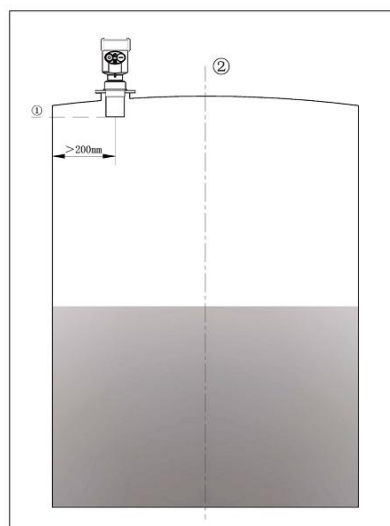
Explosion proof grade: Exd IIC T4 Gb

IV. Installation Guide

4.1 Installation location description

- Installation of ultrasonic wave 5 meters and 10 meters

At the time of installation, the instrument and vessel wall shall maintain a minimum distance of 200mm, which is recommended to be greater than 500mm.



① Lower edge of sensor

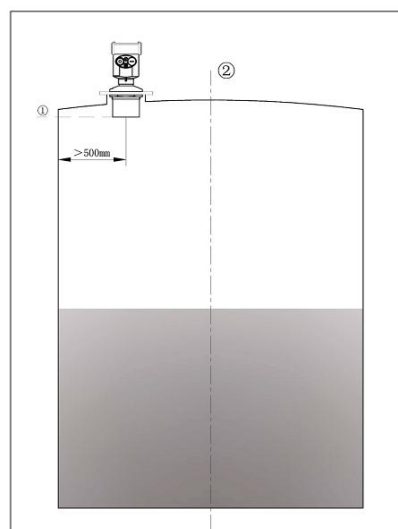
(acoustic emission surface)

② Central line of storage tank

- Installation of 10 meter ultrasonic wave

At the time of installation, keep the instrument and vessel wall at least 500mm distance.

- ① Lower edge of sensor
(acoustic emission surface)
- ② Central line of storage tank



4.2 Install

- Installation requirements

The instrument distance must keep a distance from the tank wall (see installation location 3.1)

When transmitting ultrasonic pulses, the transducer has a certain beam angle. From the edge of the transducer to the surface of the medium to be measured, the A and B obstacles should be avoided as far as the radiation region of the ultrasonic beam is concerned: Such as: ladder, level switch, a heating coil, the guide groove etc..

Note that the ultrasonic beam shall not intersect the feed stream;

When installing instrument, the highest material level shall not enter the measuring blind area;

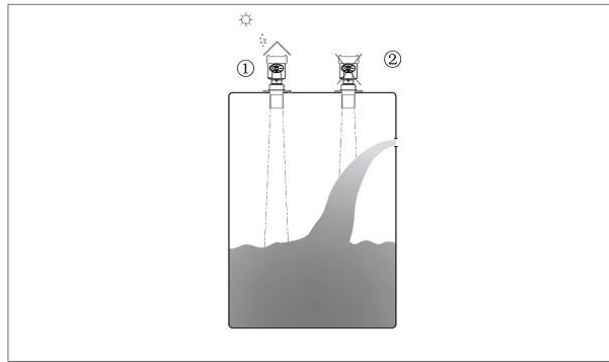
The installation of the instrument can make the direction of the transducer vertical to the liquid level as much as possible;

Explosion proof area must comply with the installation regulations of the national explosion prevention area. This type of shell adopts aluminium shell. This type of instrument can be installed in the explosion-proof requirements of the occasion, the instrument must be grounded.

- Typical error installations

Do not install the instrument at the top of the feed. The actual level cannot be measured. At the same time note: outdoor installation should adopt sun shading and rainproof measures.

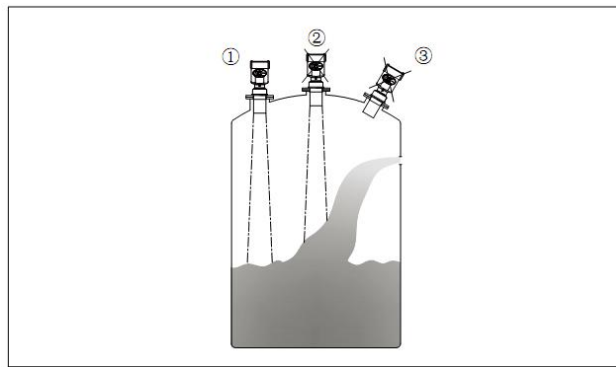
- ① Correct
- ② Error



The transducer shall be perpendicular to the surface of the medium to be measured.

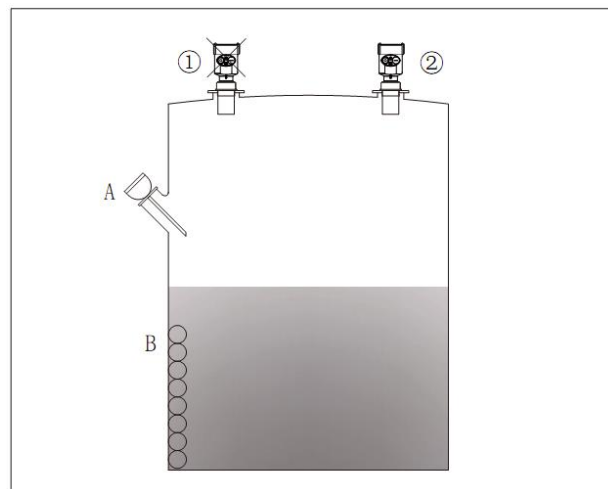
The instrument can not be installed in the middle of the arched tank top to avoid multiple reflections.

- ① Correct
- ② Error
- ③ Error



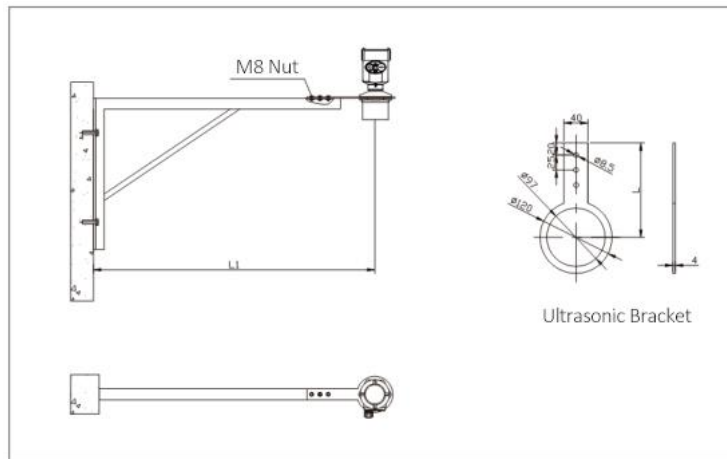
The instrument should avoid A and B obstructions during installation.

- ① error
- ② Correct



• Bracket mounting

Bracket mounted for 15 meter ultrasonic level meter.



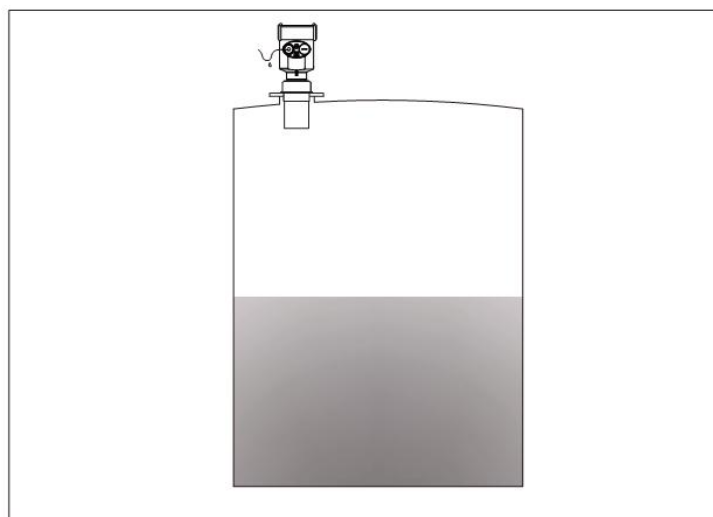
● Flange mounting

Flange mounted for 15 meter ultrasonic level meter.



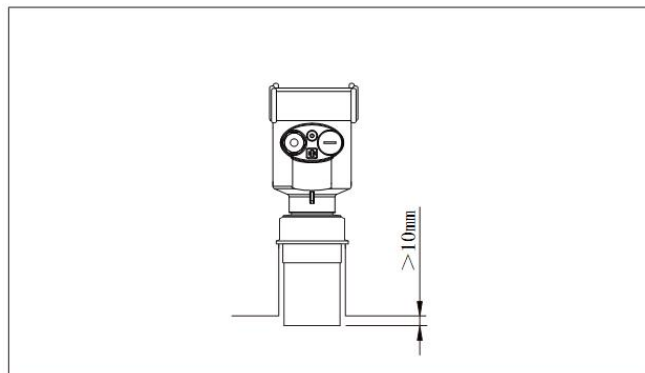
● Moisture-proof

For installation in an outdoor or humid room, the cable sealing sleeve shall be tightened and the cable bent downward to U type at the entrance. As shown:



- **Container nozzle**

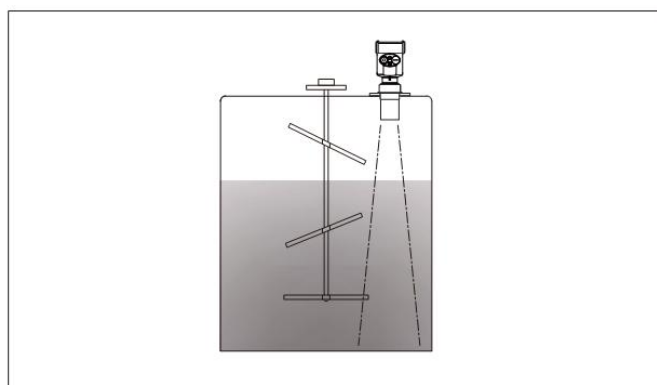
Length of container nozzle: must ensure that the probe extends out of the nozzle, at least 10mm.



- **Foam**

Foam is formed on the surface of some liquid medium because of feeding, stirring or other process in the container, and the emission signal is attenuated. If the foam causes a measurement error, the sensor shall be mounted in the wave guide tube or using a guided wave radar level meter. Guided wave radar level meter measurement is not affected by foam, and is the best choice for this kind of application.

When the tank is stirred, the instrument is installed as far away from the agitator as possible. If foam or wave is caused by agitation, the wave guide installation shall be used.



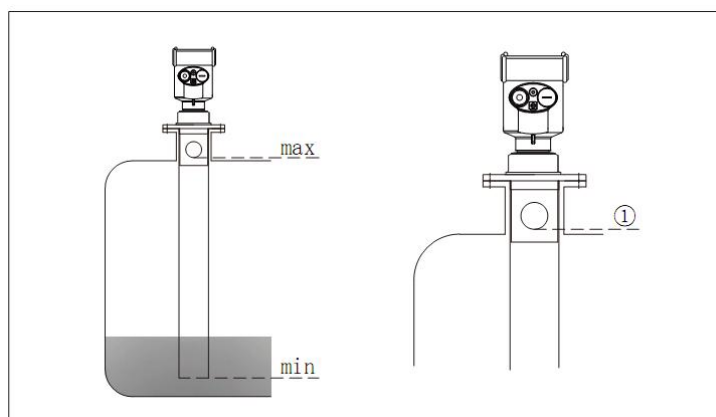
- **Airflow**

If the container has a strong airflow, such as outdoor installation, and windy, or a container with air vortex, suggested sensors installed in the wave guide tube, or the use of pulse radar level gauge or guided wave radar level meter.

- **Guided wave tube installation**

The diameter of the air vent (5-10) mm and the use of a guided wave tube (guided wave tube or bypass tube) can avoid the effects of vessel obstruction, foam, and air turbulence on

the measurement.



Note: material is sticky and can not be measured by guided wave tube.

V. Instrument Debugging

Debugging method

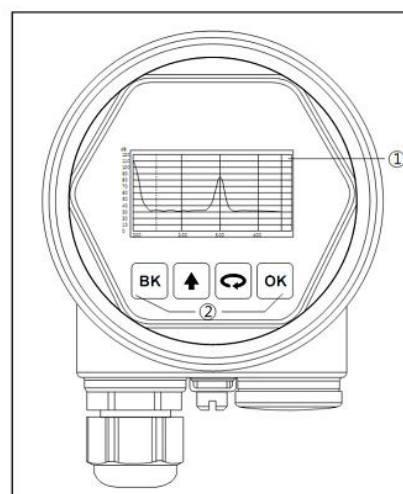
- 1.Header key debugging
- 2.Upper computer software debugging
- 3.HART handheld programmer debugging

1. Header key debugging

The instrument is debugged by using 4 keys on the meter. After debugging, it is only used for field display.

① LCD

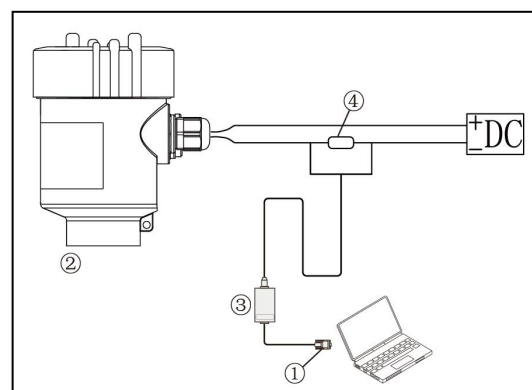
② Key



2. Upper computer software debugging

Connect to PC through HART

- ① USB interface
- ② Header
- ③ HART adapter
- ④ 250 Ω resistor



3. HART handheld programmer debugging

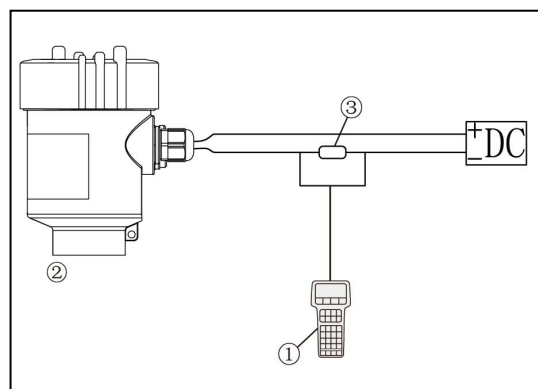
Programming with HART handheld programmer

- ① Hand programmer
- ② Header
- ③ 250 Ω resistor

Relative humidity <95%

Pressure <0.1MPa

Resistance to vibration Mechanical shock 10m/s



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