



EAX4

Ultrasonic Level Transmitter Operation Manual



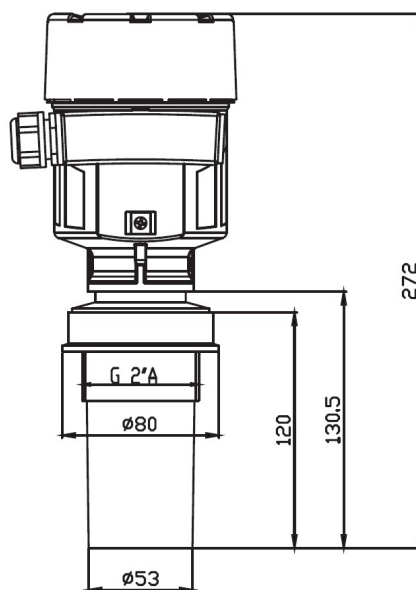
1. Overview

The EAX is a compact two-wire **ultrasonic level gauge**. It is **non-contact, low-cost, and simple to install** and can measure liquid levels continuously. This product not only outperforms other products in its category in terms of price but also offers excellent measurement performance and a simple and intuitive operation method. The EAX features an 8-meter measurement range, excellent chemical resistance, and simple on-site installation, making it suitable for a wide range of industrial applications.

2. Product Features

- 4~20mA two-wire output
- 24Vdc power supply
- Outer casing protection grade **IP67**
- Probe material PVDF
- Elimination of invalid echo wave
- Internal temperature compensation improves measurement accuracy.
- Beam angle 5°
- Not affected by changes in liquid properties like temperature, specific gravity, and viscosity.
- Maximum measurement range of 8 meters.

3. External Specifications



4. Operating Principles

A level gauge operates on the principle that the probe emits ultrasonic pulses, which are reflected back by the surface of the tested medium. A portion of the reflected waves are captured by the probe and converted into electrical energy signals.

Ultrasonic pulses travel at the same speed as sound waves. From emission to reception, the time interval and distance between the tested medium surface are proportional. The equation for the relationship between distance value D, speed of sound C, and transmission time T is expressed as:

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

Because the emitted ultrasonic pulse has a specific width, the reflective and emitted waves overlap in a small section near the probe, which cannot be identified or measured separately. This area is referred to as the measurement blind spot. The size of the blind spot is associated with the level gauge's operating frequency.

A level gauge is a one-piece measurement system composed of electronic components and a probe. It can output 4-20mA signals and directly connect to PLC, DCS, and SCADA systems.

5. Product Specifications

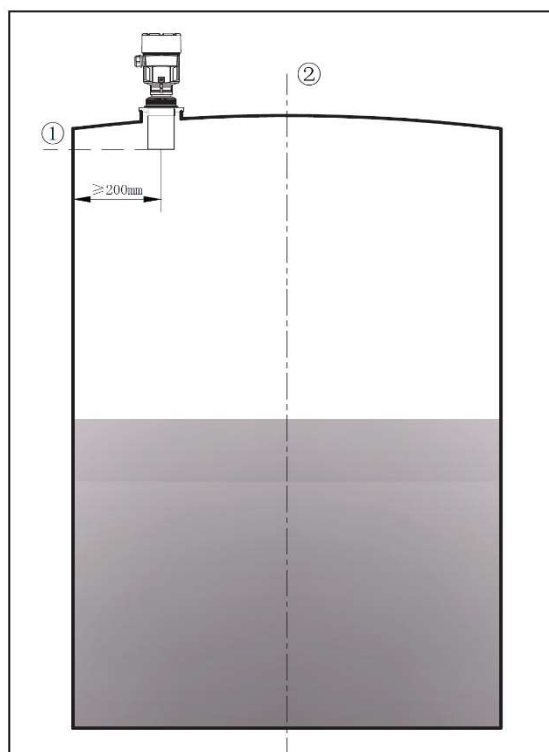
Frequency	50KHz
Working voltage	24VDC
Power consumption	Max. 22.5mA, 0.54W
Output signal	4-20mA
Blind spot	300mm
Maximum aerial depth	8m
Resolution	1mm
Accuracy	±0.25% (full range)
Operating temperature range	-40~80°C
Maximum work pressure	<0.1MPa
Beam angle	5°
Probe material	PVDF
Casing material	Aluminum
Casing sealing	fluorine rubber
Protection grade	IP67
Wire inlet	One M20x15 cable entranced (outer diameter of cable 6~9mm) One blind plugM20x1.5
Connection specifications	Screw thread G2”A
Weight	1.4 kg
Vibration resistance	Mechanical vibration 10m/s ²
Resolution	1.6 uA
Damping time	0~30s (adjustable)
Fault output	20.5mA ; 22mA ; 3.9mA

6. Installation Instructions and Precautions

6.1 Description of Installation Positions

During installation, keep a minimum distance of 200mm from the tank wall, preferably more than 500mm.

- ① Level gauge base (sound wave emission side)
- ② Storage tank center line.



6.2 Installation Requirements

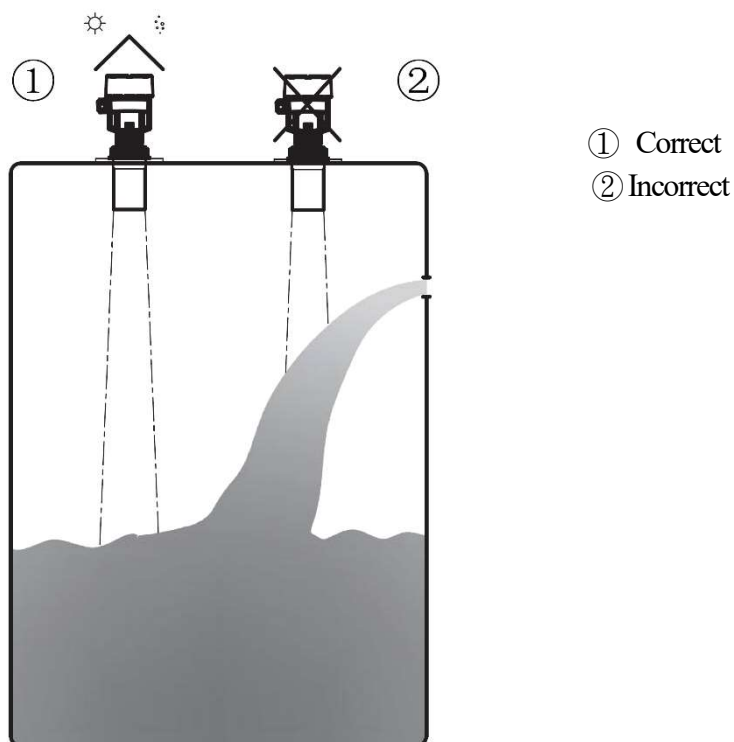
The probe emits ultrasonic pulses with a predetermined beam angle. Obstacles such as ladders, mixers, high-level and low-level switches, heating coils, diversion troughs, and so on should be avoided between the probe's base and the tested medium's surface.

- (1) Incoming materials must not come into contact with ultrasonic beams.
- (2) The maximum liquid level must be kept outside the measurement blind spot during ultrasonic installation.
- (3) During ultrasonic installation, the probe's emission path must be perpendicular to the liquid surface.
- (4) When the on-site working conditions require flange installation, it is recommended that PP, PTFE, PA, and other plastic flange be used for ultrasonic installation. The internal holes of flanges can be used to process screw threads or to convert them directly into through-holes, depending on the size of the ultrasonic screw thread purchased. Use the screws supplied by the manufacturer to fasten the flanges.
- (5) When the installation of stainless-steel flanges is required on-site, it is highly advisable to process stainless flanges into through-holes, without an internal screw thread. During ultrasonic installation, tighten the meters and flanges with the nuts supplied by the manufacturer. **When stainless flanges**

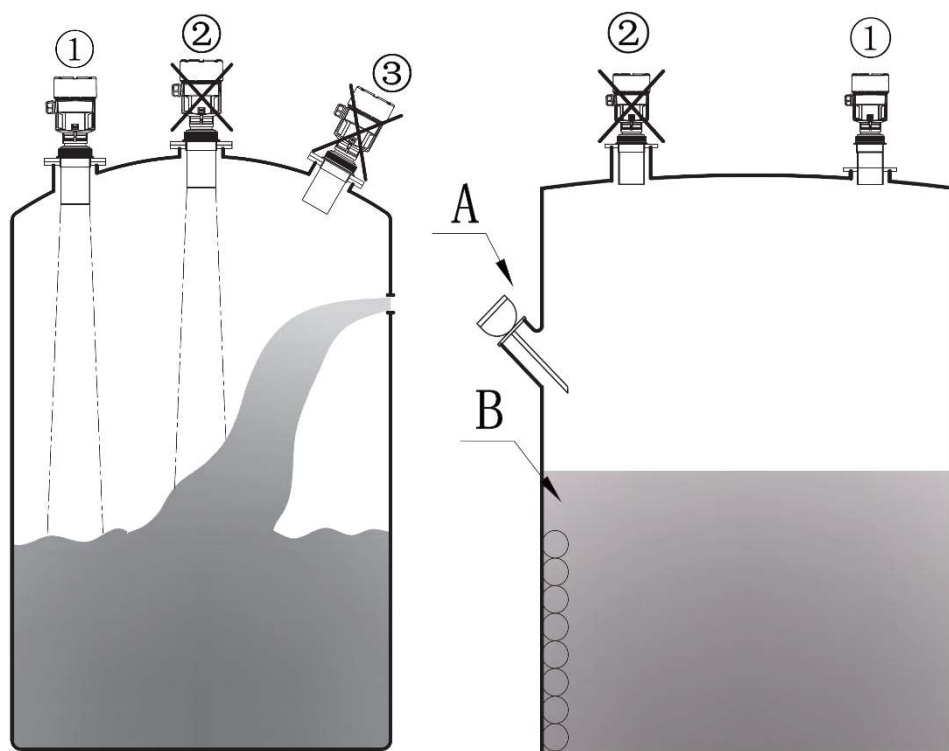
are used for installation, flange-converted parts can be obtained from the manufacturer. For installations that require special operating conditions, please consult with the manufacturer.

6.3 Installation Precautions

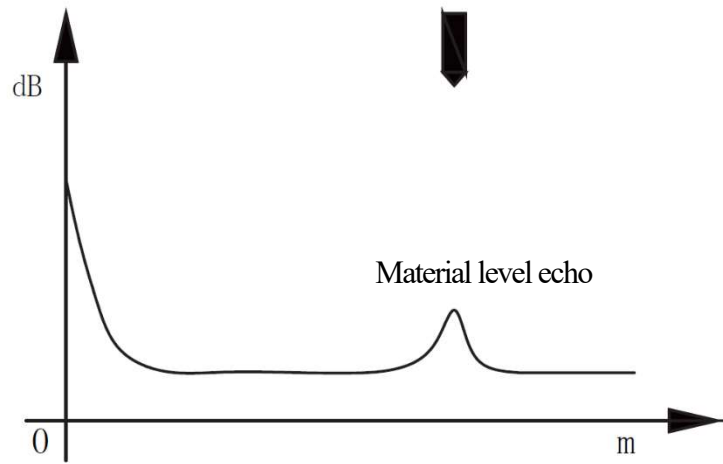
6.3.1 Do not place the ultrasonic device above the feeding inlet, or the liquid side cannot be measured. Please consider that sun and rain protection measures should be implemented during outdoor installation.



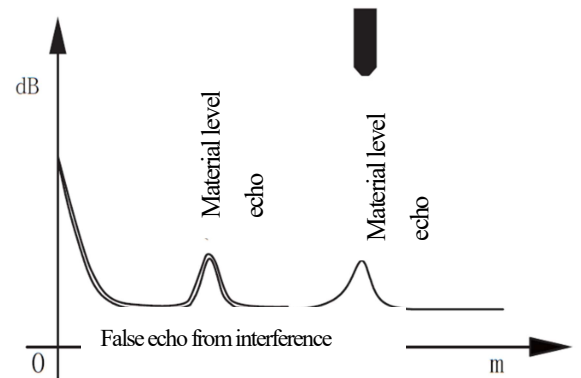
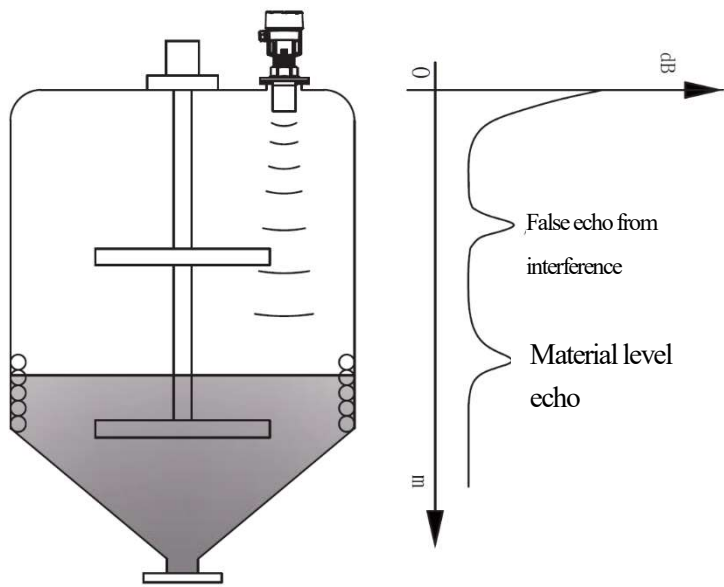
6.3.2 The probe should be perpendicular to the surface of the medium being tested. To prevent the occurrence of multiple reflective echoes, the ultrasonic should not be installed at the center of the barrel's arched top. Avoid obstacles A and B during ultrasonic installation (as illustrated in the diagram.)



- ① Correct
- ② Incorrect
- ③ Incorrect



Normal level echo diagram



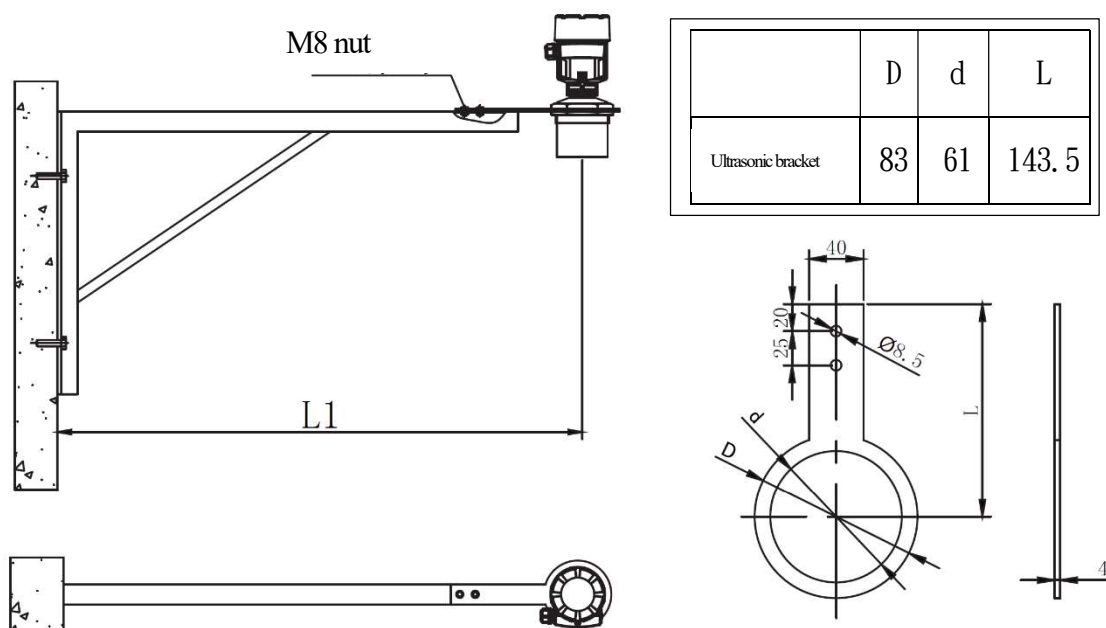
料位回波 Material level echo

正常的物位回波圖 Normal level echo diagram

虛假干擾回波 False echo from interference

包絡線 Network line

6.3.3 Bracket Installation Diagram

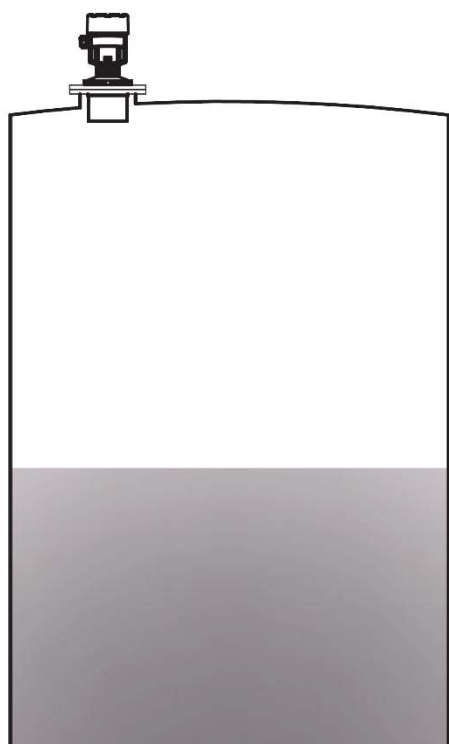


At least 200mm for L1

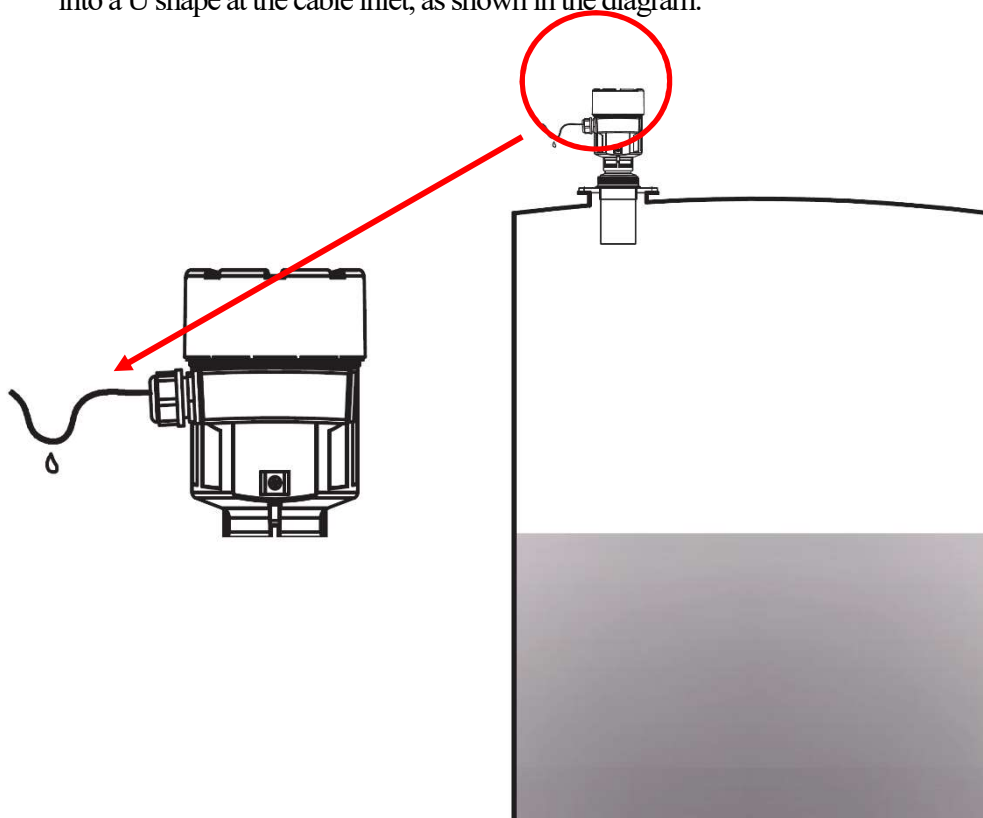
Ultrasonic bracket

M8 nut

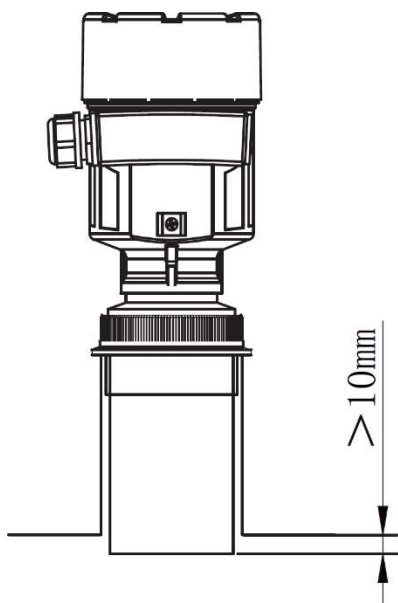
6.3.4 Flange Installation Diagram



6.3.5 To install outdoors or in a humid environment, tighten the cable cover and bend the cable downward into a U shape at the cable inlet, as shown in the diagram.

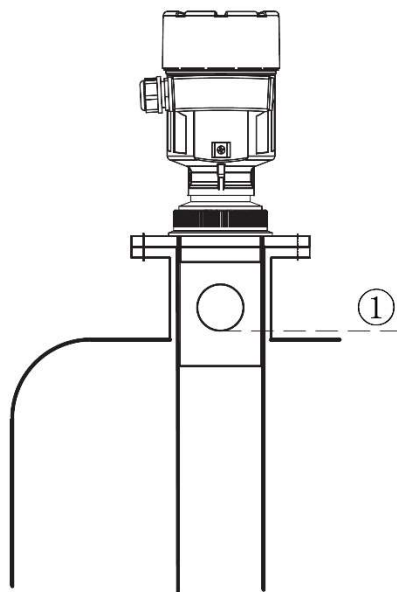
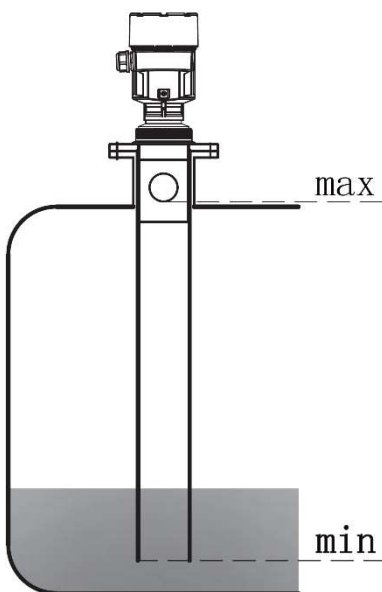
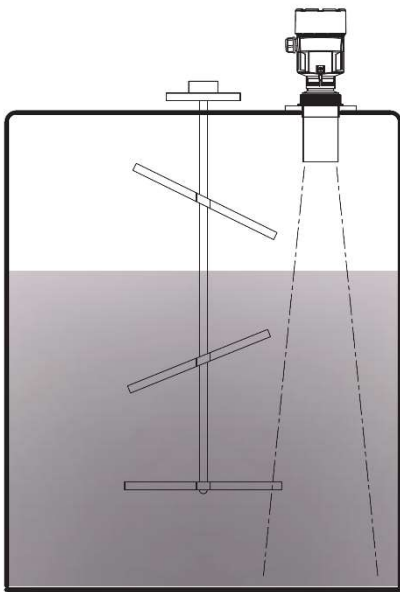


6.3.6 Extension tube length: Make sure the probe extends at least 10mm from the connecting tube.



6.3.7 Installation of Surge-protection Tubes

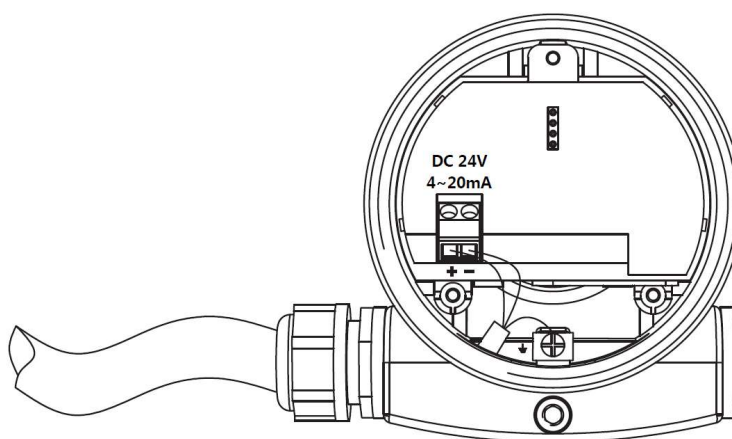
- (1) Foam will form on the surface of certain liquid mediums due to feeding, mixing, or other processes taking place inside the container. This will attenuate the signals that are emitted. In the event that foam results in measurement errors, a probe should be installed within the surge-protection tube.
- (2) When mixing takes place in the container, the ultrasonic should be installed as far away from the mixer as possible. If bubbles or waves arise from mixing, use surge-protection tubes instead.
- (3) It is advised that ultrasonic installation be conducted in a surge-protection tube in the event of a strong air current within the container (e.g. installations outdoors with fierce winds or air vortices).
- (4) Use bypass pipes or surge-protection tubes with an isobaric hole diameter of 5 to 10 mm to prevent obstructions, foam, and the impact of air turbulence on measurements. Note: Surge-protection tubes are incapable of quantifying the viscosity of materials.



7. Electrical Connection

7.1 Wiring Precautions

- Wiring for products must be completed by personnel with electrician skills.
- Electrical equipment installation must comply with domestic and international laws and regulations.
- The input power must be within the scope of this product's specification list.
- When wiring, please use a screwdriver. Connect the positive and negative electrodes as indicated on the nameplate.
- During wiring, the wire must go through the cable connector. Tighten the nut and check that the cable is tightly clamped to ensure proper sealing performance.



Two-wire Wiring Diagram 24VDC power supply and 4~20mA output

7.2 Wiring Steps

1. To remove the upper lid, rotate it counterclockwise.
2. To remove the display module panel, turn it to the left.
3. Loosen the cable connector nuts. Make sure the cable passes through the cable connector.
4. Follow the wiring diagram to insert a core wire into the terminal block. Gently pull it to ensure the guide line is securely locked in place.
5. Adjust the wire length and tighten the cable connector nuts. Please take note that the sealing ring must completely encircle and securely clamp onto the cable.
6. The display module should be reinstalled. Ensure that it is securely fastened and cannot be pulled loose.
7. Put the upper cover back and rotate it clockwise to tighten it.

7.3 Power Supply Method

1. 24VDC (2-wire) power supply
2. LOOP POWER 4~20mA output current signal

7.4 Cable Installation

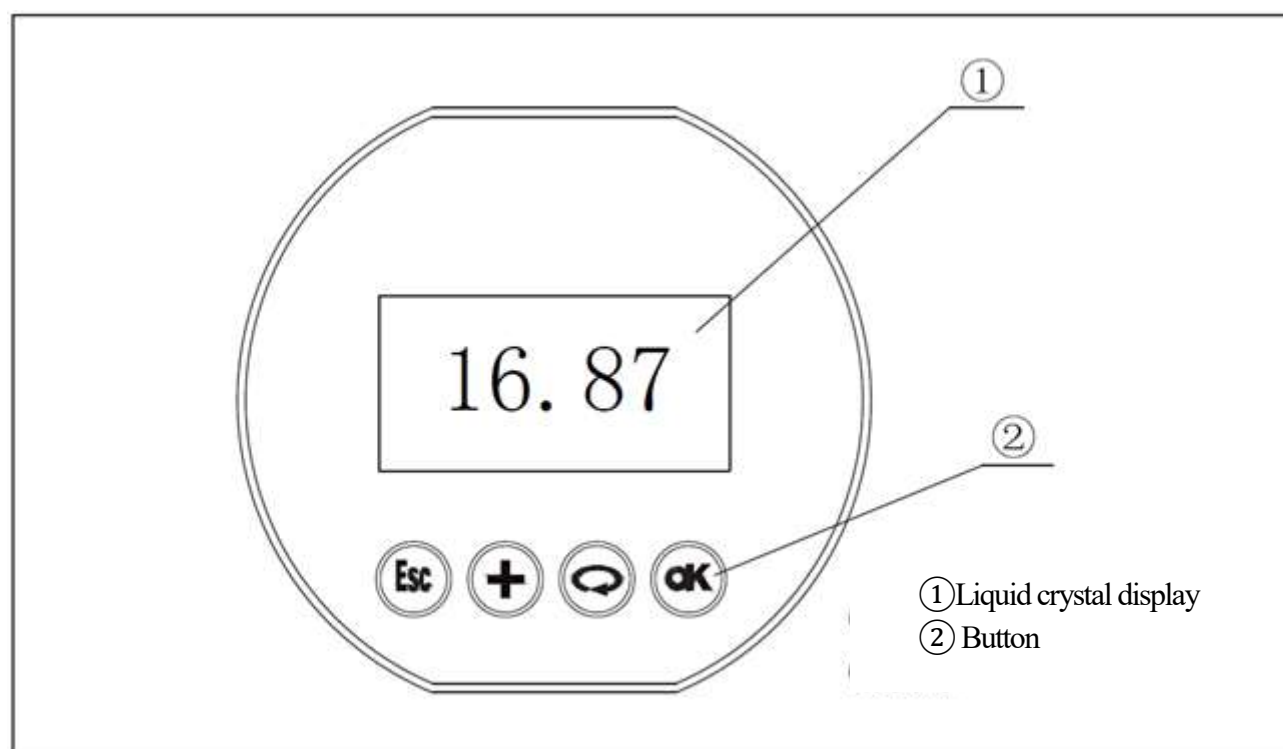
1. A two-core cable can be used for power supply. To make sure the cable inlet is sealed, the cable should have an external diameter of 6-9mm. If electromagnetic interference is present, the use of a shielded cable is advisable.

2. In order to achieve the effects of isolation and bypass high-frequency signals, the shielded end of the shielded cable, which is located away from one side of the meter, must pass through a ceramic capacitor (such as 1nF 1500V) grounding if the ground current is available.

11. Operation Instructions

11.1 Description of Panels

- This device has four buttons on the display panel that can be used to set and adjust.
- Menu content language can be selected.
- The window clearly displays the measurement value.



11.2 Button Function

 button	Exit “Edit Menu Status” and return to the previous function menu. Change the display value and echo curve interface (home page).
 button	-Change the parameter value in an infinite cycle from 0 to 9. -Change the curve display mode to home page display mode.
 button	-Change the items in the function menu. -Change the cursor position.
 button	-Enter “Edit Menu Status.” -Confirm the menu. -Confirm the parameter change.

11.3 Description of Settings

11.3.1 Enter the menu.

The interface displays the following:

In operation, press the  button to display the main menu. A triangle cursor is displayed to the left of the main menu. Press the  button to adjust the position of the triangle cursor. Press the  button to enter the menu where the cursor is pointing and press the  button to exit the currently selected item.

Each function should have the corresponding menu number in the upper right corner. The display interface is as follows:

Basic configuration	1
Display	
Diagnosis	
Service	

Note: The number in the upper right corner represents the menu number.

11.3.2 Low- level Range Settings

Low- level adjustment is used in range settings. It, along with high- level adjustment, determines the linear relationship's ratio to the current output. When the main menu number is 1, press the  button to access the basic settings submenu, in liquid crystal display.

Low-level adjustment	1.1
0.00%	
15.000 m (d)	
1.346 m (d)	

Press the  button to change the low-side percentage. To edit the percentages and distance values, refer to the characters/digital parameters and program design methods described in the previous parameter editing method. After editing, press  button and  button to exit the current option.

Note: Low- level adjustment means the distance between the flange base and the tank base is 4mA, whereas high- level adjustment means the distance between the flange base and the full range is 20mA.

11.3.3 High- level Range Settings

Range settings make use of high-order adjustments. It, along with low- level adjustment, determines the ratio of the linear relationship to the current output.

In the main menu, when the function number is 1.1, press the  button to enter high- level adjustment, in liquid crystal display.

At this point, press the  button to change the high-order adjustment.

High- level adjustment	1.2
100.00%	
0.000 m (d)	
1.346 m (d)	

11.3.4 Range Settings

To obtain accurate test results, the meter's range must be set. When the menu number is displayed as 1.7, press the  button, in liquid crystal display.

Press the  button to highlight the corresponding parameter in black. To set parameters, press the  or  button. Press OK to confirm.

Range setting 1.8

15.000 m (d)

11.3.5 Blind Spot Settings

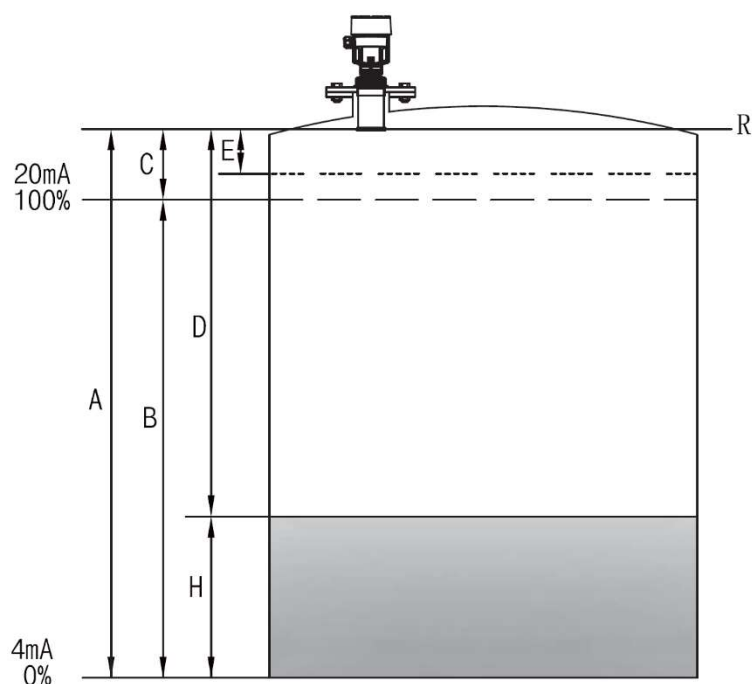
If there are fixed obstacles interfering with the measurement near the distance sensor's surface and the maximum material height does not reach the obstacles, use the blind spot range setting function to avoid measurement errors.

When the liquid crystal display menu number is 1.8, press the  button to enter the blind spot range setting menu, in liquid crystal display.

Blind spot range 1.9

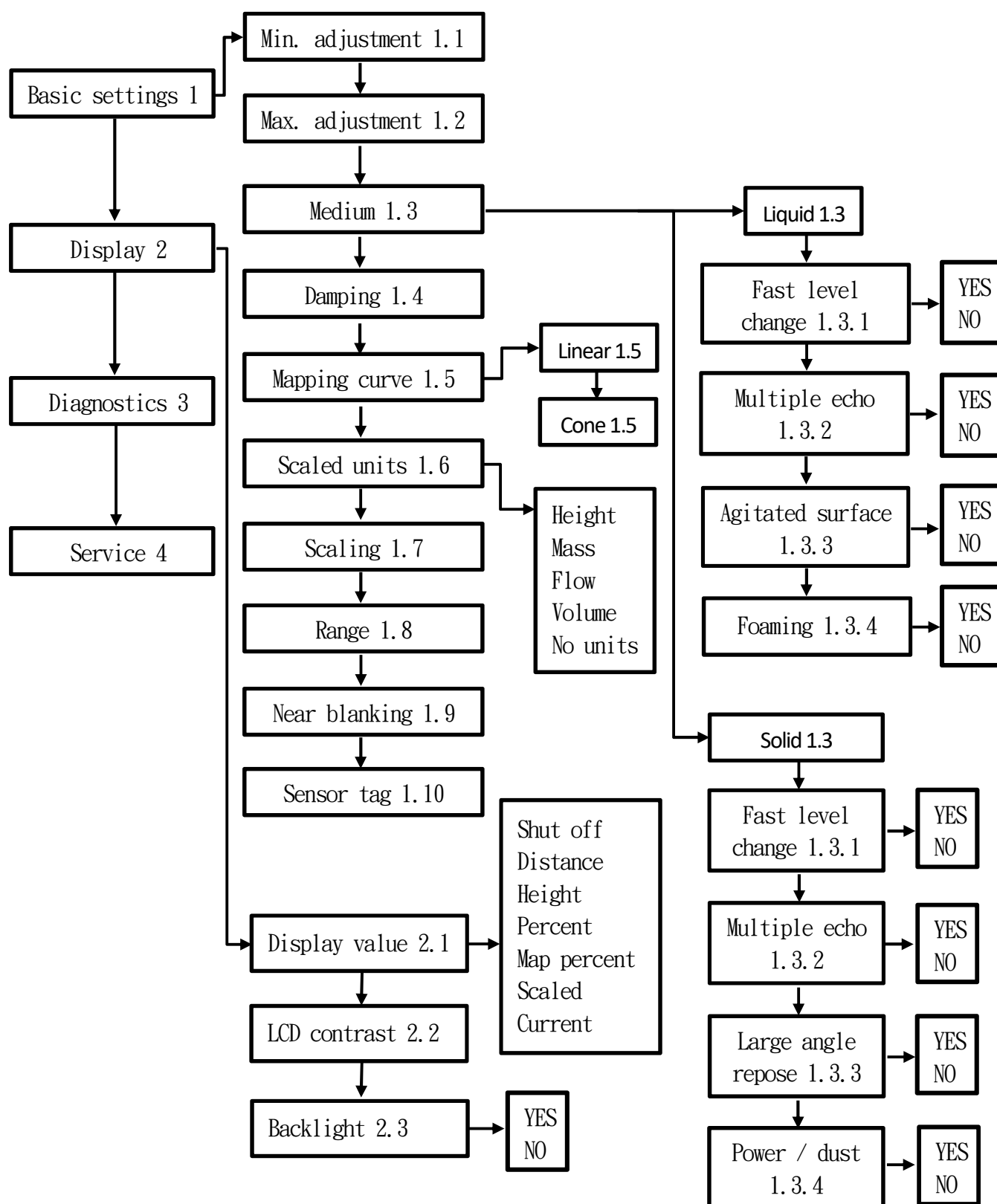
0.400 m (d)

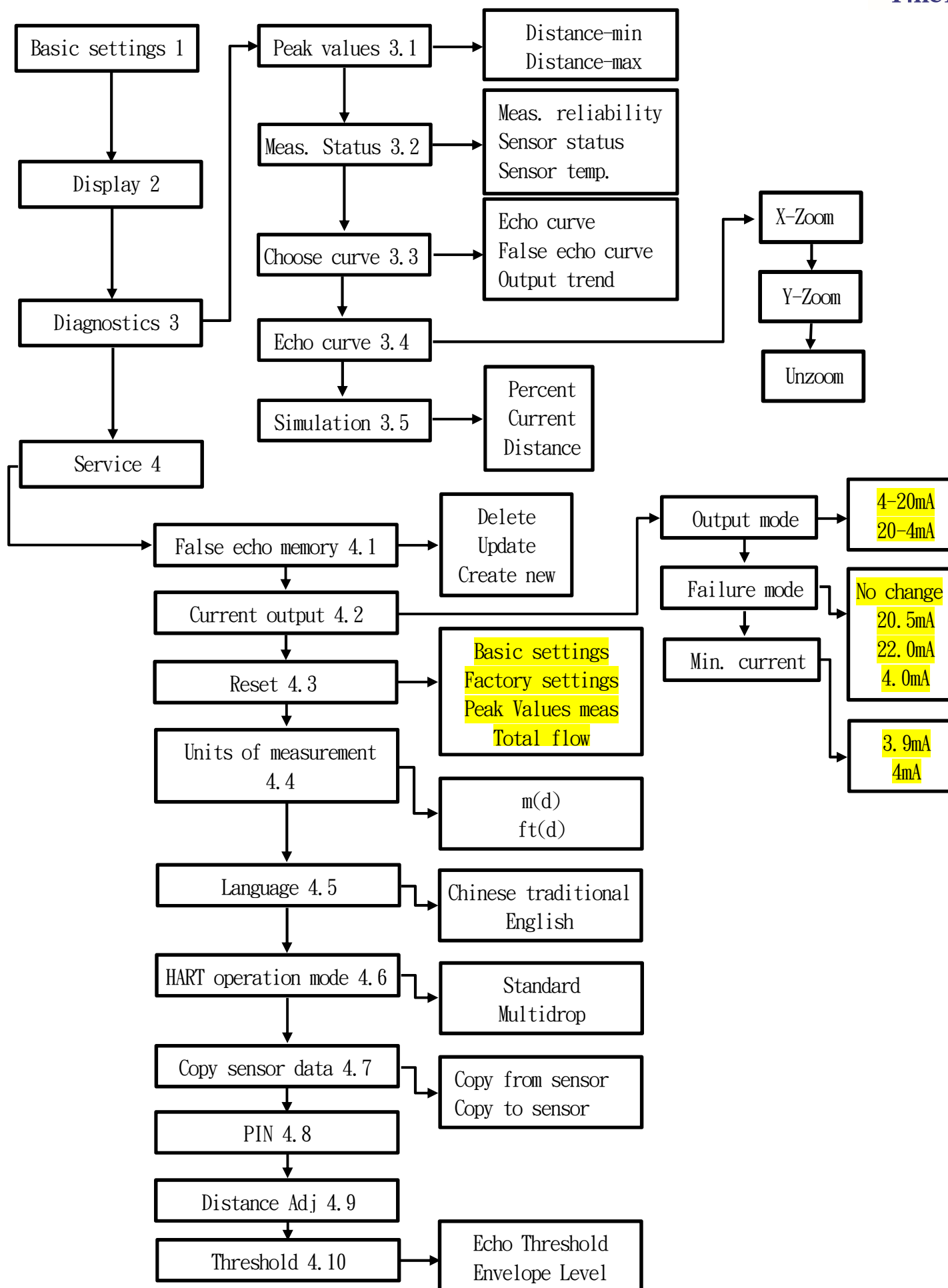
Press the  button, highlight the corresponding parameter black. Set the parameters using SELECT or the  button. Press  to confirm.



- A. Low-level adjustment
- B. measurement range
- C. High-level adjustment
- D. Air draft
- E. Blind spot range
- H. Material height
- R. Measurement reference point

12. Menu List





13. Transportation and Storage

The transportation and condition of level gauges, in addition to adhering to the JB/T9329 specifications, should also meet the following regulations:

1. Level gauges should be transported in strict compliance with the product specifications and instructions during the transportation process.
2. Appropriate protection against rain and dampness should be done.
3. Vibrations and collisions during transportation should be lessened as much as possible.
4. Level gauges should be stored in a dry and well-ventilated indoor space at -20~60°C with relative humidity not exceeding 80%.
5. Level gauges must not be stored with corrosive substances.
6. Ultrasonics after long-term storage can only be sold and used after performing corresponding tests.