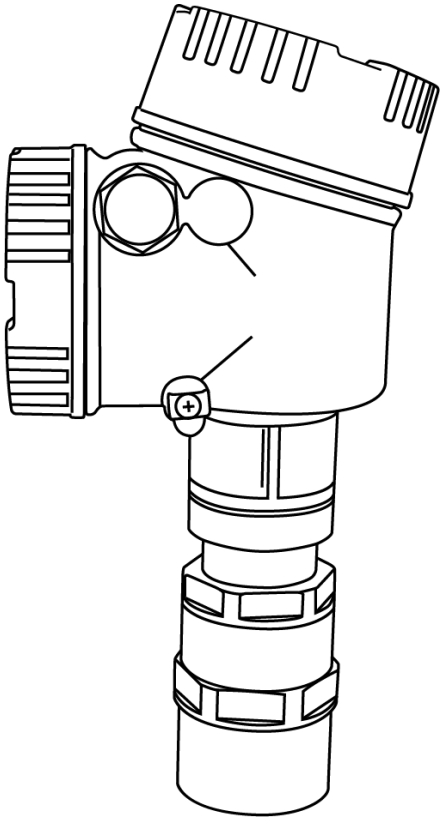
WINTERS Instruments
Excellence Since 1953

Technical Information

LRD701/LRD702/LRD703
120GHz radar level meter



Winters Instrument

V1.0

Contents

1. Safety guidelines

1.1 Personnel Requirements

Installation, commissioning, diagnosis, and maintenance personnel must meet the following requirements:

· Trained qualified professionals must be qualified to perform specific functions and tasks.
· Authorized by the manufacturer/operator.
· Familiar with federal/state regulations.
· Before starting the operation, the professional must read and understand the provisions in the Operation Manual, supplementary documents and certificates (depending on the actual application).
· Comply with operating guidelines and basic conditions.

The operator must meet the following requirements:

· Directed and authorized by factory/operator for task requirements.
· Follow the guidelines in the manual.

1.2 Designated Use

Application and measurement media

The measuring equipment described in this document is used for continuous non-contact level measurement of liquids, slurries and slurries. The device operates at about 120GHz and can be freely installed in a closed metal container for measurement. The operation is completely harmless to humans and animals.

The measuring instrument can be used to measure the following parameters in accordance with the limit values specified in the Operating Manual:

· Measured values of process variables: level, distance, signal strength

To ensure that the measuring instrument is always working properly:

· Use is permitted only when the process liquid parts of the measuring equipment can withstand the corrosion of the measured medium.
· Comply with the limit value requirements specified in the "Technical Parameters" section.

Wrong use

The manufacturer shall not be liable for damage caused by improper use or use for non-specified purposes.

Verify critical conditions:

· When measuring special media and cleaning fluids, we are happy to help you verify the corrosion resistance of the material of the exposed part, but do not guarantee or accept any liability for this.

Other risks

During operation, the heat exchange with the process and the power consumption of the electronic components themselves can cause the temperature of the electronic chamber housing and its built-in components to increase to 80°C, such as the display module, the main electronic module and the input/output electronic module. During the measurement process, the sensor temperature may approach the medium temperature.

There is a risk of overheating surface resulting in burns!

· In high temperature conditions: ensure that protective measures have been taken to avoid contact burns.

1.3 Workplace safety

When operating equipment:

· Comply with federal/state regulations and wear personal protective equipment.

1.4 Operation Safety

There is a risk of personal injury.

· Operate equipment only under correct technical and fail-safe conditions.
· It is the operator's responsibility to ensure that the equipment is operated without interference.

Modified equipment

Do not make unauthorized changes to the equipment, which may cause unforeseen hazards.

· If you need to change, please consult the company.

Repair

Safe operation and reliable measurement of equipment should always be ensured.

· Perform only expressly permitted equipment repairs.

· Comply with electronic equipment repair guidelines in Union/national regulations.

· Only the original spare parts and accessories of this product are used.

Dangerous area

When the equipment is used in hazardous areas, measures should be taken to eliminate personnel or equipment hazards (e.g., explosion protection, pressure vessel safety) :

· Check and confirm that the ordered equipment is allowed to be used in hazardous areas with reference to the nameplate.

2. product introduction

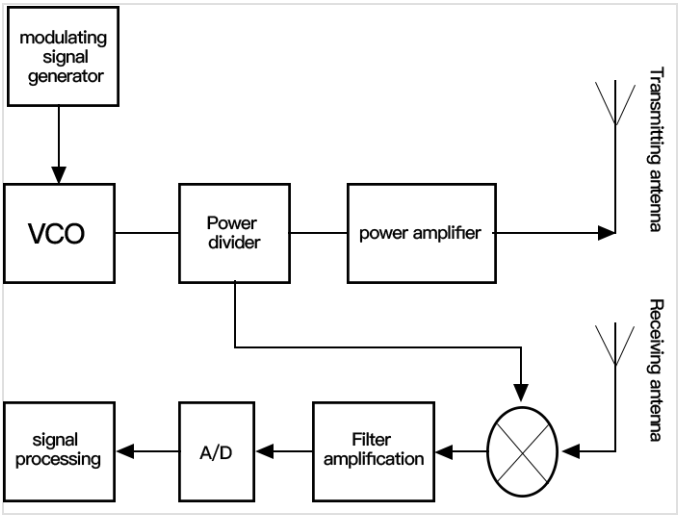
2.1 Product Overview

Frequency Modulated Continuous Wave Radar is a continuous wave radar whose transmission frequency is modulated by a specific signal. By comparing the difference between the frequency of the echo signal at any time and the frequency of the transmitted signal at this time, FMCW radar can obtain the range information of the target.The distance is proportional to the frequency difference between the two.The radial velocity and distance of the target can be obtained by processing the frequency difference between the two measurements.

Angular wave modulation can obtain both distance and velocity information.

2.2 FMCW radar system framework

The following is the system block diagram of FMCW radar, which is mainly composed of three parts: transmitting antenna and receiving antenna, RF front end composed of power splitter, power amplifier and mixer, modulation signal generator and AD sampling and signal processing back-end processing part.



System block diagram of FMCW radar

The modulating signal generator provides the required modulating signal, which is controlled by VCO to produce continuous high frequency constant amplitude wave whose frequency changes in time according to the zigzag shape. One part is amplified and radiated out through the transmitting antenna, and the other part is used as the local oscillator signal. After the radio wave meets the target and returns

to the receiving antenna, the frequency of the echo signal changes compared with the local vibration signal, and the beat signal is produced after the mixer. The frequency of the beat signal is related to the distance and speed of the target. The main task of signal processing is to extract the frequency of the beat signal and get the real distance and speed of the target through it.

2.3 Advantages of FMCW radar

Frequency-modulated continuous wave (FMCW) radar is a radar system which can obtain target information according to the frequency difference and phase difference between transmitted signal and echo signal by modulating the frequency of continuous wave. Compared with the pulse system radar, it has the following advantages:

(1) According to radar theory, range resolution is determined by the bandwidth of the radar signal, and FMCW radar has a large bandwidth, so it has a high range resolution.

(2) Because the delay time of the echo signal of the FMCW radar is much less than the time width of the transmitted signal, the radar transmitter and the receiver can work at the same time, and there is no distance blind area.

(3) Under a certain noise power condition, the detection capability of the radar is determined by the energy of the radar signal. FMCW radar has a large time-band product, much larger than the pulse radar with the same signal bandwidth and level, so under the same detection capability, FMCW radar has low transmitting power and is not easy to be intercepted.

(4) Because the FMCW radar has a large time broadband width product, it does not need a high peak power, so its operating voltage is relatively low, and it does not need to use high power and high voltage devices, so that the whole system has a simple structure, small size, light weight and low cost.

2.4 Technical Specifications

Radar frequency: 120GHz
Equivalent omnidirectional radiated power: < 10uW
Measuring range: 0.01 ~ 30m
Power consumption: < 2.4W
Power supply: 24VDC, 220VAC, two-wire system/four-wire system
Display resolution: 0.1mm
Measurement accuracy: ±1mm, ±3mm
Output current: 4 ~ 20mA
Communication type: RS485, HART
Process pressure: 0 ~ 2.5MPa, the maximum pressure of the special isolation device can reach 10MPa
Ambient temperature: -40 ~ +80℃
Process temperature: -40℃~+ 80℃, -40℃~+200℃, through the special heat insulation device temperature can reach 680℃
Shell material: cast aluminum
Protection level: IP66/IP67

3. Storage and transportation

3.1 Storage Conditions

- Permissible storage temperature: -40~+80°C
- Use the original packaging for storage.

3.2 Transport the product to the measuring point

Look out
The case or antenna may be damaged or broken.
There is a risk of injury!

- Transport measuring equipment to measuring points or process connections in its original packaging.

• Do not fix the lifting device (rope, ring, etc.) to the housing or antenna, only to the process connection. Pay attention to the center of gravity of the device to avoid tilt.

• When transporting equipment weighing more than 18kg, comply with safety guidelines and transport conditions.

4. installation

4.1 Installation Conditions

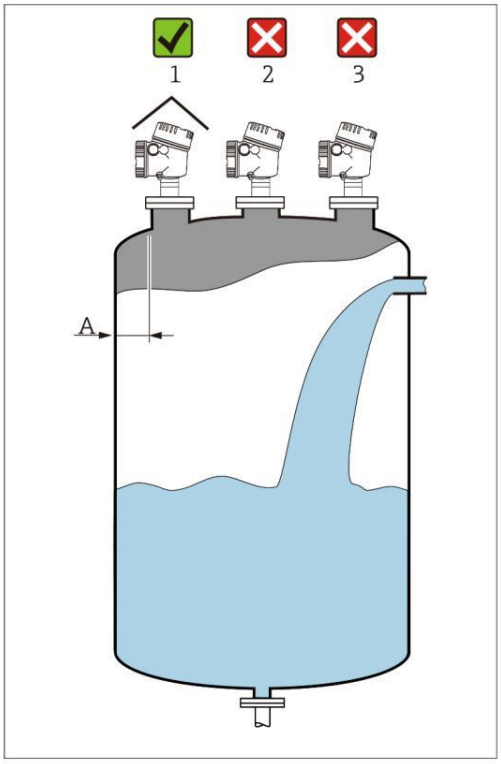
4.1.1 Installation Position

•The recommended installation distance between the tank wall and the outer wall of the mounting short tube A: approximately 1/6 of the diameter of the tank.However, the distance between the instrument installation position and the tank wall cannot be less than 15cm.

• Do not install the meter in the center of the tank (2), as interference will cause signal loss.

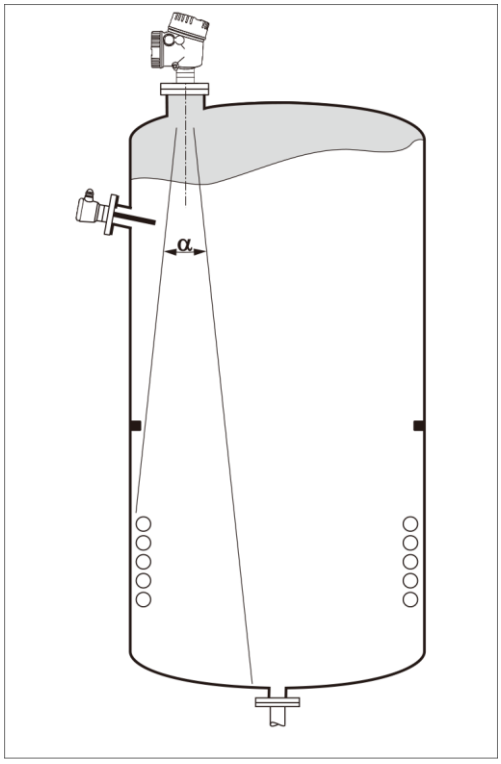
• Do not install the meter above the feed port (3).

• It is recommended to install a protective cover (1) to avoid direct exposure to the sun and rain.



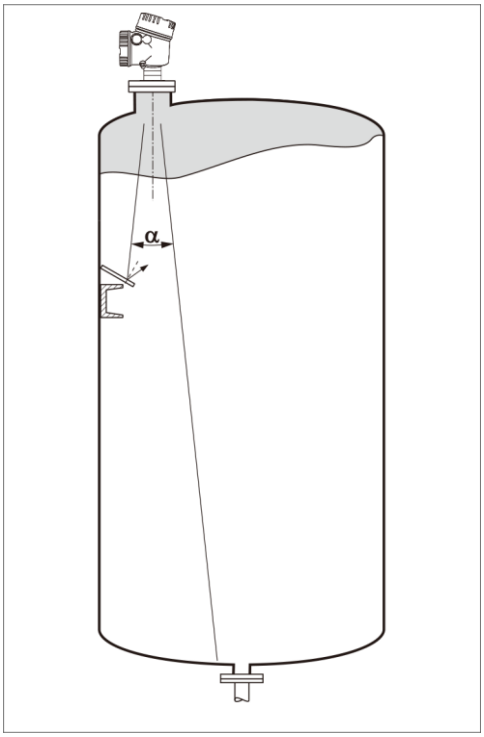
4.1.2 Installing ebackup in a Container

Avoid installing any devices (such as limit switches, temperature sensors, supports, vacuum rings, heating coils, baffles, etc.) within the range of the signal beam. Attention beam Angle



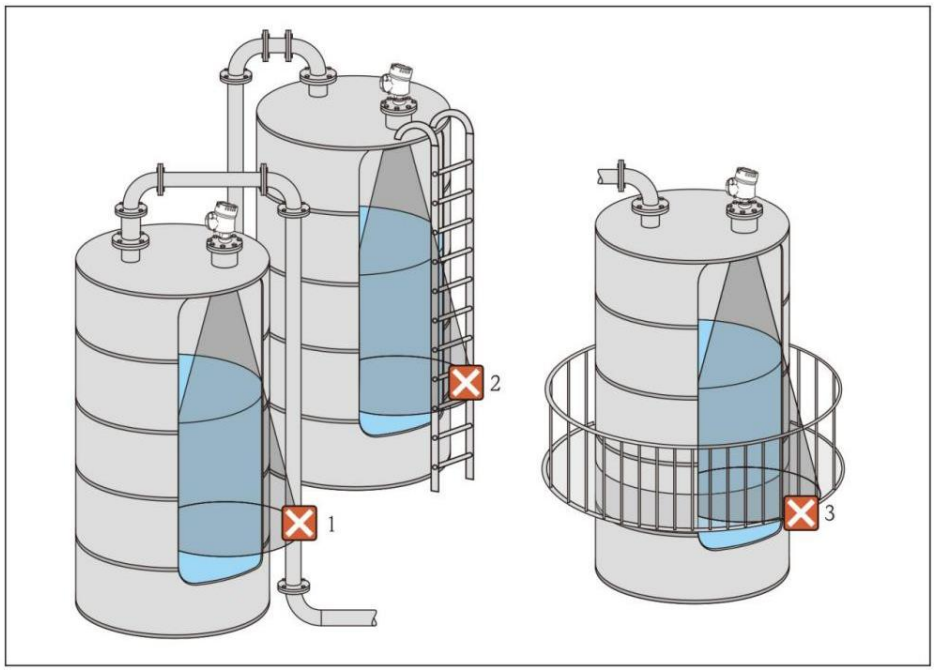
4.1.3 Reduce interference echoes

Slanted metal reflectors scatter radar signals;
Thus, interference echoes can be reduced.



4.1.4 Measurement in plastic containers

When the outer walls of the vessel are made of non-conductive materials (e.g. GRP), microwaves can also be reflected by interferors outside the signal beam range (e.g., metal pipes (1), stairs (2), boilers (3), etc.). Therefore, installation of such jammers within the range of the signal beam is prohibited. Please contact us for more information.



4.1.5 Best Choice

• Interference suppression: Measurements can be optimized with electronic interference echo suppression.

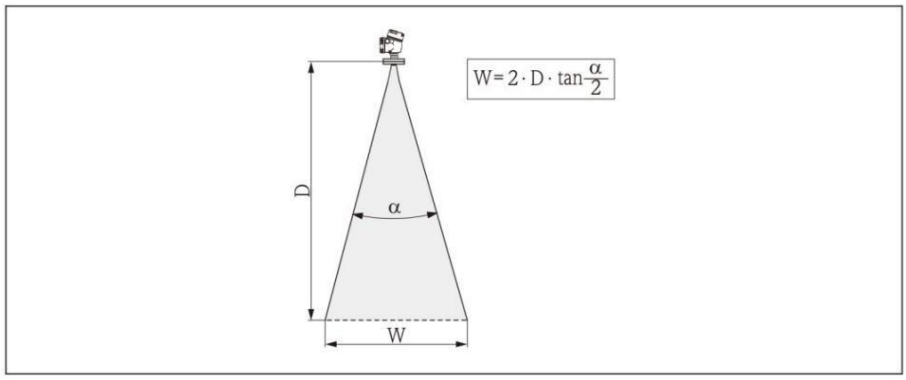
See Distance Adjustment Parameters for details.

• Waveguide: Waveguide can avoid interfering with the signal.

• Inclined metal reflectors: can scatter radar wave signals; Therefore, interference echoes can be

reduced.

4.1.6 Beam Angle



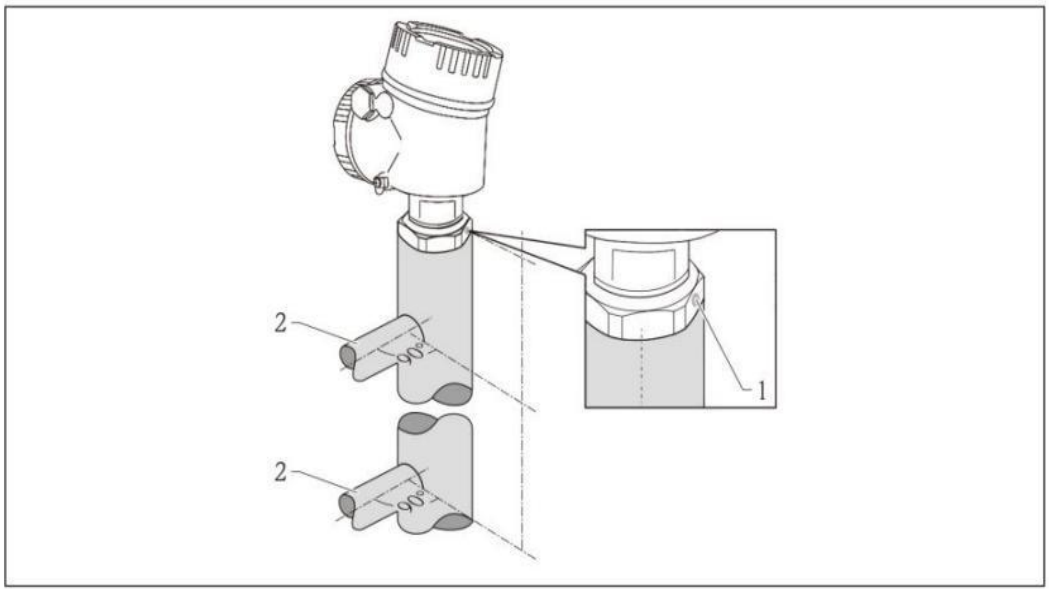
The relationship between beam Angle α, distance D and beam width W

Beam Angle α is defined as the Angle at which the energy density of a radar wave reaches half of its maximum value. Microwaves are emitted outside the range of the signal beam and can be reflected by jammers.

The beam width W depends on the beam Angle α and the measured distance D:

LRD7 series	
Beam Angle **α**	2°
Measuring distance (D)	**Beam width (W)**
3 m	0.1 m
6 m	0.21 m
9 m	0.31 m
12 m	0.42 m
15 m	0.52 m
20 m	0.70m
25 m	0.87 m
30 m	1.05m

4.2 Install in the bypass pipe



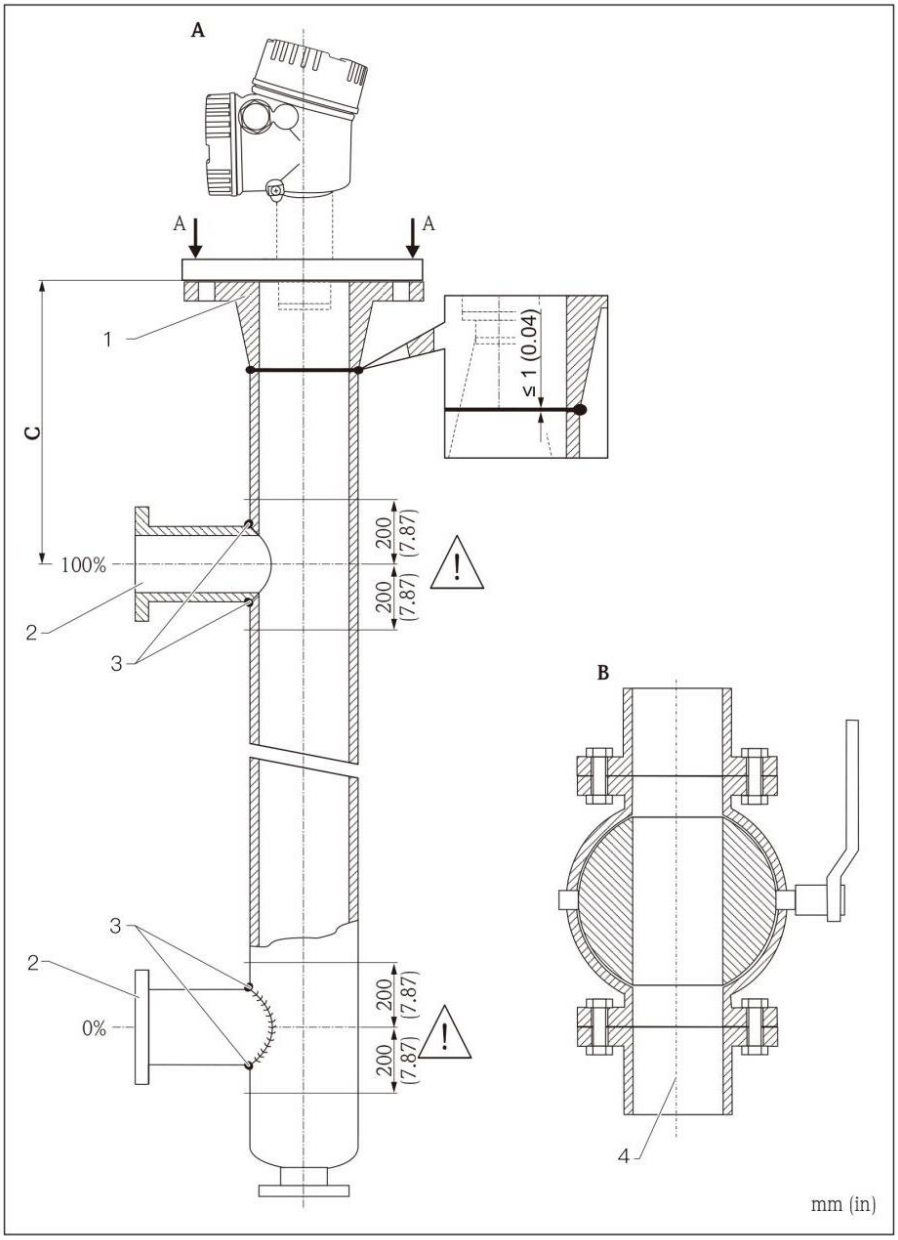
1: antenna installation position calibration mark; 2: Joint of tank body

- Mark vertical (90°) alignment of tank joints.
- Measurements can be made using full diameter ball valves.

4.2.1 Requirements for bypass pipes

- Metal tube (no plastic coating or enamel coating).
- Uniform pipe diameter.
- Any transition section (e.g. when using a ball valve or repairing a pipe section) must not create any cracks exceeding 1 mm.
- At the tank joint (±20 cm), the measurement accuracy will be reduced.

4.2.2 Example of bypass pipe structure



A: With 80 mm (3") horn antenna

B: Full diameter ball valve

C: Recommended distance from upper connection pipe: minimum 400 mm

1: axis position mark

2: For example: welding neck flange HG/T-20592

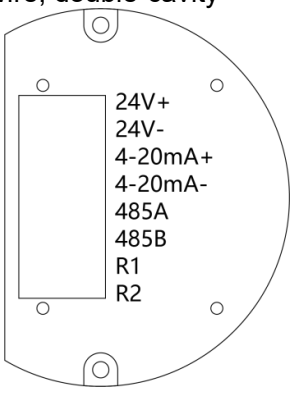
3: The connection pipe diameter should be as small as possible

4: Do not weld through the pipe wall. The inner wall of the bypass pipe must be smooth at all times.

5: The opening diameter of the ball valve must always be consistent with the pipe diameter. Flange and reduction must not exist.

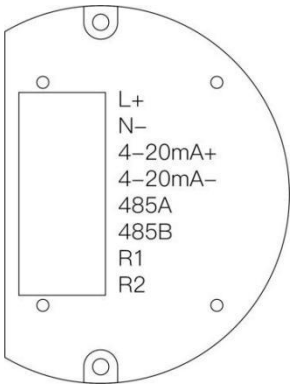
4.3 Mode of connection

Four-wire, double-cavity



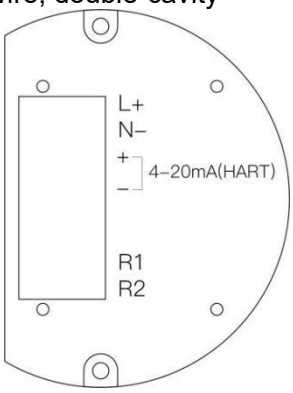
Four-wire, double-cavity

4~20mA output, MODBUS (optional)
24V power supply, 4-wire, relay output (optional)



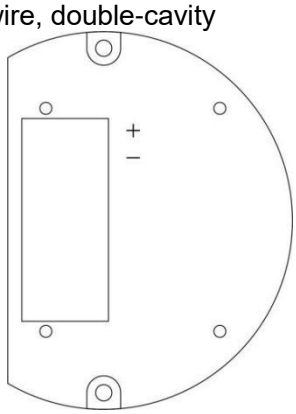
Four-wire, double-cavity

4~20mA output, MODBUS (optional)
220VAC power supply, 4-wire, relay output (optional)



Two-wire, double-cavity

4~20mA output, HART (optional)
24VDC power supply, 4-wire , relay output (optional)



4~20mA+HART output
24VDC power supply, two-wire

4.4 post-connection check

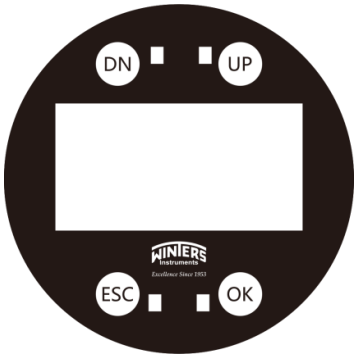
☐	Is the equipment or cable intact (visual inspection)?
☐	Does the cable meet the requirements?
☐	Is the cable completely protected from external forces?
☐	Are all plugs installed, securely tightened and sealed?
☐	Does the power supply conform to the nameplate identification?
☐	Is the terminal assignment, correct?
☐	Optional: Is a protective grounding connection established?
☐	Is the device ready after it is powered on? Is the value displayed on the display unit?
☐	Are all housing covers installed and securely tightened?
☐	Are the fastening fasteners properly tightened?

5. Instrument operation

5.1 Instrument Keys

5.1.1 Key Distribution

4 keys are used to set parameters. The distribution of keys is shown in the figure。



Keying diagram

5.1.2 Key Functions

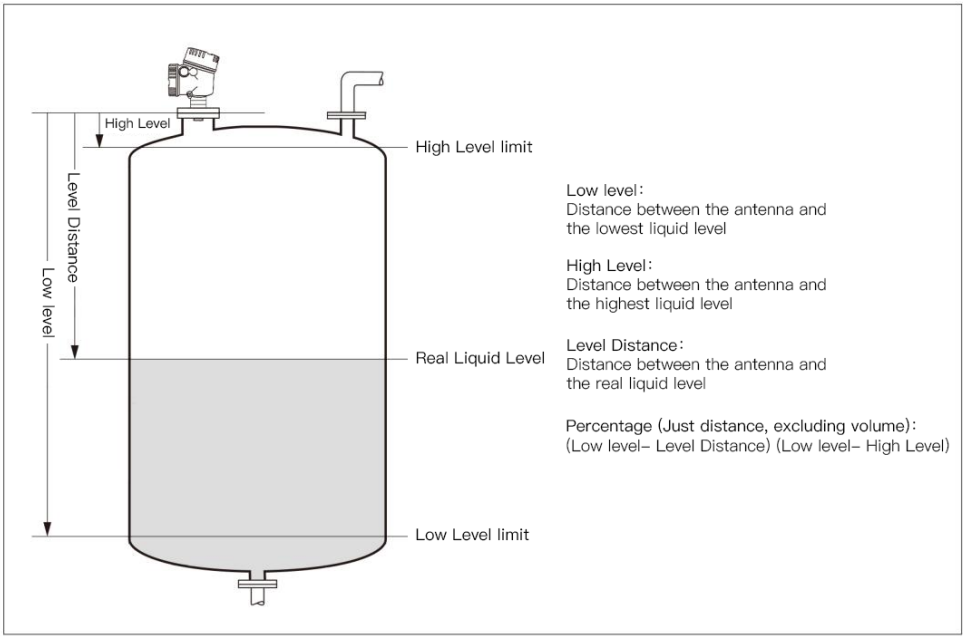
Each key has several different functions, and the main functions of each key are shown in the table.

Key function

key	Feature
DN	Down key/Right key
UP	Add switch between key/material height or air height interface, output current interface and echo display interface
ESC	Return to key/exit edit status
OK	Confirm key/Enter the editing state/Enter the parameter setting screen

5.2 Parameter description

Level information indicates the picture



Level information indicates the picture

5.2.1 Basic Settings

Low adjustment: Low percentage. The default value is 0.00%. If the low set value is greater than the range set value, it automatically changes to the range set value; If the low setting value is less than or equal to the high setting value, it automatically changes to the original setting value.

High adjustment: High percentage. The default value is 100.00%. If the high setting value is greater than the range setting value, it automatically becomes the range setting value; If the high setting value is

greater than or equal to the low setting value, it automatically changes to the original setting value.

Damping coefficient: The value ranges from 1 to 30. The default value is 5. If the value is greater than 30, it automatically changes to 30. Setting a larger damping coefficient can improve the stability of the measured value and increase the anti-interference ability. But the response time to display the value is a little slower.

Range setting: Set the value range 0.300~99.999, the default value is 30.000, according to the working condition, indicating the range range of the radar level meter.

Material properties: Liquid by default. When measuring liquid, the liquid level change speed,

surface fluctuation, foam can be set; When measuring solids, the level change rate, pile Angle size and dust strength can be set.

5.2.2 Advanced Settings

Echo selection: The default value is highest.

Echo calibration: The default is start. When cancelled, close range cannot be measured. After calibration according to the specific working conditions, the distance must be greater than 1 meter.

Auto gain: Disable by default.

Output mode: The default value is 4-20mA. 4-20mA mode, empty tank output 4mA, full tank output 20mA; In 20-4mA mode, the output is 20mA for empty tanks and 4mA for full tanks.

Fault mode: The default value is no change. Output current 4-20 MA Normal output.

Material height selection: the default is material height; Material high indicates the display material high value, and empty high indicates the display empty high value. Material height + empty height = low value - high value.

Blind area: The value ranges from 0.01m to the measuring range. Set according to specific working conditions.

Distance deviation: Value range from 0m to ± range. Set according to specific working conditions.

5.2.3 Status Query

Signal-to-noise ratio: the ratio of signal to noise. A larger value indicates a stronger echo signal.

Output status: Normal when the output loop has 4~20mA current, open circuit when the output loop has no current, and overtemperature when the current output chip is overtemperature.

5.2.4 Device Information

Sensor model: Set this parameter based on the actual situation.

Serial number: Set this parameter based on site requirements.

Production date: Set this parameter based on the actual situation.

Software version: Set this parameter based on site requirements.

5.3 Interactive Interface

The interactive interface is divided into four menus, the first menu is the initial interface displayed when the boot, the second menu has four options: basic Settings, advanced Settings, status query and device information, the third menu has sixteen options, and the fourth menu has six options. As shown in the table.

<table>
<tr><th>First level menu</th><th>Two-level menu</th><th colspan="2">Three-level menu</th><th>Four-level menu</th></tr>
<tr><td rowspan="6">Initial interface</td><td rowspan="6">Basic setup</td><td colspan="2">Low level adjustment</td><td></td></tr>
<tr><td colspan="2">High adjustment</td><td></td></tr>
<tr><td colspan="2">Damping coefficient/range setting</td><td></td></tr>
<tr><td rowspan="3">Material nature</td><td rowspan="3">liquid</td><td>Rapid liquid level change</td></tr>
<tr><td>Surface fluctuation</td></tr>
<tr><td>froth</td></tr>
</table>

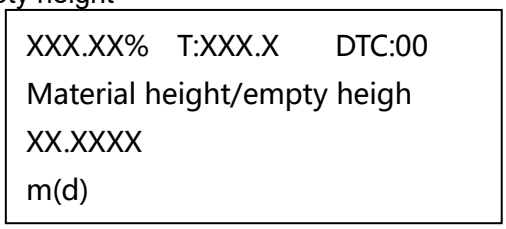
			solidity	The level changes rapidly
				Pile Angle size
				Strong dust
	Advanced Settings	Echo selection		
		Echo calibration		
		Automatic gain		
		Output mode		
		Failure mode		
		Material height selection		
		Blind area		
		Range deviation		
	Status query	Signal-to-noise ratio		
		Output state		
	Device information	Sensor model/serial number		
		Production date/software version		

5.4 Parameter Settings

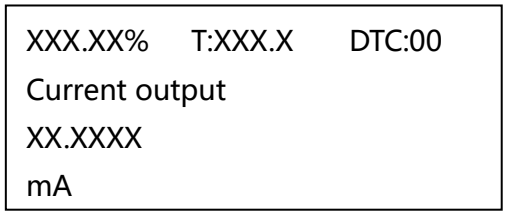
5.4.1 Initial parameters

Press the "UP" key on startup to switch the interface. The percentage displayed in the top left corner of the screen represents the percentage of the material height in the tank; The T number in the middle represents the temperature; The DTC value in the upper right corner represents the fault diagnosis code, 00 indicates no fault, and the specific meaning of other values is to be determined. Echo curve Shows the 128-point spectrum diagram near the target echo.

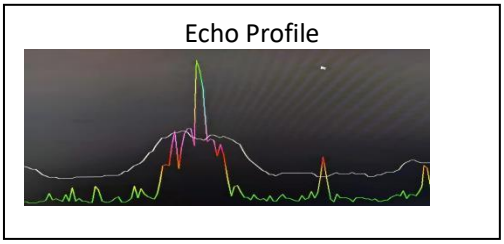
5.4.1.1 Material height/empty height



5.4.1.2 Current output

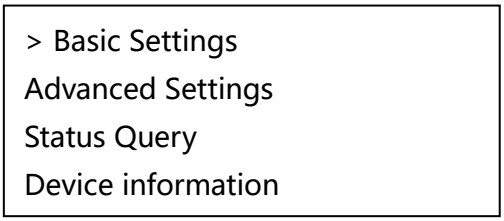


5.4.1.3 Echo curve



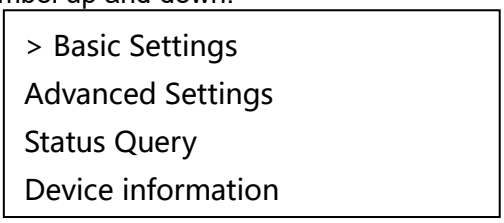
5.4.2Settings screen

Press the "OK" key to go to the Settings screen, and press the "ESC" key to return to the initial screen.



5.4.2.1 Basic Settings

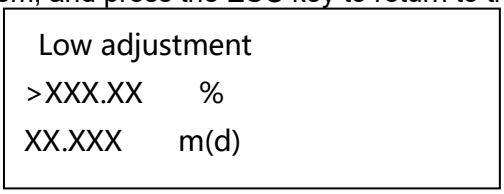
Press the "OK" key to go to the next level menu, press the "ESC" key to return, and press the "DN" key to move the cursor symbol up and down.



(1) Low adjustment

Press the "OK" key to enter the editing state, press the "DN" key to move the editing cursor symbol around, press the "UP" key to select the number/symbol in a cycle, press the "OK" key to save and exit the editing state, press the "ESC" key to not save and exit the editing state.

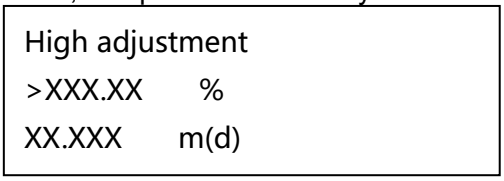
In the non-editing state, press the DN key to move the cursor symbol UP and down, press the Up key to cycle to the next menu item, and press the ESC key to return to the previous menu.



(2) High adjustment

Press the "OK" key to enter the editing state, press the "DN" key to move the editing cursor symbol around, press the "UP" key to select the number/symbol in a cycle, press the "OK" key to save and exit the editing state, press the "ESC" key to not save and exit the editing state.

In the non-editing state, press the DN key to move the cursor symbol UP and down, press the Upkey to cycle to the next menu item, and press the ESC key to return to the previous menu.



(3) Damping coefficient/range setting

Press the "OK" key to enter the editing state, press the "DN" key to move the editing cursor symbol around, press the "UP" key to select the number/symbol cycle, press the "OK" key to save and exit the editing state, press the "ESC" key to not save and exit the editing state.

In the non-editing state, press the DN key to move the cursor symbol UP and down, press the Up key to cycle to the next menu item, and press the ESC key to return to the previous menu.

Damping coefficient
>XX
range setting
XX.XXX m(d)

(4) Material nature

Press the "OK" key to enter the next level menu, press the "ESC" key to return, press the "DN" key to move the cursor symbol UP and down, and press the "Up" key to cycle into the next menu item.

Material nature
> Liquid
Solids

Liquid

① Rapid liquid level change

Press the "OK" key to save and cycle into the next menu item, press the "ESC" key to return, press the "DN" key to move the cursor symbol UP and down, press the "up" key to cycle into the next menu item.

Rapid liquid level change
> Fast
Medium
slow

② Surface fluctuation

Press the "OK" key to save and loop into the next menu item, press the "ESC" key to return, press the "DN" key to move the cursor symbol UP and down, and press the "Up" key to loop into the next menu item

Surface fluctuation
>yes
no

③ Foam

Press the OK key to save and enter the next menu item, press ESC to return, press DN to move the cursor symbol UP and down, and press Up to enter the next menu item.

Foam
>yes
no

2) Solids

① The level changes rapidly

Press the "OK" key to save and cycle into the next menu item, press the "ESC" key to return, press the "DN" key to move the cursor symbol UP and down, press the "up" key to cycle into the next menu item.

The level changes rapidly
>Fast
Medium
slow

② High pile Angle

Press the "OK" key to save and loop into the next menu item, press the "ESC" key to return, press the "DN" key to move the cursor symbol UP and down, and press the "Up" key to loop into the next menu item.

High pile Angle
>yes
no

③ Strong dust

Press the "OK" key to save and loop into the next menu item, press the "ESC" key to return, press the "DN" key to move the cursor symbol UP and down, and press the "Up" key to loop into the next menu item.

Strong dust
>yes
no

5.4.2.2 Advanced Settings

Press the "OK" key to go to the next level menu, press the "ESC" key to return, and press the "DN" key to move the cursor symbol up and down.

Basic Settings
>Advanced Settings
Status query
Device information

(1) Echo selection

Press the "OK" key to save and loop into the next menu item, press the "ESC" key to return, press the "DN" key to move the cursor symbol UP and down, and press the "Up" key to loop into the next menu item.

Echo selection
>Large bow wave
The highest
area

(2) Echo calibration

Press the OK key to save and enter the next menu item, press ESC to return, press DN to move the cursor symbol UP and down, and press Up to enter the next menu item.

Echo calibration
> Start
Cancel
calibration

(3) Automatic gain

Press the OK key to save and enter the next menu item, press ESC to return, press DN to move the

cursor symbol UP and down, and press Up to enter the next menu item.

Automatic gain
> Start
Cancel

(4) Output mode

Press the OK key to save and enter the next menu item, press ESC to return, press DN to move the cursor symbol UP and down, and press Up to enter the next menu item。

Output mode
>4-20 mA
20-4 mA

(5) Fault mode

Press the "OK" key to save and loop to the next menu item, press the "ESC" key to return and press the "DN" key

Fault mode
>No change
4.0 mA

Move the cursor symbol UP and down and press the "Up" key to loop through to the next menu item.

(6) Material height selection

Press the OK key to save and enter the next menu item, press ESC to return, press DN to move the cursor symbol UP and down, and press Up to enter the next menu item.

Material height selection
>Height of material
Dead height

(7) The range of blind areas

Press the OK key to enter the editing state, press the DN key to move the editing cursor symbol around, press the UP key to select numbers/symbols repeatedly, press the OK key to save and exit the editing state, press ESC to not save and exit the editing state.

In the non-editing state, press DN to move the cursor symbol UP or down, press Up to go to the next menu item, and press ESC to return to the previous menu.

Blind areas
XX.XXX m(d)

(8) Distance deviation

Press the OK key to enter the editing state, press the DN key to move the editing cursor symbol around, press the UP key to select numbers/symbols repeatedly, press the OK key to save and exit the editing state, press ESC to not save and exit the editing state.

In the non-editing state, press DN to move the cursor symbol UP or down, press Up to go to the next menu item, and press ESC to return to the previous menu.

Distance deviation
XXX.XXX m(d)

5.5 Status Query

5.5.1 SNR

Press ESC to return, and press UP to cycle to the next menu item

SNR
XX.XXXX
dB

5.5.2 Output Status

Press ESC to return, and press UP to cycle to the next menu item. Normal, open only one state is displayed.

Output state
Normal
Open a way
Overtemperature

5.6 Device Information

Press the OK key to go to the next menu, press ESC to return, and press DN to move the cursor symbol up or down.

Basic setup
Advanced Settings
Status query
> Device Information

5.6.1 Sensor Model/Serial number

Press ESC to return, and press UP to cycle to the next menu item.

Sensor type
LRD707
Serial number
20210001

5.6.2 Production Date/Software version

Press ESC to return, and press UP to cycle to the next menu item.

Production date
20211022
Software version
V1.0.0.0

6. Maintenance and repair

Measuring meters require no special maintenance.

6.1 External Cleaning

When cleaning the outer surface of the measuring instrument, always clean it with a cleaning agent that will not damage the housing and sealing ring.

6.2 Replacing the sealing ring

The process seal (process connection) of the sensor must be replaced regularly, especially when using a formed seal (anti-corrosion structure).

The replacement cycle depends on the frequency of the cleaning cycle, the temperature of the measuring medium and the cleaning temperature.

6.3 Equipment Repair

Please pay attention to the following points when repairing explosion-proof equipment:

• Only trained personnel or our service engineers are allowed to repair explosion-proof equipment.

• Comply with relevant standards, national explosion-proof regulations, Safety Guidelines and certification requirements.

• Use only our original spare parts.

• When ordering spare parts, pay attention to the nameplate of the equipment. Replace only the same parts.

• Refer to the operation guide for maintenance. Perform routine tests specified for equipment after maintenance.

• Only our service engineers are allowed to modify certified equipment.

• Record all repair and modification operations.

7. Accessories

Tank side display

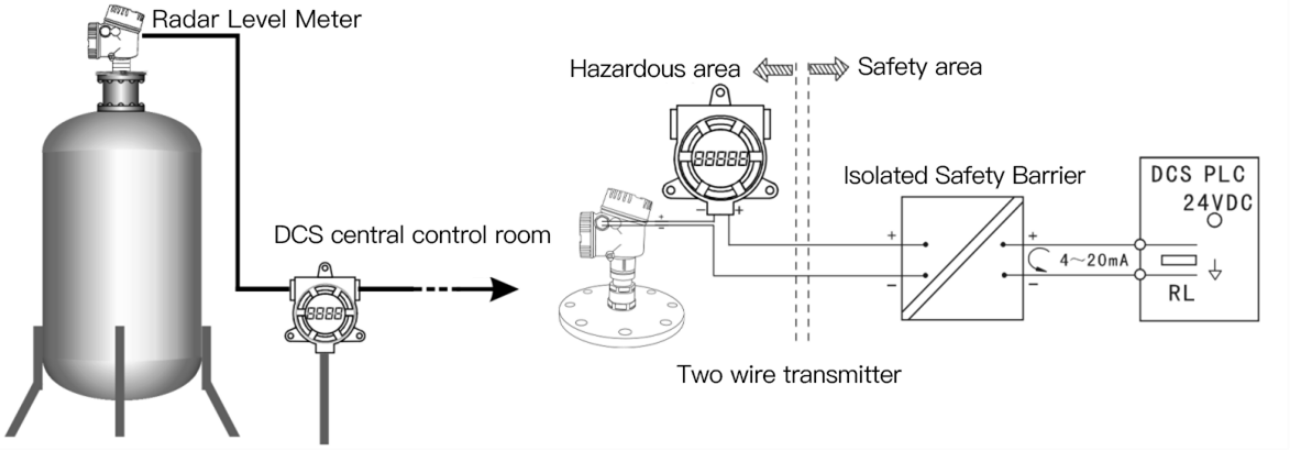
The DCU-A type tank side display instrument adopts a 24 bit A/D converter, combined with a 32-bit high-performance industrial grade MCU, to achieve the acquisition and display of 4-20mA signals. The tank side display instrument adopts a wide angle and low-temperature resistant LCD screen, high-speed analog variable transmission output, optional transmission range, 4-20mA current circuit power supply, and no external power supply is required.

DCU-B type thermistor and thermocouple full range measurement, standard current and standard voltage range can be set arbitrarily, compatible with various analog signal acquisition modules, memory type manual analog signal transmission output, can be used as a general signal source, convenient for on-site equipment debugging, modular design, easy selection of analog signal transmission output and RS485 communication output, two relay alarm outputs, upper and lower limits, within the range Four alarm methods available outside the interval.

Working current	DC 4-20mA
Minimum operating starting current	2mA
Maximum carrying current	40mA
Maximum withstand voltage	DC50V
Effective precision display range	-19999～35000
Display accuracy	±0.1%±1 bit
Overall power consumption	<0.5W
Maximum system voltage drop	≤2. 8V
Maximum visual distance	Clear to read from 8 meters away (no effect from strong light irradiation)
Optional display unit	MPa/KPa/m/cm/mm/℃/%/mA
Operating temperature	-30~50℃

<table>
<tr><td colspan="2"></td></tr>
<tr><td>Working current</td><td>AC220V（High pressure type）/DC24V (Dc low voltage type)</td></tr>
<tr><td>Measurement accuracy</td><td>0.2%FS</td></tr>
<tr><td>Transmission accuracy</td><td>0.5%FS</td></tr>
<tr><td>Sampling rate</td><td>5/s</td></tr>
<tr><td>Input signal</td><td>
<table>
<tr><th>Input</th><th>Code</th></tr>
<tr><td>T type thermocouple</td><td>t-t</td></tr>
<tr><td>R type thermocouple</td><td>t-r</td></tr>
<tr><td>J type thermocouple</td><td>t-J</td></tr>
<tr><td>WAR325 type thermocouple</td><td>t-H</td></tr>
<tr><td>B type thermocouple</td><td>t-b</td></tr>
<tr><td>S type thermocouple</td><td>t-S</td></tr>
<tr><td>K type thermocouple</td><td>t-P</td></tr>
<tr><td>E type thermocouple</td><td>t-E</td></tr>
<tr><td>Pt100 Resistance</td><td>P100</td></tr>
<tr><td>Cu50 Resistance</td><td>Cu50</td></tr>
</table>
When selecting a resistance input, the range will automatically be displayed according to the standard range, and the controller will automatically hide the DOT PL and PH parameters. If there is a display error, it can be corrected through two parameters: PSBL and PSBH.
<table>
<tr><th>Input</th><th>Code</th></tr>
<tr><td>Cu50 Resistance</td><td>Cu50</td></tr>
<tr><td>0-375Ω</td><td>375</td></tr>
<tr><td>DCO-75mV</td><td>0-75</td></tr>
<tr><td>DC0-30mV</td><td>0-30</td></tr>
<tr><td>DC0-5V</td><td>5u</td></tr>
<tr><td>DCO-10V</td><td>10u</td></tr>
<tr><td>DCO-20mA</td><td>0-20</td></tr>
<tr><td>DCO-10mA</td><td>0-10</td></tr>
<tr><td>DC4-20mA</td><td>4-20</td></tr>
<tr><td>Manual output</td><td>out</td></tr>
</table>
</td></tr>
<tr><td>Feed output</td><td>DC 24V/ 50mA(Precision voltage regulation,With output short circuit protection)</td></tr>
<tr><td>Converter output</td><td>0-20mA、4-20mA、0-10V</td></tr>
<tr><td>Communication rules</td><td>RS485(RTU 协议)</td></tr>
<tr><td>Relay contact</td><td>AC250V 7A</td></tr>
<tr><td>Operating temperature</td><td>-30~50℃</td></tr>
</table>

Application diagram:



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