USER MANUAL

ONE-STOP SOLUTION

ONE-STOP SERVICE

HUNAN MACSENSOR COMPANY LIMITED

User Manual For Ultrasonic Level Meter UL101/UL105







UL101 **UL105**

1. Menu operation and parameters setting

◆ Please read the following instructions carefully, and operate the menu carefully according to the product type menu you purchased

Three/four wire ultrasonic level meter menu

Basic setting			
The instrument has a LCD display, with key operation instruction. Press A, and instruction interface occurs. Operate according to the instruction. Default user password is "0000" and administrator password is "1000". (A) Menu, Shift, Return (B) Scroll down, Add (C) Confirm.			
Menu and Function			
First level menu	**Second level menu**	**Third level menu**	**instruction**
User login			Default “0000”

Administrator login			Default “1000”
Mounting setting	**Mounting Height**		Input the distance from the sensor bottom to tank bottom (m)
	Working Environment		Open or closed (default closed)
Output	**Analog**	Starting point	0 corresponds to 4mA (unit m)
		End point	Full scale corresponds to 20mA (unit m)
		Low end	Fine tuning
		High end	Fine tuning
		Virtual output	Not modifiable
		Analog configuration	Not modifiable
	Serial port	Address	0-255
		Baud Rate	900-36000(default 9600)
		Check bit	None (default), odd, even
		Delay	50ms(default)
		Read/write	Read only(default)
		Custom receive	Not modifiable
		Custom send	Not modifiable
	Switch	No.1 D	Default 1, unit: m
		No.1 H	Default 2, unit: m
		No.2 D	Default 1, unit: m
		No.2 H	Default 2, unit: m
		No.3 D	Default 1, unit: m
		No.3 H	Default 2, unit: m
		Switch Configuration	Not modifiable
Display	**Display Unit**		M(default), cm,mm,yard,foot,inch,L,m^3,g,kg
	Reserved		3 (default)

	Decimal Number		
	Display Conversion		Not modifiable
	Contrast		Not modifiable
	Display Delay		15minutes(default)
Probe	**Medium**	Medium Selection	Not modifiable
		Custom Speed	
	Characteristic	Cycle	
		Blind area	
		Sending Intensity	
		Receiving Gain	
		Max Gain	
		Sampling Threshold	
	Filtering	None	
		Rapidly	
		Fast	default
		General	
		Stable	
	Parameter correction	Temperature	Not modifiable
		Display	
		Linear	
System	**Set User**	User	**“0000”**
		Admin	**“1000”**
	Low power setting	Wake-up period	Not modifiable
		Work time	
		Low voltage protection	
	Language	Chinese, English	
	Restore	Cancel/Confirm	Choose Confirm

Two wire ultrasonic level meter menu

Basic setting			
The instrument has a LCD display, with key operation instruction. Press A, the instruction interface occurs. Operate according to the instruction. Default user password is "0000" and administrator password is "1000". (A) Menu, Shift, Return (B) Scroll down, Add (C) Confirm.			
Menu and Function			
One level	**Two level**	**Three level**	**instruction**
Users login			Default “0000”
Administrator login			Default “1000”
Mounting setting	**Mounting Height**		Input the distance from the sensor bottom to tank bottom (m)
	Working Environment		Open or closed (default closed)
Output	**Analog**	Starting point	0 corresponds to 4mA (unit m)
		End point	Full scale corresponds to 20mA (unit m)
		Low end	Fine tuning
		High end	Fine tuning
		Virtual output	Not modifiable
		Analog configuration	Not modifiable
	Serial port	Serial port address	HART address
		Serial port read/write	Read only(default)
Display setting	**Display Unit**		M(default), cm,mm,yard,foot,inch,L,m^3,g,kg
	Reserved Decimal Number		**3(**default)
	Display Conversion		Not modifiable

	Contrast		Not modifiable
	Display Delay		**15minutes(**default)
Probe setting	**Medium**	Medium Selection	Not modifiable
		Custom Speed	
	Characteristic	Measurement Cycle	
		Blind area	
		Sending intensity	
		Receiving gain	
		Max gain	
		Sampling threshold	
	Filtering	None	
		Rapidly	
		Fast	default
		General	
		Stable	
	Parameter correction	Temperature	Not modifiable
		Display	
		Linear	
System setting	**Set User**	User password modification	“0000”
		Administrator password correction	“1000”
	Language	Chinese, English	
	Restore	Cancel/Confirm	Choose Confirm

2. Installation and precaution

2.1 Sensor installation

2.1.1 Sensor should be placed where there is no obstacle between emission surfaces and measured liquid, it also should be far way from feeding throats, **Figure Ⅰ.**

2.1.2 Tank shape should be considered. Some type of container will bring second echo, especially conical and spherical tank. A good installation place will solve the problem, **Figure Ⅱ.**

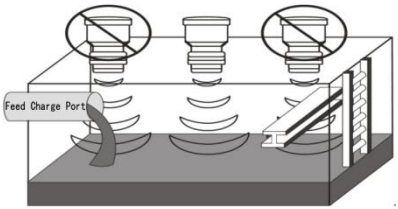


Figure Ⅰ

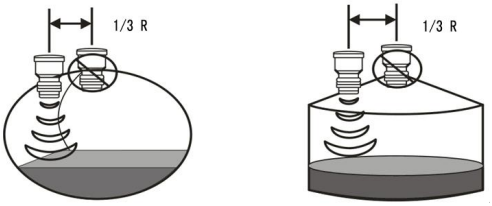


Figure Ⅱ

2.1.3 Lever meter can be installed by flange or ℄61 hole, whatever installation way, make sure the sensor bottom through the installation hole or flange, **Figure Ⅲ.**

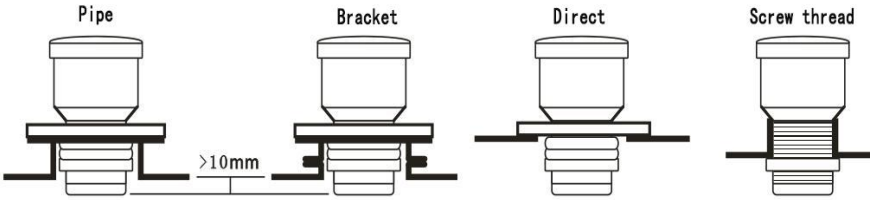


Figure Ⅲ

2.1.4 If the liquid to be measured has sewage, afloat impurities or fluctuation, use a waveguide and the diameter of the waveguide should over 120mm, **Figure Ⅳ.**

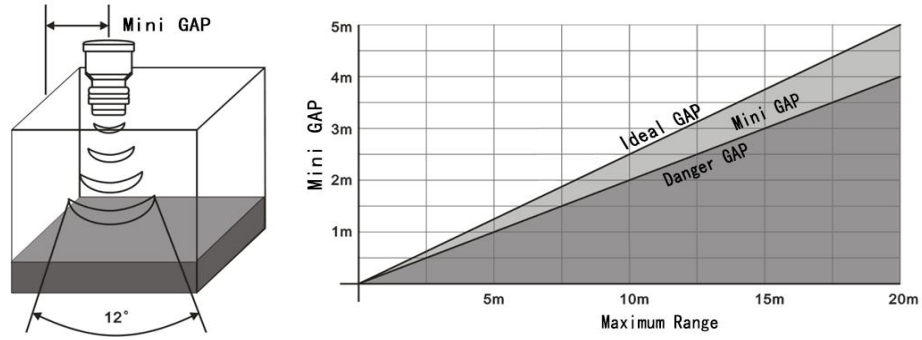
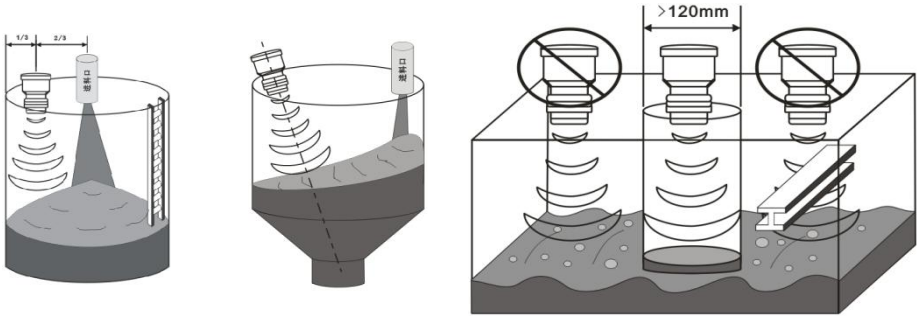


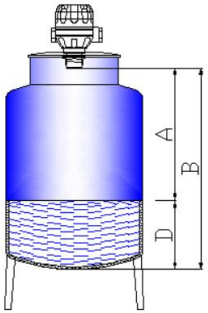
Figure Ⅳ

2.1.5 In the measurement of solid materials, the probe should be typically installed at a distance of 1/3 of the container wall from the side wall to the central feed inlet. When the material is piled up, it will form a cone. The installation position of the probe shown in Figures 5 and 6 will give a reading of the average level, which is the level height when the materials are piled flat. This is correct for conical stacking or concave stacking surface when discharging. The average level height measured by this installation is correct only for cylindrical containers and the inlet is at the center line of the container. For containers with other shapes or the inlet is not in the middle position, the probe should be installed according to the user's requirements and meet the above requirements.

2.1.6 Ultrasonic measurement will get the best effect for liquid with calm surface and no waves. If there are impurities, bubbles or large fluctuations on the surface of the liquid, a waveguide should be installed. The diameter of waveguide should be greater than 120mm, and there is no joint. As shown in figure 7



2.2 Work mode



2.2.1 Measure liquid level

B (Installation Height) is the distance from bottom of container to sensor surface, A is the distance between sensor surface and liquid surface, **D** is the height of liquid, D= B (Installation Height) -A, display value is bottom of container to liquid surface(D).

2.2.2 Measure air distance

Set **BD** =0, display value is distance from sensor surface to liquid surface (**A)**.

2.3 Environment and Filtering

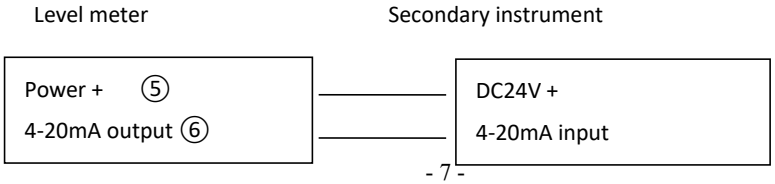
This instrument default dynamic filtering, to avoid the filter interference of mixing, tank walls, and other fixed bars. But for totally enclosed small space or other easily formed secondary echo environment, it's not reliable. When the display value is about twice the actual value regularly, change "**Environment**"to"**Closed**".

2.4 DC12V power is better. When it's from switch power, the DC negative must contact ground. Refer to the tags attached on the instrument for wiring. In order to keep it working reliable and display precise , please electrify >15 minutes before work. When operated outdoors, it should be placed under a sun screen to avoid direct under sunshine and rain. Lightning proof measures should also be taken out door.

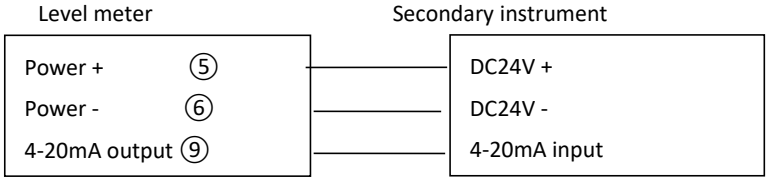
3. Wiring diagrams

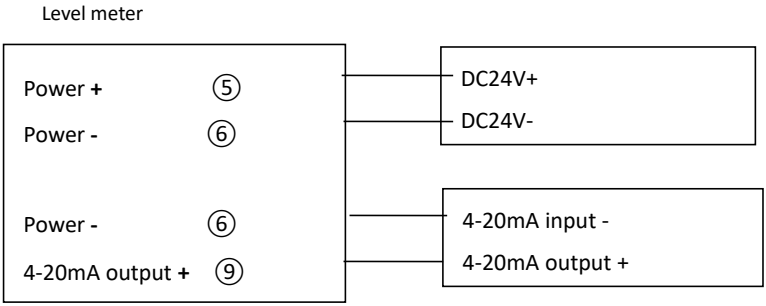
3.1 When wiring the 2016 model, the terminal of the machine should correspond to the number on the label on the product. (Refer to 3.6.1.1 and 3.6.1.2)

3.1.1 Schematic diagram of the connection between the two-wire level meter and the secondary instrument.

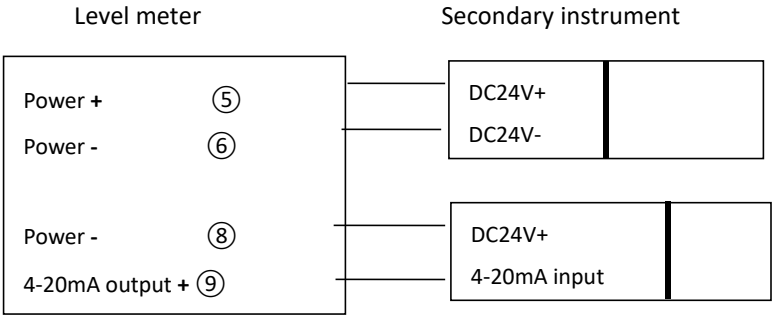


3.1.2 Schematic diagram of the connection between the three-wire level meter and the secondary instrument.



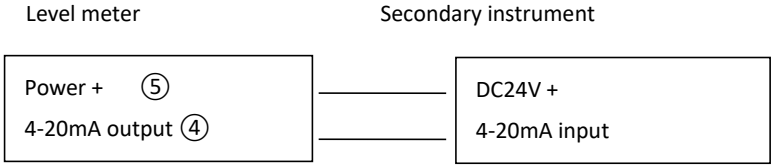


3.1.3 Schematic diagram of the connection between the four-wire level meter and the secondary instrument

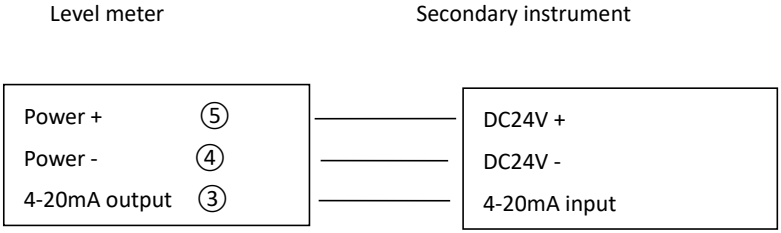


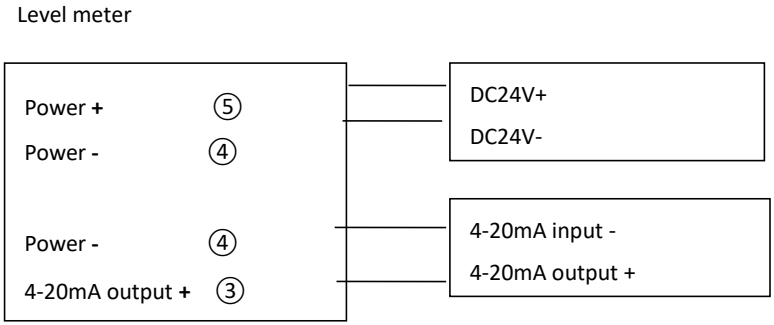
3.2 When wiring the 2022 model, the terminal of the machine should correspond to the number on the label on the product. (Refer to 3.6.2.1and 3.6.2.2)

3.2.1 Schematic diagram of the connection between the two-wire level meter and the secondary instrument.

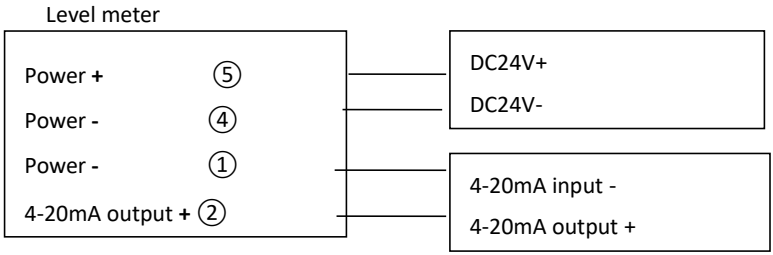


3.2.2 Schematic diagram of the connection between the three-wire level meter and the secondary instrument.



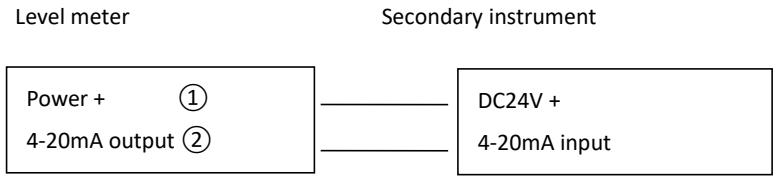


3.2.3 Schematic diagram of the connection between the four-wire level meter and the secondary instrument.

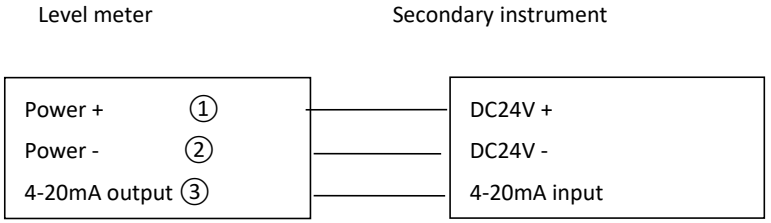


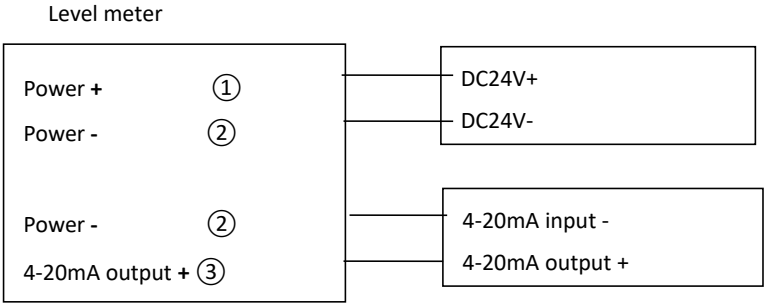
3.3 When wiring the 2022model, the terminal of the machine should correspond to the number on the label on the product. (Refer to 3.6.3.1 and 3.6.3.2)

3.3.1 Schematic diagram of the connection between the two-wire level meter and the secondary instrument.

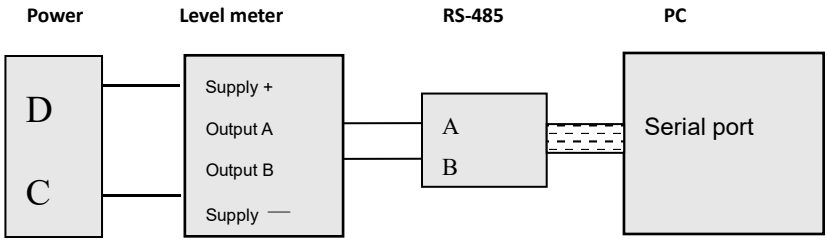


3.3.2 Schematic diagram of the connection between the three-wire level meter and the secondary instrument.

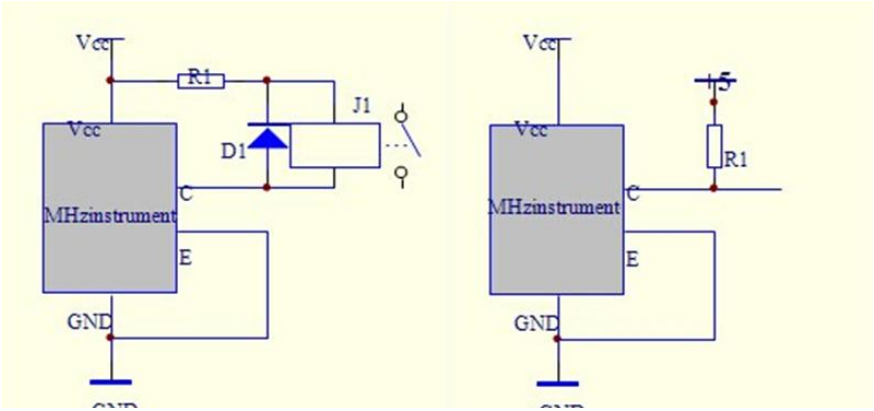




3.4 serial output connecting with PC



3.5 NPN output wiring diagram



Relay output setting:

This instrument has 2 relays or 3 NPN output. When uses relay control, it must be set control point: D and H. D for relay start point, H for relay end point. X for display value. It works as follows:

When D<H

X<D close	D	D<X<H retain	H	X>H Disconnect

when D>H

X>D close	D	D>X>H retain	H	X<H Disconnect

3.6 Wiring Definition



3.6.1.1 Definition of Three (Four) Wire Wiring (16 type)

Please connect according to the label !!! (Due to its multiple functions, it is subject to the actual product label)

Definition	Terminal		YES/NO
Power	⑤ DC12~24V+, ⑥ DC12~24V-		☐YES / ☐NO
	⑩ AC220V(L), ⑪ AC220V(N)		☐YES / ☐NO
No wire	☐ GPRS ☐NB ☐LoRa☐RF		☐YES / ☐NO
Current	Three wire	⑨ 4~20mA	☐YES / □NO
	Four wire	⑧ DC24V+, ⑨ 4~20mA	☐YES / □NO
Voltage	⑨ ☐0-5V☐0-10V☐ others _____		☐YES / □NO
RS485	③ RS485(A), ④ RS485(B)		☐YES / ☐NO
Switch	Relay	① J1_COM, ② J1_NO	□YES / □NO
		⑩ J2_COM, ⑪ J2_NO	□YES / □NO
	NPN	① N1	□YES / □NO
		② N2	□YES / □NO
		☐⑦N3☐⑩N3☐⑪N3	☐YES / ☐NO

3.6.1.2 Definition of Two Wire Wiring (16 type)



Please connect according to the label !!! (Due to its multiple functions, it is subject to the actual product label)

Definition	Terminal	YES/NO
Power	⑤ DC18-28V	☐YES / □NO
Output	⑥ 4-20mA	☐YES / □NO
	⑥ HART	☐YES / □NO
Ground	⑦ ⏚	☐YES / □NO



3.6.2.1 Definition of Three (Four) Wire Wiring (22 type)

Please connect according to the label !!! (Due to its multiple functions, it is subject to the actual product label)

Definition	Terminal		YES/NO
Power	Built-in battery		☐YES / ☐NO
	Solar energy		☐YES / ☐NO
	⑤ DC12~24V+, ④ DC12~24V-		☐YES / ☐NO
	⑥ AC220V(L), ⑦ AC220V(N)		☐YES / ☐NO
No wire	☐GPRS☐NB☐LoRa☐RF		☐YES / ☐NO
Current	Three	③ 4~20mA	☐YES / ☐NO
	Four wire	⑦ DC24V+, ⑥ 4~20mA	☐YES / ☐NO
Voltage	③ ☐0-5V ☐0-10V ☐others_____		☐YES / ☐NO
RS485	② RS485(A), ① RS485(B)		☐YES / ☐NO
Switch	Relay	② J1_NO, ①J1_COM	☐YES / ☐NO
		⑦ J2_NO, ⑥J2_COM	☐YES / ☐NO
	NPN	① N1	☐YES / ☐NO
		⑥ N2	☐YES / ☐NO
		☐①N3☐③N3	☐YES / ☐NO
Pressure level	☐1m ☐2m ☐5m ☐10m ☐Others_____		☐YES / ☐NO



3.6.2.2 Definition of Two Wire Wiring (22 type)

Please connect according to the label !!! (Due to its multiple functions, it is subject to the actual product label)

Definition	Terminal	YES/NO
Power	⑤ DC18-28V	☐YES / ☐NO
Output	④ 4-20mA	☐YES / ☐NO
	④ HART	☐YES / ☐NO



3.6.3.1Definition of Three (Four) Wire Wiring (20 type)

Please connect according to the label !!! (Due to its multiple functions, it is subject to the actual product label)

Definition	Terminal		YES/NO
Power	Built-in battery		☐YES / □NO
	① DC12~24V+, ② DC12~24V-		☐YES / □NO
No wire	NB-IOT		☐YES / □NO
Current	③ 4~20mA		☐YES / □NO
Voltage	③☐0-5V☐0-10V☐others_____		☐YES / □NO
RS485	④ RS485(A), ⑤ RS485(B)		☐YES / □NO
Switch	NPN	⑤ N1	☐YES / □NO
		④ N2	☐YES / □NO
		③ N3	☐YES / □NO
Pressure level	☐1m☐2m☐5m☐10m☐others____		☐YES / □NO



3.6.3.2 Definition of Two Wire Wiring (20type)

Please connect according to the label !!! (Due to its multiple functions, it is subject to the actual product label)

Definition	Terminal	YES/NO
Power	① DC18-28V	☐YES / □NO
Output	② 4-20mA	☐YES / □NO
	② HART	☐YES / □NO

3.6.4.1No Display Product Wiring Definition

Please connect according to the label !!! (Due to its multiple functions, it is subject to the actual product label)

Definition	Terminal/colour	YES/NO
Power +	□/□	□YES / □NO
Power -	□/□	□YES / □NO
Current	□/□	□YES / □NO
Voltage	□/□	□YES / □NO
RS485	□/□	□YES / □NO
	□/□	
control output Ⅰ	□/□	□YES / □NO
	□/□	
control output Ⅱ	□/□	□YES / □NO
	□/□	
control output Ⅱ	□/□	□YES / □NO
	□/□	

4.Trouble shooting

1. Not working, no display, no sound
Probable reason: ① Power is not connected or "+""-"polarities are connected reversely ② Too low voltage resulting no working or too high resulting damage
Remedy: ① Check to ensure correct wiring as instructed. ② Use 12-24V DC supply, or contact with distributor
2. No display, sensor has sound
Probable reason: ① Turning off ② Connected to high voltage, damaging display chip
Remedy:

① Press "B" to turn on display; ②contact with distributor.
3. With sound and display, but the values not change with distance
① Too low input voltage ② Sensor or power driver damaged
Remedy ①12-24V DC supply ②Contact with distributor
4. With display ,but value is irregular fluctuation
Probable reason ① Deflective installation ② improper setting of pulse intensity, leading to great residual vibration or diffraction ③ more than 2 instruments work together, interfering each other ④ too much electromagnetic disturbance in working area ⑤ There are bubbles or debris on liquid
Remedy ① Adjust the axis of sensor vertical to surface to be measured ② in general, range of 1-3m, transmit intensity is 2-5 ③ try to eliminate interference ④ find out disturbance source and shield ⑤ eliminate bubbles or debris
5. Big error
Probable reason ①Non vertical installation, leading to multiple reflection ②installed too close to wall, sonic wave reflected midway③ check **"BD"**④ check temperature display
Remedy ①Adjust installation positions several times. ② correctly set **"BD"** ③adjust temperature (**"TE"**) to proper value.
6. Abnormal current output
Probable reason ①Too large load resistance ②**FS, AL or AH** changed. ③ undesired supply rectification and filtering ④ electrify time is not enough
Remedy

①Lower load resistance ②readjust parameter③ replace with DC regulated supply with larger capacity ④electrify >15 minutes before work
7. Abnormal RS485 output
Probable reason ①Reverse connecting of A and B ②incorrect parameter of serial ports, its not match with main unit
Remedy ① Change wiring, ②reset parameter, same with main unit
8. Abnormal control output
Probable reason ①Wrong parameter. Setting ②external current-limiting resistor too large ③external current-limiting resistor too small, damaging the level meter
Remedy ① Reset parameter ② Decrease current-limiting resistor ③ contact with distributor