

Smart Radar Level Transmitter

Model: MDRA8



1. Product Overview

1.1 Introduction

The MDRA8 series radar level meter is an 80GHz high frequency Smart level measuring instrument, which outputs (4 ~ 20) mA analog signal and can measure 120 meters in maximum range. The antenna is further optimized, and the new type of fast microprocessor can carry out higher rate signal analysis and processing, so that the instrument can be used for material level measurement under very complex working conditions such as process storage tank, reactor and solid bin.

1.2 Principle

A radar level gauge emits a continuous radar wave signal from an antenna. The signal is a frequency modulated continuous wave, or FMCW. There is a frequency difference between the continuous wave emitted from the radar level gauge antenna and the echo returned from the surface of the object, the frequency difference is proportional to the distance between the antenna and the surface of the object. After receiving the ECHO, the electronic components are processed by special processing, such as Fourier Transform, and a unique high precision algorithm is used to make the instrument accurately measure the height of the object.

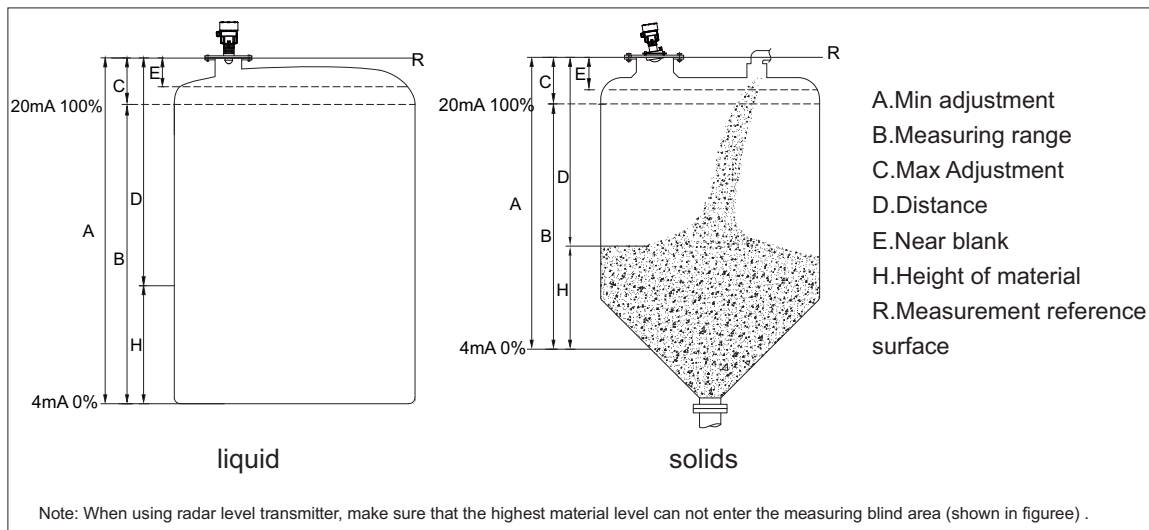





Figure 1

1.3 Characteristics

The radar object level transmitter adopts a working frequency of 80GHz and has the following characteristics:

- ▶ Non-contact measurement, no wear, no pollution.
- ▶ The antenna size is small, easy to install.
- ▶ Shorter wavelength, better reflection on an inclined solid surface.
- ▶ The measuring blind area is smaller, and good results can be obtained for small storage tanks.
- ▶ The small beam angle and concentrated energy enhance the echo ability, and it is beneficial to avoid the interference.
- ▶ Almost impervious to corrosion and steam.
- ▶ Almost unaffected by changes in temperature and pressure in the atmosphere.
- ▶ And in the serious dust environment the instrument can read the accurate level of the Real Echo.
- ▶ High signal-to-noise ratio, even in the case of fluctuations can also have better performance.
- ▶ 80GHz frequency is the best choice for measuring solid and low dielectric constant media, which is satisfied with the measurement of dielectric constant $\epsilon_r \geq 1.8$.

2.Product Introduction

 <p>MDRA81</p>	<p>Features: Threaded integrated lens antenna, Bluetooth function, easy installation, high precision. Should be used: Measurement of liquid level in general liquid storage tanks, such as chemical industry, smelting.</p> <p>Range: 10m/20m/35m Accuracy: ±1mm Process connection: Thread/Flange Process temperature: -40~150 °C Process pressure: - 0.1~0.3 MPa Frequency: 80GHz Signal output: 4~20mA/HART 24V DC 2-wire /4-wire system; 4~20mA/HART 220V AC 4-wire system; RS485/Modbus</p> <p>Bluetooth function: Yes/No Explosion proof grade: Exia IIC T6 Ga/Exd IIC T6 Gb DNV-approval (Det Norske Veritas) ABS-certificate (American Bureau of shipping) Protection rating: IP68</p>
 <p>MDRA82</p>	<p>Features: Compound flanged anti-corrosion Lens Antenna, suitable for liquid level measurement, small beam angle, strong gathering ability, high precision. Application: Measurement of liquid level various liquids (such as hydrochloric acid, nitric acid, sulfuric acid, lye, etc.) storage tanks in chemical industry, smelting, food processing and other industries.</p> <p>Range: 10m/20m/35m Accuracy: ±1mm Process connection: Flange Process temperature: -40~200°C Process pressure: - 0.1~4.0MPa Frequency: 80GHz Signal output: 4~20mA/HART 24V DC 2-wire /4-wire system; 4~20mA/HART 220V AC 4-wire system; RS485/Modbus</p> <p>Bluetooth function: Yes/No Explosion proof grade: Exia IIC T6 Ga/Exd IIC T6 Gb DNV-approval (Det Norske Veritas) ABS-certificate (American Bureau of shipping) Protection rating: IP68</p>
 <p>MDRA83</p>	<p>Features:The lens antenna is equipped with purging and universal flange, with small beam angle and high sensitivity. Should be used: Measurement of material level of solid storage tanks in cement, steel, electric power, coal, building materials and other industries (E. G. Powder, block, granule).</p> <p>Range: 35m/85m/120m Accuracy: ±1mm Process connection: Thread/ universal flange Process temperature: -40~250 °C Process pressure: -0.1~0.3MPa Frequency: 80GHz Signal output: 4~20mA/HART 24V DC 2-wire /4-wire system; 4~20mA/HART 220V AC 4-wire system; RS485/Modbus</p> <p>Bluetooth function: Yes/No Explosion proof grade: Exia IIC T6 Ga/Exd IIC T6 Gb DNV-approval (Det Norske Veritas) ABS-certificate (American Bureau of shipping) Protection rating: IP68</p>



MDRA84

Features: Both solid and liquid can be measured,Bluetooth function,small beam angle,strong gathering ability, high precision and Cone antenna.

Application: Measurement of both liquid level and solid level in general storage tanks in petroleum,chemical, electric power and other industries.

Measuring range: 10m/20m/35m/85m/120m

Accuracy: $\pm 1\text{mm}$

Process connection: thread/flange

Process temperature: $-40\sim 315^{\circ}\text{C}$

Process pressure: $-0.1\sim 4.0\text{Mpa}$

Frequency Range: 80GHz

Signal output: 4~20mA/HART 24V DC 2-wire /4-wire system;

4~20mA/HART 220V AC 4-wire system;

RS485/Modbus 6~30V DC

Bluetooth function: Yes/No

Explosion proof grade: Exia IIC T6 Ga/Exd IIC T6 Gb

DNV-approval (Det Norske Veritas)

ABS-certificate (American Bureau of shipping)

Protection rating: IP68

3.Mounting

Please take note of the following to ensure proper instrument installation.

- ① Please reserve enough space for installation.
- ② Please avoid installation with strong vibration.

3.1 Mounting Position

- ▶ Install at 1/6 or 1/4 of tank diameter

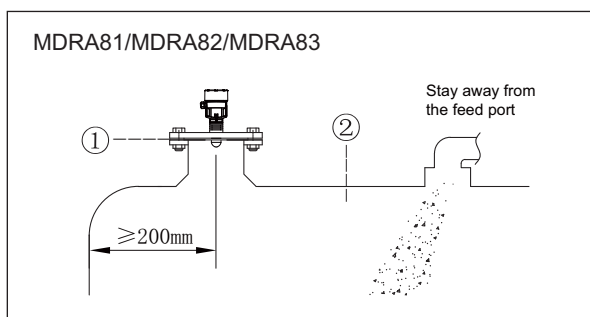


Figure 2

Minimum Distance from tank wall $\geq 200\text{mm}$

Note: ① Datum Plane

② Container Center or symmetrical axis

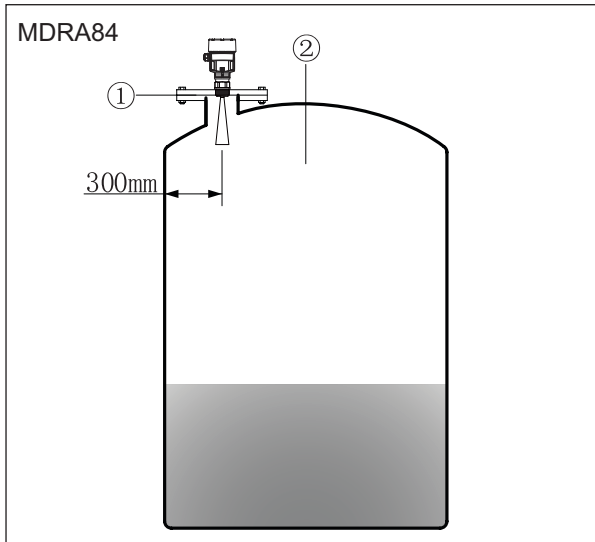


Figure 3

Minimum Distance from tank wall $\geq 300\text{mm}$

Note: ① Datum Plane

② Container Center or symmetrical axis

- The instrument should be mounted in the middle of the tank top if the tank is flat-topped conical tank, to ensure that the bottom of the cone can be measured

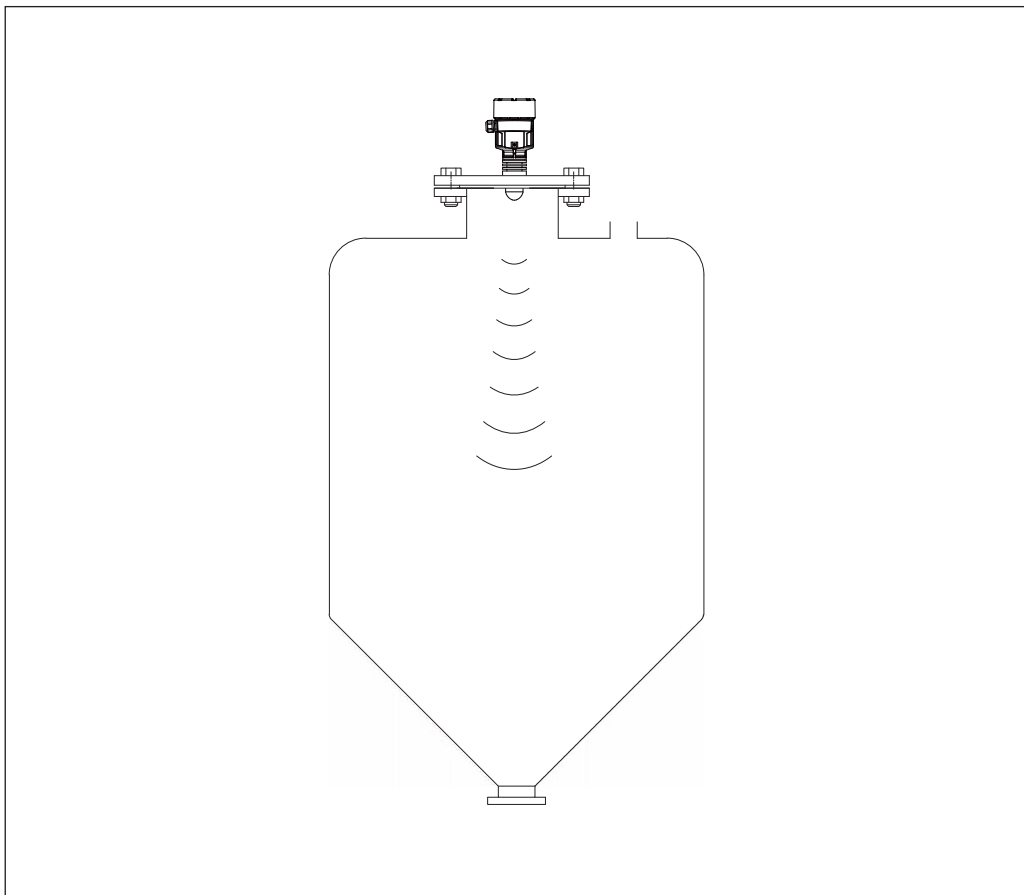


Figure 4

- ▶ Because the beam angle of the radar is very small, it is almost not affected by the agitator. If the agitator diameter is large, and the beam angle can not completely avoid the agitator, it is suggested that when the empty tank agitator is in operation, perform a false echo storage.

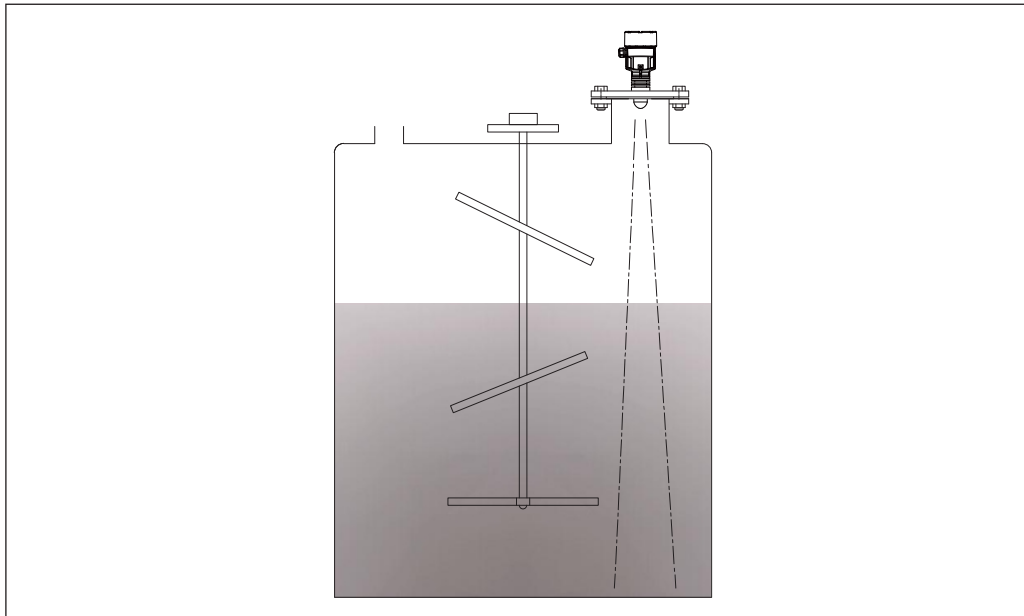


Figure 5

- ▶ Storage tank with a stack of material
If the bevel is uneven, a universal Farlane must be used to adjust the angle of the antenna so that the antenna is as close to the bevel as possible.

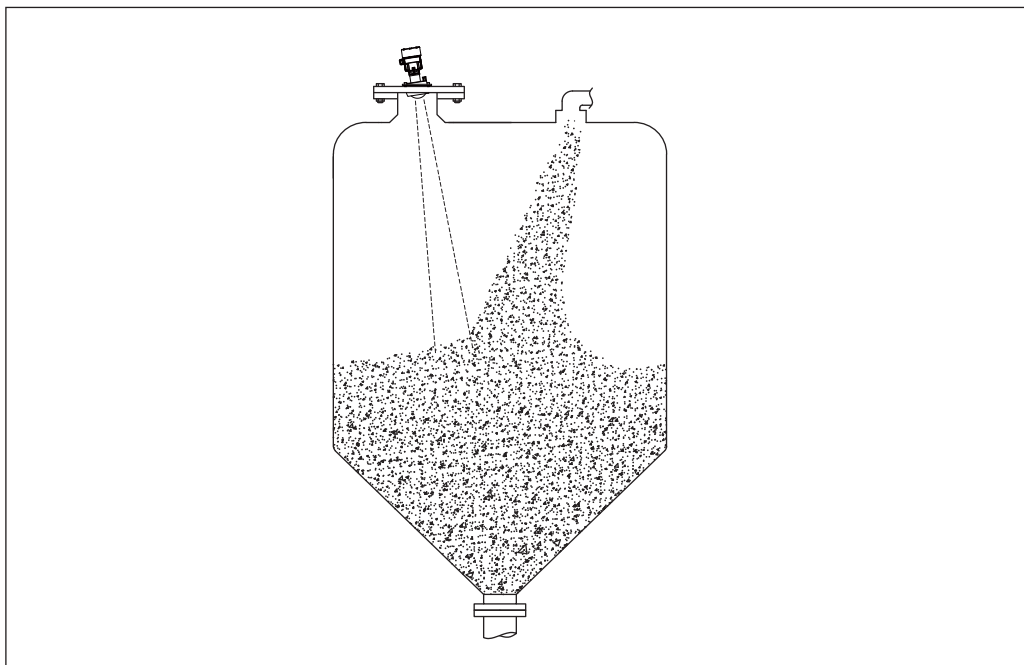


Figure 6

- By using a wave guide tube installation (or bypass tube), the impact of obstacles, foam, and large surface wave fluctuations on measurements within the container can be avoided.
- Note: The diameter of the isobaric hole is (5~10) mm.
The diameter of the wave guide tube must be at least 50mm and the inner wall must be smooth.
Only good flowing media can be measured, viscous media cannot be measured using a wave guide tube.

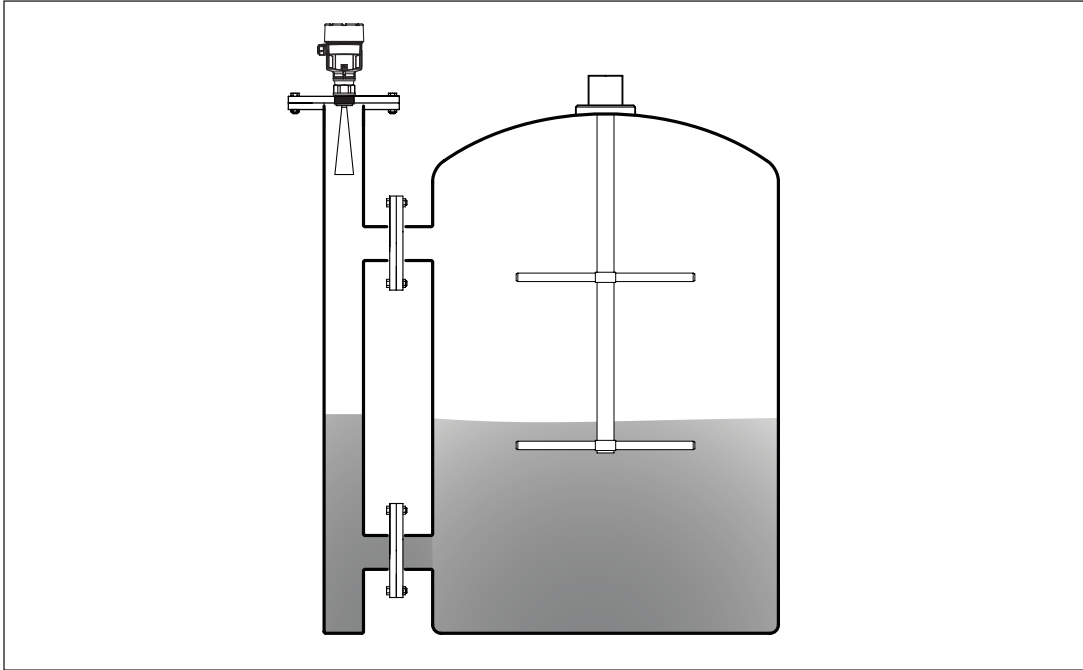


Figure 7

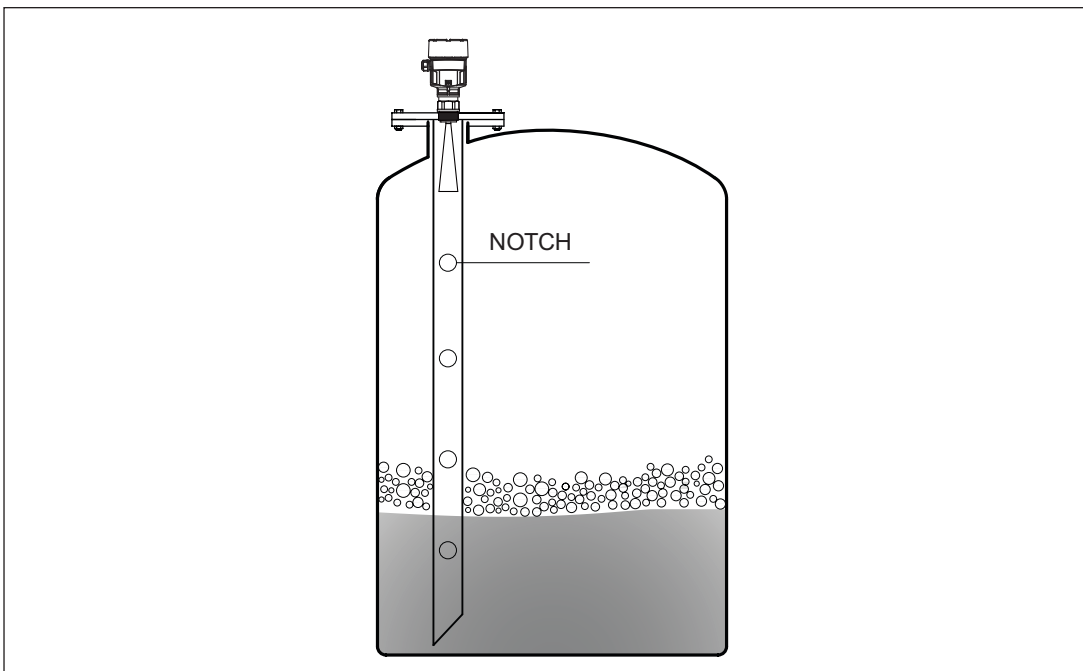


Figure 8

3.2 Typical Error Mounting

- ▶ Can Not be mounted on top of feed inlet. And note that outdoor installation should be taken to shade, rainproof measures.

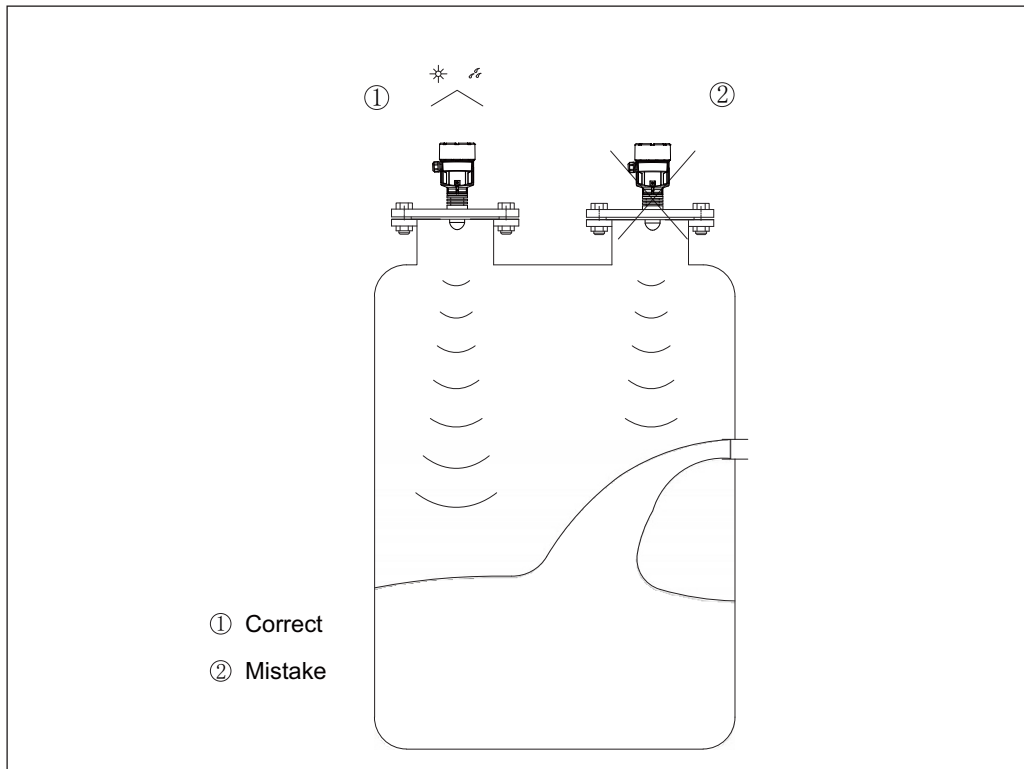


Figure 9

- ▶ The instrument can not be installed on the middle of the arched storage tank, if that it will generate multiple echoes because the arc-shaped Crest can focus on multiple echoes, and the multiple echo will stronger than the true echo,so it can not be installed on the center.

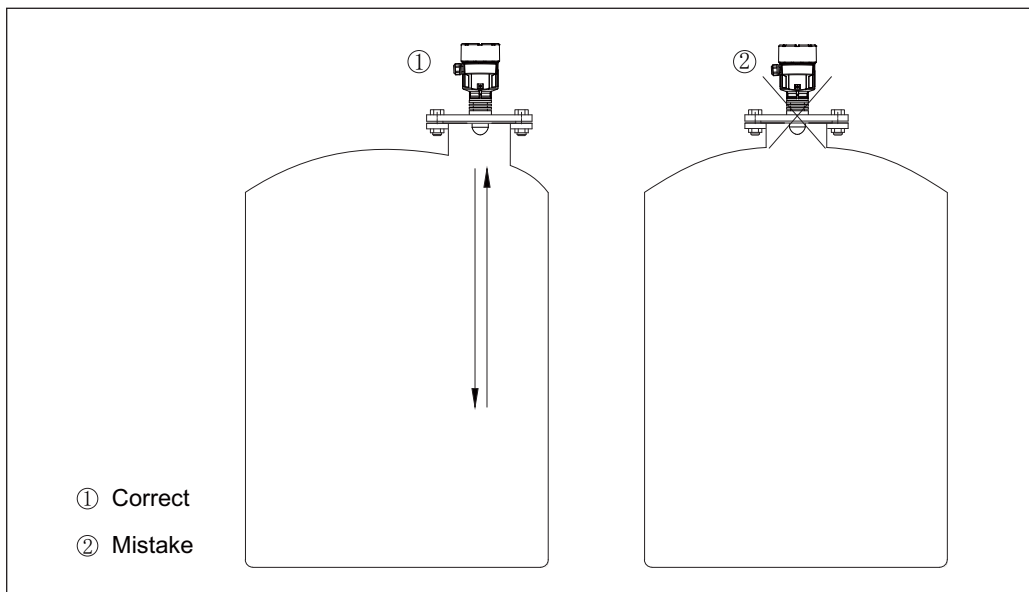


Figure 10

3.3 Container Nozzle

(1)MDRA81/MDRA82/MDRA83

- ▶It is strongly recommended that the height of short nozzle for vessel installation on site is $\leq 200\text{mm}$, and the height of short pipe for vessel installation is $\leq 200\text{mm}$, which is a very reasonable installation method.
- ▶If the nozzle length of the container is long, please refer to figure 11. The longest installation short nozzle should be smaller than the size shown in Figure 8 as far as possible, and the end must be ground flat without burrs and other protrusions. If necessary, using the "false echo storage" function to eliminate the reflected signal at the end of the container nozzle can also obtain a better measurement effect.

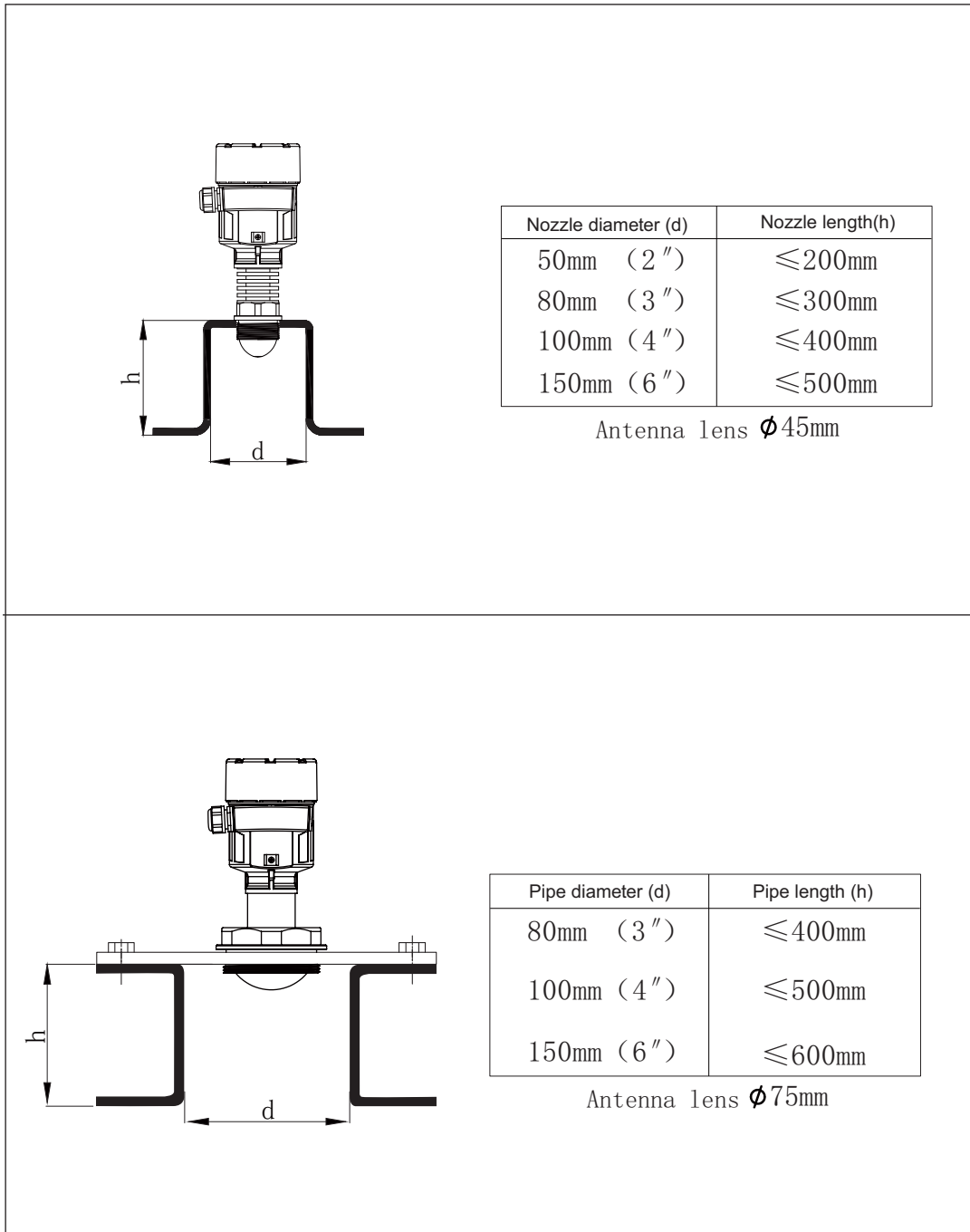


Figure 11

(2)MDRA84

► Recommended connection tube installation length:

It is recommended that the antenna extends to a distance of 10mm from the inner wall of the tank.

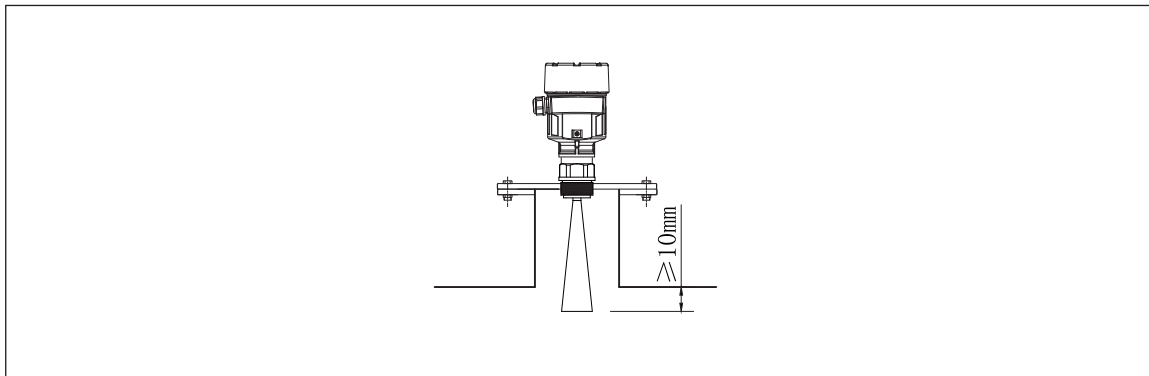
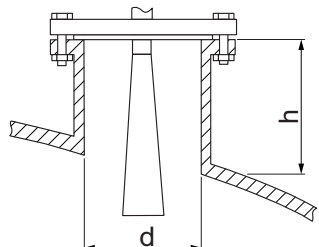


Figure 12

► Instructions for installing the connection tube: The maximum connection tube length - h depends on the connecting tube diameter - d.

	Tube diameter - d	Tube length - h
	80mm (3")	≤1000mm
	100mm(4")	≤1500mm
	150mm(6")	≤2000mm

Note: It is recommended that the connecting tube length be less than 300mm. If the connecting tube is longer than usual, the maximum length range should not exceed the tube length corresponding to the tube diameter listed in this table.

Figure 13

If the maximum connecting tube length is exceeded the above table, the measurement performance will definitely be reduced. Please note:

- The bottom of the connecting tube must be smooth and free of burrs.
- The edge of the connecting tube should be rounded.
- Interference echo suppression should be performed.
- When the connecting length exceeds the values listed in the table, please contact the technical support department.

3.4 Datum

The following figure shows the position of the datum plane for different types of sensors.

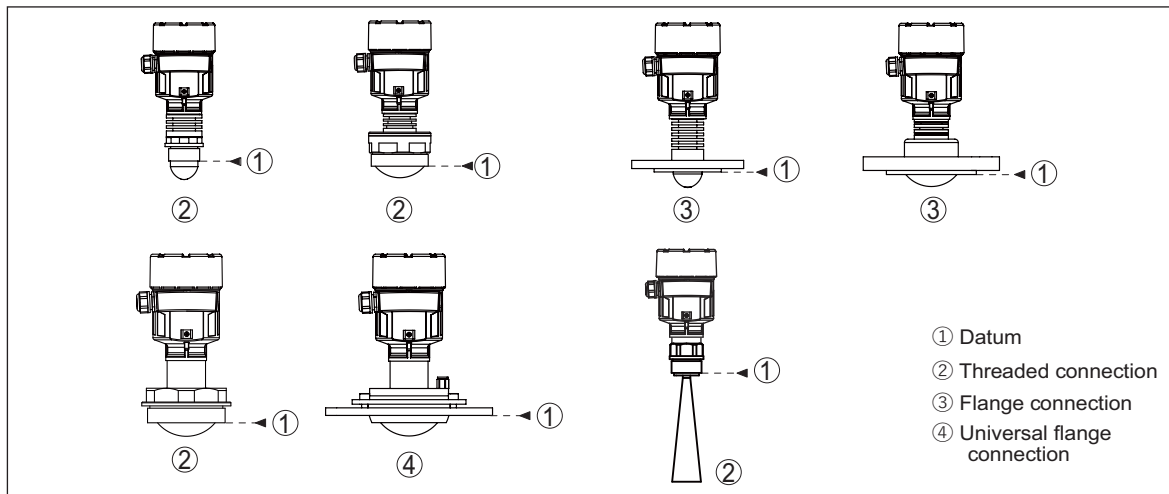


Figure 14

3.5 Beam Angle And False Reflection

The beam angle of a radar potentiometer depends on the antenna size.

This is best if the transmitted radar signal reaches the surface of the medium vertically and is not obscured and reflected by any device in the container.

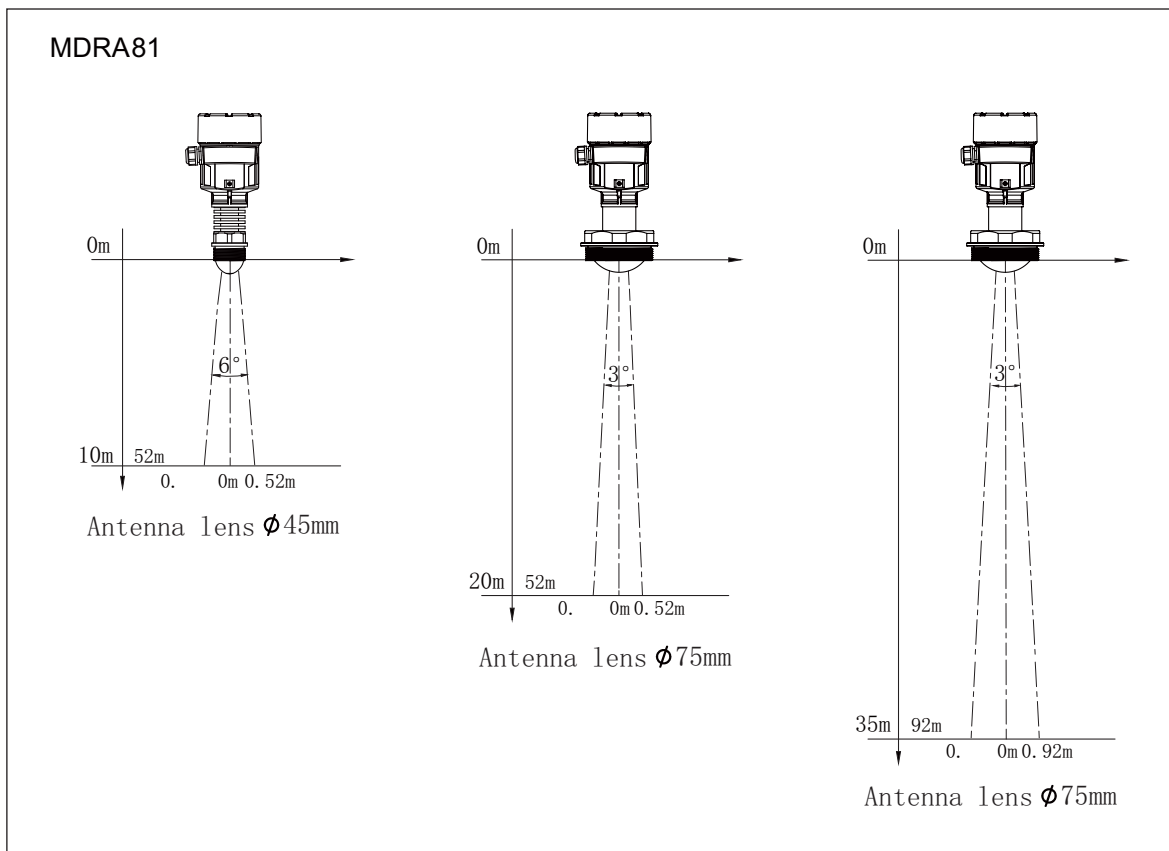


Figure 15

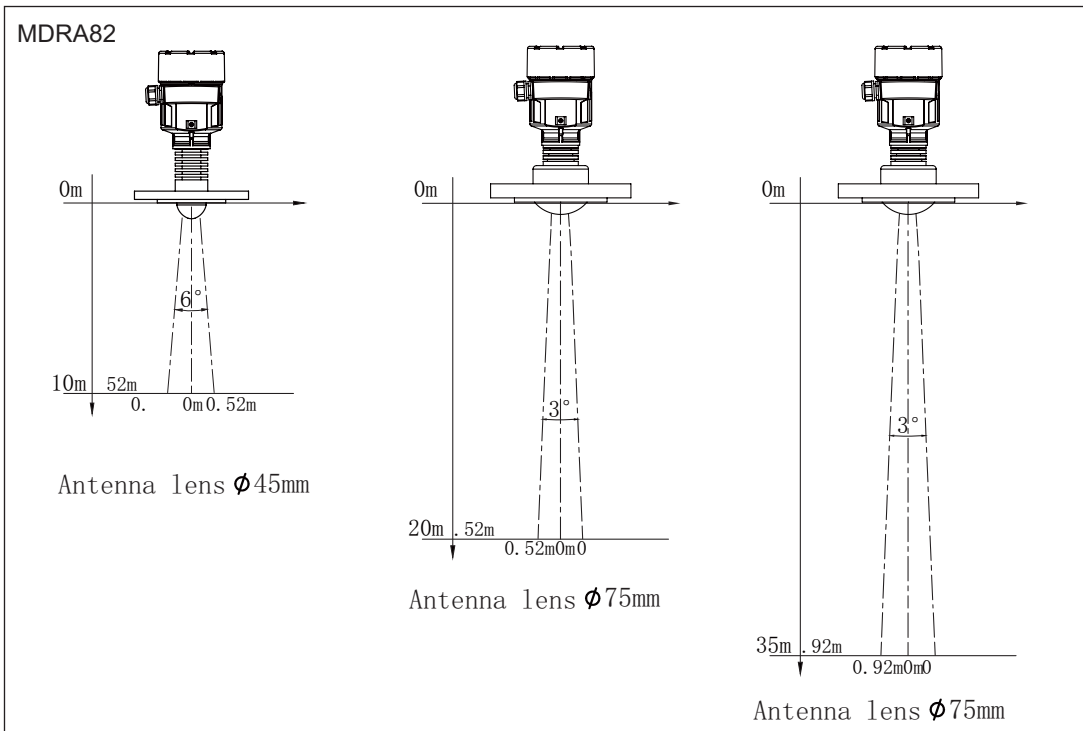


Figure 16

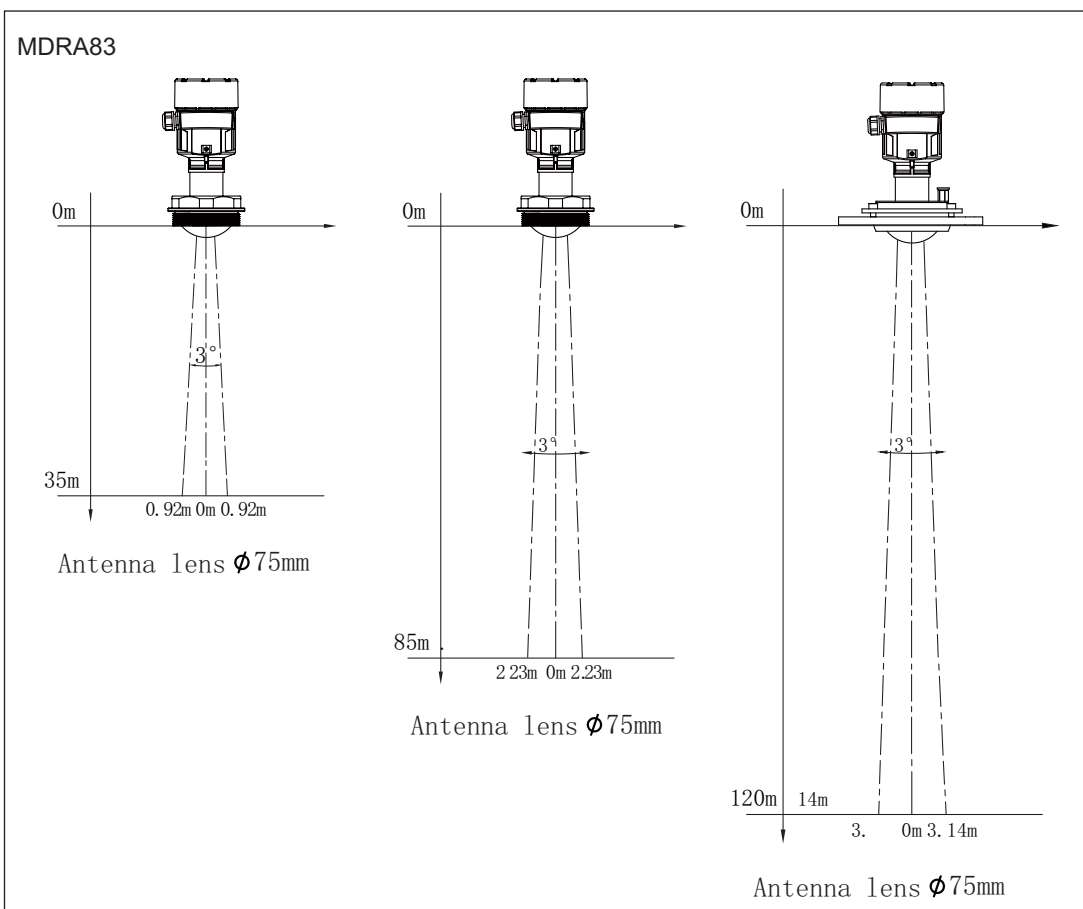


Figure 17

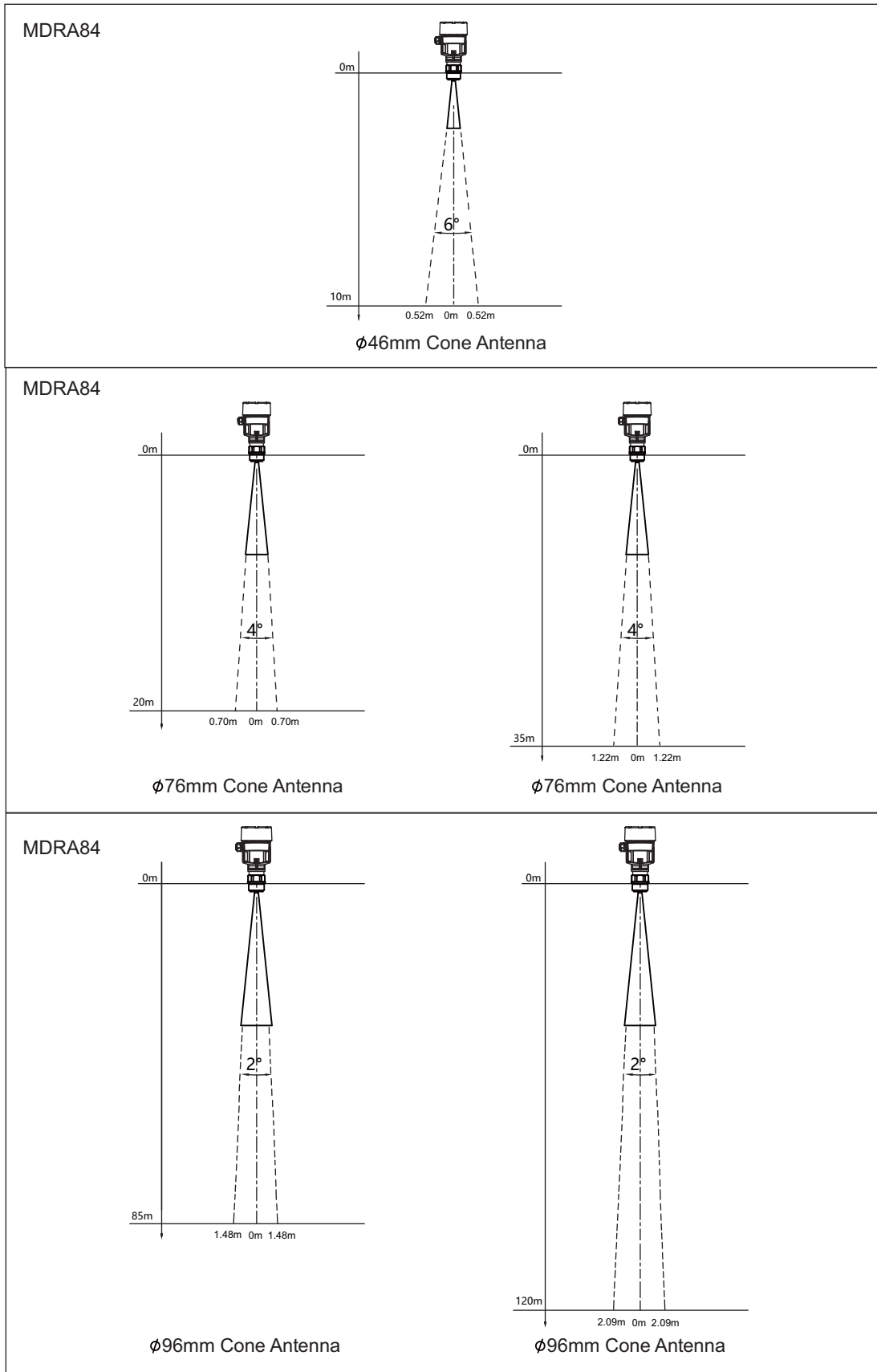


Figure 18

4. Electrical Connection

4.1 Supply Voltage

(4 ~ 20) mA/HART (two-wire system) Power supply 24V DC

The power supply and output current signal share a two-core shielded cable. For intrinsically safe type, a safety barrier must be added between the power supply and the instrument.

(4 ~ 20) mA/hart (four wire system) Power supply 24V DC

The power supply and current signal are separated, and two two-core shielded cables or one four-core shielded cable are used.

4.2 Installation Of Connecting Cable

Outside diameter of cable : 6~9mm(M20×1.5) 3.5mm~8.7mm(½ NPT)

Two core shielded cable is generally used for wiring.

(4 ~ 20) mA/hart (two-wire system) Two-core cables can be used for power supply cables

(4 ~ 20) mA/hart (four-wire system) Four-core cables can be used for power supply cables

4.3 Shielding And Wiring Of Cables

Ideally, the shielding wire is grounded at both ends. Note, however, that there will be ground compensation current through. When both ends are grounded, a capacitor with grounding potential can be connected at the grounding end (such as: switch cabinet). (e.g. : 1μF; 1500 v). Use grounding with as low resistance as possible.

(Note: If meter is used in explosion-proof area, Because of the potential output, never use grounding at both ends)

4.4 Connection Mode

(1) Wiring mode of intrinsically safe single-cavity instrument

24VDC power supply, 4 ~ 20mA output

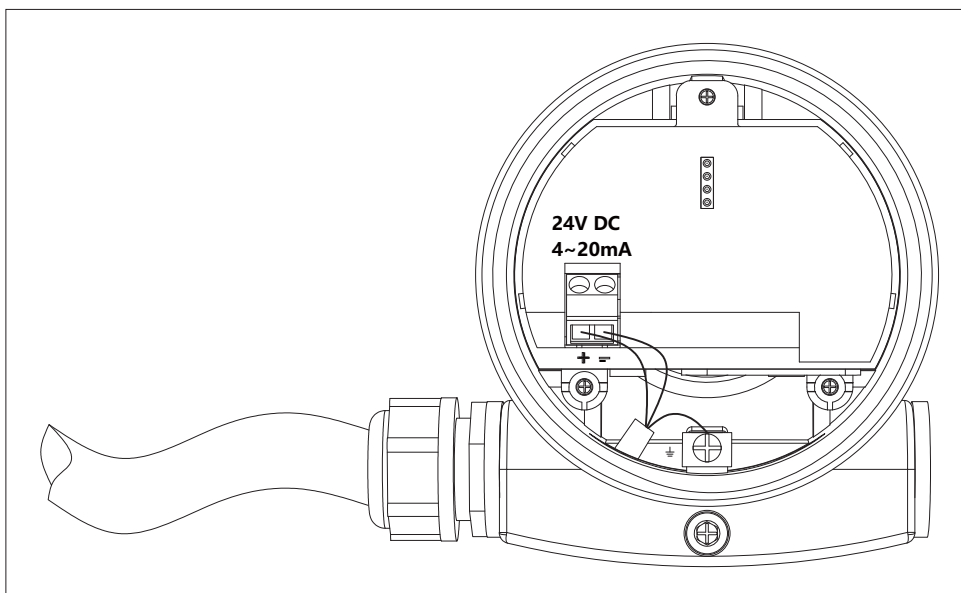


Figure 19 Two-wire connection

Explosion proof joint:

The explosion-proof type of this product is intrinsically safe. EXPLOSION-PROOF MARK: Exia IIC T6 Ga, this product is suitable for Exia IIC T6 Ga explosion-proof class below the combustible medium level continuous measurement.

This product must be supplied with safety grille when in use. The Safety Grille is the related equipment of this product. The explosion-proof type is intrinsically safe. Explosion Proof Mark: [Exia Ga] IIC, power supply voltage 24V DC, short circuit current 100mA, working current (4 ~ 20)mA.

All cables shall be shielded with a maximum length of 500m from instrument to Grille. $U_i=30VDC$, $I_i=100mA$, $P_i=0.75W$, $C_i=0\mu F$, $L_i=0mH$. The radar level gauge must be connected to the earth when it is installed. No other associated equipment without explosion proof inspection shall be used.

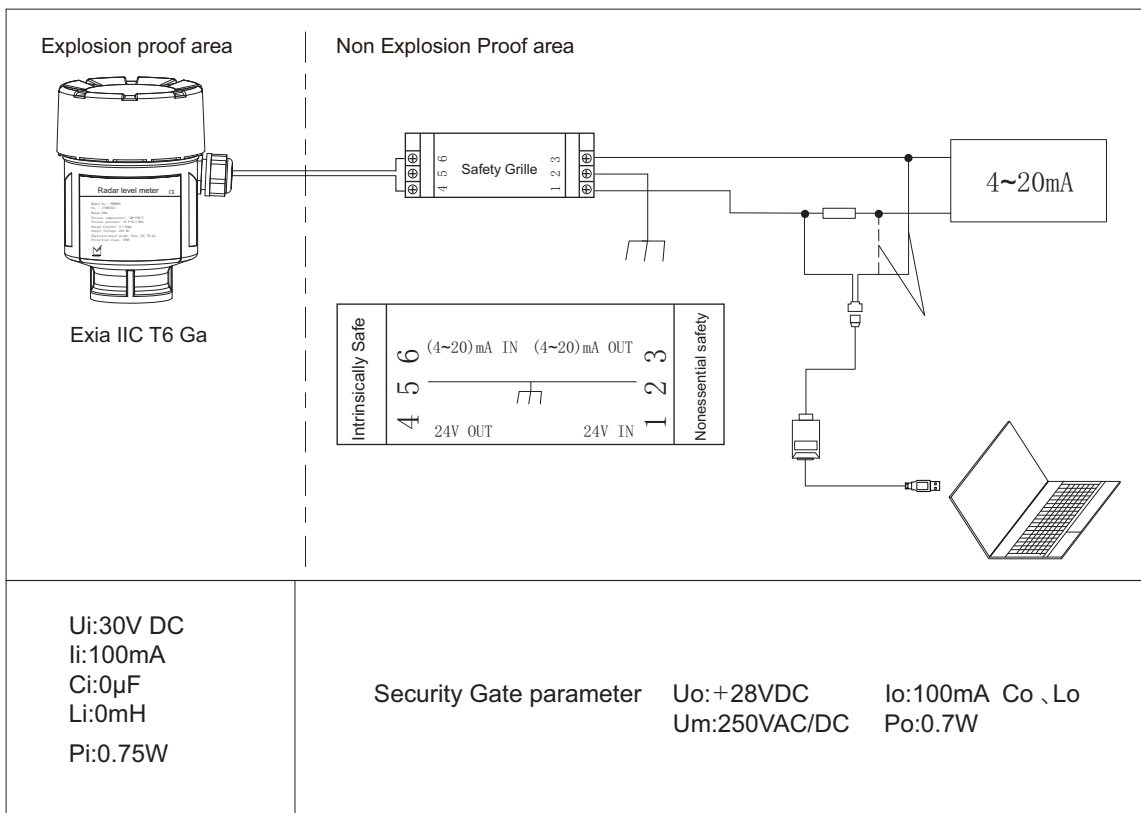


Figure 20 Intrinsically safe type explosion-proof wiring

The distribution parameters of the connecting cables between the Grille and the level meter shall satisfy:

$$U_o \leq U_i \quad I_o \leq I_i \quad P_o \leq P_i \quad C_o \geq C_c + C_i \quad L_o \geq L_c + L_i$$

Note: U_o : Maximum output voltage of security gate

I_o : Maximum output current of safety gate

C_o : Maximum external capacitance of security gate

L_o : Maximum External inductance of Safety Grille

C_c : Maximum allowable distributed capacitance of connecting cable

L_c : Maximum allowable distributed inductance of connecting cable

C_i : Maximum internal capacitance of level meter

L_i : Maximum internal inductance of level gauge

Precautions for explosion protection :

Do not allow to replace components or structure, so as not to affect the explosion-proof performance.
 When this product is used in the "0" zone, the power supply transformer to the security grid must meet the requirements of end users.

The installation and wiring of the Safety Grille shall be carried out in accordance with the Safety Grille Operation Manual, and the Safety Grille shall be certified explosion-proof.

When this product is used in zone 0, measures should be taken to prevent ignition hazard due to impact or friction!

(2) Connection Mode of flameproof double-cavity instrument

220VAC/50Hz or 24V DC (OPTIONAL 12V DC) , 4 ~ 20mA output

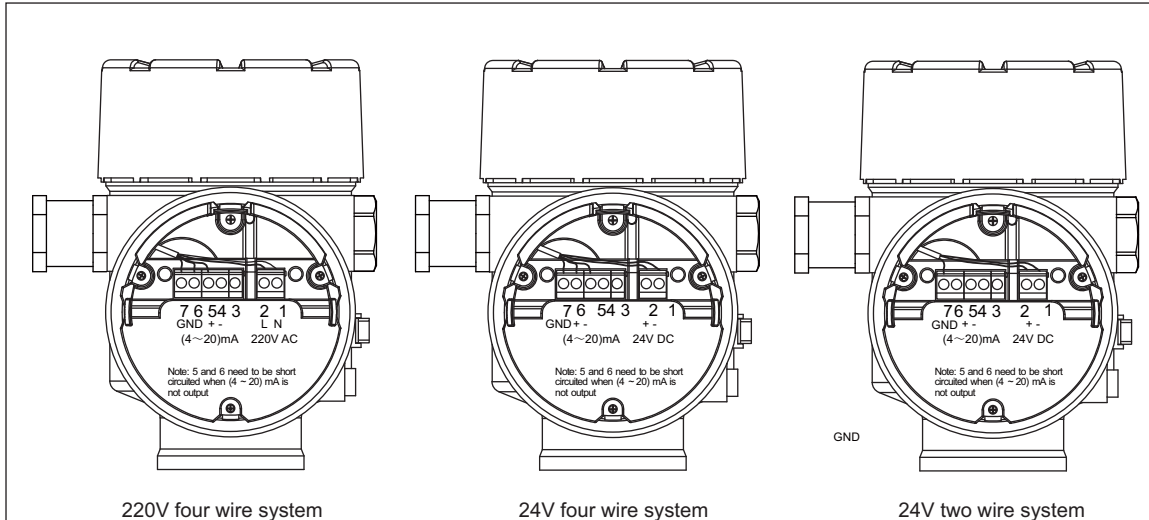


Figure 21

Flameproof connection:

The explosion-proof type of this product is explosion-proof type. EXPLOSION-PROOF MARK: Exd IIC T6 Gb, this product is suitable for Exd IIC T 6 Gb explosion-proof class below combustible medium level continuous measurement.

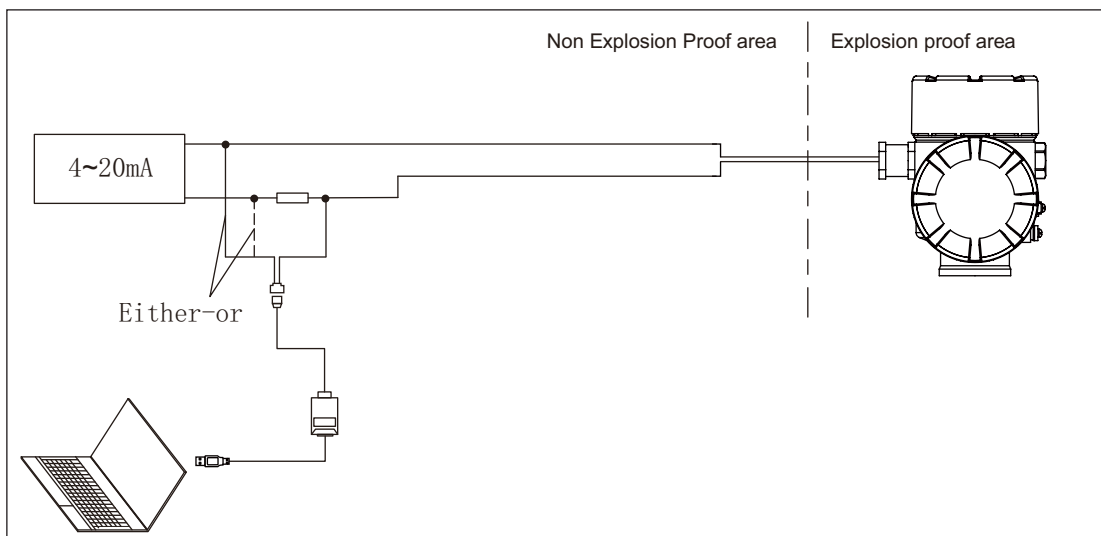


Figure 22 Two-wire wiring diagram of flameproof double-cavity instrument

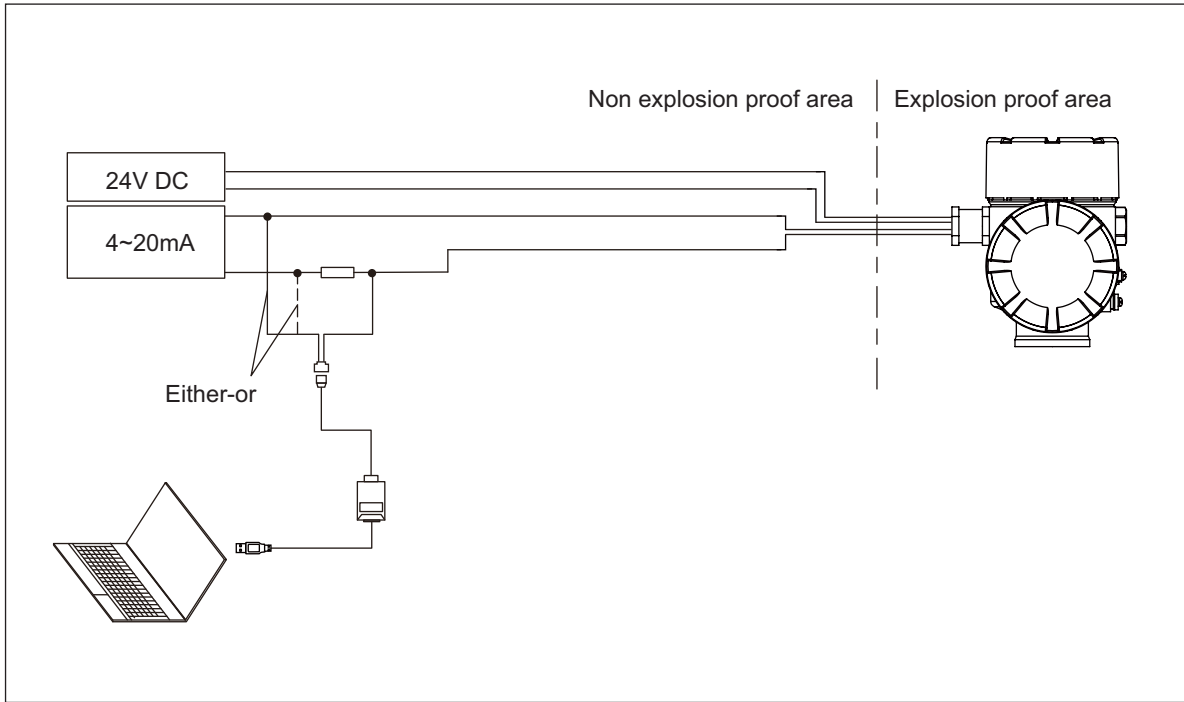


Figure 23 Four-wire connection of flameproof double-cavity instrument

(3) Display wiring mode next to the tank

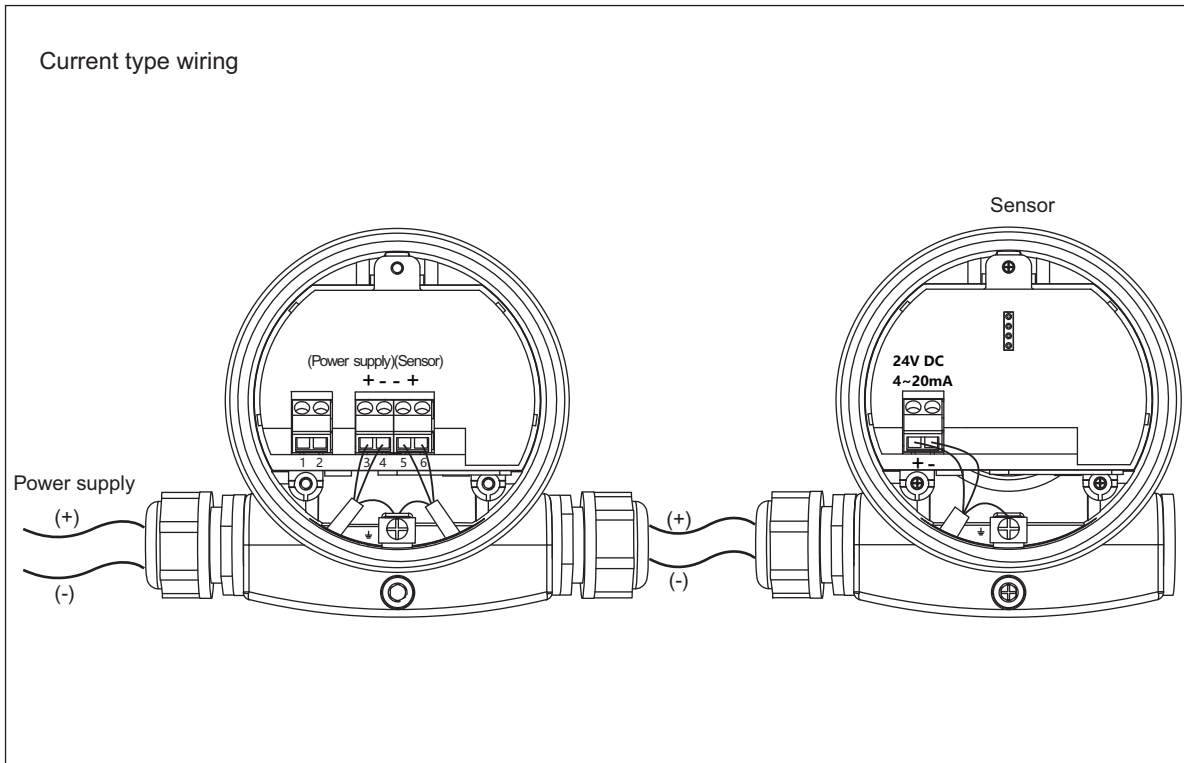


Figure 24

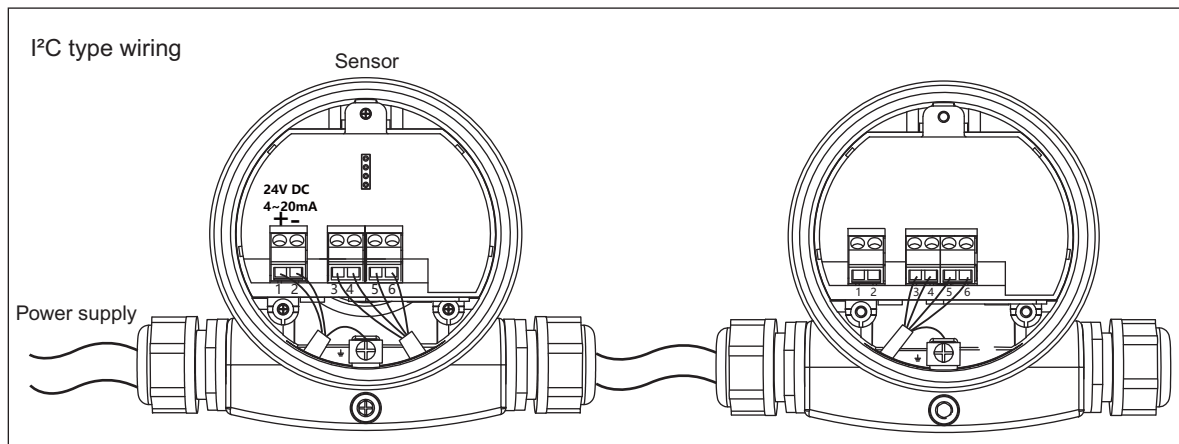


Figure 25

4.5 Safety Guide

All electrical connections must be made after turn off the power. Please follow the instructions in the instrument manual!

- ▶ Please comply with local electrical installation procedures.
- ▶ Please comply with local health and safety regulations. All operation of the electrical components of the instrument must be carried out by professionally trained personnel.
- ▶ Please check the nameplate of the instrument to ensure that the product specifications are in line with your requirements. Please ensure that the supply voltage is in accordance with the requirements on the nameplate of the instrument.

4.6 Protection Rating

This instrument fully meet the protection level IP68 requirements, please ensure the waterproof cable sealing head.

Here's the picture:

How to ensure that the installation meets IP68 requirements:

- ▶ Please make sure the sealing head is not damaged
- ▶ Please make sure the cable is not damaged
- ▶ Please ensure that the cable used meets the requirements of the electrical connection specification by bending the cable downward before entering the electrical interface to ensure that water does not flow into the housing, See 1 ①
- ▶ Please tighten the cable seal head, See ②
- ▶ Please tighten the unused electrical interface with blind plug, see ③

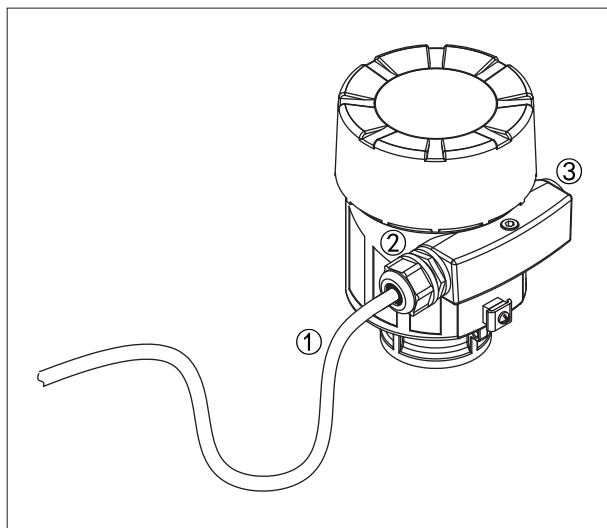


Figure 26

5. Technical Parameter

General data

Model No.		MDRA81	MDRA82	MDRA83	
Process connection		Screw thread G $\frac{3}{4}$ " A	Composite Flange	Screw thread 2G" A	
		Screw thread G $1\frac{1}{2}$ " A		Screw thread 3G $\frac{1}{2}$ " A	
		Screw thread G $3\frac{1}{2}$ " A		Universal Flange	
Weight (Depends on the procedural connection)	Antenna lens ϕ 45mm	1.5KG	4KG	2KG	
	Antenna lens ϕ 75mm	2.5KG	5.5KG	4KG	
Antenna material		PTFE	PTFE	PTFE	
Process temperature (The temperature of the antenna section)		-40~150°C	-40~200°C	-40~250°C	
Process pressure (depends on the process connection/material/antenna size)		Stainless steel thread G $\frac{3}{4}$ " A -0.1~2.0MPa	Antenna lens ϕ 45mm -0.1~4.0MPa	atmospheric pressure	
		Stainless steel thread G $1\frac{1}{2}$ " A -0.1~4.0MPa			
		Stainless steel thread G $3\frac{1}{2}$ " A -0.1~2.0MPa	Antenna lens ϕ 75mm -0.1~2.0MPa		
		Plastic thread G $1\frac{1}{2}$ " A Plastic thread G 3 " A -0.1~0.3MPa			
Model No.		MDRA84			
Process connection		G $1\frac{1}{2}$ " A			
		1 $\frac{1}{2}$ " NPT			
		Flange/Universal Flange			
Weight (Depends on the procedural connection)		2KG			
Lens Material		PTFE/PEEK			
Process pressure (depends on the process connection/material/antenna size)		-40~315°C			
Supply Voltage	Two wire system	Standard type	16~26V DC		
		Intrinsic Safety type	21.6~26.4V DC		
		Power consumption	Max. 0.54W		
		Allowable ripple	-<100Hz U _{ss} <1V -(100~100k)Hz U _{ss} <10mV		
	Four wire system	Standard type	24V DC(±10%)	220V AC(±10%)	
		Power consumption	max. 0.54W	max. 2W	

Cable parameter	Cable inlets	1 M20 × 1.5 cable inlet (cable diameter 6 ~ 9 mm) 1 Blind Block M20 × 1.5
Output parameter	Output Signal	4~20mA/HART RS485/Modbus
	Resolution	1.6μA
	Fault output	20.5mA; 22mA; 3.9mA
	Damping time	0~100s Adjustable
Outer Shell	Shell material	Aluminium/Plastics (ABS)
	Enclosure seal	Fluoro adhesive
	Top Window	PC
	Ground Terminal	Stainless steel

Characteristic parameter

Model No.		MDRA81			MDRA82			MDRA83		
Measuring range		10m	20m	35m	10m	20m	35m	35m	85m	120m
Precision		±1mm								
Blind area	Antenna lens φ45mm	0.05m			0.05m			0.10m	———	
	Antenna lens φ75mm	0.10m			0.10m			0.15m	0.2m	
General parameter	Microwave frequency	77~81GHz								
	Communication interface	HART/RS485								
	Measurement interval	About 1 second (depending on the parameter setting)								
	Adjustment Time	About 1 second (depending on the parameter setting)								
	Vibration resistance	Mechanical Vibration 10m/s ² , (10 ~150)Hz								
	Non-repeatability	≤1mm (Has been included in the measurement deviation)								
	Display resolution	1mm								
	Relative humidity	<95%								

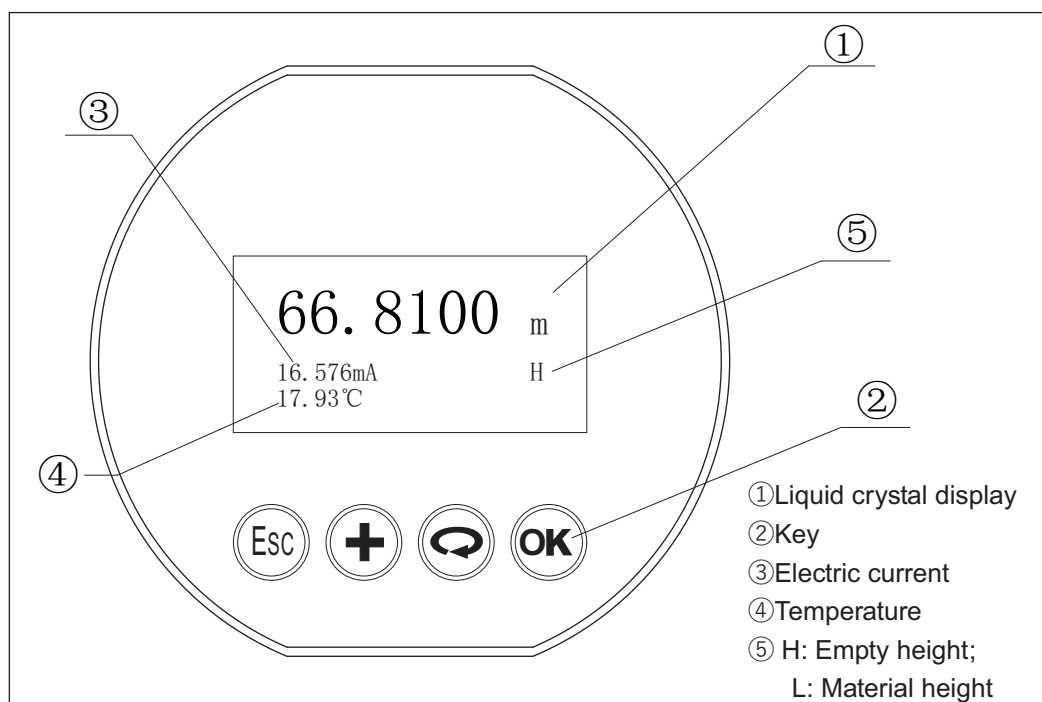
Model No.	MDRA84		
Measuring range	10m	20m/35m	85m/120m
Blind spot	0.3m	0.4m	0.5m
Precision	±1mm		
General parameter	Microwave frequency	77~81GHz	
	Communication interface	HART/RS485	
	Measurement interval	About 1 second (depending on the parameter setting)	
	Adjustment Time	About 1 second (depending on the parameter setting)	
	Vibration resistance	Mechanical Vibration 10m/s ² 、 (10 ~150)Hz	
	Non-repeatability	≤1mm (Has been included in the measurement deviation)	
	Display resolution	1mm	
	Relative humidity	<95%	





6. Debugging

6.1 Programmer











6.1.1 Key Function

The instrument is debugged by 4 keys on the programming module. The language of the debug menu is optional. After debugging, generally only for display, through the glass window can be very clear to read the measured value.



 Keys	<ul style="list-style-type: none"> -Exit the programming state or retreat to the upper level menu -Toggles the display value with the echo curve interface (home)
 Keys	<ul style="list-style-type: none"> -Switch menu items -Change cursor position -Modify parameter value, 0 ~ 9 infinite loop -Switch curve display mode or home page display mode
 Keys	<ul style="list-style-type: none"> -Switch menu items -Change cursor position
 Keys	<ul style="list-style-type: none"> -Go to programming mode -Confirm programming item -Confirm parameter modification

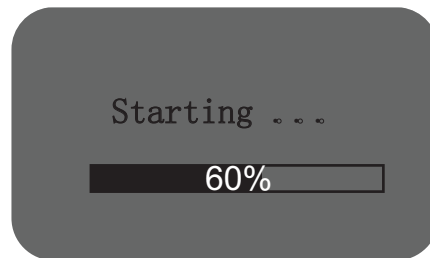
Parameter Editing Method


programming method	<p>Press the  key to enter the programming state when the instrument is running, and display the programming main menu. After each parameter is edited, it must be confirmed with the  key, otherwise the editing will be invalid. After editing, press the  key to exit the programming state and return to the running state. At any moment of programming, you can press the  key to give up programming and exit the parameter item programming state.</p>
Alphanumeric parameter programming	<p>When the menu enters the character/number programming state, the first digit of the parameter to be edited is highlighted in black, at this time, you can press the  key to change the character/number until the desired character/number. Press the  key, the characters/numbers are reversed in turn, and other bits can be programmed. After programming, press  key to confirm programming.</p>
Optional parameter programming	<p>Optional parameter means that the programming item has several selected parameter items for users to choose. Use  key and  key to point the arrow to the required parameter item, press  key to confirm programming.</p>

6.1.2 Commissioning Steps

(1) Device Startup And Initialization Interface

After the meter is powered on, the start-up interface displays Starting, and then displays the MADECO logo and progress bar.

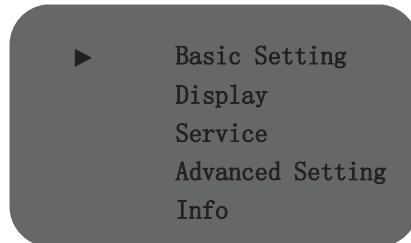


(2) After entering the ranging interface, the material height, output current and electrical temperature are displayed. After pressing the  key, the material height in large font is displayed, as shown in the figure:

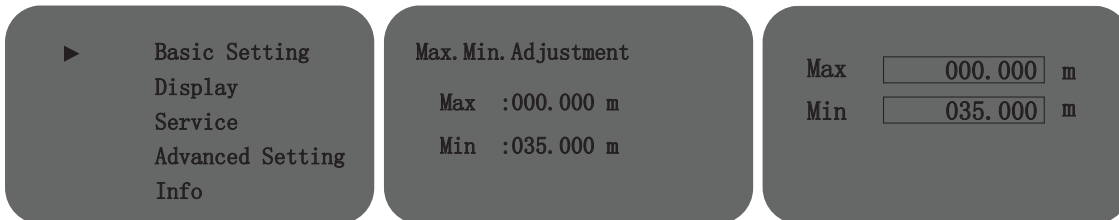


6.1.3 Basic setting

In the running state, press the **OK** key to display the programming main menu, there is a triangle cursor on the left side of the main menu, press the **↻** key to change the position of the triangle cursor down, press the **+** key to change the position of the triangle cursor up, press the **OK** key to enter the menu pointed by the cursor, press the **ESC** key to exit the current menu.



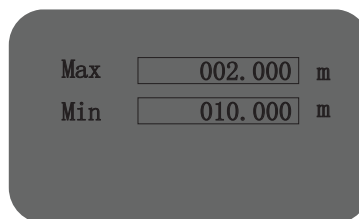
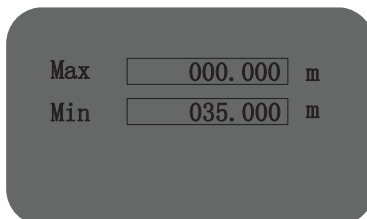
(1) Max.Min adjustment



Enter the "Basic Settings" menu, the programmer will directly display the first submenu "High and Low Adjustment Settings".




For example:

- ① In general, if the distance from the measurement reference point to the bottom of the tank is 35m, the "low adjustment" should be set to 35.000m; the "high adjustment" should be set to 00.000m.
- ② In special cases, the on-site production process needs to set the highest output below the zero point of the meter, for example: the 10m tank process requires that the tank is full when the material is injected to 2m below the zero point of the meter to prevent danger, then the "low adjustment" is set to 10.000m, "High adjustment" should be set to 02.000m.



(2) Material properties

The Material Properties menu is used to select liquids or solids.

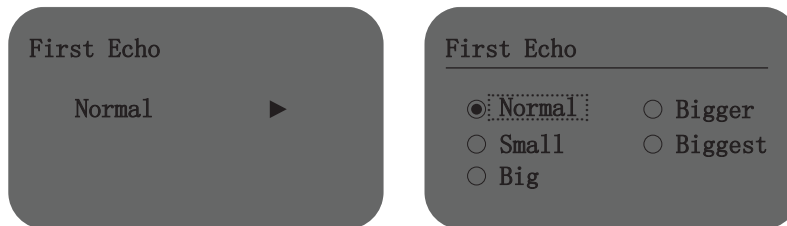
Press the  button to enter the parameter selection state, use the  key to move the arrow to the required parameter, such as liquid or solid, after the editing is completed, press the  button to confirm.







(3) First Wave Selection

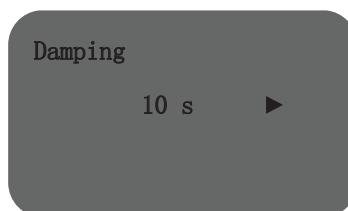
The first wave selection function is used to control the enhancement and weakening of the first wave signal.

Enter the first wave selection menu, press the  key to enter the parameter selection state, use the  key to move the arrow to the desired parameter item, such as normal, weakened, slightly stronger, stronger or the strongest, after editing, press the  key to confirm.



(4) Damping Time

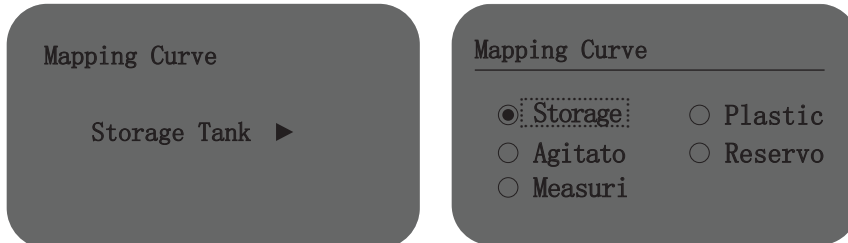
In order to improve the stability of the measured output value, a larger damping time can be set to stabilize the measured value and increase the anti-interference ability. Enter the damping time setting menu, press the  key to enter the parameter editing state, use the  key to set the number, use the  key to select the edited digit, the damping time is set to 10s by default, and the optional range is 0-100s adjustable, press the  key after editing confirm.



(5) Mapping curve

The mapping curve Indicates the mapping mode for setting the nonlinear output ratio. The output mapping screen is displayed, and the LCD is displayed.

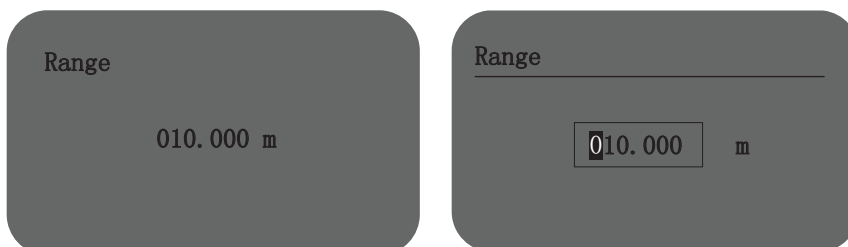
Press the **OK** button to enter the parameter selection state, use the **↺** key to select different mapping methods, such as storage box, mixing tank, metering tank, plastic tank and reservoir, etc., press **OK** the button to confirm after editing.



(6) Measurement range

In order to obtain the correct measurement results, the measuring range of the instrument needs to be set. Enter the measuring range menu and set the measuring range to 0.100m-120.000m.

Press the **OK** button to enter the parameter editing interface, use the **+** key to set the number, use the **↺** key to select the edit digit, and press the **OK** button to confirm.

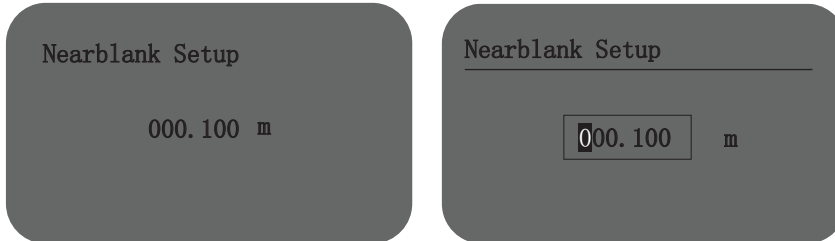


Note: This range is not the output range of the instrument, but the maximum range of the instrument processing reflected echoes, (set value: range setting \geq low adjustment).

Example: The process requires measurement from the bottom of the tank, the output range is 10m, if the "measurement range" is set to 9m, "min." is set to 10m, and "max. adjustment" is set to 0m. The output range of the instrument has not changed, but the bottom 1m level of the tank body cannot be measured, and the instrument cannot find the signal at the bottom of the tank when the tank is empty, and the number value is prone to jump.

(7) Dead Zone Setting

When there is a fixed obstacle near the surface of the distance sensor that interferes with the measurement, and the maximum material height will not reach the obstacle, it can be used to set the blind zone to avoid measurement errors. Press the **OK** key to enter the dead zone setting editing interface, select the **+** or **↺** key to set the parameters, and press the **OK** key to confirm.



6.1.4 Display Value

(1) Set Display Value

After entering the "Display" menu, the first submenu is "Display Value". After setting the options, the instrument programmer will display the corresponding content. The factory default value is generally the material level, that is, the height of the material level displayed on the panel when the programmer does not enter any menu.



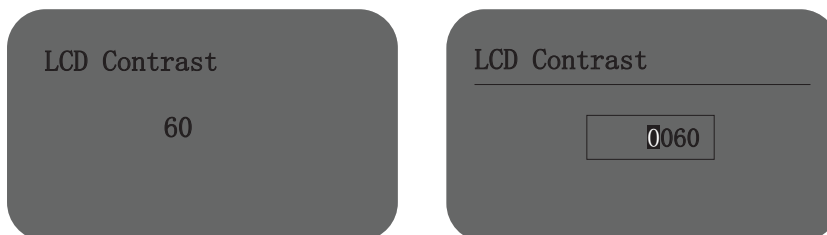
Explanation of display content:

- ① Distance: measure the distance from the reference point to the surface of the medium;
- ② Height: material level height, its value is equal to "low adjustment" minus "distance" - (empty height);

(2) LCD contrast

This item is used to adjust the brightness of the display. Enter the LCD contrast menu, LCD display:

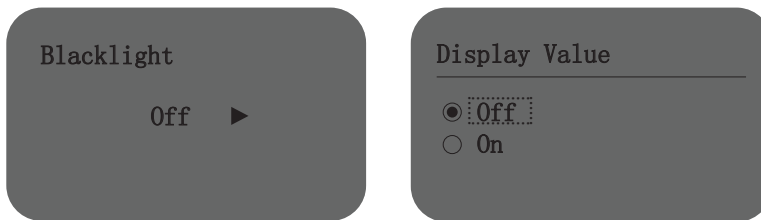
Press the **OK** button to enter the parameter editing interface, use the **+** key to set the number, use the **↺** key to select and edit the number, and press the **OK** button to confirm.



(3) Backlight lighting

Backlight lighting is used to illuminate the display.

Press **OK** key to enter the current output selection interface, use **↻** key to select closed or open.

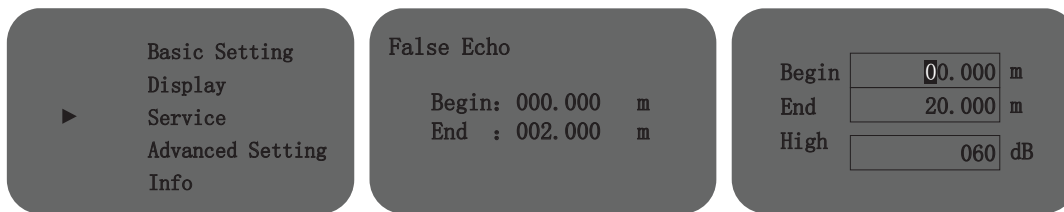


6.1.5 Service

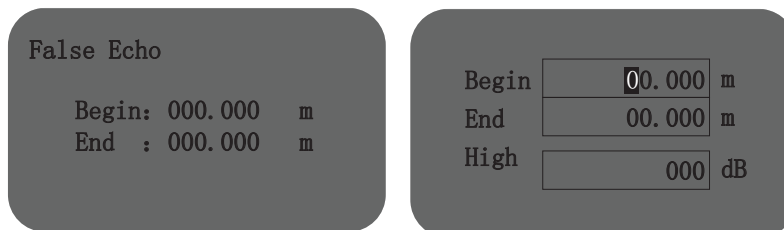
(1) False Echo Storage Function

The false echo storage function can eliminate the influence of interference waves on real signals under certain circumstances.

Enter the "Service" menu, the first submenu is "False Echo", click **OK** to enter the setting interface and display four options.

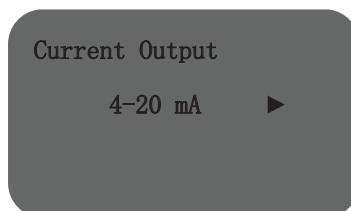


Note: The method of deleting false echoes Begin: 0; End: 0; Height: 0. As shown below:



(2) Select Current Output

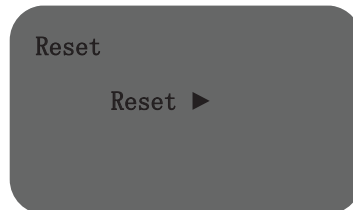
After the setting of "False Echo" is completed, press the key to cycle through the menu to display "Current Output".





Current output: You can choose the output direction of the current when the meter is working. The factory default setting is 4-20mA, and the output current has a direct proportional linear relationship with the material height; after selecting 20-4mA, the output current has an inverse proportional linear relationship with the material height, that is, the output current has a proportional linear relationship with the empty height.

(3) Reset

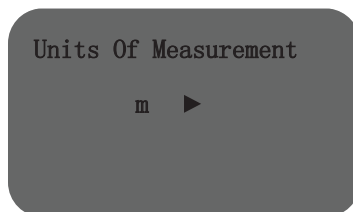
Basic reset resets the range, dead zone, damping time and other functions to factory settings; factory reset resets all functions to factory settings.





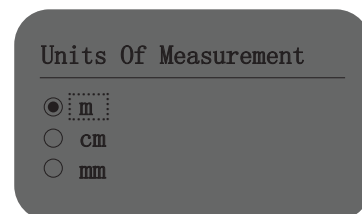
Press  Key, enter the reset select menu, according to the need to use  key to select the basic reset or factory reset.

(4) Units Of Measurement

Measurement units provide the user with the choice of using different measurement units.

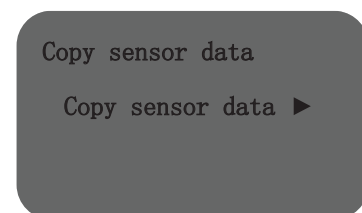


Press the  key to enter the measurement unit selection menu, and use the  key to select the three measurement units of m, cm and mm as required.

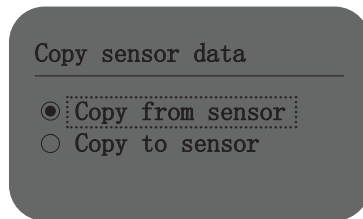


(5) Copy Sensor Data

Copy sensor data contains two functions from sensor amplitude and copy to sensor.

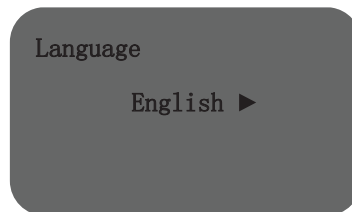


Press the **OK** key to enter the copy sensor data selection menu, and you can use the **↺** key to select copy from sensor and copy to sensor as required.

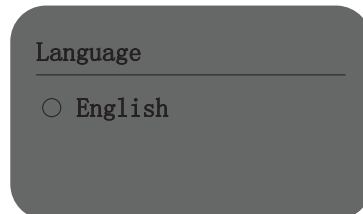


(6) Language

Copy sensor data contains two functions from sensor amplitude and copy to sensor.

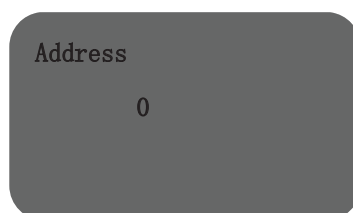


Press the **OK** key to enter the language selection menu, and use the **↺** key to select English.



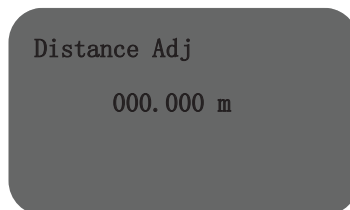
(7) Set The Bus Address

When two or more instruments are connected to the host computer through the HART communication interface, this function is required to set the instruments to multi-point working mode. Enter the bus address menu, press the **OK** key to enter the parameter editing interface, use the **+** key to set the number, use the **↺** key to select the digit to be edited, and press the **OK** key to confirm.



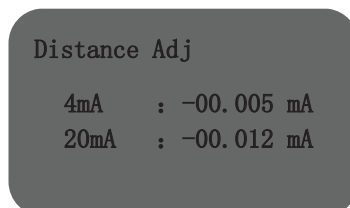
(8) Set Distance Offset

The distance offset setting is used to modify the measurement error of the instrument. Its value is the difference between the actual empty height value and the displayed empty height value. It has been set before leaving the factory. Enter the distance offset menu setting, press the **OK** key to enter the parameter editing interface, use the **+** key to set the number, use the **↶** key to select the digit to be edited, and press the **OK** key to confirm.



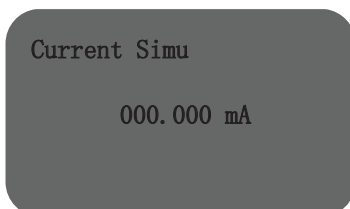
(9) Set the current offset

The current calibration setting is used to calibrate the error value of the current output. It is used to calibrate the current of 4mA and 20mA, adjust the current offset, and the instrument realizes the linear change of the 4-20mA current. It has been set before leaving the factory. Enter the current calibration menu setting, press **OK** the key to enter the parameter editing interface, use the **+** key to set the number, use the **↶** key to select the digit to be edited, and press **OK** the key to confirm.



(10) Set Current Simulation

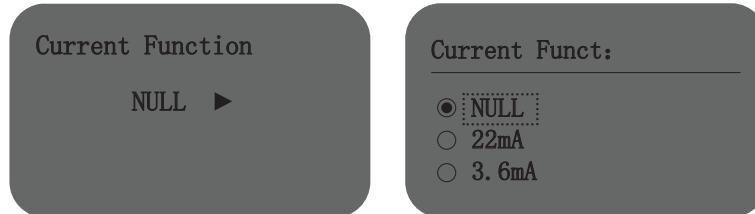
Calibrate the error value of the current output. Enter the current simulation menu setting, press the **OK** key to enter the parameter editing interface, use the **+** key to set the number, use the **↶** key to select the digit to be edited, and press the **OK** key to confirm.



(11) Setting The Current Function

You can set the value of the actual output current when the instrument encounters a fault.

Press the **OK** key , go to the current function selection menu, select no change, 22mA or 3.6 Ma three fault output current.



(12) Setting Threshold Setting

The threshold setting is used to set the threshold width and height of the effective echo.

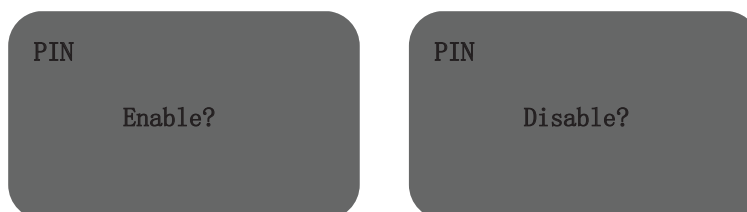
The larger the threshold setting is, the stronger the effective echo amplitude is required on site, which is more conducive to eliminating small signal clutter interference; but be sure to pay attention: if the modified threshold is greater than the effective When the echo amplitude is too large, it will cause the result of false echo.

Press the **OK** key to enter the parameter editing interface, use the **+** key to set the number, use the **↻** key to select the digit to be edited, and press the **OK** key to confirm.



(13) Set Password

The password is used to protect the parameters under the advanced setting menu of the instrument. After the password function is enabled, it is necessary to enter the password when changing any advanced setting interface parameters. Once the correct password is entered, the password protection function will be canceled within a limited time, and the parameters can be modified. Press the key to enable the password function and set a password or disable the password function.

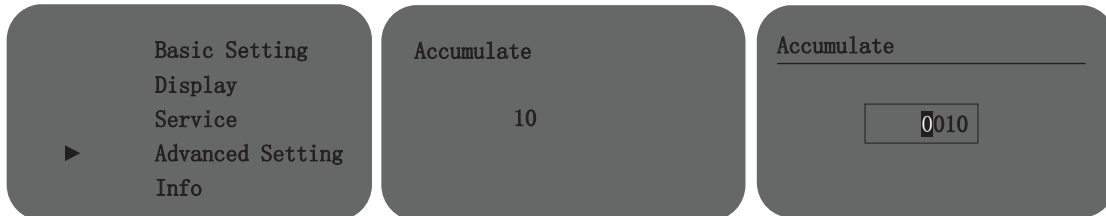


6.1.6 Advanced Setting

(1) Original Accumulate

This parameter is used to set the sampling times of the original data in a period.

Press the **OK** button to enter the original cumulative editing interface, use the **+** key to set the number, use the **↺** key to select the edit digit, press the **OK** button to confirm.



(2)Level 1 Filter

The Level 1 Filter is the filtering of the original signal ADC. Opening will weaken the intensity, and under the condition of requiring accuracy, you can choose to close.

Press the **OK** key to enter the editing state, press the **↺** button to select open or close, and press **OK** the button to confirm.



(3)Level 2 Filter

The second-level filter is the filtering of FFT, opening will weaken the intensity, and under the condition of requiring accuracy, you can choose to close.

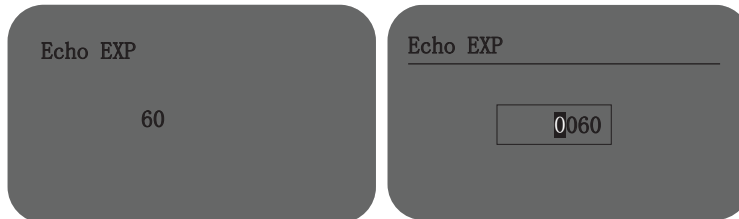
Press the **OK** key to enter the editing state, press **↺** the button to select open or close, and press the **OK** button to confirm.



(4) Echo EXP

Echo EXP is equivalent to waveform damping, the sum of historical echo FFT, the smaller the value, the faster the change; The greater the value, the better the stability, preventing signal mutation.

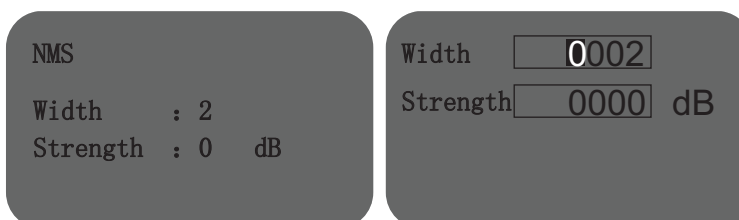
Press the **OK** button to enter the parameter editing mode, use the **+** key to set the number, use the **↶** key to select the edit digit, and press the **OK** button to confirm.



(5) NMS

This function is used to start and select the function of merging two echo signals that are very close to each other. This helps to suppress measurement jumps caused by conical piles or emptying funnels during solids loading or emptying. The value of the suppression width determines what maximum distance is allowed between the end of the first echo and the start of the second echo before they can be merged. The value of the suppression strength determines the maximum amplitude difference allowed between two adjacent echoes in order to merge them.

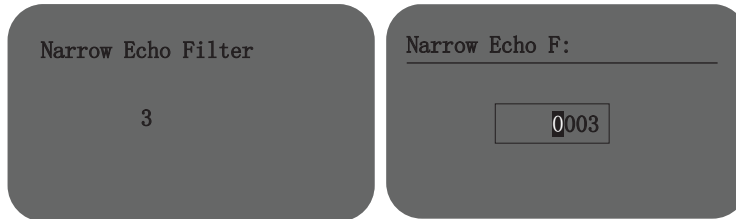
Press the **OK** button to enter the parameter editing mode, use the **+** key to set the number, use the **↶** key to select the edit digit, and press the **OK** button to confirm.



(6) Narrow Echo Filter

The narrow-wave filter is used to set the filter width. If the echo width is less than the set number, it is considered as clutter. If the echo width is greater than the set value, it is considered as an effective signal.

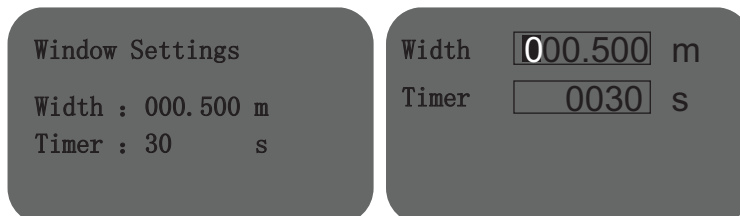
Press the **OK** button to enter the parameter editing mode, use the **+** key to set the number, use the **↻** key to select the edit digit, and press the **OK** button to confirm.



(7) Window Settings

When there is a wave loss situation, if the filter mode in the echo lock menu has been selected, the window setting can make the signal within the window range valid. When the window width is 0.500m, the default signal recognition range of the instrument is -0.25m to +0.25m. When the window time is 10s, it means that the instrument is within 10s, and the change signal within the window range is effective. Note: The window width refers to the maximum range of up and down movement of the signal.

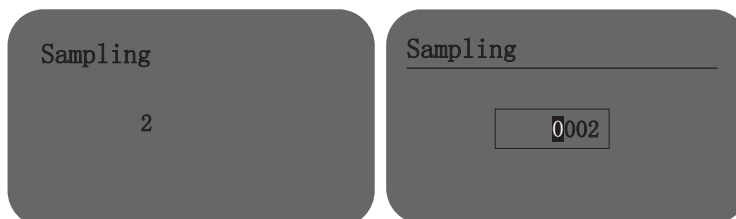
Press the **OK** button to enter the window setting and editing interface, use the **+** key to set the number, use the **↻** key to select the edit digit, and press **OK** the button to confirm.



(8) Sampling

Sampling is used to set the minimum number of sampling times. When the number of occurrence of the target signal point is greater than this number, it is considered to be a valid signal.

Press the **OK** button to enter the window setting and editing interface, use the **+** key to set the number, use the **↻** key to select the edit digit, and press the **OK** button to confirm.



(9)Noise Settings

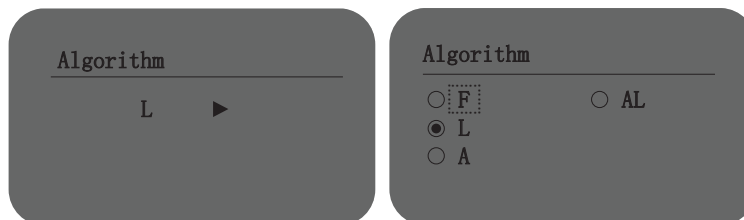
The Noise settings is used to filter out ineffective clutter, only waves above the envelope (threshold line) that exceed the minimum intensity are effective, and only values that exceed the minimum area are effective.

Press the **OK** button to enter the window setting and editing interface, use the **+** key to set the number, use the **↻** key to select the edit digit, and press the **OK** button to confirm.



(10)Algorithm

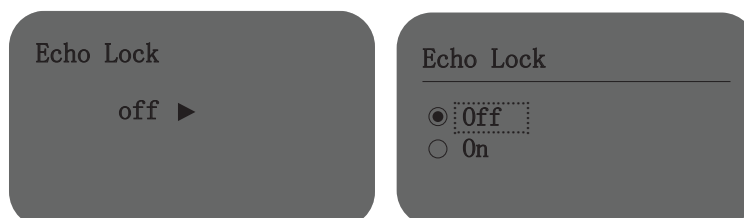
The algorithm is divided into four options, respectively F: first wave L: intensity A: area AL: intensity area. AL corresponds to the most energetic, generally default strength, powder collapse inclined material. The signal amplitude is small, but there are a bunch of waves in the case. Press the **OK** button to enter the algorithm selection interface, and select the appropriate algorithm according to the actual working conditions.



(11)Echo Lock

Echo lock is equivalent to the switch of window function, closing is equivalent to closing the window function, quickly select the strongest echo, but also equivalent to opening the express change; Opening is equivalent to opening a window function.

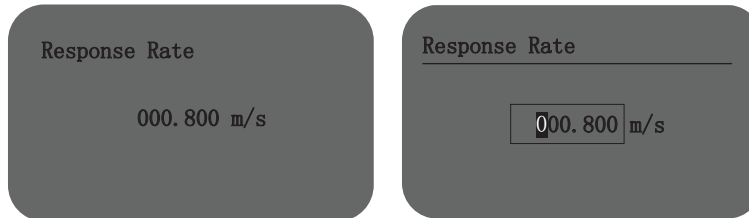
Press the **OK** key to enter the editing state, press **↻** the button to select open or close, and press the **OK** button to confirm.



(12) Response Rate

The default speed of tank loading and unloading can be superimposed with the window, and the default setting is 0.8m/s.

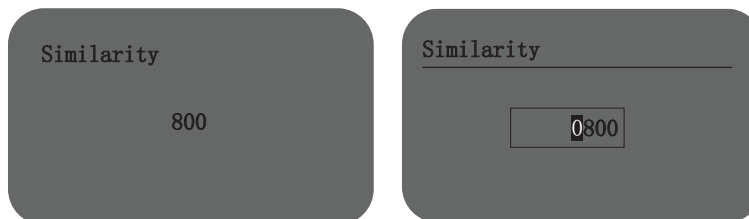
Press **OK** key to enter the window setting and editing interface, use the **+** key to set the number, use **↻** key to select the editing number, press **OK** key to confirm.



(13) Similarity

Default parameter for echo comparison. Do not modify this value.

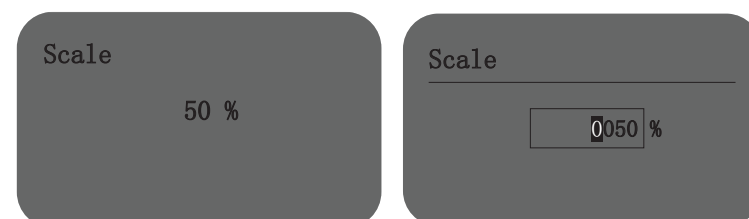
Press **OK** key to enter the window setting and editing interface, use **+** key to set the number, use **↻** key to select the editing digit, and press **OK** key to confirm.



(14) Scale

In the window function, the window can be displayed only when the percentage of the wave outside the window is greater than the effective proportion of the wave inside the window. Select the signal wave after the window time.

Press **OK** key to enter the window setting and editing interface, use **+** key to set the number, use **↻** key to select the editing digit, and press **OK** key to confirm.



(12) Signal Gain

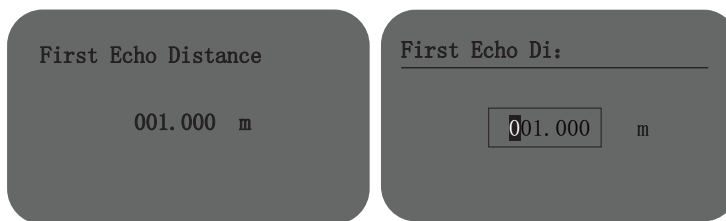
The signal gain is suitable for small on-site target signals. By adjusting the signal gain adjustment, the signal strength is increased to identify the target signal. Enter the signal gain adjustment, press the **OK** key to enter the signal gain selection interface, use the **↻** key to select 1, 2 or 3 three signal strengths.



(16) First Echo Distance

First Echo Distance Specifies the enabling distance of the first wave function. When the first wave distance is set to 1 meters, it means that the first wave function is turned on when the target is less than 1 meters (combined with the first wave ratio), and the first wave is selected as an effective signal.

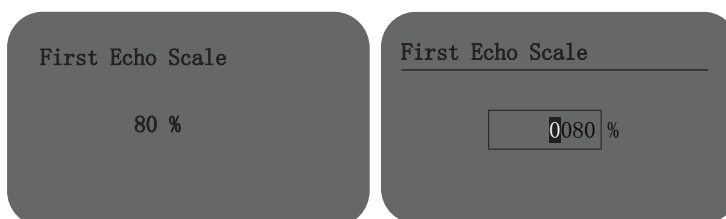
Press the **OK** button to enter the window setting and editing interface, use **+** the key to set the number, use the **↻** key to select the edit digit, and press **OK** the button to confirm.



(17) First Echo Scale

The First echo scale is used to set the conditions under which the first wave can be recognized. When the ratio of the first wave is set to 80%, it means that before the maximum wave, the wave whose signal strength can reach 80% of the maximum wave signal strength is identified as the first wave (combined with the ratio of the first wave). By default, the first wave has the priority to be selected as the first wave. In this case, the first wave is selected as the effective signal.

Press the **OK** button to enter the window setting and editing interface, use the **+** key to set the number, use the **↻** key to select the edit digit, and press the **OK** button to confirm.



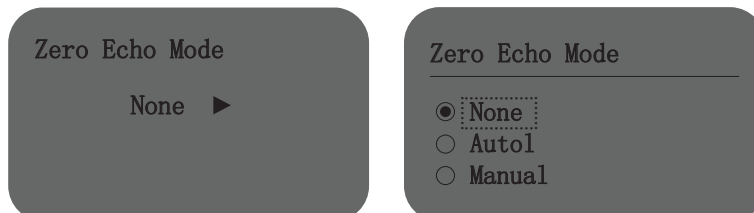
(18) Echo Specified

Press **OK** key to enter the window setting and editing interface, use **+** key to set the number, use **↶** key to select the editing digit, and press **OK** key to confirm.



(19) Zero Echo Mode

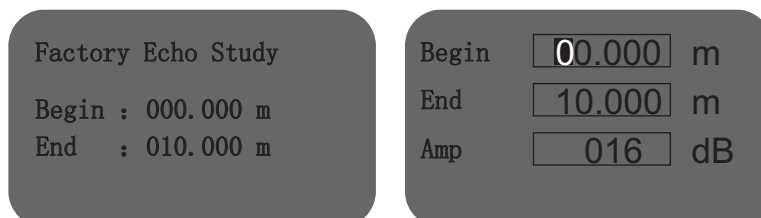
Press **OK** key to enter the editing mode, press **↶** key to select none, manual or automatic, and press **OK** key to confirm.





(20) Factory Echo Study


Before leaving the factory, the device is placed in a dark room equipped with absorbing materials for full-scale factory echo learning.

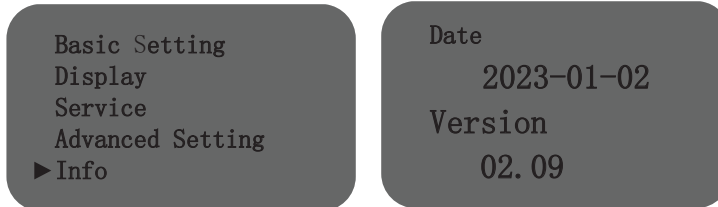
Press **OK** key to enter the window setting and editing interface, use **+** key to set the number, use **↶** key to select the editing digit, and press **OK** key to confirm.




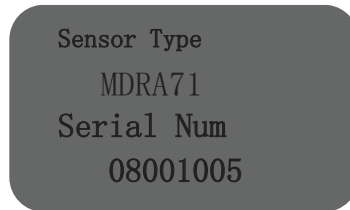
6.1.7 Information

The information menu includes some basic information of the meter, such as sensor type, serial number, production date and software version. When the LCD displays the main menu, press the  key or the  key to move the arrow to Information.





(1) Press the  key to enter the information submenu, displaying the production date and software version of the instrument.

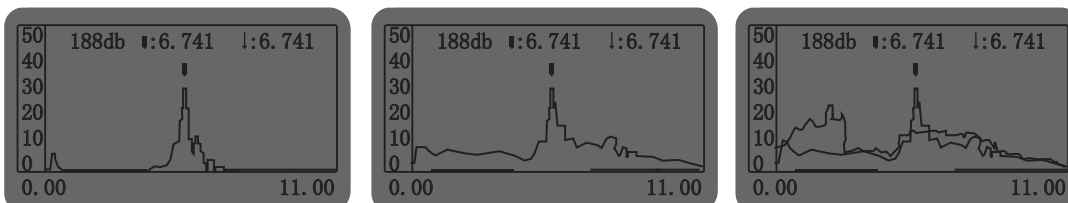


(2) Press  key to display the sensor type and serial number used by the meter.



6.1.8 Curve

In the running state, press the  key to display the curve interface, the horizontal axis of the curve is the distance information, and the vertical axis is the amplitude information. The upper part of the page contains three items: signal amplitude of the selected target, locked target data and instantaneous target data. On the MDRA80 echo curve interface, if you press the  key, the full waveform will be displayed. When you press the  key, there will be an envelope (threshold line) running through the echo curve, and the radar level gauge will combine the false echo with the envelope. All in one. Press the  key again to return to the distance measurement main interface.

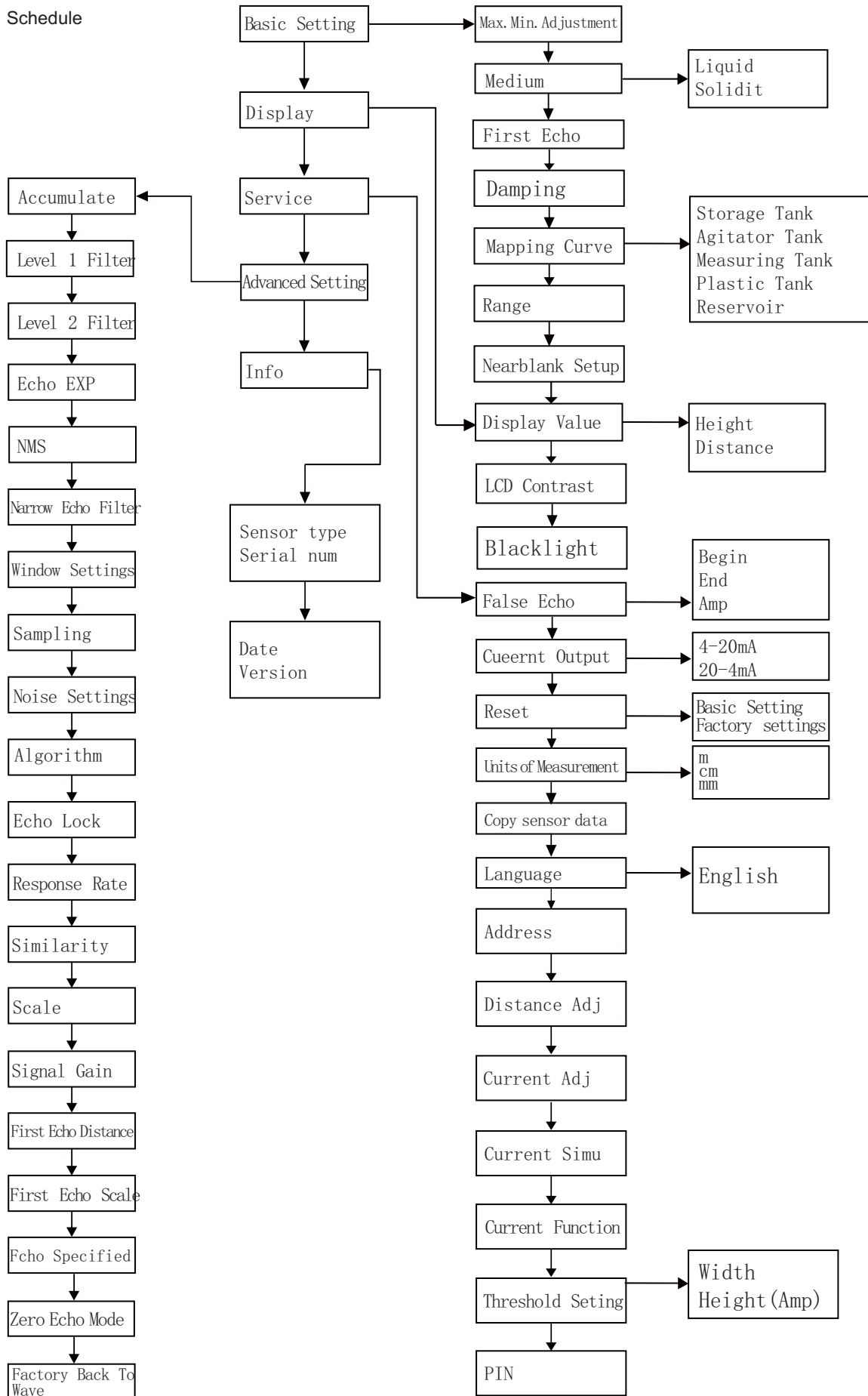


**A table
Menu Overview:**

Menu Item	Parameter	Select	Factory Default
Basic Settings	Max. Min Adjustment	Max, Min	Current Value
	Medium	Liquid	Liquid
		Solidit	Solidit
	First Echo	Normal , Small , Big , Bigger, Biggest	Normal
	Damping	0-100s	10s
	Mapping Curve	Storage, Agitato, Measuri , Plastic, Reservo	Storage
	Range	0-Instrument Range	Current value
	Nearblank Setup	0-99m	0. 1m
Display	Display Value	Height, Distance	Distance
	LCD contrast	0-100	60
	Blacklight	off, on	off
Service	False Echo	Begin, end, Amp	0-1m
	Current Output	4-20mA, 20-4mA	4-20mA
	Reset	Basic Settings, Factory Settings	-
	Units Of Measurement	m, cm, mm	m
	Copy Sensor Data	Copy From Data	Copy To Data
	Language	English	English
	Address	0-8	0
	Distance Adj	-	-
	Current Adj	4mA, 20mA	4mA, 20mA
	Current Simu	-	-
	Current Function	NULL, 22mA, 3. 6mA	NULL
	Threshold Setting	Width Amp	Width:40 Amp: 3dB
	PIN	-	-
Advanced Settings	Accumulate	0-10	10
	Level 1 Filter	off, on	off
	Level 2 Filter	off, on	off

	Echo EXP	0-99	60
	NMS	Width Strength	Width:2 Strength:0dB
	Narrow Echo Filter	0-100	3
	Window Settings	Width Timer	Width: 0.5m Timer: 30s
	Sampling	0-100	2
	Noise Settings	Strength Area	Strength: 4dB Area: 0dB
	Algorithm	F、L、A、AL	L
	Echo Lock	off、on	off
	Response Rate	0-30m/s	0.8m/s
	Similarity	0-5000	800
	Effective Ratio	0%-99%	50%
	Signal Gain	1、2、3	1
	First Echo Distance	0-range	1m
	First Echo Scale	0-99%	80%
	Echo Assignment	0-range	0
	Zero Wave Mode	None、Automatic、Manual	None
	Factory back to wave learning	Begin End Amp	Begin: 0m End: range Amp: 16dB
Info	Sensor Type	Sensor Type	Current Model
	Product Number	Serial Number	Current Serial Number
	Production Date	Date	Current Date
	Software Version	Version Model	Current Version

Schedule



6.2 PC software debugging

Connect to host computer through Hart

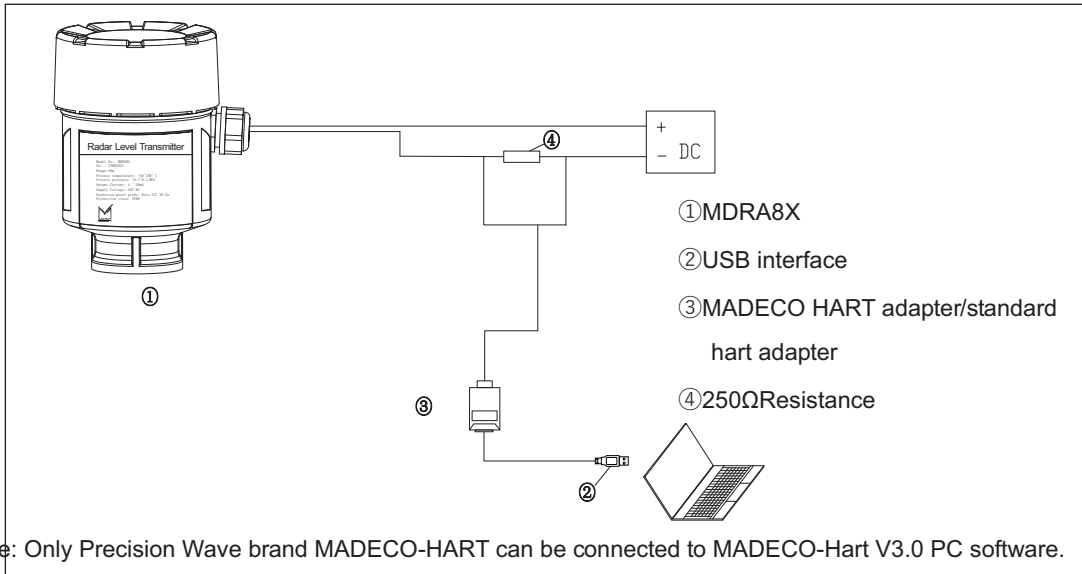


Figure 28

(1) Login page

The login page of MADECO-Hart V3.0 software consists of seven parts: parameter selection, serial port, address, language, user name, password and company basic information.



Figure 29

(2) Main page

The main interface of MADECO-Hart V3.0 software consists of six parts: menu bar, tool bar, directory, real-time data, parameter setting area and curve display area.

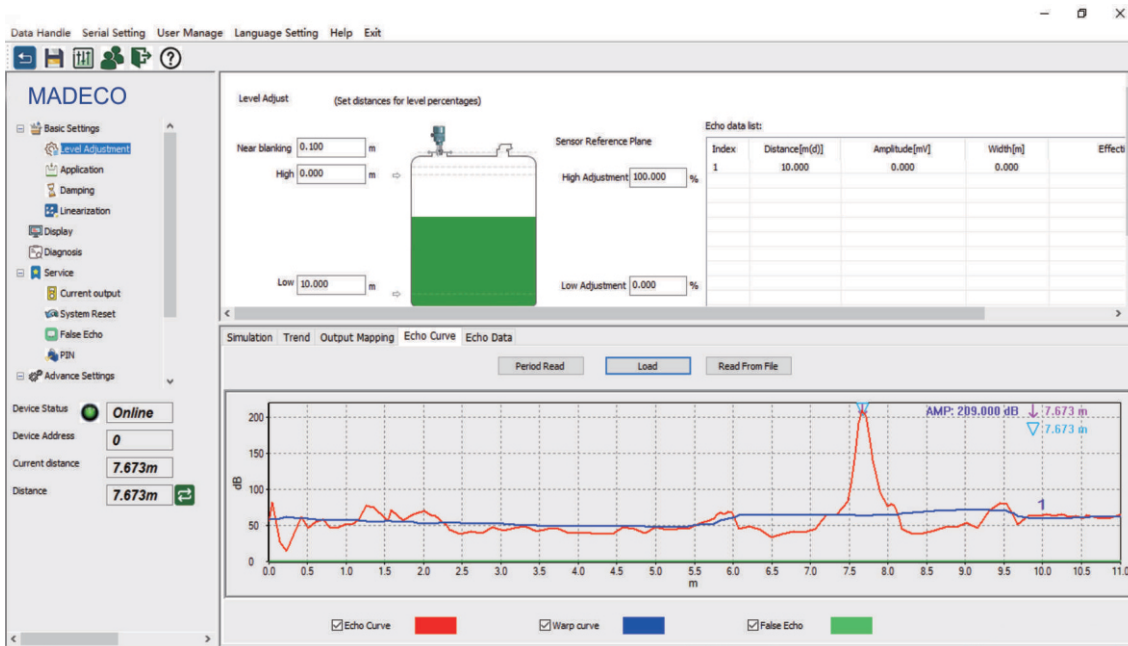


Figure 30 Main interface

(3) Real-time data

The basic parameters of MDRA80 series mainly include meter status, meter address, current distance, empty height, material height, percentage and output current. Basic parameters are all read-only and read cyclically. The address of the instrument is the same as the address on the login page, the material height is the difference between the measurement range and the empty height, and the percentage is the ratio of the material height to the low adjustment.

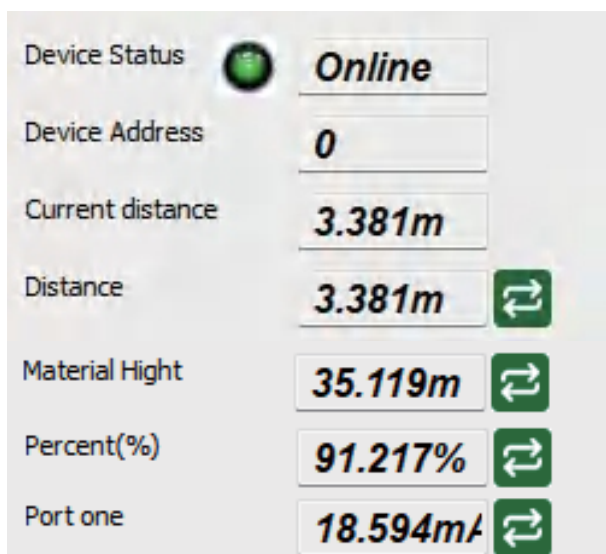


Figure 31 Real-time data interface

(4) Directory And Parameter Setting

① Level adjustment

Level adjustment includes six functions of blind zone, high level adjustment, low level adjustment, range, high level adjustment percentage and low level adjustment percentage. The written low adjustment and range data should not exceed the maximum value of the range corresponding to the selected model.

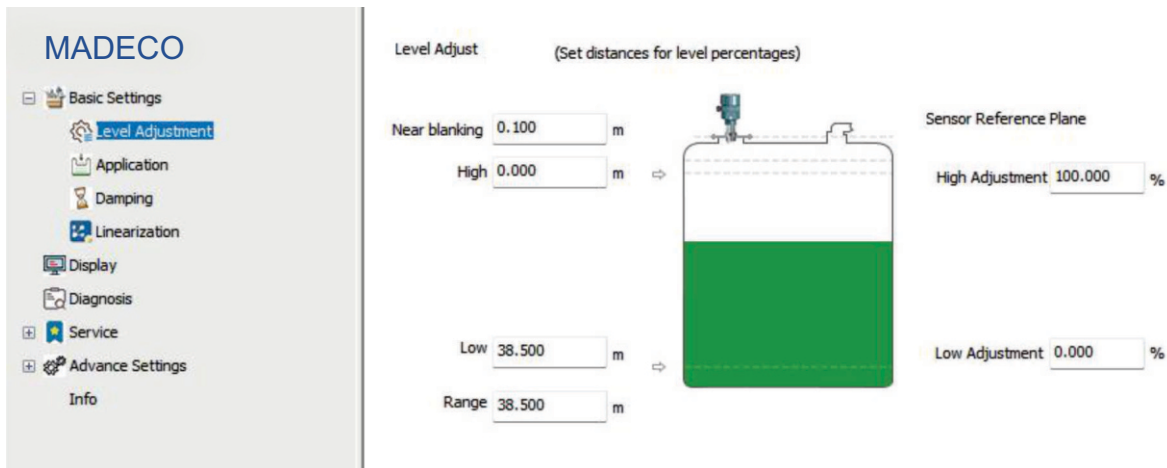


Figure 32 Level adjustment interface

② Material properties

Material properties include three functions: medium type, head wave and rapid change of material level. This function can be set by selecting the desired function and clicking "Save".

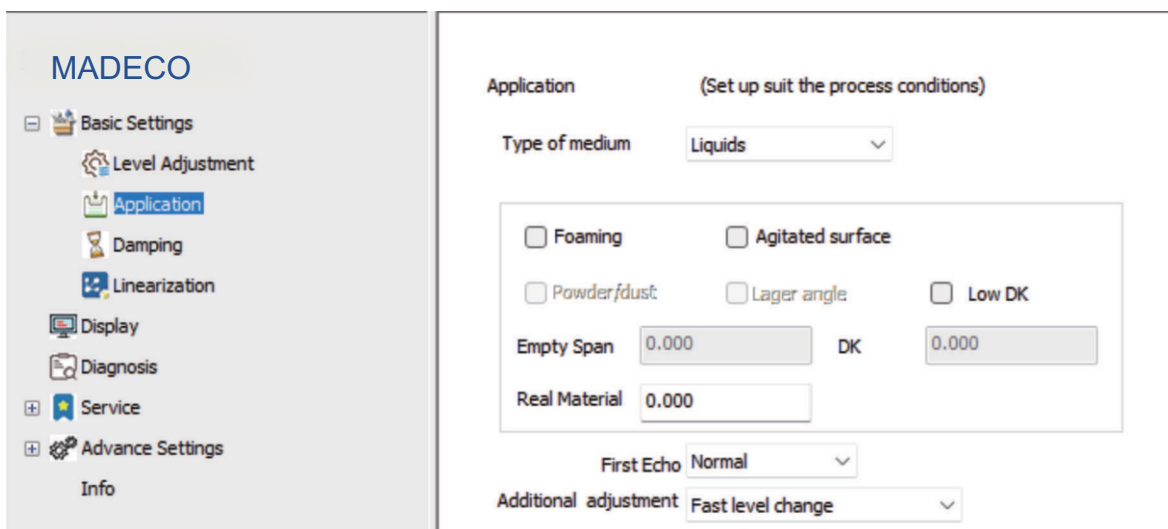


Figure 33 Material properties interface

③ Damping time

Damping time includes a function of damping time. The damping time is mainly to set a larger damping time to realize the stability of the measured value and increase the anti-interference ability.

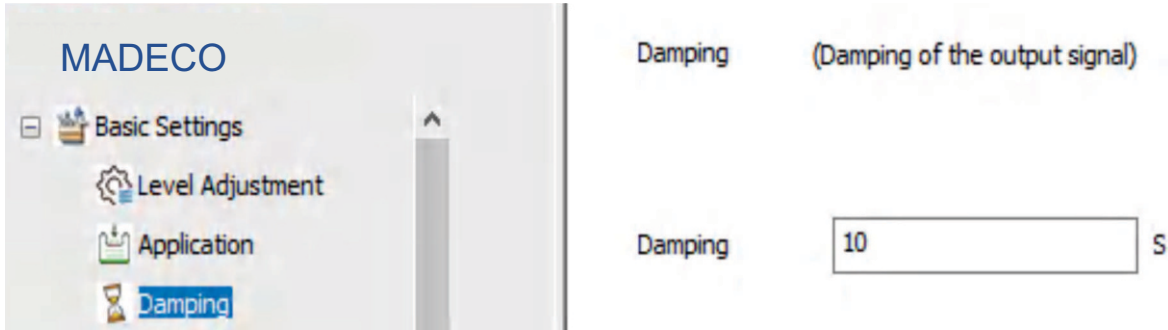


Figure 34 Damping time interface

④ Display

Display includes the function of displaying content. The display content includes two options of empty height and material height, and the display content of the home page of the instrument screen can be changed by modifying the display content.

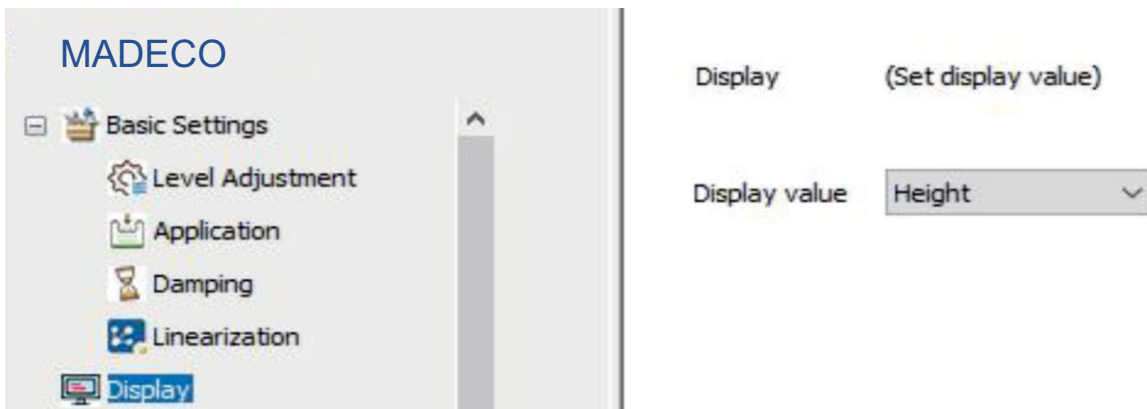


Figure 35 Display interface

⑤ Diagnosis

Diagnosis includes four functions of maximum value, minimum value, sensor status and output current. The diagnostic page functions are all read-only.

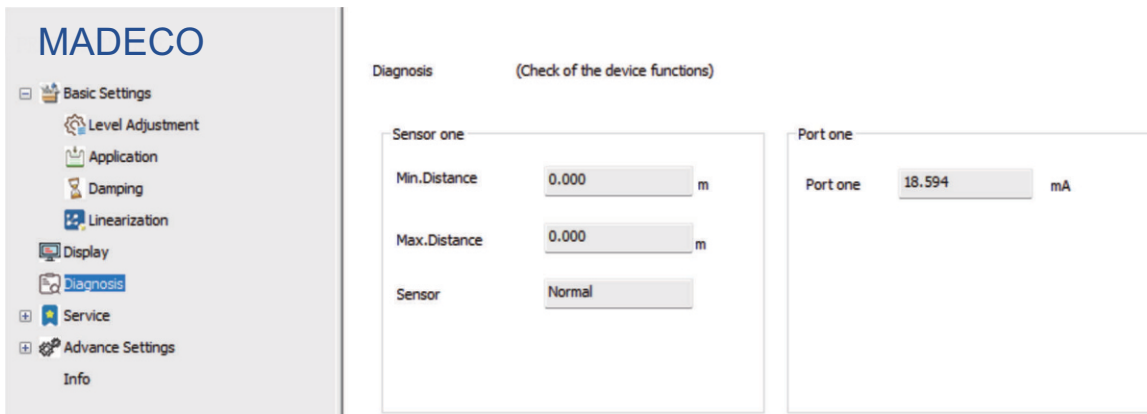


Figure 36 Diagnosis interface

⑥ Current Output

The output current includes three functions of failure mode, output mode and minimum current. This function can be set by selecting the desired function and clicking "Save".

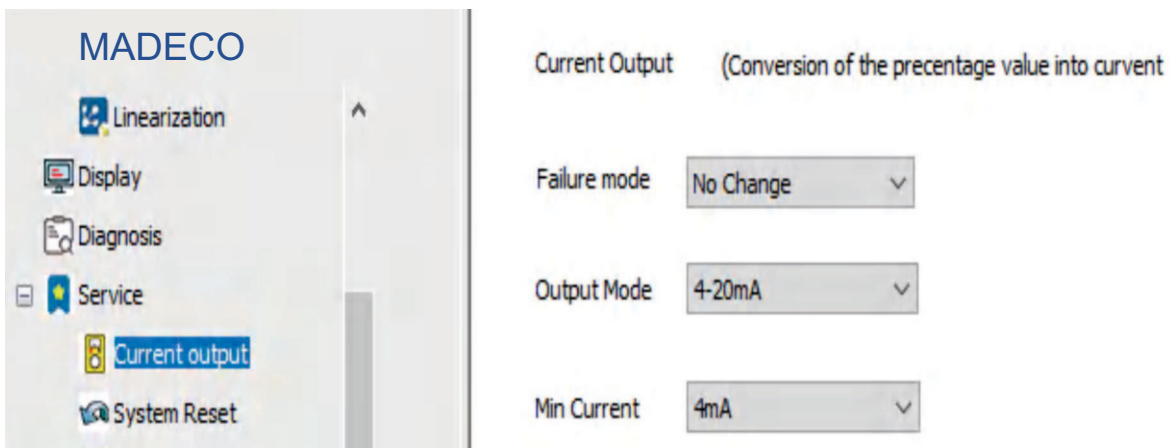


Figure 37 Damping time interface

⑦ False echo

False echo includes six functions: create new false echo, update false echo, edit false echo, delete all, delete range and delete serial number.

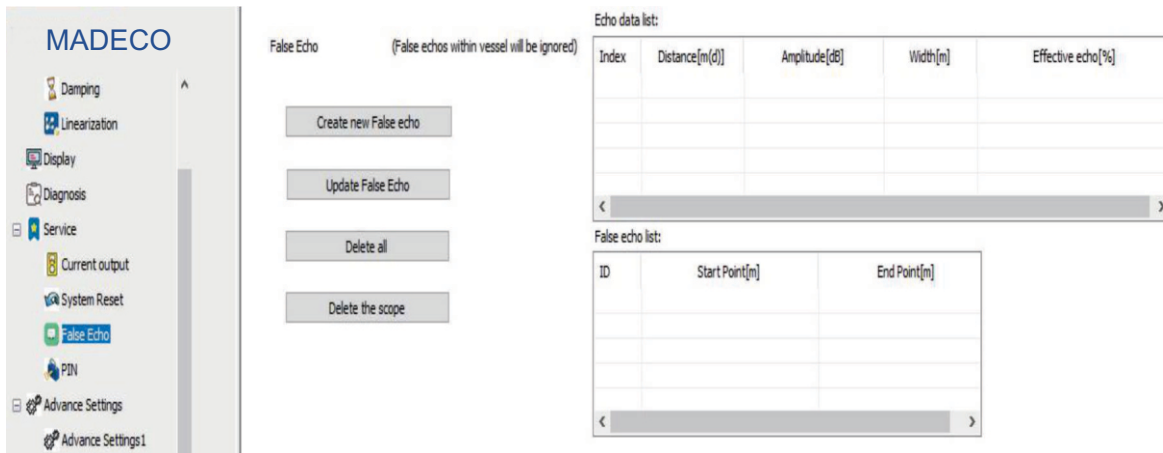


Figure 38 False echo interface

⑧ Advance Settings 1

Advance setting 1 includes two functions of calibration points and factory learning. Before leaving the factory, the device needs to be placed in a sealed absorbing material for factory learning settings and calibration. When calibrating, select the points to be calibrated in the drop-down box, click the "Calibrate" button, and enter the measured value and calibration value in the pop-up window (the measured value is the distance value measured by the instrument, and the calibration value is manually measured. distance), click the "OK" button to write the measured value and calibration value, exit the pop-up window, and click the "Save" button to write the calibration points.

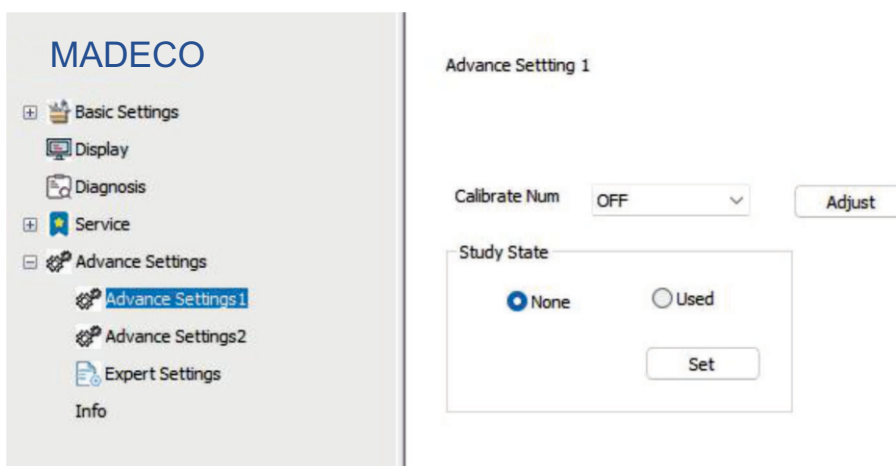


Figure 39 Advance setting 1 interface

⑨ Advance Settings 2

Advance settings 2 include other functions such as transmit frequency, 4mA offset, 20mA offset and zero echo function. Zero echo function includes three modes: off, automatic, and manual, with two modes of reading and writing.

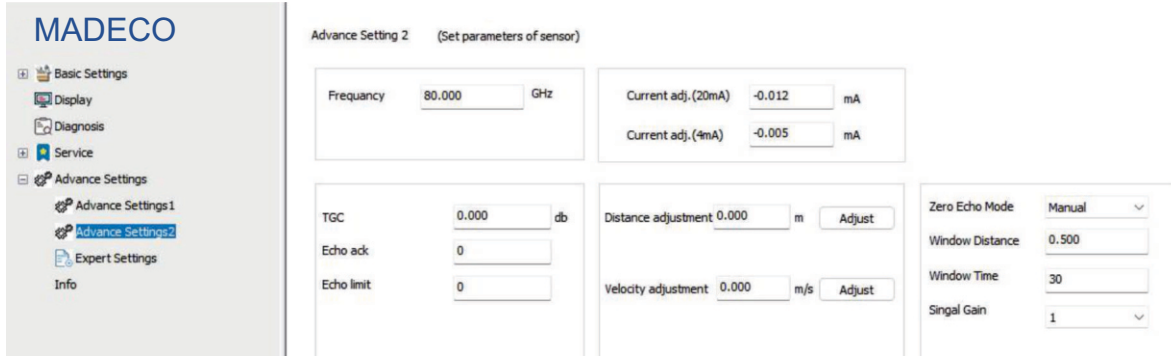


Figure 40 Advance Settings 2 interface

⑩ Expert settings

Expert settings include more specialized functions such as Media Type, Output Mapping, Echo Lock, Algorithms, and Current Output for use by trained personnel. If you need to modify the data, you need to contact my company technical personnel.

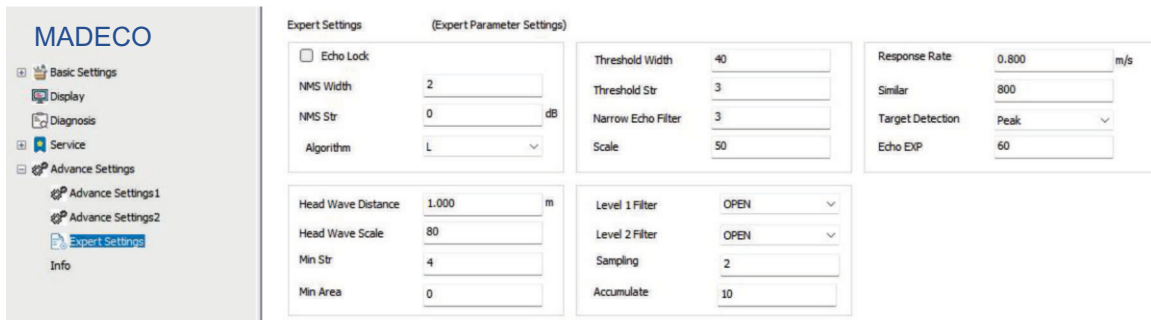


Figure 41 Expert setting interface

⑪ Curve

The curve contains three curves of echo curve, envelope curve and false echo, and the upper right corner of the curve contains three data items of signal strength, arrow data and inverted triangle data. The position indicated by the arrow represents the position of the target selected by the instrument. Cyclic reading of curves is possible with periodic reading. Click the left button of the mouse and drag to the lower right corner to enlarge the image, and drag any distance to the upper left corner to restore the initial interface.

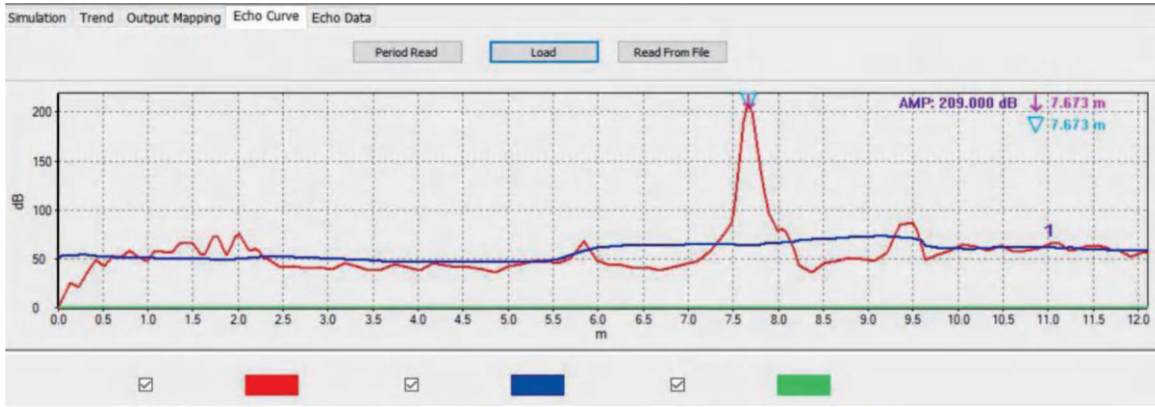


Figure 42 Curve interface

(5) False echo storage function

① Edit false echo

Right-click "False Echo List", click the "Add" button, enter the required start point, end point and amplitude in the pop-up window, and select the false echo mode (curve or rectangular wave), a false echo table will display a Corresponding data, and display a raised curve at the same position as the false echo curve.

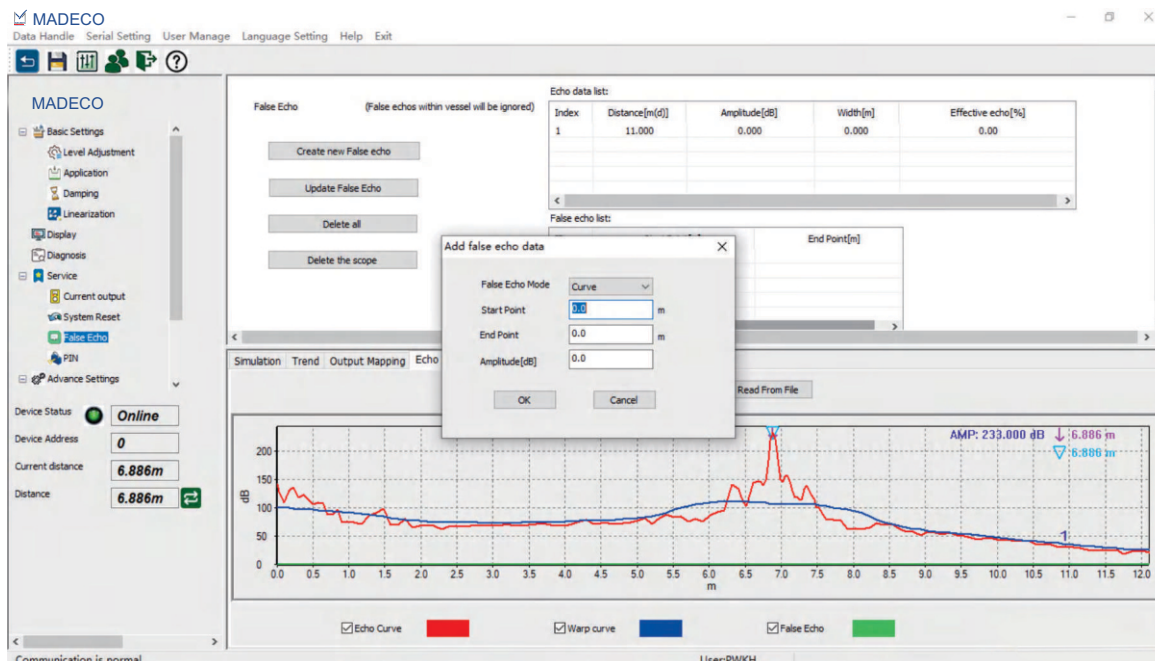


Figure 43 Edit false echo function

② Create and update false echo

Create a single false echo starting from 0, update can set false echo again based on the newly created data.

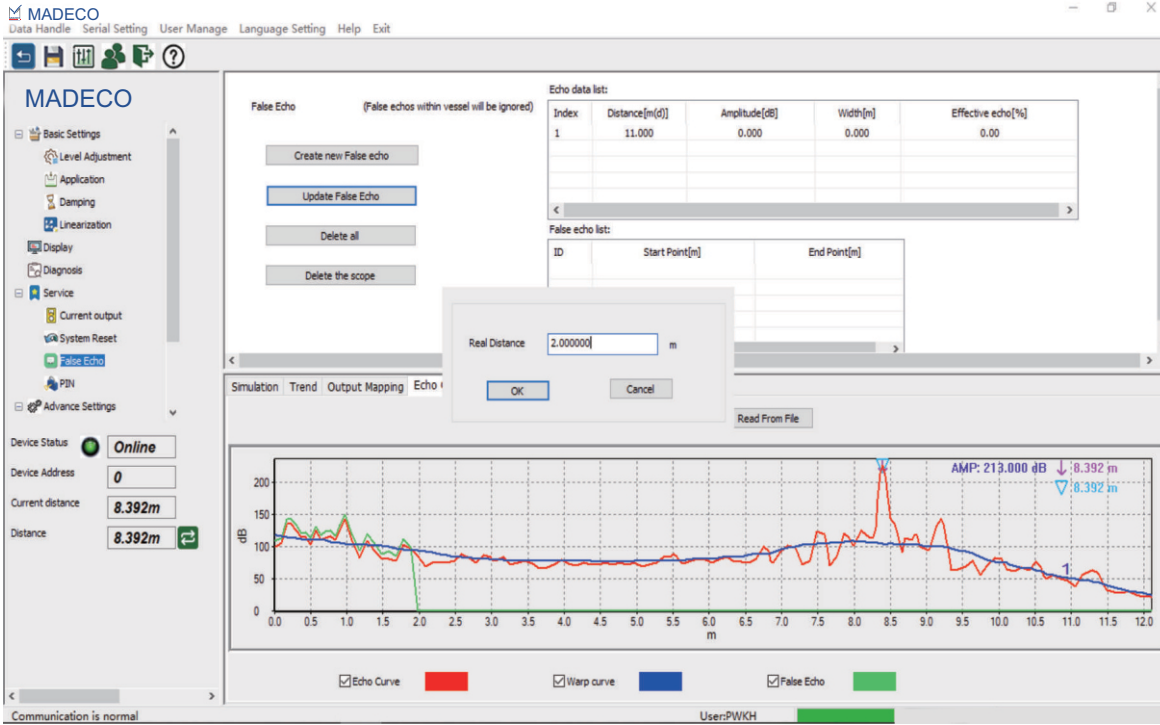


Figure 44 Create false echo function

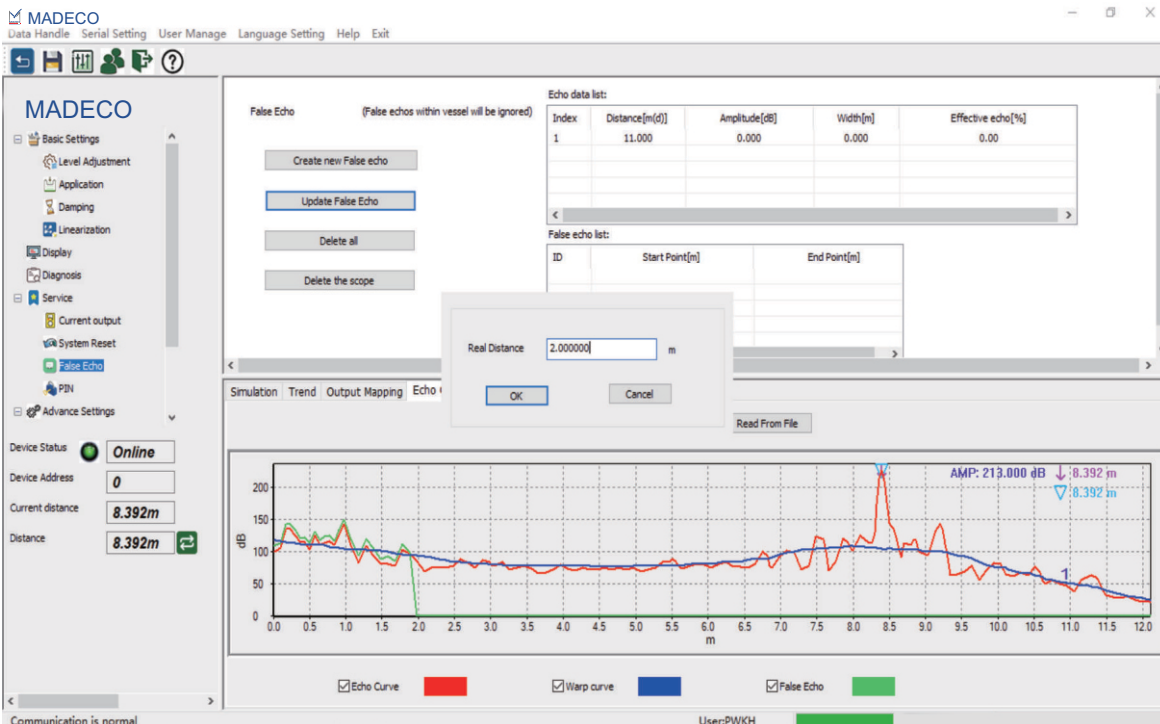


Figure 45 Update false echo function

③ Delete false echo

Delete range can delete a section of false echoes by setting the start point and end point; delete serial number can delete a group of false echoes in the false echo list; delete all can delete all false echoes.

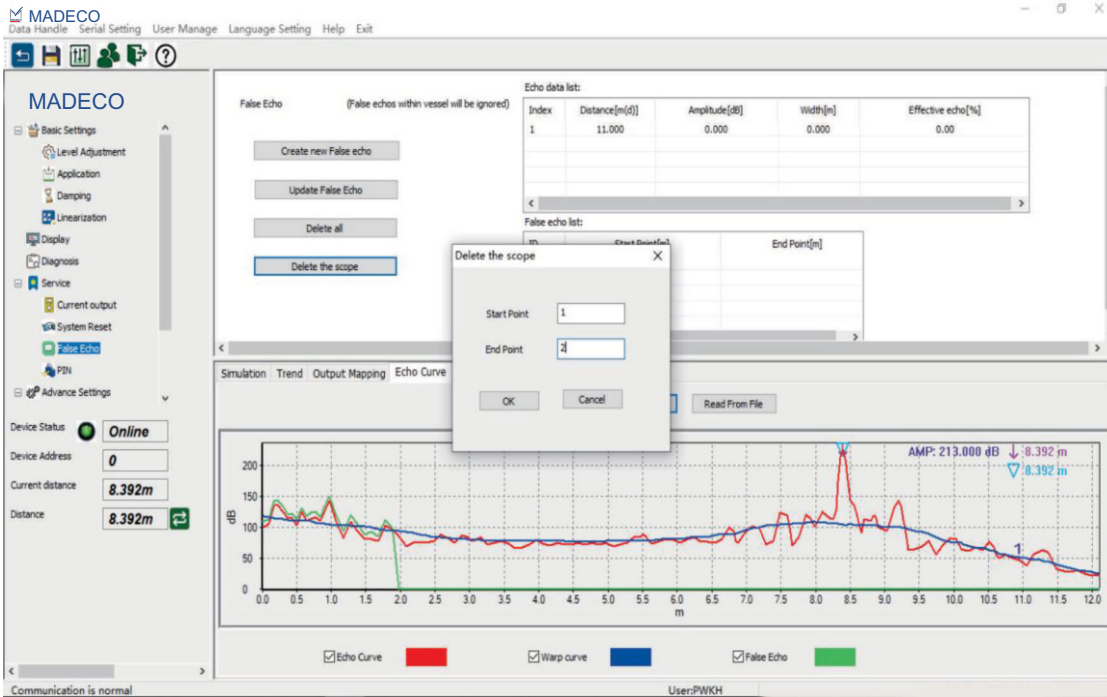


Figure 46 Delete range function

(6) Zero point echo storage function

① Add zero echo in automatic mode Select the "Auto" command, display the data of "Low Adjustment" in the pop-up window of the "New Zero Echo Distance" function, then modify the data in the text box, write the data you want to modify, and then click the "Save" button, After the writing is successful, read the echo curve, and a zero point echo appears at the same data position of the echo curve. When writing to other modes, the values in the "Auto" mode are automatically cleared.

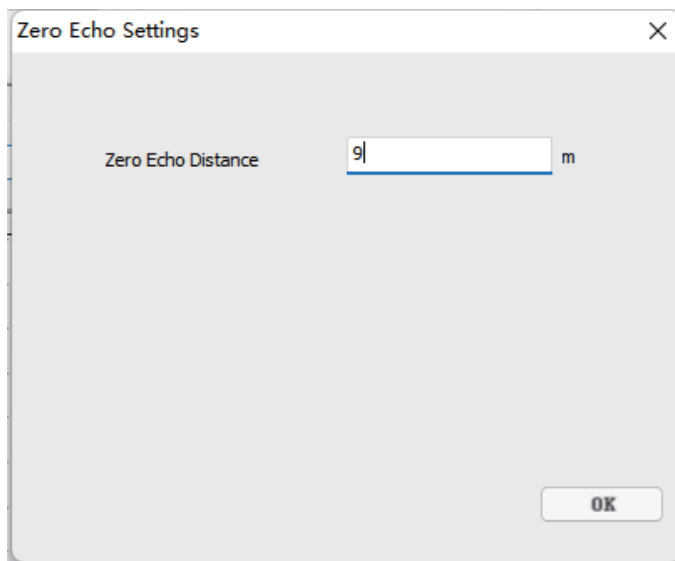


Figure 47 Adding zero echo in automatic mode

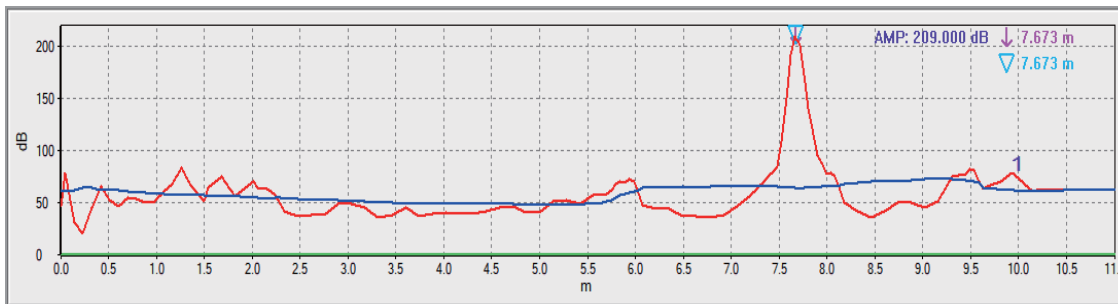


Figure 48 Create a new zero point echo in the automatic mode at the 9m position

② Add zero echo in manual mode

Select the "Manual" command, the read range data is displayed in the text box after the "New Zero Echo Distance" in the pop-up window, then modify the data in the text box, write the data you want to modify, and then click the menu Click the "Save" button in the column, read the echo curve after the writing is successful, and the corresponding zero point echo will appear at the same data position of the echo curve. When writing to other modes, the value in "Manual" mode will be cleared automatically.

Zero Echo Settings ✕

Zero Echo Distance	<input type="text" value="10.000"/>	m
Zero Echo Width	<input type="text" value="0.5"/>	m
Zero Echo Opened	<input type="text" value="11"/>	m
Zero Echo Amplitude	<input type="text" value="70"/>	
Del Bottom Echo Signal	<input type="text" value="0"/>	m
Del Bottom Echo Signal	<input type="text" value="0"/>	m

Figure 49 Add zero echo in manual mode

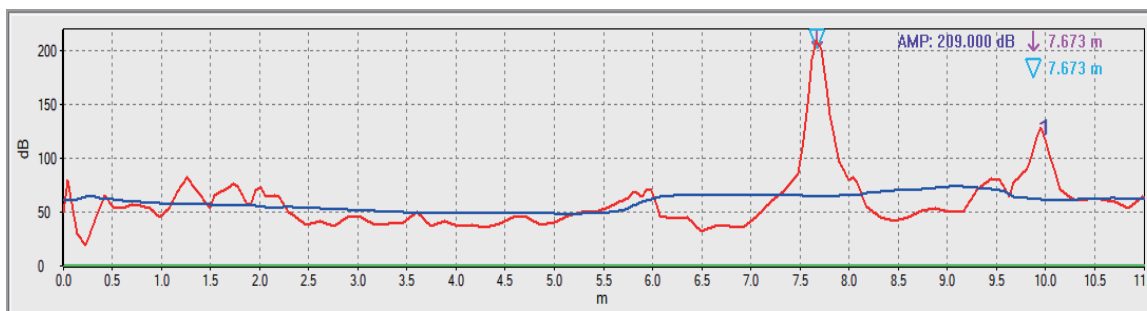


Figure 50 Adding a zero point echo with a width of 0.5m and an amplitude of 70dB in the manual mode at the position of 9m

③ Close mode

After the "close" command is written, all the data in the zero point echo part will be restored to 0, and after the echo curve is read, the zero point echo on the echo curve will also disappear.

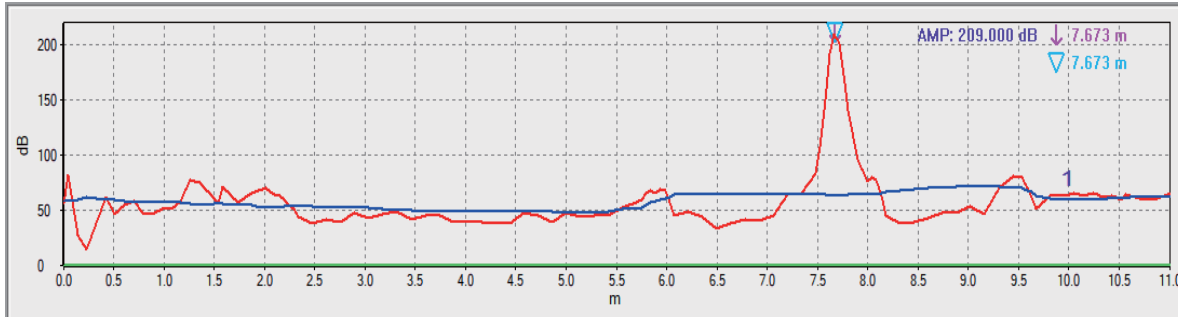


Figure 51 Echo curve in zero echo mode

6.3 HART handheld programmer debugging

MDRA8 can be programmed with HART handheld programmer

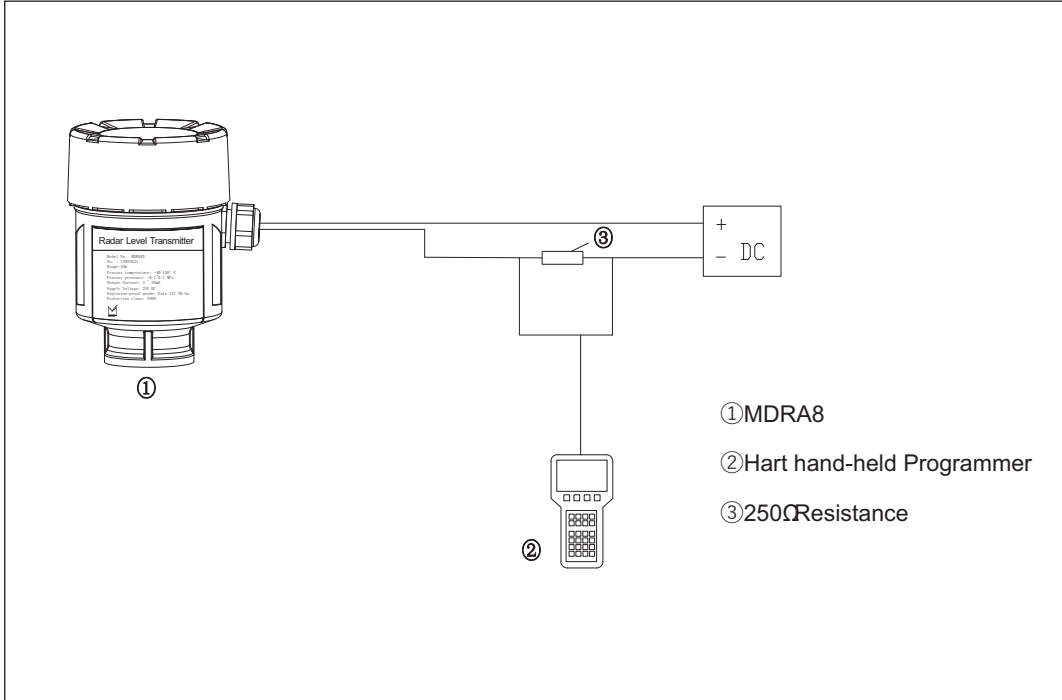


Figure 52

6.4 MD tools APP Bluetooth software debugging

MDRA 80 series can be debugged with Bluetooth function

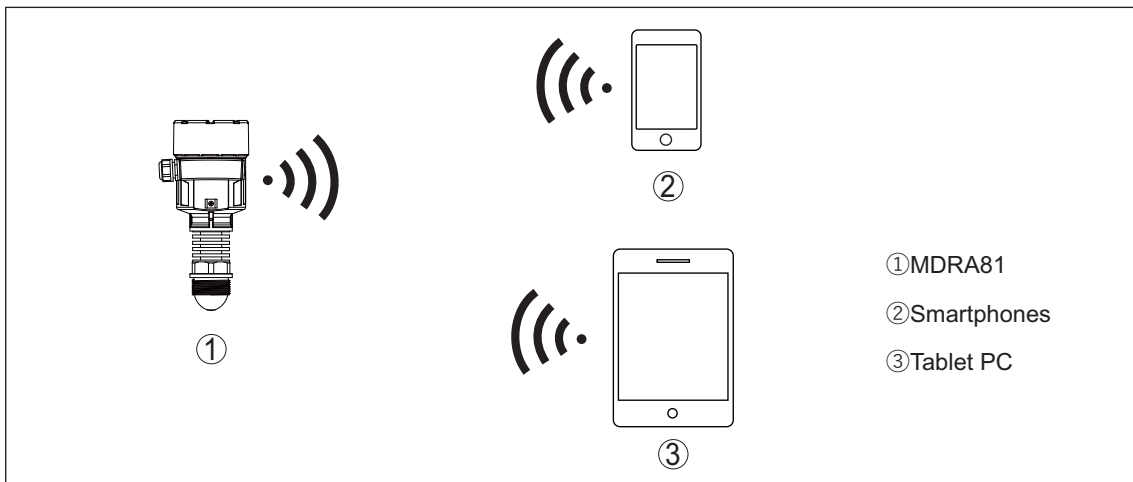


Figure 53

6.4.1 MDRA8 series can be debugged with Bluetooth function

- (1) Users can search and download the MD Tools APP software on 360 Mobile Assistant, Google Play, Apple APP Store and Baidu Mobile Assistant respectively.
- (2) After the download is complete, open the software, select the required language, enter the account number and password, and check the user agreement and privacy agreement, and click Login to log in successfully.

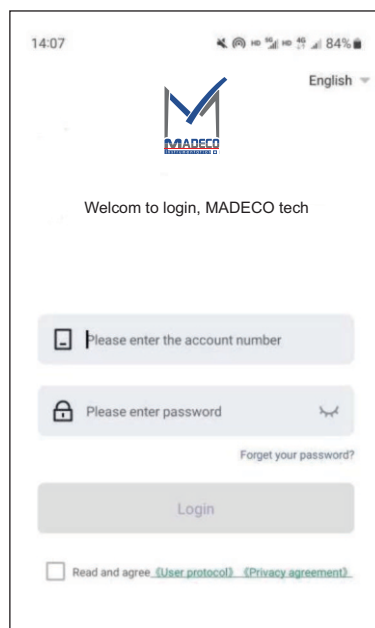


Figure 54

6.4.2 Connection

(1) Enter the main page and click "My Devices".

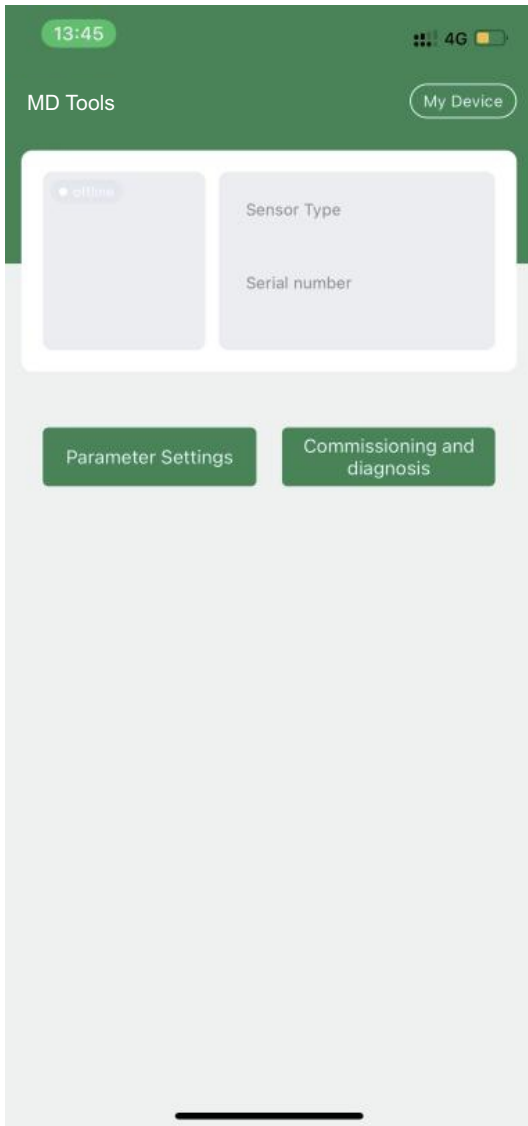


Figure 55

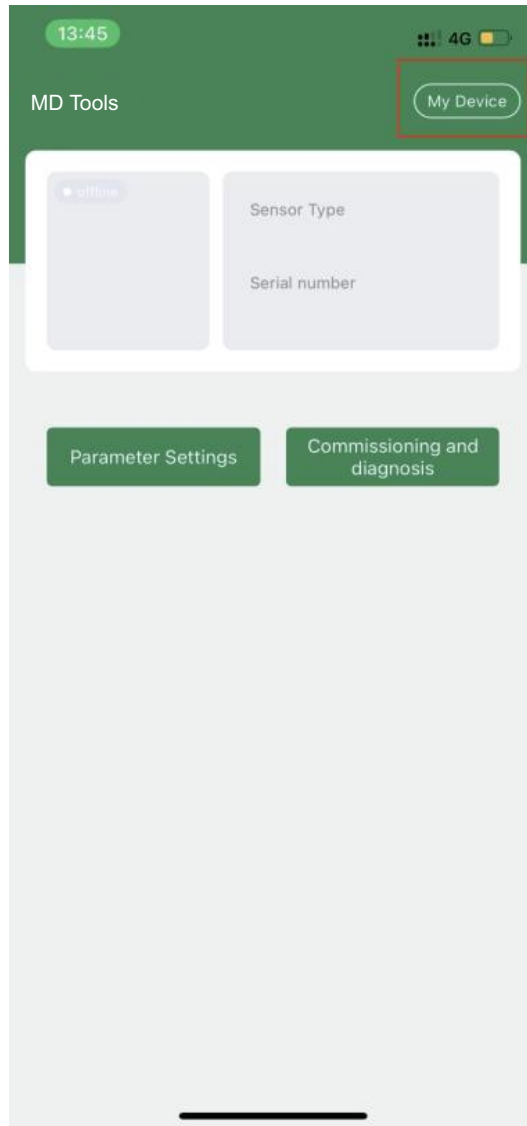


Figure 56

(2) It is allowed to obtain the location of the device, and it is allowed to find nearby devices; if you still cannot find the device after all are allowed, you need to check whether the "location" function in the notification bar of the mobile phone is turned on.

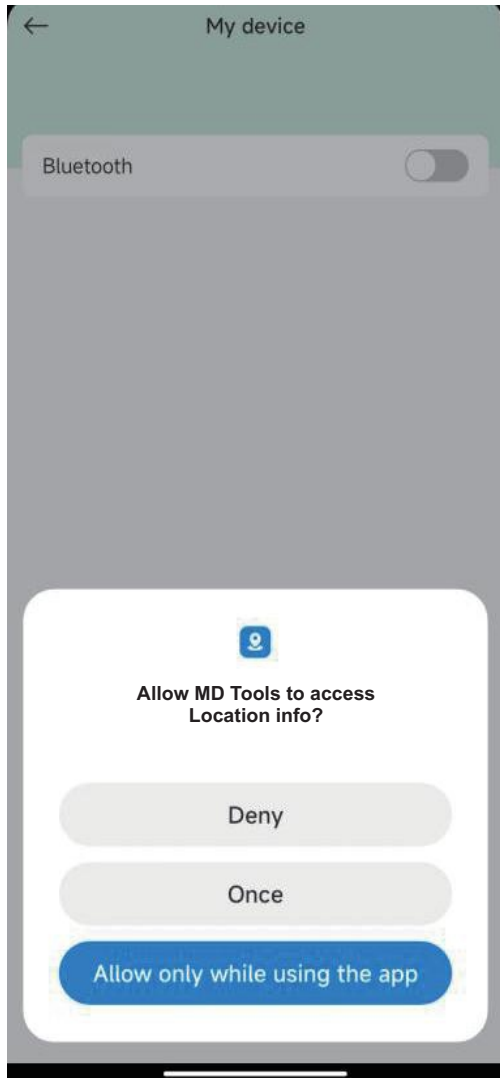


Figure 57

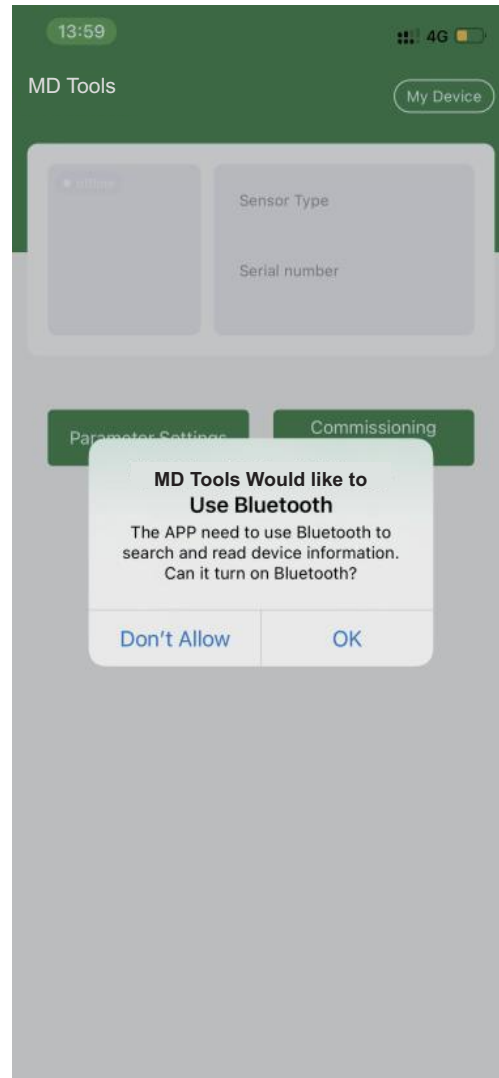


Figure 58

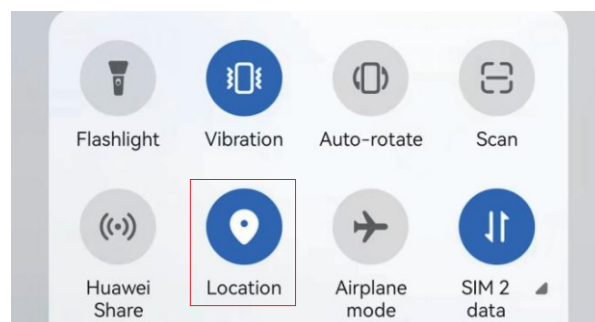


Figure 59

(3) Click "Refresh", you can see the meters that can be connected in the "Device List", click the name of the meter that needs to be connected according to the actual situation, and the connection will be successful.

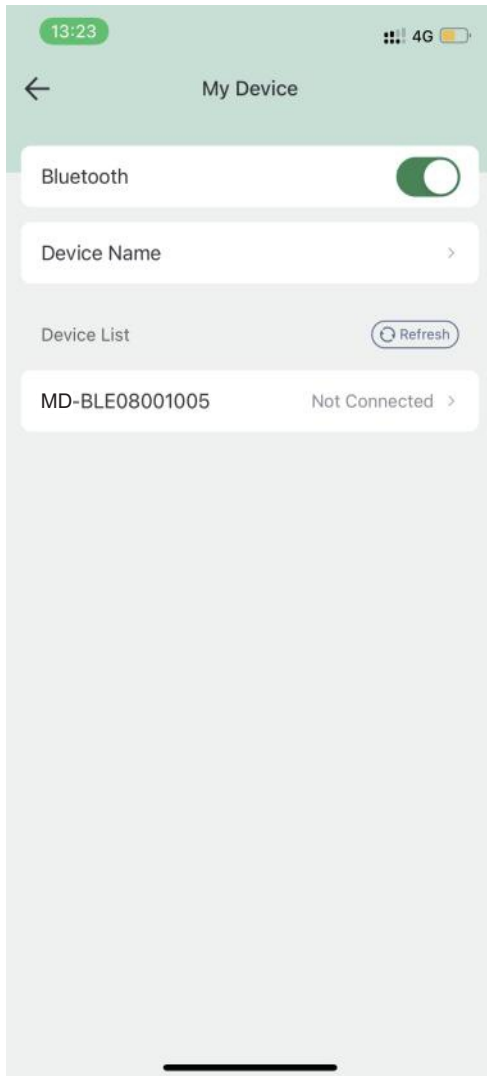


Figure 60

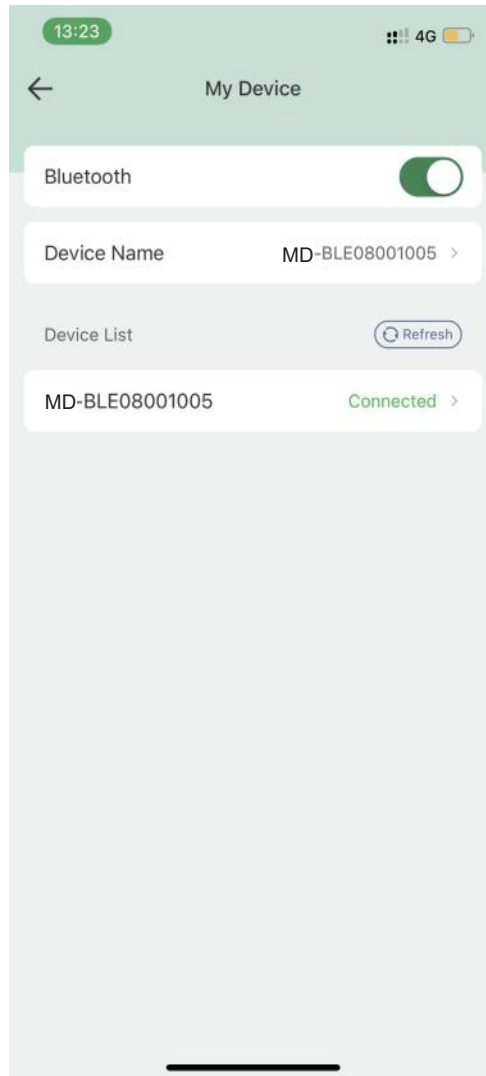


Figure 61

(4) Return to the main interface, you can see that the upper left corner is displayed as "on line", and you can read the corresponding instrument picture, instrument name, and instrument serial number; the MDRA80 level meter also includes address, empty height, material level, Angle and current five real-time data, the cycle reading cycle of real-time data is 5s. (The "instrument serial number" should be consistent with the last 8 digits of the device name in the device list).

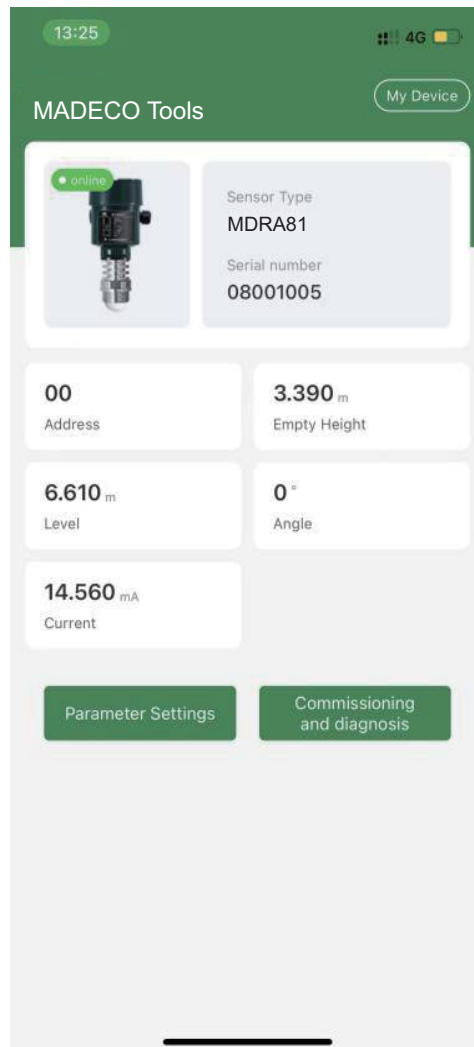


Figure 62

6.4.3 Parameter setting

(1)Click "Parameter Settings" on the main page to enter the directory page of the Bluetooth software.

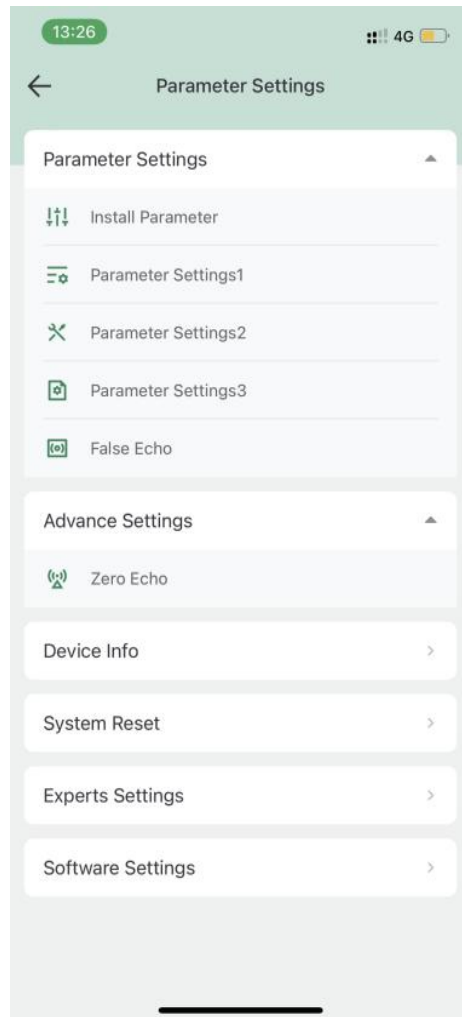


Figure 63

(2) Enter the "Installation Parameters" page. The "Installation Parameters" page includes four functions: range, dead zone, high position adjustment, and low position adjustment. At this time, the measuring range of the meter is displayed as 38.5m.

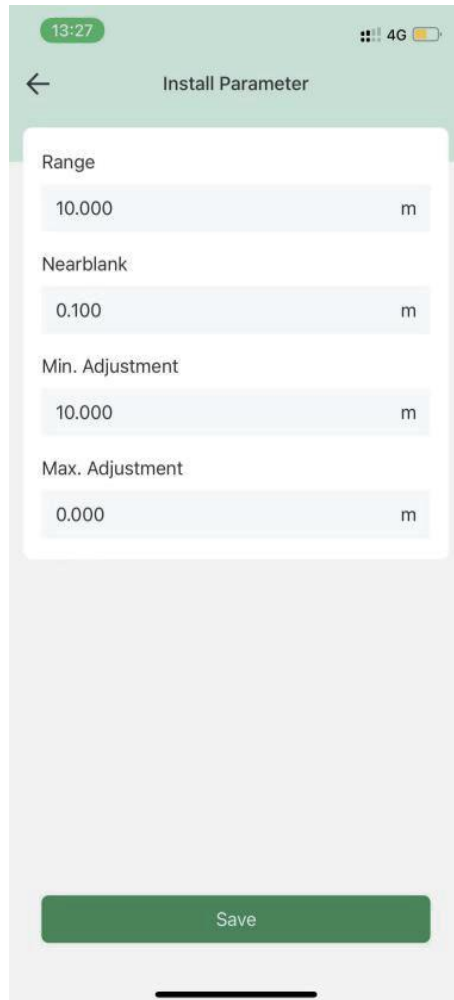


Figure 64

(3) Click the text box of the range function, use the keyboard to delete the parameters in the text box at this time, and enter 20, click the "Save" button at the bottom of the page, the save is successful, and exit the "Installation Parameters" page.

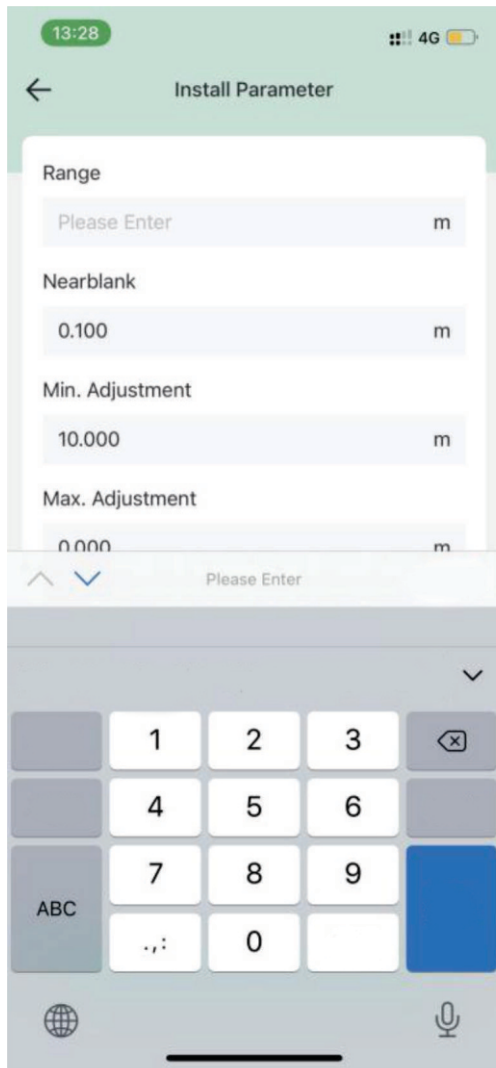


Figure 65

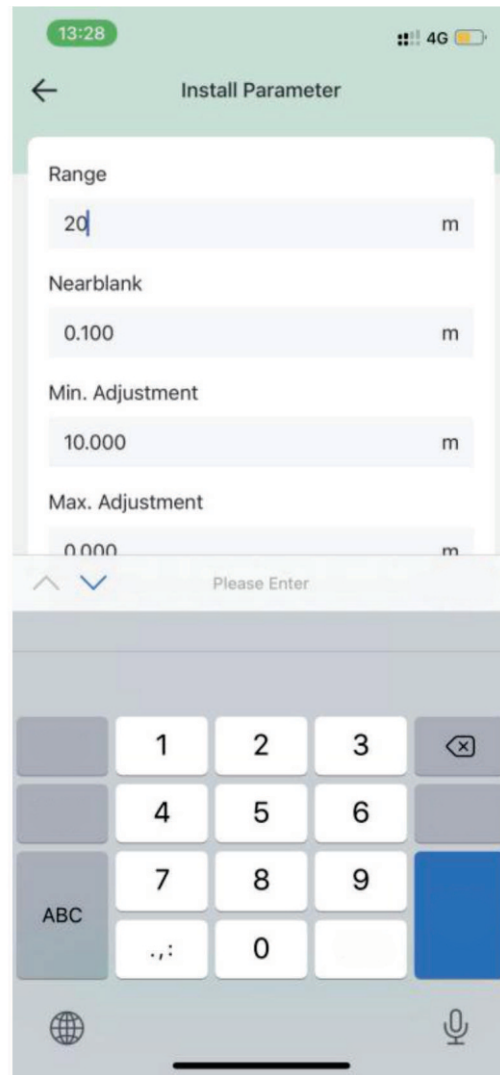


Figure 66

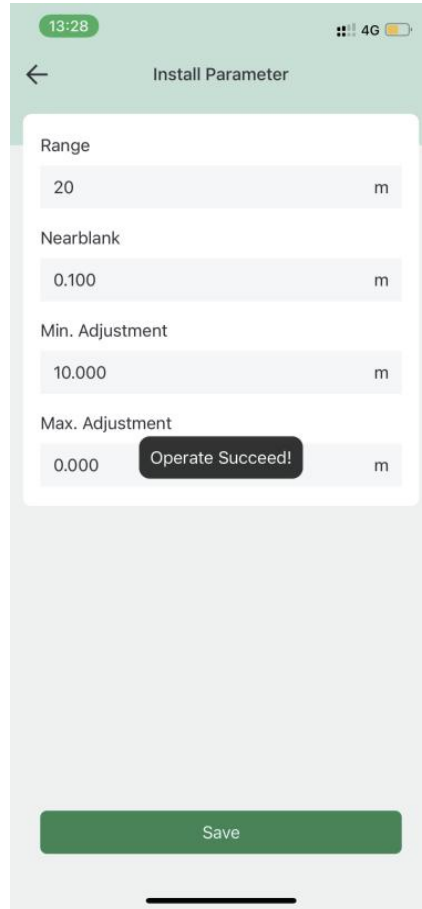


Figure 67

(4) Enter the "Installation Parameters" page again, and you can see that the measuring range of the instrument has been displayed as 20m, and the parameter of the low position adjustment function has also changed to 20m.

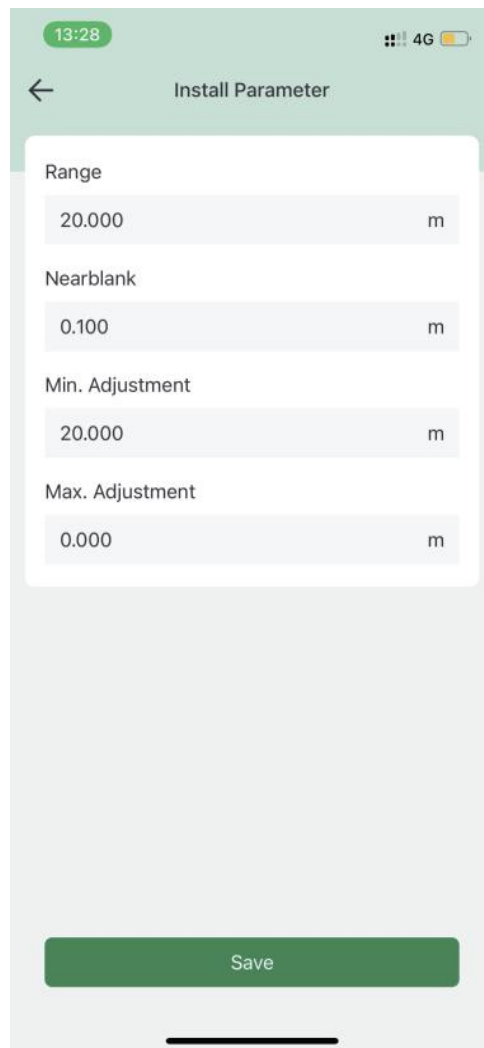


Figure 68

6.4.4 Parameter setting

- (1) Click "Debugging and Diagnosis" on the main page to enter the curve display page.
- (2) The horizontal axis of the curve is the distance information, and the vertical axis is the amplitude information. The upper part of the page contains three items: signal amplitude of the selected target, locked target data and instantaneous target data. The middle part contains three curves and the color designation of the curves. The bottom of the page contains the "Single Read", "Auto Read" and "Landscape" buttons.

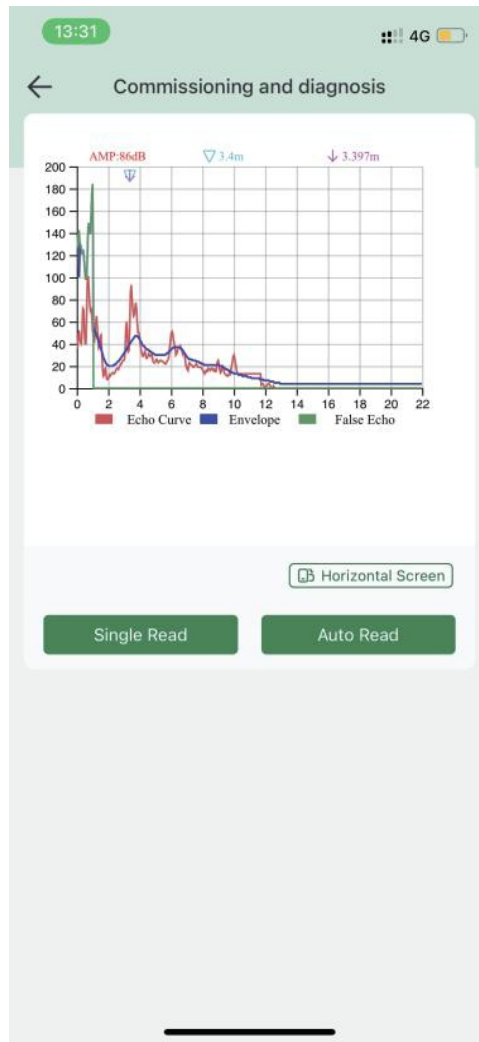


Figure 69

(3) By clicking the corresponding color mark, the corresponding curve in the coordinate system can be hidden.

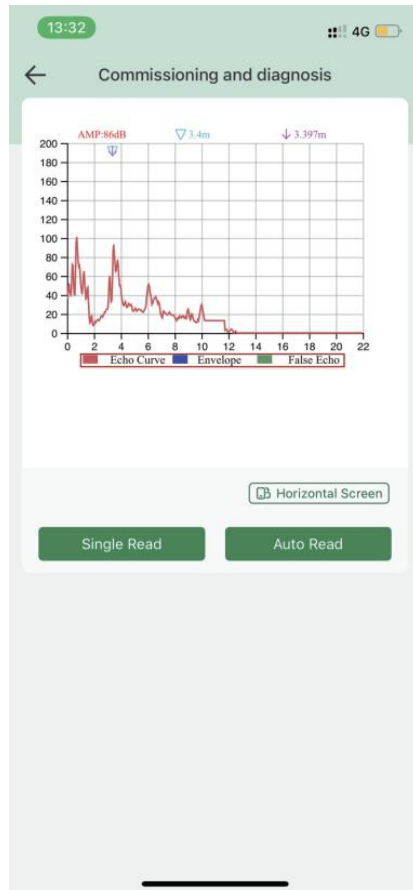


Figure 70

(4) Click the "horizontal screen" button to display the curve in a horizontal screen; click the "auto read" button to read the curve periodically, and the cycle reading period is 15s.

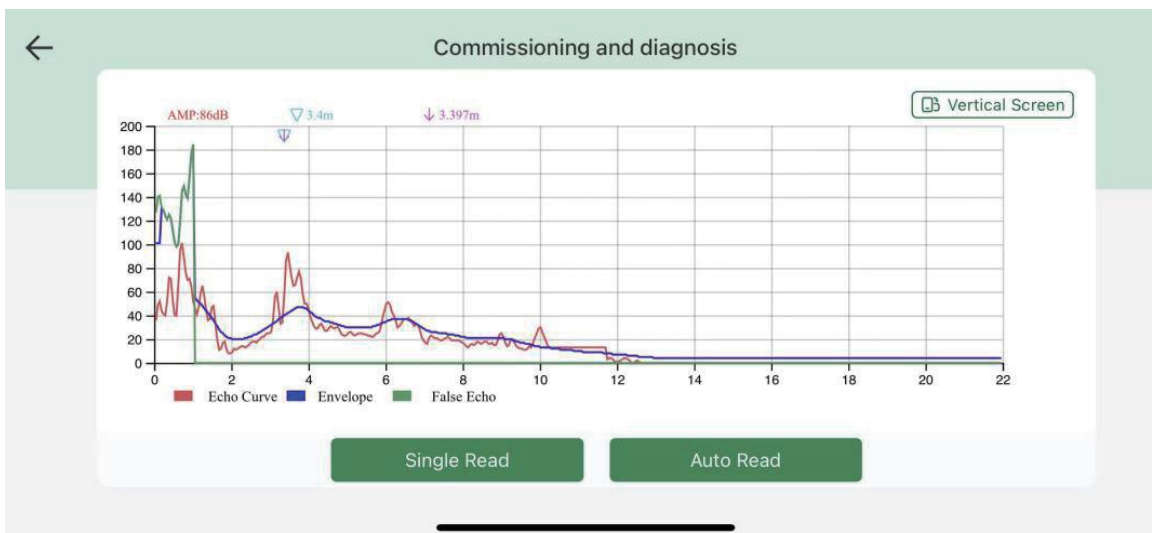


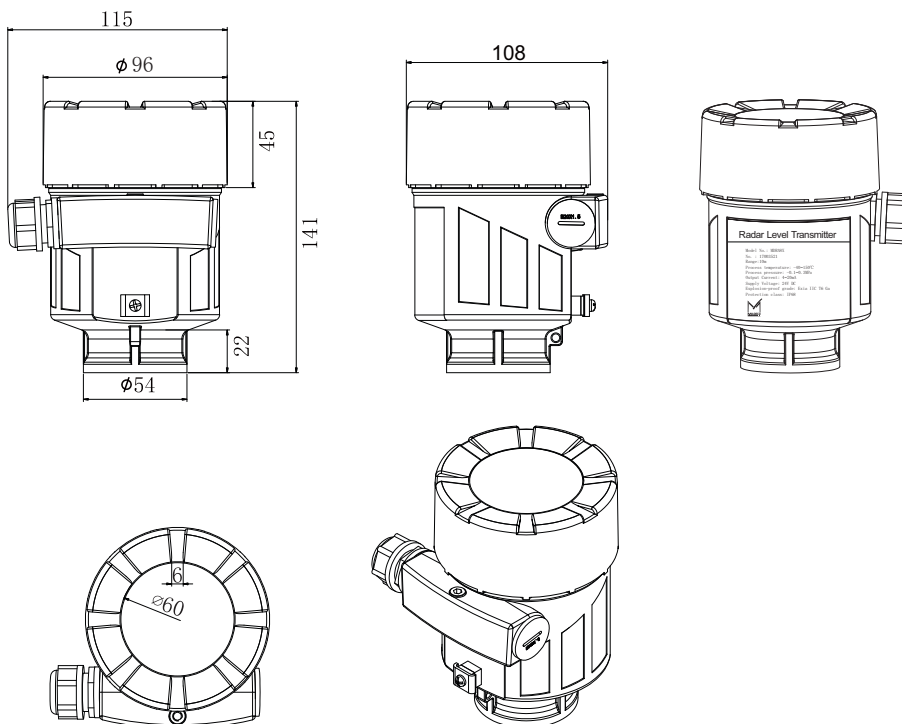
Figure 71

6.5 Error code interpretation:

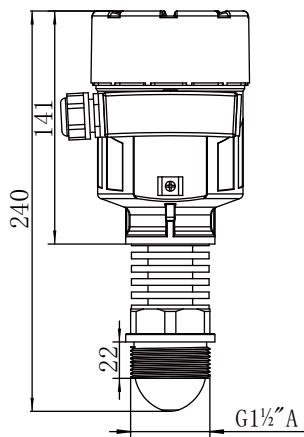
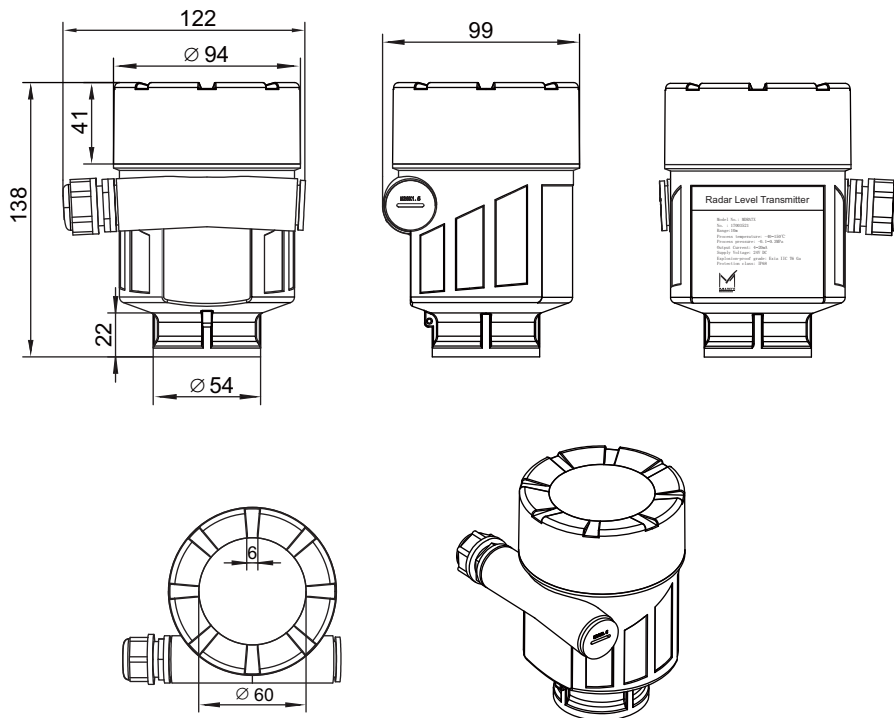
CODE	Reason	Rectify
F140	Zero signal . May overshoot or enter a blind zone.	Change the measuring range or blind area size according to the actual situation on site.

7.MDRA80 Series Size (Unit:mm)

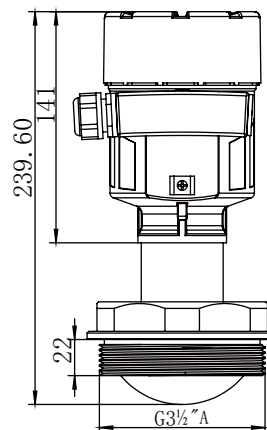
Shell Size(Material: aluminum)



Shell Size(Material):

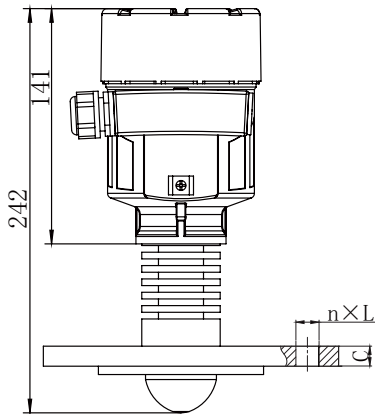


Antenna lens $\phi 45\text{mm}$



Antenna lens $\phi 75\text{mm}$

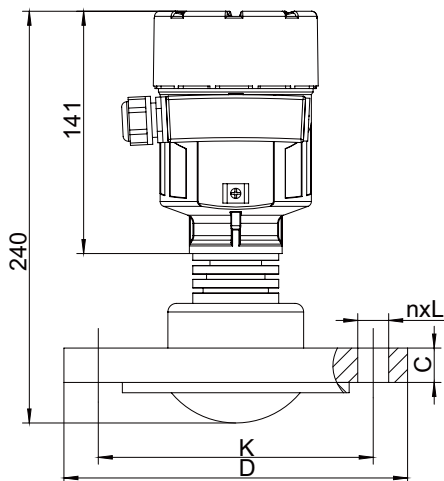
MDRA82



Antenna lens ϕ 45mm

Flange type selection table		mm	
Serial number		2	3
Specifications	DN50	DN80	DN100
Outside diameter (D)	ϕ 165	ϕ 200	ϕ 220
Center hole distance (K)	125	160	180
Number of holes (n)	4	8	8
Aperture (L)	18	18	18
Thickness (C)	12		

Table 2

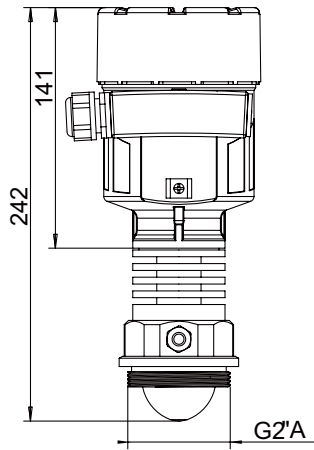


Antenna lens ϕ 75mm

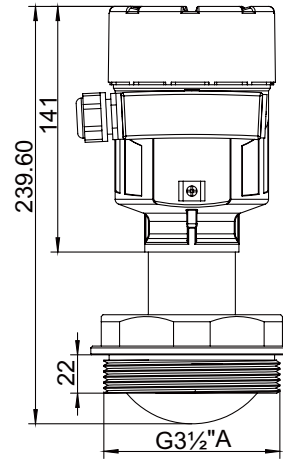
Flange type selection table		mm			
Serial number		1	2	3	4
Specifications		DN80	DN100	DN125	DN150
Outside diameter (D)		ϕ 200	ϕ 220	ϕ 250	ϕ 285
Center hole distance (K)		160	180	210	240
Number of holes (n)		8	8	8	8
Aperture (L)		18	18	18	22
Thickness (C)		14			

Table 3

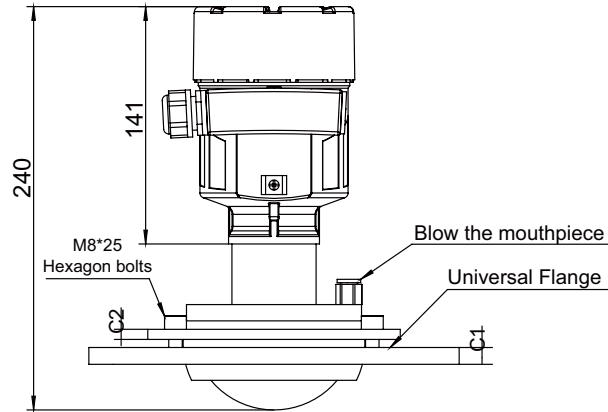
MDRA83



Antenna lens ϕ 45mm



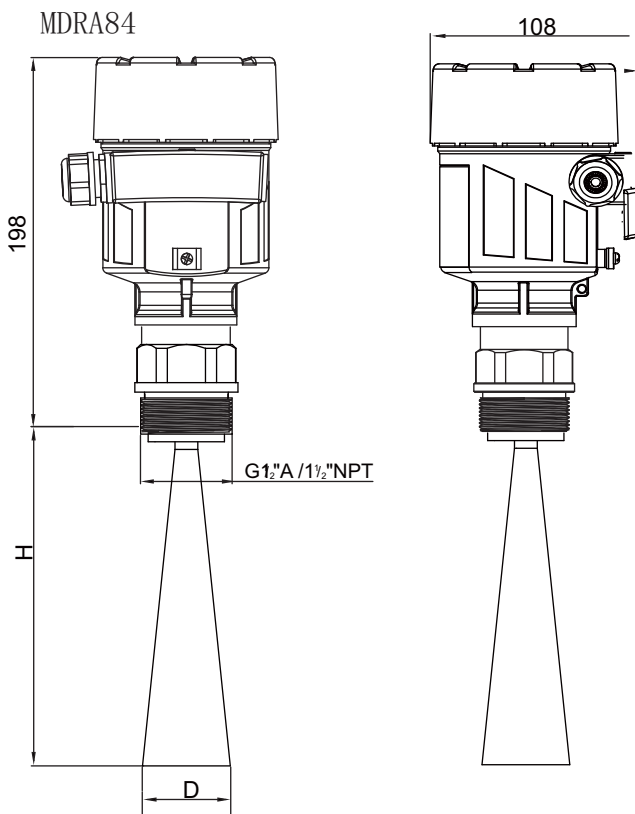
Antenna lens ϕ 75mm



Antenna lens ϕ 75mm

Universal Flange type selection table				mm
Serial number	1	2	3	4
Specifications	DN100	DN125	DN150	DN200
Outside diameter (D)	ϕ 220	ϕ 250	ϕ 285	ϕ 340
Center hole distance (K)	180	210	240	295
Number of holes (n)	8	8	8	12
Aperture (L)	18	18	22	22
Thickness (C1)	10			
Thickness (C2)	6			

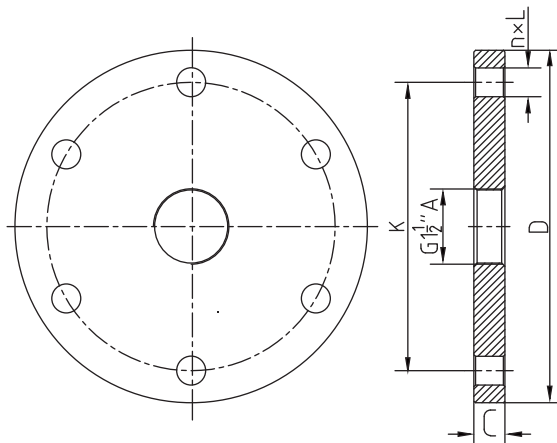
Table 4



Taper antenna type selection diagram

Unit: mm

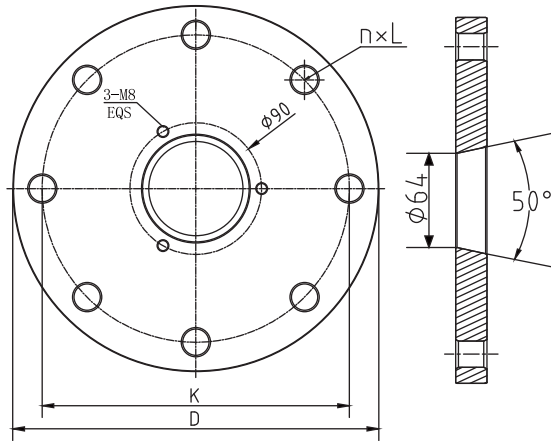
Diameter D	Altitude H
∅ 46	175
∅ 76	320
∅ 96	420



Flange type selection table

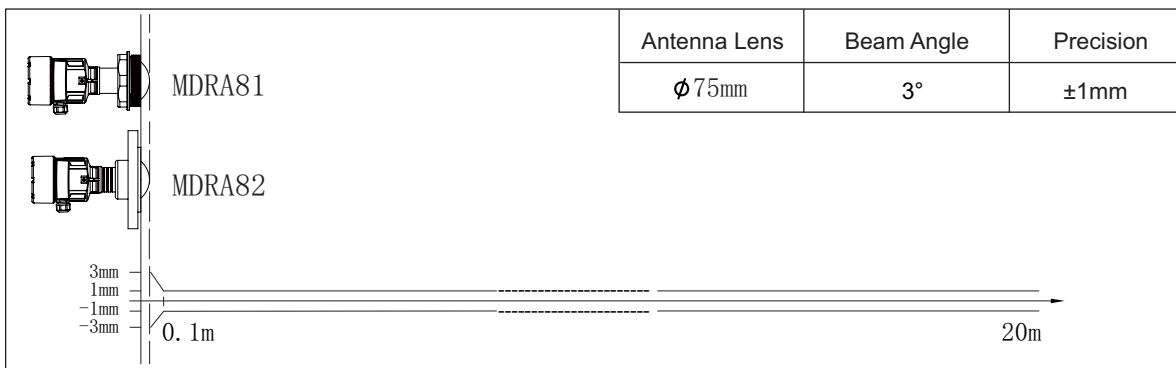
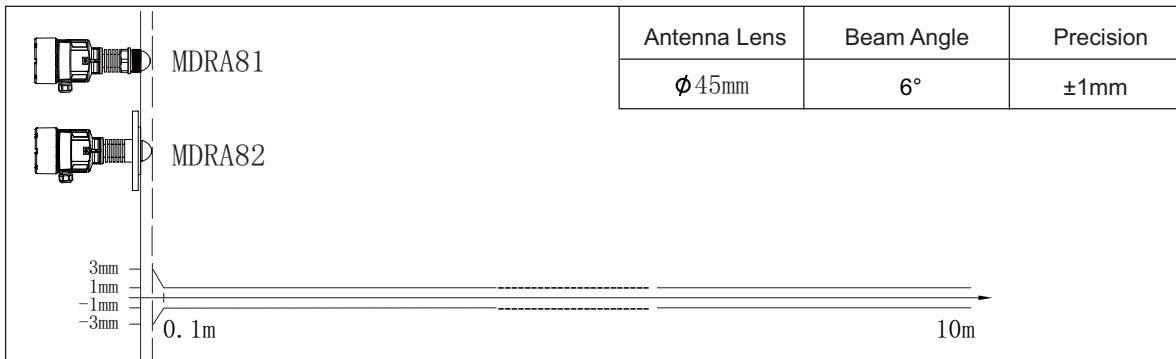
Unit: mm

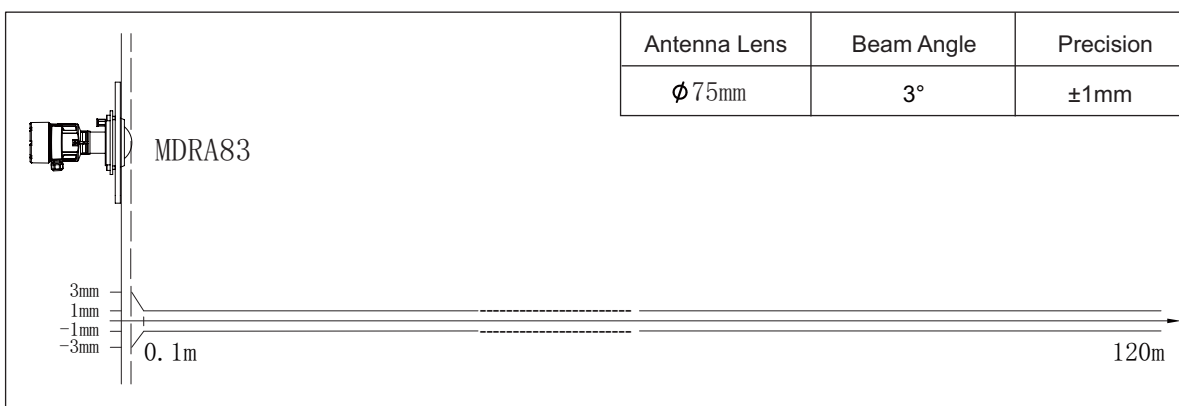
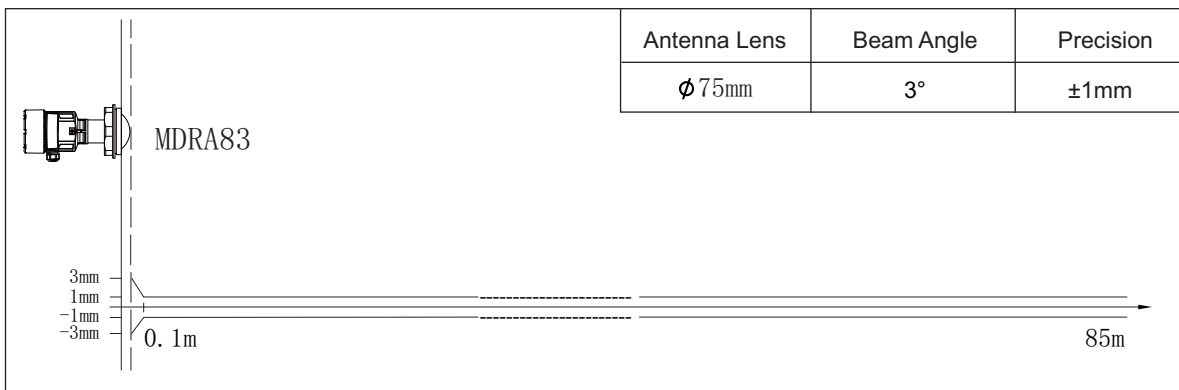
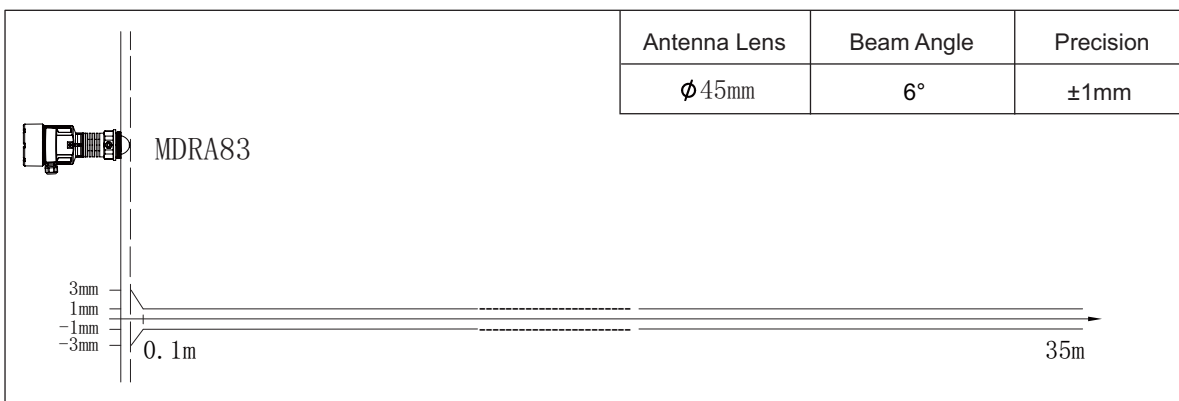
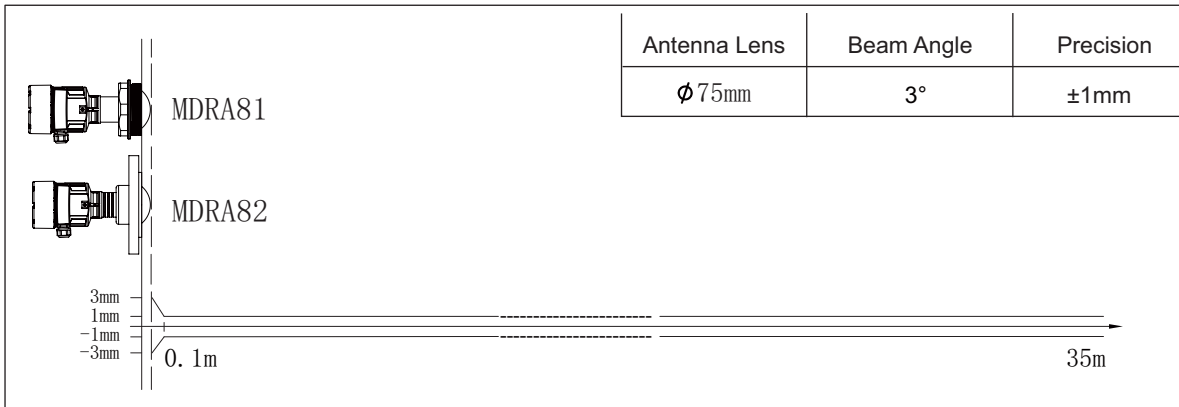
Serial number	1	2	3	4	5	6
Specifications	DN50	DN80	DN100	DN150	DN200	DN250
Outside diameter (D)	∅ 165	∅ 200	∅ 220	∅ 285	∅ 340	∅ 405
Center hole distance (K)	∅ 125	∅ 160	∅ 180	∅ 240	∅ 295	∅ 355
Number of holes(n)	4	8	8	8	12	12
Aperture (L)	∅ 18	∅ 18	∅ 18	∅ 22	∅ 22	∅ 26
Thickness(C)	12					

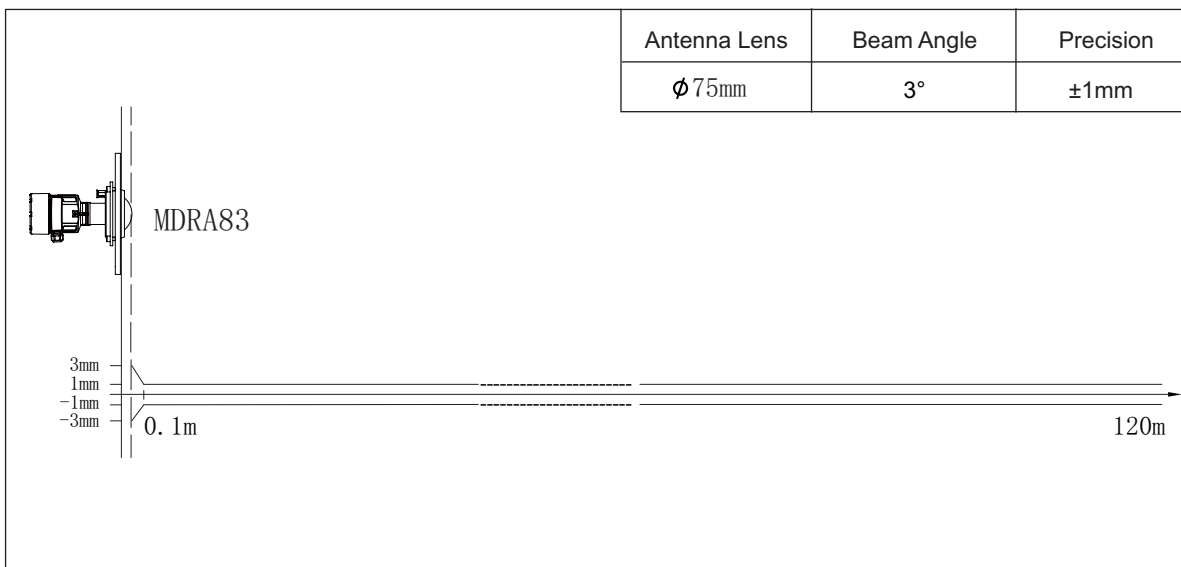
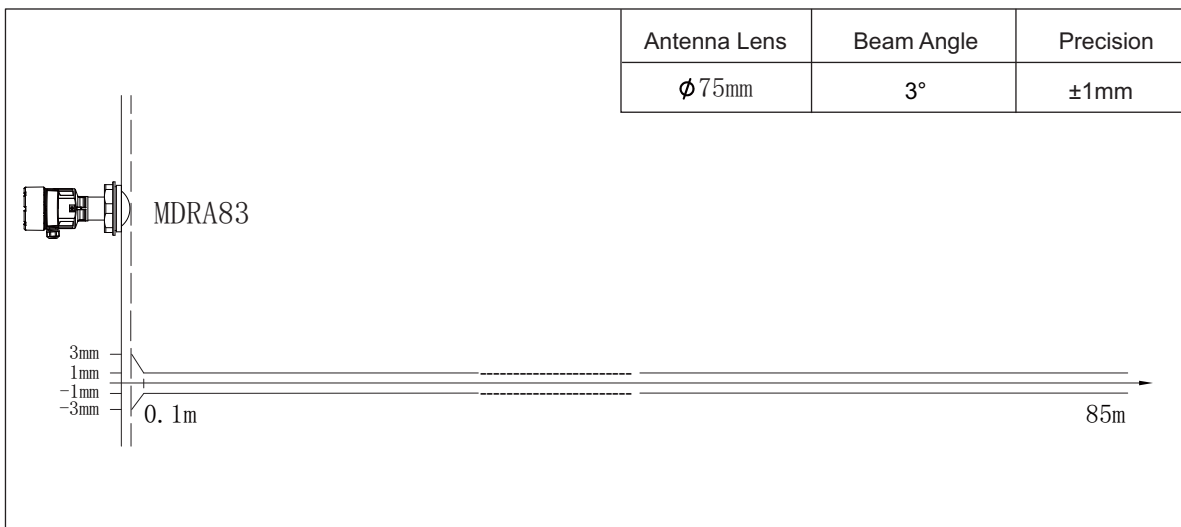
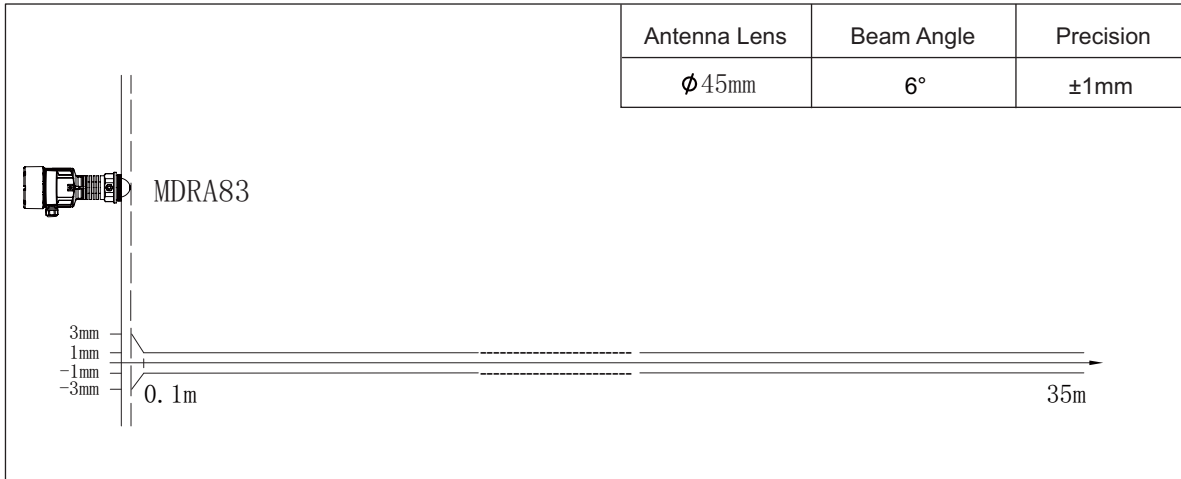


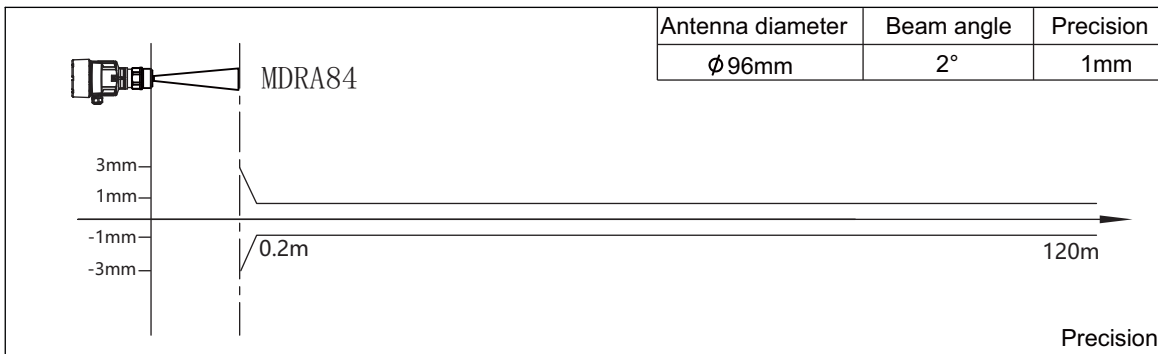
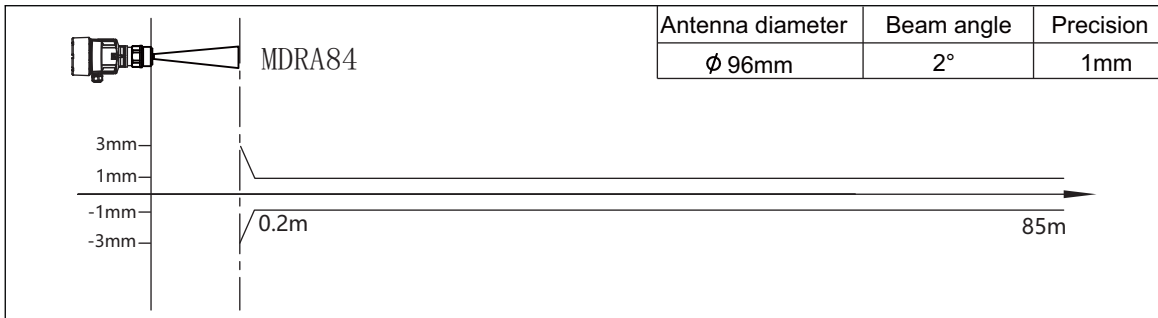
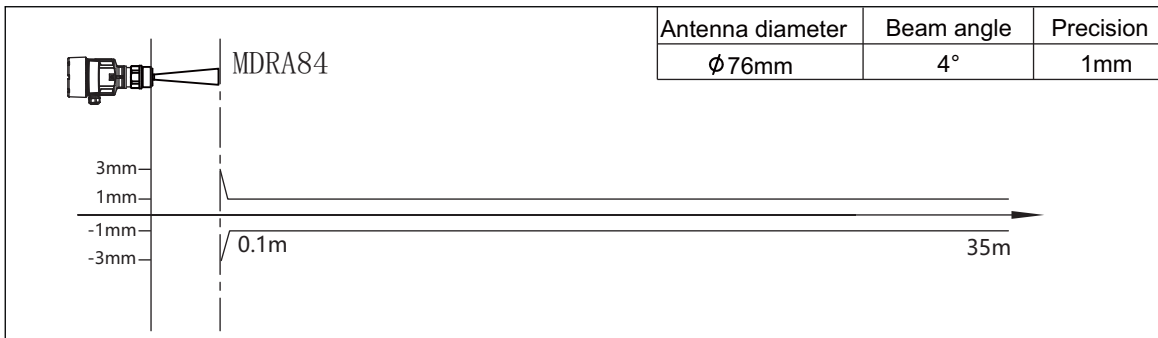
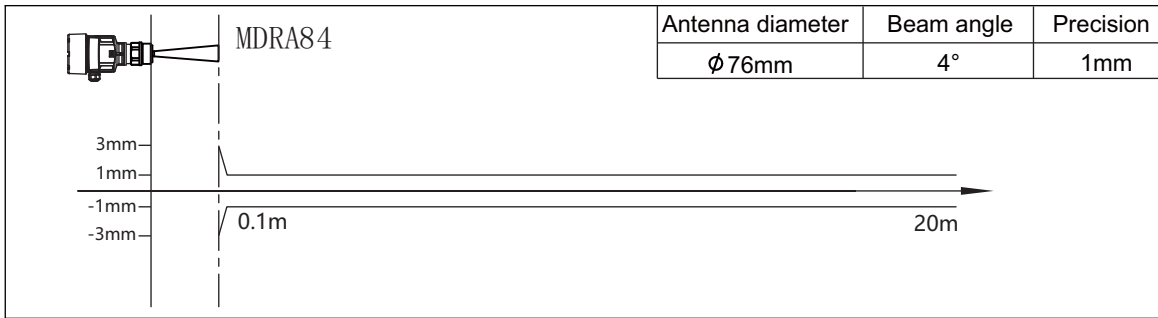
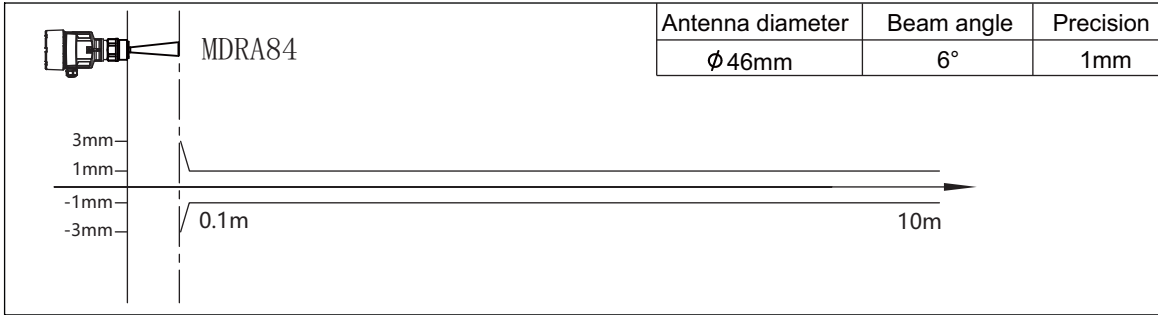
Universal Flange type selection table						Unit: mm
Serial number	1	2	3	4	5	6
Specifications	DN80	DN100	DN125	DN150	DN200	DN250
Outside diameter (D)	∅ 200	∅ 220	∅ 250	∅ 285	∅ 340	∅ 405
Center hole distance (K)	∅ 160	∅ 180	∅ 210	∅ 240	∅ 295	∅ 355
Number of holes(n)	8	8	8	8	12	12
Aperture (L)	∅ 18	∅ 18	∅ 18	∅ 22	∅ 22	∅ 26
Thickness(C)	12					

8.Linear Graph









9. Transport And Storage

In addition, the transport and storage conditions of level transmitter shall be in accordance with the following requirements:

1. The material level Transmitter should be transported strictly according to the characteristics of the products and the requirements of the specifications.
2. The level gauge shall be stored in a dry ventilated room at $-20 \sim 60^{\circ}\text{C}$ with a relative humidity of not more than 80% . Not to be mixed with corrosive substances. After long-term storage of the instrument should be carried out the corresponding test before sale, use.



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