



TRG804X
RADAR LEVEL MITTER-6.3GHz

Operating Manual

TRG804X-DT-JS-1006-2018(A)



PREFACE

Thank you for choosing the products of Dandong Top Electronics Instrument (Group)-Co.,Ltd. This operation manual provides you with important information on installation, connection and commissioning as well as on maintenance, troubleshooting and storage.

Please read it carefully before installation and commissioning and keep it as part of the product near the meter for easy reading.

This manual can be downloaded by entering the version number at www.ddtop.com.

If the instructions are not followed, the protection provided by the meter may be destroyed.

Trademark, Copyright and Restriction Instructions

Dandong Top Electronics Instrument (Group) Co.,Ltd.®, Dandong Top Pump Co.,Ltd.®, DDTOP® are registered trademarks of the company.

The performance specifications of the meter are effective as of the date of publication and are subject to change without notice. Dandong Top Electronics Instrument (Group)Co.,Ltd. reserves the right to modify the products described in this manual at any time without prior notice.

Quality Assurance

Dandong Top Electronics Instrument (Group) Co.,Ltd. guarantees that all variable area flow meters have no defects in materials and manufacturing processes within one year from the date of delivery. During the warranty period, if the product returns with quality problems and the claim is determined by the manufacturer to be within the scope of warranty, Dandong Top Electronics Instrument (Group) Co.,Ltd. is responsible for repair or replacement of the buyer (or owner) free of charge. Dandong Top Electronics Instrument (Group) Co.,Ltd. is not responsible for the costs caused by improper use of equipment, labor claims, direct or subsequent damage and installation and use of equipment. In addition to the special written warranty certificate for certain products of Dandong Top Electronics Instrument (Group) Co.,Ltd., Dandong Top Electronics Instrument (Group) Co.,Ltd. does not provide any express or implied warranty.

Quality

Dandong Top Electronics Instrument (Group) Co.,Ltd. has passed the ISO9001 quality system certification. The whole process of product production is strictly in accordance with the scope of the quality system, providing the strongest guarantee for product and service quality.

Content

| | |
|---|----|
| 1. Safety Tips | 5 |
| 2. Product Descriptions | 5 |
| 3. Technical Parameters | 6 |
| 4. Outline Dimension Diagram-Figure 3 | 8 |
| 5. Unpacking and Inspection | 9 |
| 6. Installation | 9 |
| 7. Instrument Configuration..... | 11 |
| 8. Precautions | 20 |
| 9. Fault Analysis and Troubleshooting | 21 |
| 10. Disassemble..... | 22 |
| 11. Product Certification..... | 22 |

1. Safety Tips

For safety reasons, it is expressly prohibited to modify or change the product without authorization. Repair or replacement is only allowed to use the accessories specified by the manufacturer.

1.1 The explosion may cause death or serious injury.

When installing the device in an explosive environment, be sure to comply with applicable local, national and international standards, codes and regulations. Ensure that the equipment is installed in accordance with intrinsically safe or non-flammable site operating procedures.

1.2 Process leakage may cause serious injury or death.

If the process seal is damaged, the medium may leak at the connection.

1.3 Failure to follow the safety installation guidelines may result in death or serious injury.

All operations described in this manual must be carried out by trained and qualified or end-user-appointed personnel.

2. Product Descriptions

2.1 Main structure-Figure 1

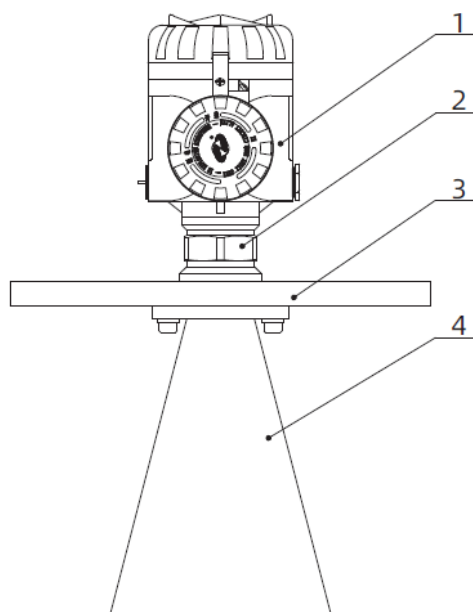


Figure 1 Product Main Structure

1. Transmitter, with circuit board module inside
2. Sealing component, with sealing structure inside
3. Flange, with flange installation on site
4. Antenna, selected according to site conditions

2.2 Working Principle

The radar antenna emits a very short microwave pulse with very low energy. The pulse propagates in space at the speed of light and meets the surface of the measured medium. Part of its energy is reflected back and received by the same antenna. The time interval between the transmitted pulse and the received pulse is proportional to the distance from the antenna to the surface of the measured medium, so that the distance from the antenna to the surface of the measured medium is calculated.

2.3 Packaging

Please send packaging waste to a special recycling agency.

2.4 Lifting and Transportation

Please use quality lifting equipment and lifting straps, and pay attention to safety.

2.5 Storage

Storage temperature $-20^{\circ}\text{C}\sim 40^{\circ}\text{C}$

Storage humidity $\leq 40\%$

3. Technical Parameters

3.1 Key Performance

Power Supply: (16 ~ 36) V DC (two-wire)

Output: 4 ~ 20mA

Blind Zone: 400mm

Transmission Frequency: 6.3GHz

Structure: rod antenna, horn antenna

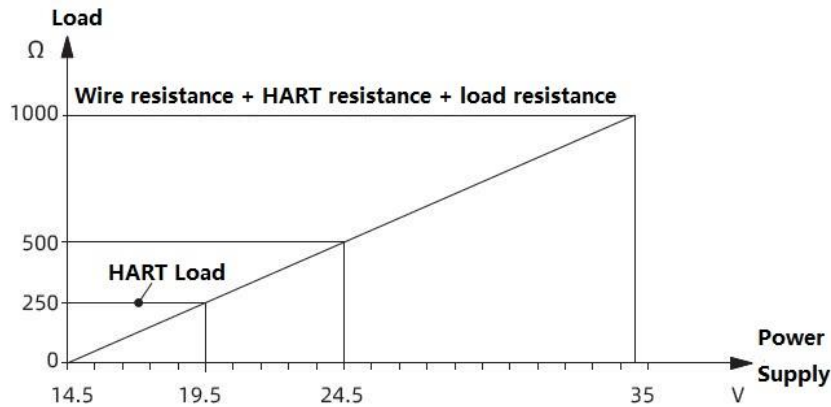


Figure 2 Two-wire Load Resistance Diagram

3.2 Appearance and Performance Parameters

TRG8041-Apperance



TRG8041- Performance parameter

Antenna structure: Rod type

Application conditions: suitable for strong corrosive liquids, simple process conditions

Measuring range: 10m

Measurement accuracy: $\pm 10\text{mm}$

Process temperature: $(-40 \sim 120)^{\circ}\text{C}$

Process pressure: $(-0.1 \sim 0.3) \text{MPa}$

TRG8042- Apperance



TRG8042- Performance parameter

Antenna structure: horn type

Application conditions: temperature-resistant, pressure-resistant, slightly corrosive liquid

Measuring range: 30m

Measurement accuracy: $\pm 10\text{mm}$ or $0.1\%\text{FS}$ (whichever is greater)

Process temperature: $(-40 \sim 200)^{\circ}\text{C}$

Process pressure: $(-0.1 \sim 4.0) \text{MPa}$

3.3 Explosion-proof Mark

Passed the national explosion-proof certification, certification mark:

Intrinsically safe Ex ia IIC T1 ~ T5/T6 Ga; Ex iaD 20 T85°C

Intrinsically safe and flameproof composite type Ex d ia [ia Ga]IIC T1 ~ T5/T6 Gb; Ex tD A21 T100°C /T85°C

3.4 Executive Standard

TRG804X Radar Level Transmitter Executive Standard

JB/T 13252-2017 Microwave (radar) level transmitter

4. Outline Dimension Diagram-Figure 3

If special size is required when ordering, the actual size shall prevail.

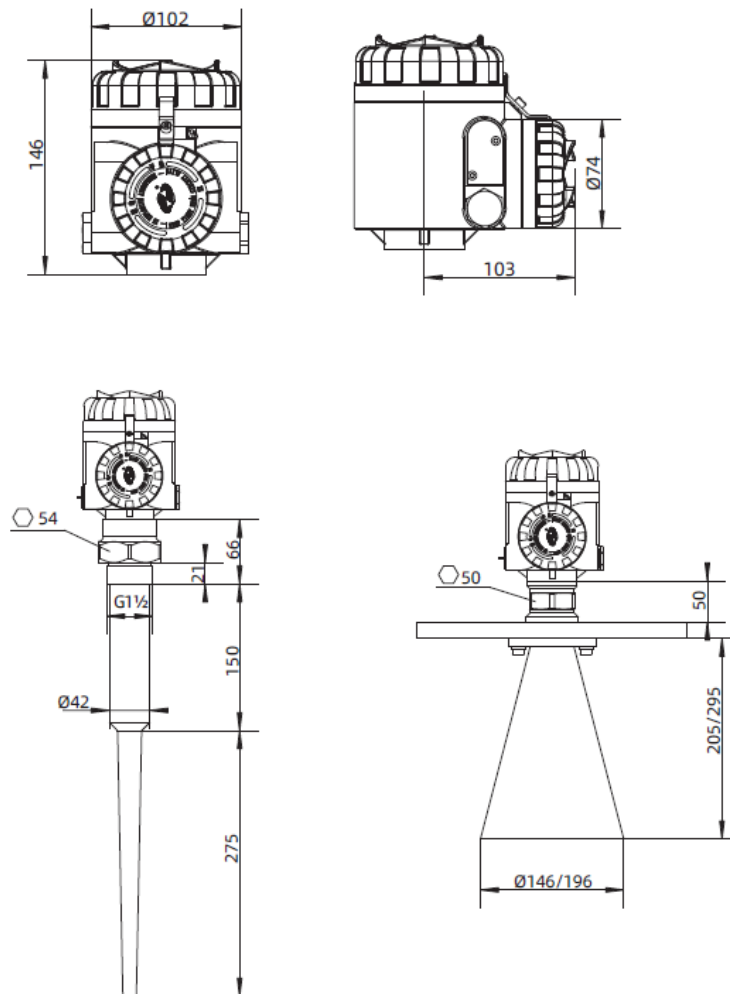


Figure 3 Outline Dimension

5. Unpacking and Inspection

5.1 Precautions for Unpacking Inspection

5.1.1 Check whether the product nameplate (Figure 4) is consistent with the supply list information

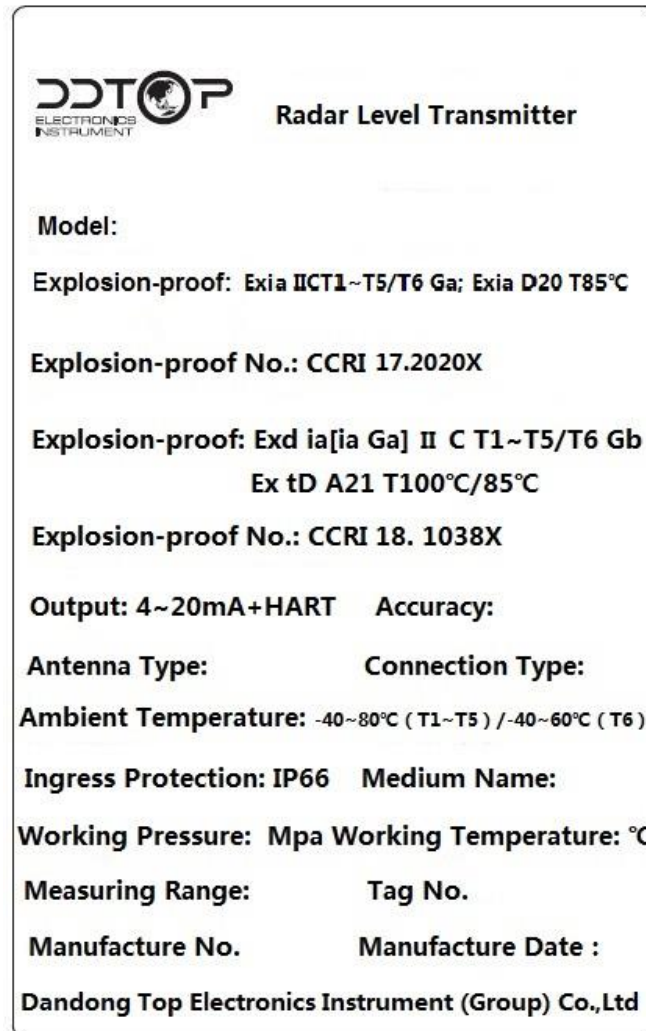


Figure 4 Product Nameplate

5.1.2 Check the quantity and material of each part against the packing list.

5.2 Content of Inspection

5.2.1 Check whether the appearance of the meter is defective or damaged.

6. Installation

6.1 Installation Tool

Tools suitable for process connections like wrenches, flange gaskets and flange bolts.

6.2 Installation Technical Requirements

Installation Location

During installation, take care to maintain a distance of at least 600 mm between the instrument and the vessel wall, as shown in Figure 5.

- ①-Datum plane;
- ②-The center of the container or the axis of symmetry.

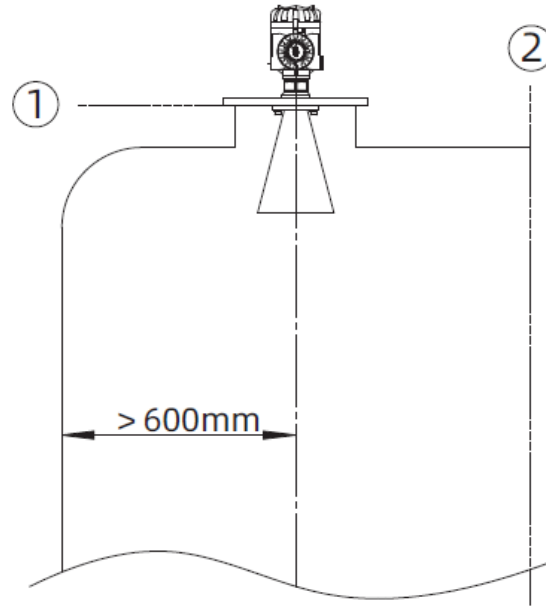


Figure 5 Schematic Diagram of Installation Position

For a cone-shaped container with a flat tank top, the best installation position of the meter is the center of the top of the container, so that the bottom of the measuring container can be ensured, as shown in Figure 6.

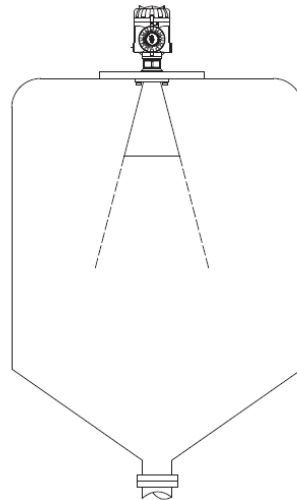


Figure 6 Diagram of Installation Position of Cone Bottom Tank

Moisture proof

For installation in an outdoor or humid room and on a cooling or heating tank, in order to prevent moisture, the cable gland should be tightened, and the cable should be bent downward at the inlet, as shown in Figure 7.

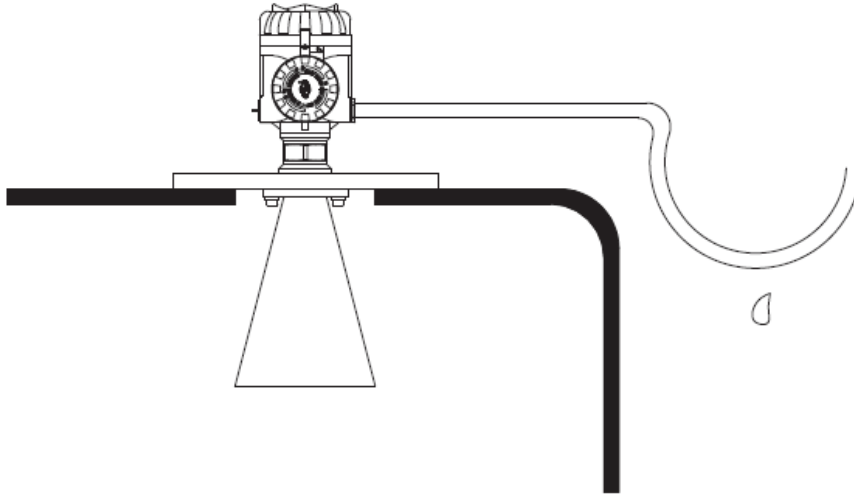


Figure 7 Diagram of Moisture-proof Wiring

Container Tube Connection

The length of the container nozzle should be as long as possible to ensure that the end of the antenna extends into the tank, as shown in Figure 8.

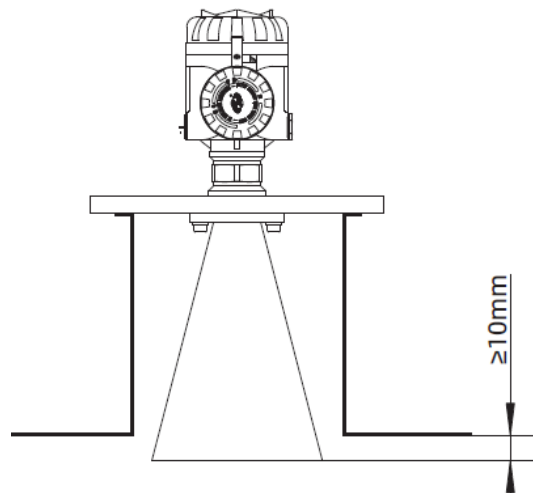


Figure 8 Diagram of Container Connecting Pipe Connection

7. Instrument Configuration

7.1 Electrical Wiring

According to the wiring shown in Figure 9 below, terminal 2 is connected to 24VDC positive, and terminal 1 is connected to 24VDC negative.

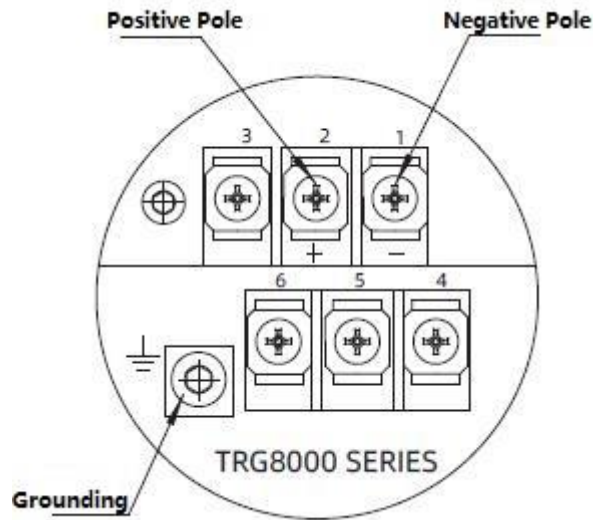


Figure 9 Electrical Wiring

7.2 Configuration Operation Process

7.2.1 Diagram of Parameter Setting-Figure 10

The reference surface of the measurement is the sealing surface of the thread or flange

- ① -Blind area;
- ② -Range setting;
- ③ -High level adjustment;
- ④ -Low level adjustment

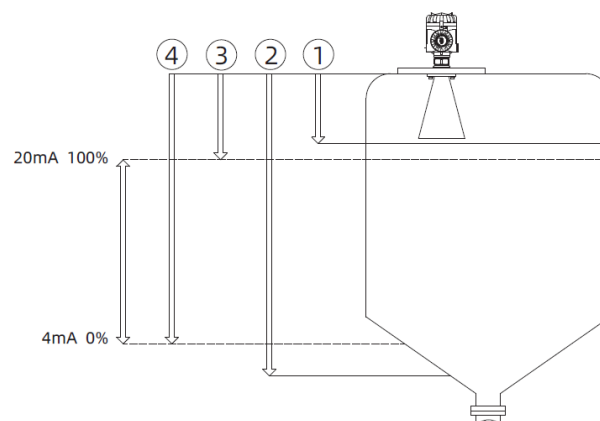


Figure 10 Diagram of Parameter Setting

7.2.2 Introduction to Operation Interface

There are 4 buttons on the instrument panel (Figure 11), and the instrument can be configured

through the 4 buttons. The language of the configuration menu is optional. After configuration, the LCD screen displays the measured value, and the measured value can be read out very clearly through the glass window.

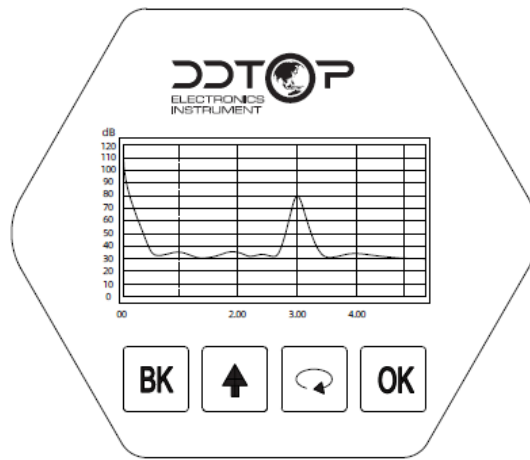


Figure 11 Instrument Panel

| 【BK】 key | 【↑】 key | 【↻】 key | 【OK】 key |
|-----------------------------|-------------------|---------------------------|----------------------|
| -Exit the programming state | -Modify parameter | -Select programming items | -Enter programming |
| -Back to the previous menu | value | -Select to edit parameter | state |
| -Display echo curve | | bits | -Confirm programming |
| | | -Parameter item content | -Confirm parameter |
| | | display | modification |

Display

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

Diagnose

Diagnosis completes the inspection and testing functions of the instrument. Mainly include: measuring peak value, measuring state, selection curve, echo curve and simulation.

Service

Including false echo, current output, reset, measurement unit, language, HART working mode, copy sensor data and password.

Information

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

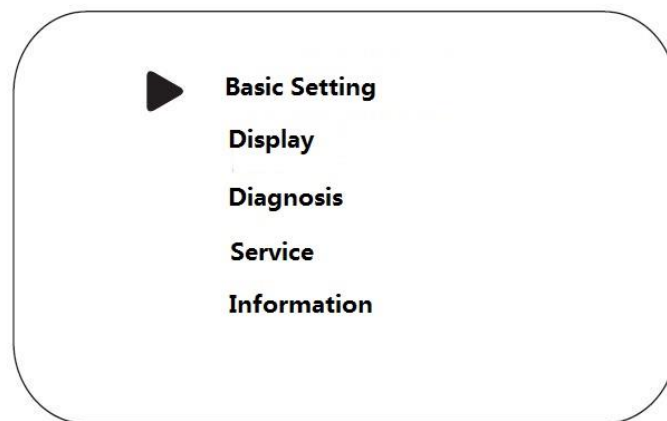
Programming method

When the instrument is running, press the OK key to enter the programming state and display the programming main menu. After editing each parameter, press OK to confirm, otherwise the editing is invalid. After finishing editing, press BK key to exit programming state and return to running state. At any time during programming, you can press BK key to abandon programming and exit the parameter item programming state.

7.2.3 Configuration steps

Basic settings

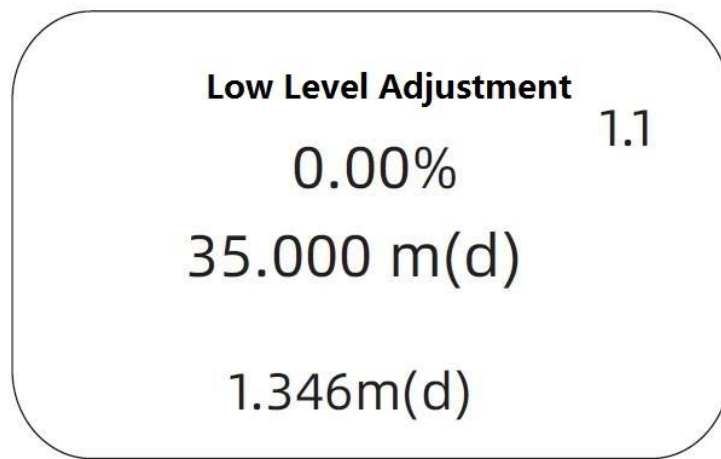
Basic settings include the settings of main instrument parameters, such as range, material properties, damping time, etc. In the running state, press the OK key to enter the programming state, the LCD displays the main menu, as shown in Figure 11-1 Basic Settings



11-1 Basic Setting

Low Level adjustment


Low level adjustment is used for range setting. Together with the high level adjustment, it determines the ratio of the current output linear corresponding relationship. In the main menu, when the menu number is 1, press the OK key to enter the basic setting sub-menu, LCD display, as shown in Figure 11-2 low adjustment.



11-2 Low Level Adjustment

Press OK to enter the programming low percentage, refer to the character/number parameter programming method in the parameter editing method to edit the percentage value and distance value. After editing, press OK key to confirm, press BK key to abandon programming.

High Level Adjustment

High level adjustment is used for range setting. Together with the low level adjustment, it determines the ratio of the current output linear corresponding relationship. When the menu number of the LCD display is 1.1, press the key  to enter the high position adjustment, and the LCD display is shown in Figure 11-3.

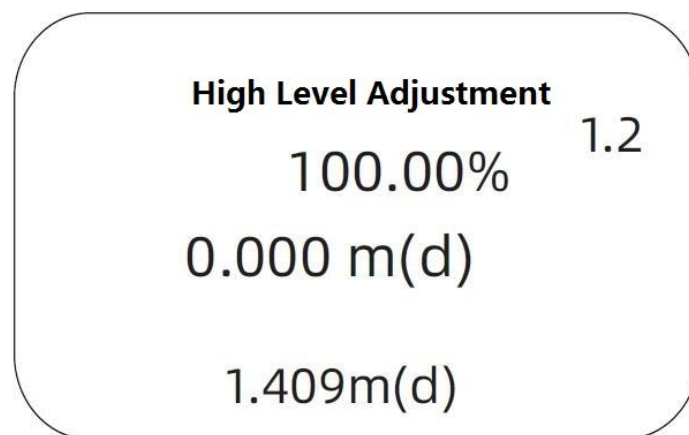



Figure 11-3 High Level Adjustment

At this point, press the OK key to edit the high adjustment.

Material Property

When the LCD display menu number is 1.2, press the key  to enter the material property programming, and the LCD will display, as shown in Figure 11-4. The material properties menu is used to select solid, liquid or micro DK, so as to further determine other properties of the material

that affect the measurement.

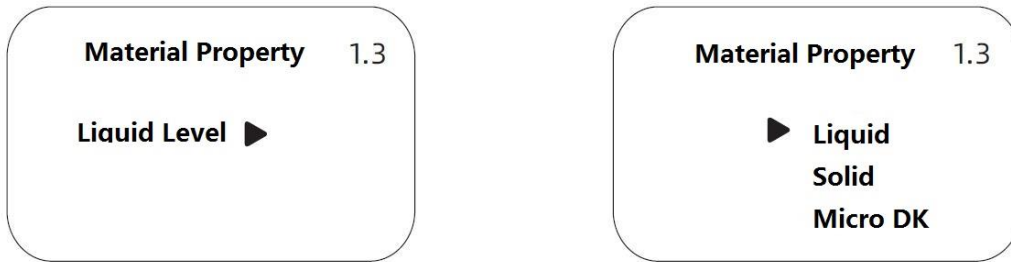





Figure 11-4 Material Property

Damping time


When the LCD display menu number is 1.3, press the key  to enter the damping time setting menu, the LCD displays, as shown in Figure 11-5 damping time.

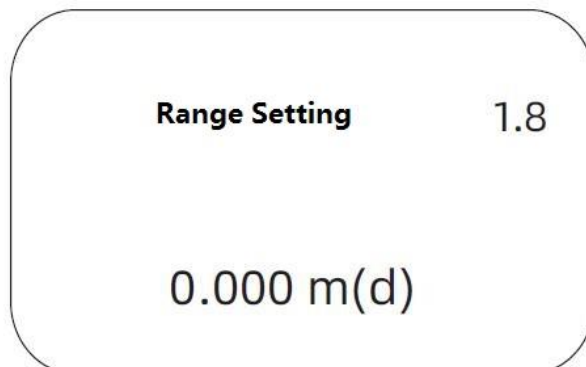


11-5 Damping Time


Press the OK key to enter the parameter editing state, use the  key to set the number, use the key  to select the edit digit, and press the OK key to confirm after editing.

Range setting


In order to get the correct measurement results, you need to set the range of the meter. When the menu number is displayed as 1.7, press the key  to enter the range setting menu, and the LCD will display, as shown in Figure 11-6.

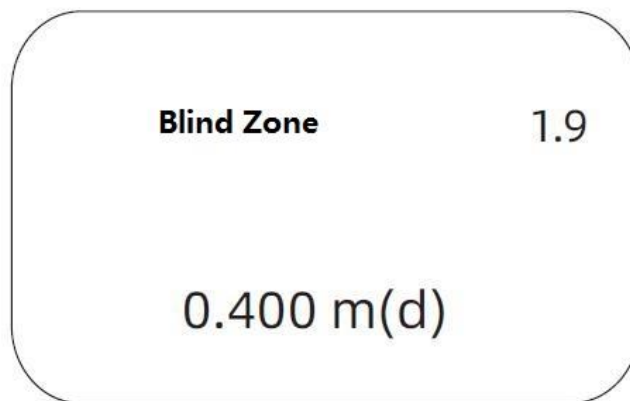


11-6 Measuring Range Setting

Press the OK key, the corresponding parameter \pm or reverse black, use the \uparrow or key  to set the parameter, and press the OK key to confirm.

Blind Zone


When there is a fixed obstacle close to the sensor surface that interferes with the measurement, and the maximum material height will not reach the obstacle, the blind zone range setting function can be used to avoid measurement errors. When the LCD displays menu number 1.8, press the key  to enter the blind zone range setting menu, and the LCD displays, as shown in Figure 11-7 Blind Zone Range.

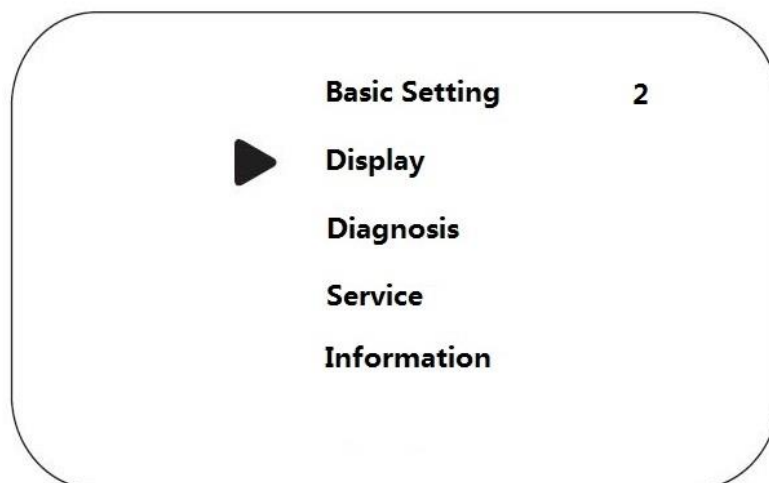


11-7 Blind Zone

Press OK to enter the parameter editing state, and press OK to confirm after editing.

Display

This function is used for display mode programming. When the LCD displays the main menu, press the key  to move the arrow to the display item, and the LCD will display as shown in Figure 11-8.



11-8 Display

Press the OK key to enter the display mode programming.

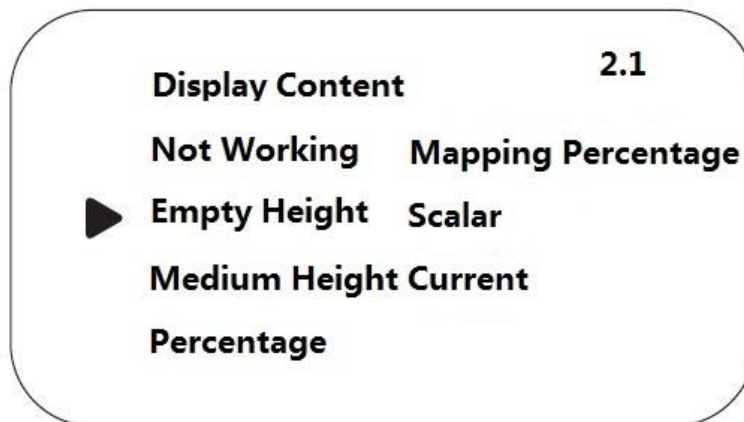
Display content

Enter display mode programming, LCD display, as shown in Figure 11-9.



11-9 Display Content

The parameter indicating the current display content is the empty height, that is, the meter displays the measured empty height value. Press the OK key to enter the editing state, and the LCD will display, as shown in figure 11-10.




11-10 Display Empty Height

Use the key  to move the arrow to the desired parameter item and press OK to confirm.

When editing is complete, press the BK key to exit display programming and return to the previous menu.

Service

The service menu includes more specialized functions. Mainly include false echo learning, time-varying gain control, reset and instrument parameter storage. When the LCD displays the main menu, press the key  to move the arrow to the service item, and the LCD displays, as

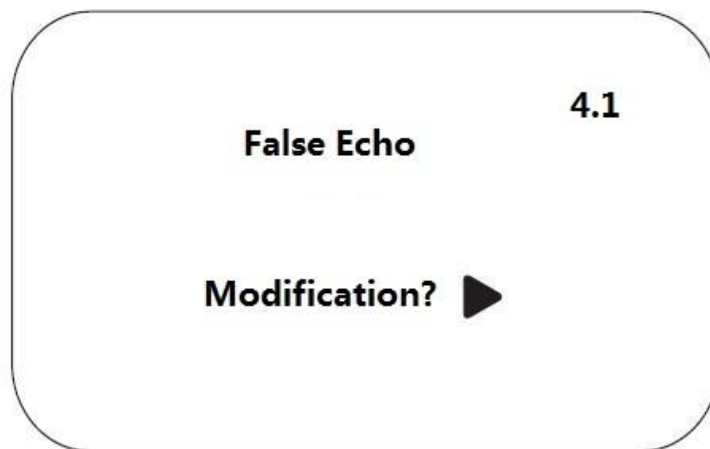
shown in Figure 11-11 Service.



11-11 Service

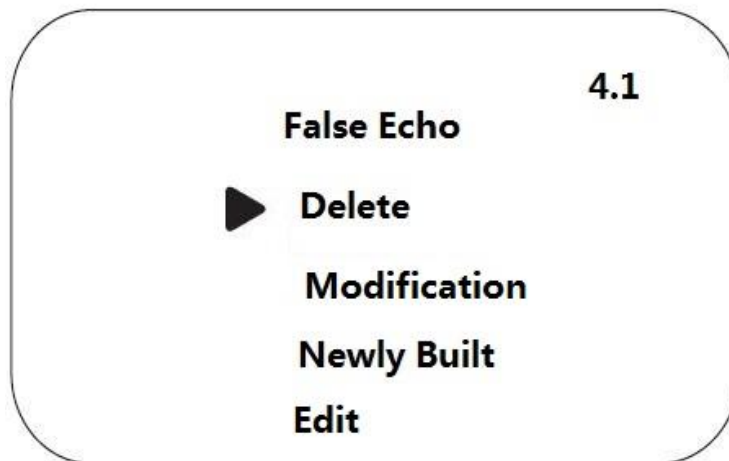
False Echo

When there is a fixed obstacle in the measurement range that interferes with the measurement, the false echo learning function can be used to overcome its influence. When the main menu is displayed on the LCD and the menu number is 4, press the OK key to enter the service submenu, and the LCD will display as shown in Figure 11-12 false echo.




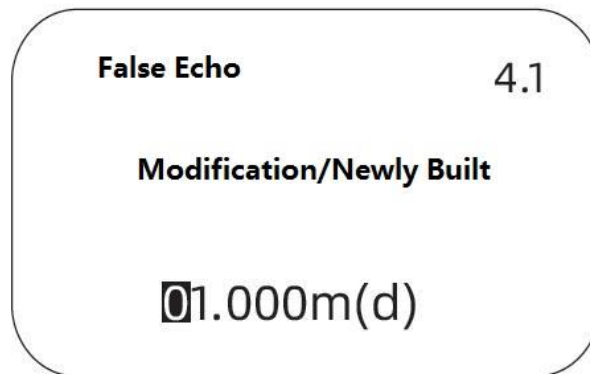
11-12 False Echo

Press the OK key, the LCD will display, as shown in Figure 11-13, the false echo sub-menu.



11-13 False Echo Submenu

If you it is needed to update/create a new false echo curve, press the  key, move the arrow to the current new entry, press OK to confirm, and the LCD will display, as shown in Figure 11-14.



11-14 False Echo Update

Prompt to enter the true echo distance value. After entering the distance value, press the OK key to confirm. Please wait for the LCD display.

8. Precautions

8.1 Make sure that the power supply is safe and reliable. The power supply must be connected in accordance with the correct positive and negative poles, and the ground terminal of the transmitter must be reliably grounded;

8.2 When installing the radar level transmitter, be careful not to install it above the material flow. If it is unavoidable, it is recommended to install a still-wave tube or bypass tube for easy measurement;

8.3 When installing, ensure that the radar antenna is perpendicular to the surface of the measured medium, connect the radar to the tank flange, and tighten the fixing bolts with tools;

8.4 The operating temperature range of electronic components is $-40^{\circ}\text{C}\sim+80^{\circ}\text{C}$, and the temperature range displayed on the LCD screen is $-20^{\circ}\text{C}\sim+80^{\circ}\text{C}$ (the LCD does not display beyond the range, and the remote transmission is normal);

8.5 After configuration, tighten the display and power cover to prevent the meter from getting wet.

9. Fault Analysis and Troubleshooting

| Fault Phenomenon | Cause of Failure | Solution |
|--|--|---|
| E14 | Weak echo, or no echo | The possible reasons for this phenomenon are: 1. The radar horn antenna is blocked; 2. The feed is too full and enters the blind zone; 3. The low adjustment value of the meter is set less than the actual tank height; 4. There is high frequency AC ripple interference in the DC 24VDC power supply, and the echo baseline is too high; 5. The meter itself is a problem. |
| No display | Power failure or bad display, or delayed display | Check the power supply module, display module, check whether the explosion-proof cavity is broken and whether there is a normal voltage output |
| Value jump | There is interference, there are false echoes | Check working conditions, installation location, and perform false echo learning. |
| Deviation from the host computer measurement | The host computer parameter setting is wrong, the line transmission failure | The settings of the host computer should be consistent, replace the transmission cable |
| The false echo is generated before the real wave | There are obstacles in the measurement range, and the interference wave is caused by the obstacles | If the obstacle is fixed within the measurement range, the problem can be solved by changing the installation position, raising the amplitude of the envelope and learning the false wave. |
| The false echo is generated after the real wave | Multiple echoes produced by radar waves hitting an irregular reflecting surface | The problem can be solved by adjusting the installation position of the meter, raising the envelope amplitude and strengthening the first wave. |
| The transmitter echo shows a straight line to report E14 | It may be caused by the low setting value being smaller than the empty position, the antenna | The problem can be solved by increasing the low setting value, cleaning the meter antenna and replacing the meter core. |

| | | |
|--|--|--|
| | blockage and the malfunction of the watch core | |
| The transmitter shows E15, E17 failure | Caused by instrument hardware failure | The problem can be solved by returning to the factory for repair |
| Echo baseline height displayed on the meter header | It may be caused by high frequency AC interference in the power supply circuit and the current feedback circuit | The problem can be solved by independent wiring of the power supply circuit or current feedback circuit, or by installing an isolation module. |
| The transmitter shows negative numbers | The low adjustment value of the "basic setting" inside the instrument is set less than the actual tank height, and the actual current output is 4 mA, which is zero. | Set the low-position adjustment value item to be consistent with the tank height; |
| The meter crashes during measurement | The meter needs to be reset | Reset the meter and set the relevant parameters. The additional parameter items "large pile angle" and "dust intensity" in the "material properties" item are treated by default. Just set "No". |

10. Disassemble

10.1 Warning

Before disassembly, attention should be paid to hazardous process conditions, e.g., pressure inside the vessel, high temperature, corrosive or toxic medium.

10.2 Waste Removal

Please follow the current regulations in each region for waste disposal.

11. Product Certification

| Product Certification | | |
|-----------------------|--|---|
| Certification | Certification No. | Certification Scope |
| SIL3 |  NO.1N191227.DTEWT37 | SIL 2 @ HFT=0; SIL 3 @ HFT=1, Route 2 _H |
| Explosion-proof |  CCRI 17.2020X CCRI 18.1038X | Ex ia IIC T1 ~ T5/T6 Ga Ex ia D 20 T85°C Ex d ia [ia Ga] II C T1~T5/T6 Gb Ex tD A21 T100°C / T85°C |