Kind Reminder:

Please read the user manual carefully before installation and debugging!

Zhejiang Lefoo Sensing Technology Co., Ltd.
Address: No. 118, Changda Road, Donghu Subdistrict, Linping District, Hangzhou, Zhejiang 311100, China
Tel: +86-571-89363666
Fax: +86-571-89363678
Email: cnsale@lefoo.com
Website: www.lefoo.cn

LEFOO

Ultrasonic Level Meter

User Manual

Menu 6: Advanced Functions (Exclusive menu for engineers' debugging; do not enter!)

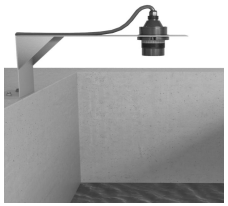
5、Common Installation Instructions for Ultrasonic Level Meters

Ⅰ、The distance between the maximum liquid level in the pool and the probe surface of the instrument shall be greater than the blind zone of the selected instrument.

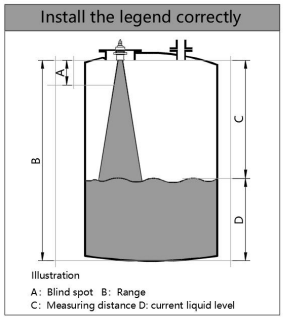
It is recommended to use an L-shaped bracket，The installation method is shown in the figure

Ⅱ、The distance between the maximum liquid level height in the pool and the probe surface of the instrument is less than the blind zone of the selected instrument.

It is recommended to use a Z-shaped bracket. The installation method is shown in the figure.



Ⅲ、The correct installation of the ultrasonic level meter on the tank is shown in Figure 1, and the incorrect installation is shown in Figure 2.



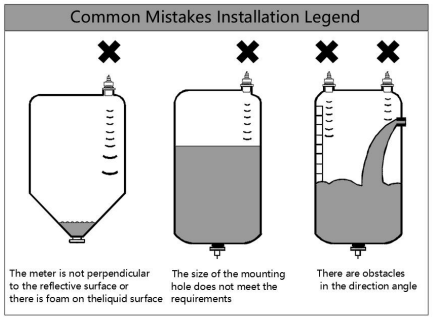


Figure 1 **Figure 2**

Table of Contents

1、Overview

Thank you sincerely for choosing our company's ultrasonic level meter! This instrument incorporates a number of patented software technologies, featuring safety, cleanliness, high precision, long service life, stability, reliability, and ease of installation and maintenance.It is suitable for various fields such as acid, alkali, salt, anti-corrosion, and high-temperature environments. The instrument can be connected to display meters or various systems via 4~20mA or RS485 (Modbus-RTU protocol or other customized protocols), providing real-time liquid level data for industrial automated operations. This instrument complies with the standard: GBT11828.4-2011, and the verification regulation: JJG971-2002. The instrument has the following characteristics:

- The circuit design adopts high-quality power modules starting from the power supply part, and selects components from high-end brands. It features high performance, stability and reliability, can resist various interference waves, and is fully capable of replacing similar imported instruments from abroad.
- The intelligent acoustic wave technology software enables intelligent echo analysis without any debugging or other special procedures. This technology has the functions of dynamic thinking and dynamic analysis.
- This instrument is a non-contact type, which does not come into direct contact with liquids, thus having a low failure rate. The instrument offers multiple installation methods, and users can completely calibrate the instrument through this manual.
- All input and output lines of the instrument are equipped with lightning protection and short-circuit protection functions.

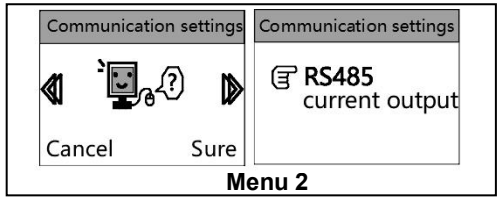
2、Technical Specifications

Measurement range: (0～10)m (selected according to actual measuring range)
Blind zone: 0.5m
Ranging accuracy: ±0.5% (full range under standard conditions)
Ranging resolution: 1mm　Pressure: Normal pressure
Instrument display: Built-in LCD displays liquid level **(distance between the bottom of the pool/tank and the surface of media such as water)** and empty height **(distance between the instrument's probe surface and the surface of media such as water)**
Analog output: 4～20mA/510Ω
Digital output: ModBus-RTU protocol or customized protocol
Relay output: 250AC/5A or 30VDC/2A　Power supply voltage: DC24V
Ambient temperature: －20℃ ～ ＋60℃
Protection class: IP65　nstrument power: ＜1W

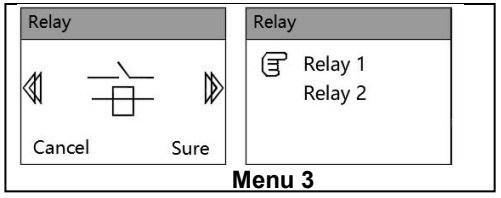
Menu 2: Communication Settings (Menu for on-site installation and commissioning personnel) as shown in the figure below

1、Rs485: The default communication address is 01, the default communication baud rate is 9600, and the default parity check is none. The receiving log is for the convenience of on-site engineers during debugging.

2、Current output settings: There are two modes: (4-20)mA and (0-20)mA, which users can choose according to their needs.The (4-20)mA is a commonly used mode, where 0mA or 4mA generally corresponds to 0m, and 20mA corresponds to the highest liquid (material) level.



Menu 2



Menu 3

Menu 3: Relay Settings: All are in the default disconnected state! (Menu for on-site installation and commissioning personnel) as shown in the figure below

The function of Relay 1 and Relay 2 is that when the water level **(liquid level)** in the on-site pool rises or drops to a certain level, the instrument can control the start or stop of the water pump in the pool through the pull-in or disconnection of the relays.

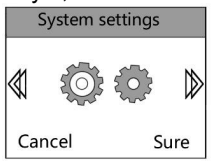
Ⅰ、For example, if the depth of the pool is 6 meters, drain water when the water level reaches 4 meters, and stop draining when the water level drops to 1 meter. The settings are as follows: set the upper limit (representing high liquid level) to 4 meters, set the lower limit (representing low liquid level) to 1 meter, action logic: Disconnected → Closed, control mode: Dual-limit alarm;

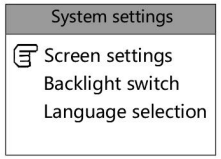
Ⅱ、Let water in when the water level reaches 1 meter, and stop water inflow when the water level reaches 4 meters. The settings are as follows: set the upper limit (representing high liquid level) to 4 meters, set the lower limit (representing low liquid level) to 1 meter, action logic: Closed → Disconnected, control mode: Dual-limit alarm;

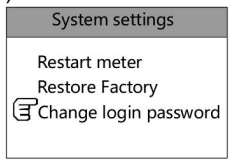
Menu 4: Record Query Its function is to record the power-on time of the instrument.

Menu 5: System Settings

1、Set the brightness and contrast of the screen; 2、Set the duration of the screen backlight;
3、Select Chinese or English; 4 and 5. Restart the instrument and restore factory settings;
6、The login password for entering the menu can be set by the user (Modification is risky! If you must modify it, be sure to remember the password!)

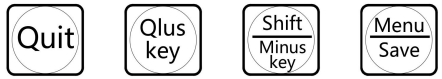






4、Instrument debugging

4.1 Keyboard description



Menu/Save Key: When the instrument needs to be set, press this key to enter the menu. After changing the instrument parameters, press the Save key.

Add Key: A key used to flip up the menu or increase the value of numbers.

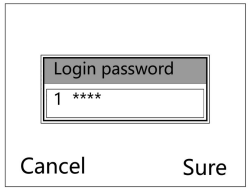
Shift/Subtract Key: Press this key to shift when modifying data in different digits, or use it to flip down the menu.

Exit Key: After completing the required menu settings, press the Exit key to return to the instrument's main interface.

4.2 Menu Settings

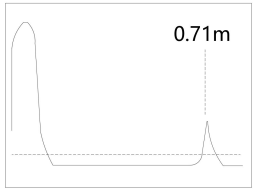
Ⅰ、Steps to Enter the Menu:

Press the Menu key, and****will appear. The first* on the left will flash. Press the Add key to change it to 1****, then press the Menu key again to enter the menu. (As shown in the figure)



Ⅱ、Echo Mode:

When the instrument is in the mode of displaying liquid level and empty height,pressing the Shift key will bring up the echocurve graph under the current measurement state (as shown in the figure) Pressing the Add key will switch back to the liquid level and empty height mode.



Menu 1: Installation Settings (Menu for on-site installation and debugging personnel) (as shown in the figure below)

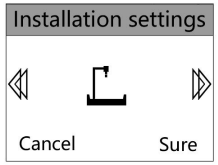
1、 Installation Height: The vertical distance from the position where the medium (such as water level) is at zero on site (usually referring to the bottom of a pool, tank, etc.) to the probe surface of the instrument.

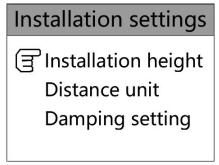
2、 Distance Unit: m (meter), cm (centimeter), mm (millimeter), and in (inch). Users can set it as needed.

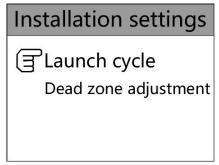
3、 Damping Settings: Automatic filtering and damping time (generally, automatic filtering is sufficient; it is not recommended to turn off automatic filtering).

4、 Transmission Cycle: 100ms-999ms, with a default of 500ms. The shorter the time, the faster the wave transmission speed.

5、 Blind Zone Adjustment: The default is 10cm. If modification is required, it is recommended to operate under the guidance of an engineer.

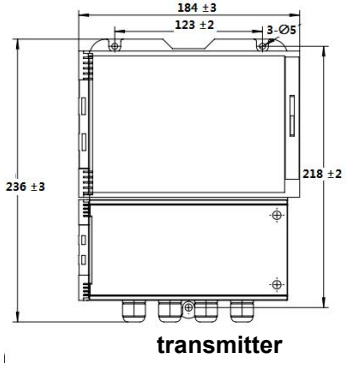




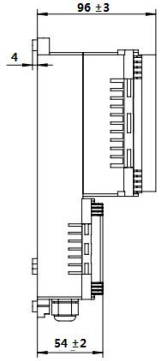


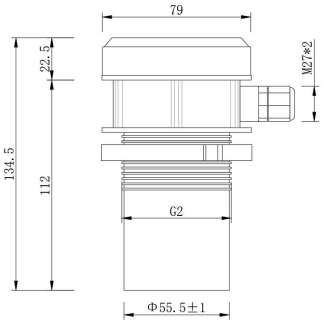
3、Instrument Installation

3.1Dimensions of the Instrument



transmitter

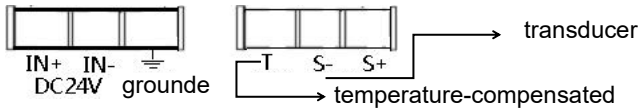




sensor

Installation Method: In open environments, the bracket mounting method is generally adopted (keep the bracket horizontal during installation). Drill a circular hole with a diameter of 60mm in the bracket, insert the instrument probe into it, and then use the nut provided with the instrument to tighten it from bottom to top. For tanks under normal temperature and pressure, flange mounting is usually used. Drill a circular hole with a diameter of 60mm in the center of the blind flange (keep the blind flange horizontal during installation) or tap a G2 thread to fix the ultrasonic liquid level meter.

3.2 Instrument Terminal Posts (as shown in the figure below)



Explanation of Terminal Posts as follows:

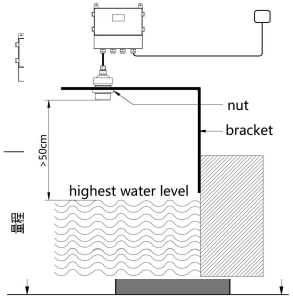
Instrument Power Supply: Connect the positive pole of the on-site DC24V to "IN+" on the circuit board; connect the negative pole of the on-site DC24V to "IN-" on the circuit board. Output signal: loop (4-20)mA.

S+ and S-: Connect to the high-frequency wire and shielded wire of the 75-3 type special cable respectively (S+ of the sensor on the circuit board: connect to the white high-frequency wire; S- of the sensor on the circuit board: connect to the shielded wire with black heat-shrinkable sleeve).

Explanation of 75-3 type special cable is as shown in the figure below: (Standard length: 10 meters. If longer length is needed, please inform in advance!)

The shielded wire with the black heat-shrinkable sleeve is connected to S- of the sensor on the circuit board; the white and transparent high-frequency wire is connected to S+ of the sensor on the circuit board; the red cable is connected to T (temperature compensation) on the PCB.

3.3 Meaning of Installation Parameters



As shown in the figure, the instrument's measurement method is as follows: Start timing from the moment the instrument sends out an acoustic pulse, and stop timing when the pulse reflected back from the medium surface is received. Multiply half of this time by the speed of sound, and the result is the measured distance. (Installation height

- measured distance = current liquid level);

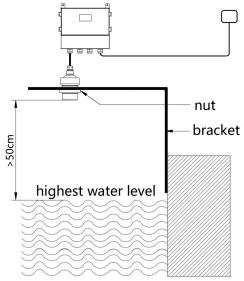
Ⅰ、 The installation height should be less than the measuring range;

Ⅱ、The instrument's blind zone refers to the area near the probe where the instrument cannot measure. The distance between the on-site maximum liquid level and the probe should be greater than the blind zone;

Ⅲ、The wave emitted by the probe is horn-shaped, i.e., it has a directional angle. When installing, try to choose an open space. There should be no other obstacles in the space below the instrument, and the area below the instrument should be kept away from positions where the liquid surface fluctuates violently, such as inlet and outlet ports.

3.4 Precautions for Instrument Installation

1）The distance from the probe's emitting surface to the maximum liquid level shall be greater than the blind zone of the selected instrument.



2）If the liquid level in the pool or tank fluctuates violently and it is inconvenient to install a waveguide tube, please choose an ultrasonic level meter with a range 2.5 times the Height of the pool or tank.

3）If the distance from the probe's emitting surface to the maximum liquid level is less than the blind zone of the selected instrument, an extension pipe must be installed. The diameter of the extension pipe should be ≥ 150mm, with a length ranging from 0.2m to 0.5m. It should be installed vertically with a smooth inner wall, and the opening on the tank body must be larger than the inner diameter of the extension pipe(Figure 1).

4）If the wall of the pool or tank is uneven, there are other obstacles, the water surface fluctuates violently, or there is foam or other impurities on the water surface, a waveguide tube must be installed for the instrument. Alternatively, a tube can be run to the bottom of the pool or tank, with a diameter of ≥ 110mm. A gap should be left at the bottom of the tube to keep the liquid level inside the extension tube equal to that in the pool or tank. Several small holes should be drilled on the extension tube near the probe installation position to allow air inside the tube to communicate with that outside the tube(Figure 2).

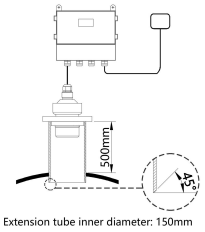


Figure 1

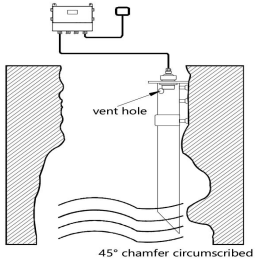


Figure 2

5）For flange mounting on tanks under normal temperature and pressure, it is best to have the probe surface of the instrument exposed inside the tank, as shown in Figure 3. If the on-site environment makes this impossible, refer to Figures 4 and 5 for the diameter of the pipe used to fix the flange. The length h should be between 100mm and 300mm, and the larger the h value, the larger the corresponding dvalue.

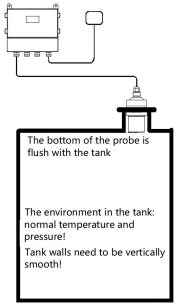


Figure 3

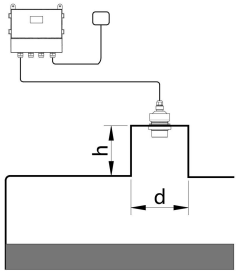
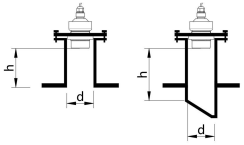


Figure 4



d	h
80mm	100mm
100mm	150mm
150mm	200mm
200mm	250mm
250mm	300mm

Figure 5

6）If the instrument is used in extremely hot or cold areas, i.e., the ambient temperature may exceed the operating requirements of the instrument, it is recommended to install high and low temperature resistant devices around the liquid level meter.