WM9100 Series Manual
Residential Ultrasonic Water Meter
（For DN15/DN20/DN25）

Lanry Instruments (Shanghai) Co., Ltd

(V1.0/2022)

Notice

Dear users，

In order to your quick understanding of our product features and use of the product correctly, please read the manual carefully before installing and operating.

- Please check the packing list and confirm whether your received goods are the same as your ordered goods.
- Please read the manual carefully before installing and operating.
- Please observe all the warnings and requirements before installing, operating and maintaining.
- Please operate the products according to the manual strictly, otherwise our company will not be responsible for any consequence.
- All the figures are only for reference. Please refer to the actual products when operating or consult our company.
- When connecting the water meter output interface with output cable, lock threaded joints after connection and do not pull the cable after locking.
- When the products show/indicate ⚠ , please consult our company.
- Please check the products carefully before installing, please consult with our company if any obvious transporting damage.
- Please keep the brochure properly for your reference anytime.
- Please contact our company if the products cannot work or need repair.
- All products are tested strictly before delivering. It is forbidden to open the seal once sold the water meter. If user open the seal privately, our company will not be responsible for the loss.

⚠ Warning

To avoid any financial loss and personal injury, please observe following safety items and operate the products properly.

①The products are precision measurement instruments, to avoid any damage please handle with care.

②About Battery

- Please do not charge, short out or modify the battery
- Please keep the battery far away from the fire, high temperature objects, water or welding
- Please do not make the battery be seriously crashed.

- Please do not replace the battery with other same model battery, as our battery is treated specially and professionally
- Please change the battery when it is low power, to avoid data loss. When changing the battery, it must be operated by professionals, or return the product to our company.
- Please do insulation treatments to the replaced battery. To avoid fire or explosion, user should keep the replaced battery far from other mental objects or batteries.
- Please do environmental treatments to the replaced battery. Otherwise return the replaced battery to our company.
- Please take the battery out immediately if it leaks, color changes, shape changes, smokes or spreads odor. Please avoid burning during operating.
- Please keep the leakage far away from eyes, skin and clothes. If touches, please wash the touched parts with the mass water (do not rub) and go to hospital immediately.

③Please do not operate the product under the acid and alkali environment.

Otherwise will reduce the working life and the product will not conform to the sanitary standard.

CONTENT

1. Summary

WM9100 Series Ultrasonic Water Meter is a new type of water meter which can measure and display the flow rate according to the time difference between upstream and downstream when the ultrasonic wave propagates in the water. Water meter can be equipped with wired or wireless data communication interface to communicate with the collector, concentrator or network server to form a remote meter reading management system. The management department can copy the data in the table as needed and convenient to the user's water consumption statistics and management.

2. Features

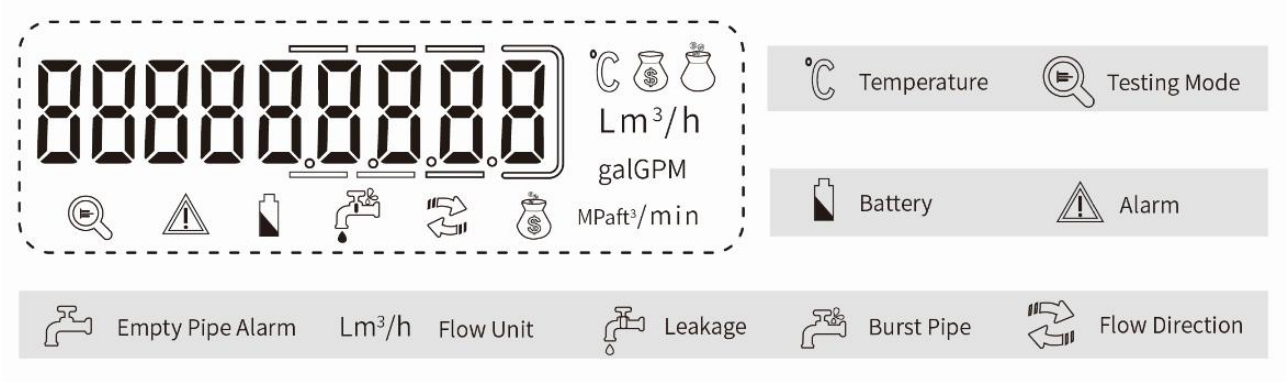
- Full Stainless Steel Body
- Wide Range
- Measuring Low Starting Flow
- No Moving Parts, Accuracy Will Not Change After Long Term Working
- With Functions of Self-diagnosis, Flow Sensor Alarm, Temperature Sensor Alarm, Over Range Alarm and Battery Under voltage Alarm
- Low Consumption Design, Battery Can Continuously Work For Over 6 Years
- With Optic Electric Interface, Hand-held Infrared Meter Reading Tool Can Read Directly
- Stainless Steel 316L Is Optional, Meet The Measurement Of Direct Drinking Water
- Bi-directional Measuring Forward And Reverse Flow
- Users Can Set Specified Time To Upload Data, Integrated Multiple Intelligent Alarm Functions For Abnormal Water Consumption, Open Protocols Are Better Suited To Compatible Extensions
- According To Sanitary Standard For Drinking Water

3. Specifications

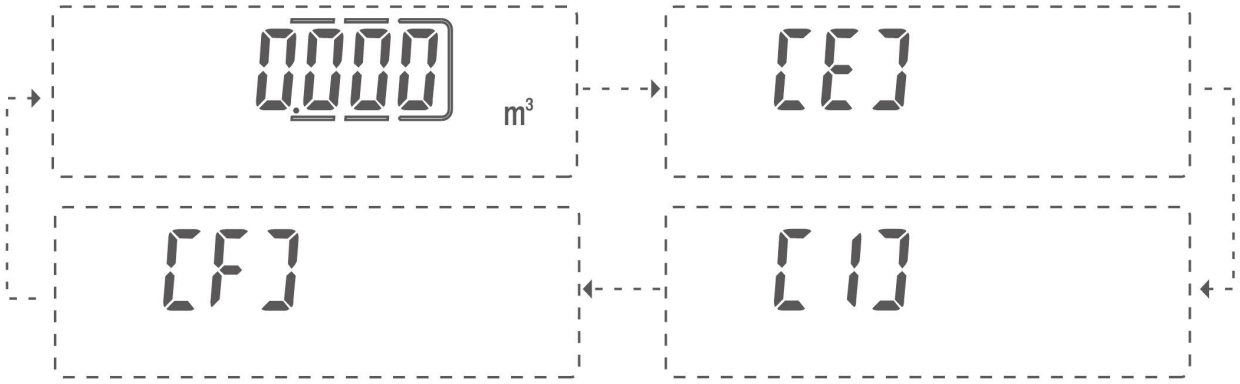
Max. Working Pressure	1.6Mpa
Temperature Class	T30
Accuracy Class	ISO 4064, Accuracy Class 2, Optional Class 1
Body Material	Stainless SS304（opt. SS316L)
Battery Life	10 Years (Consumption≤0.3mW)
Protection Class	IP68
Environmental Temperature	-40～+70℃, ≤100%RH
Pressure Loss	ΔP25, ΔP40（Based on different dynamic flow）
Climatic And Mechanical Environment	Class O
Electromagnetic Class	E2
Communication	M-bus, RS485, LoRaWAN
Display	9 digits LCD display volume Cumulative flow (m^3, L, GAL), Instantaneous flow(m^3/h, L/min, GPM) Power alarm, flow direction, output etc.
Connection	Thread
Flow Profile Sensitivity Class	U5/D3
Data Storage	Can store frozen data for 24 months, and the data will be permanently saved after power failure
Frequency	1-4 times/second
Diameter	DN15~DN25
Range Q3/Q1	125, 160, 200, 250, 400, 500 (Default 250)
Q3	DN15: 2.5m^3/h, DN20: 4.0m^3/h, DN25: 6.3m^3/h

4. Operation

This water meter adopts LCD screen combined with digital and graphic to present measurement parameters and working status information to users, as shown below:



User can use magnetic bar to touch the magnetic induction area on the water meter shell to switch different function menu. Operation and display consists of 4 groups of menus.



■ **Arrow Indicates**

- - - → Touch the induction area with the magnetic bar for more than 2 seconds and hold (same as Press & Hold in the below)

——→ Touch the induction area with the magnetic bar in 1 second and leave (same as Press & leave in the below)

The complete menu screen loop is in below order

1) Main Menu: Display screen for daily use

2) Error Menu【E】: Record and display the corresponding fault, occurrence time and duration

3) Information Menu【I】: Display water meter address, communication parameter and historical data

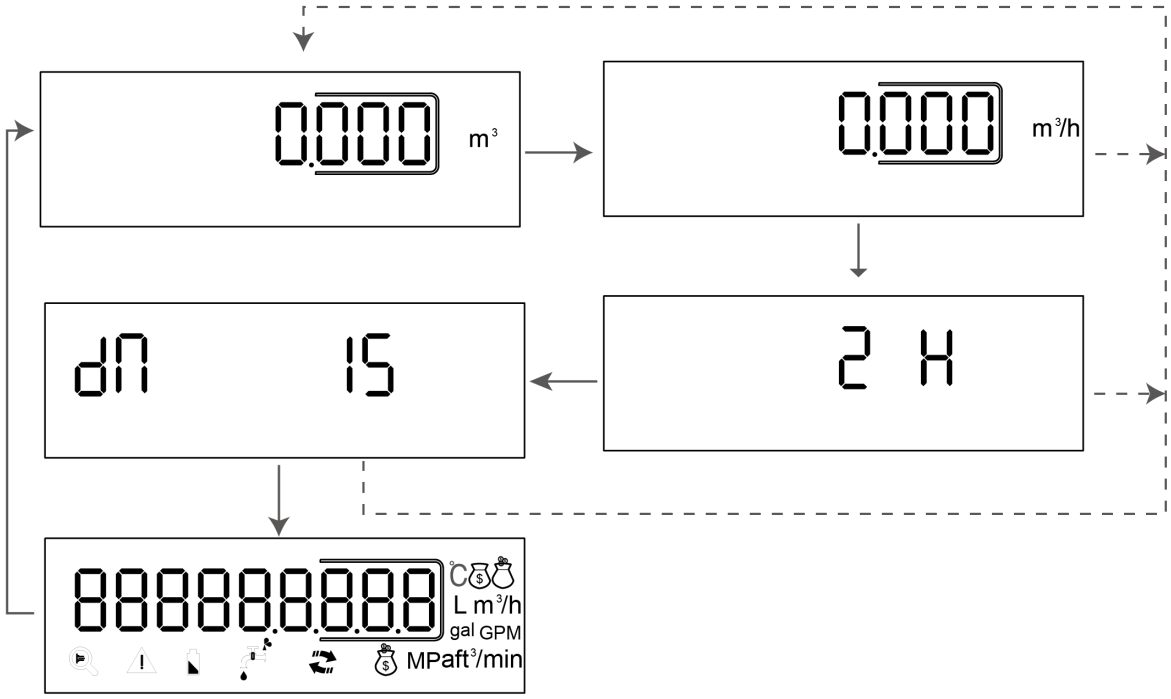
4) Testing Menu【F】: Use this menu when testing

This water meter is usually displayed by default LCD, the main menu is fixed to show cumulative flow. Use Press and Hold can loop through 4 menus. Use Press and Leave can shift in this level menu. User can use Press and Hold to shift into 【E】【I】 【F】menu and check relevant data by Press and Leave to shift into sub-menu. Screen will automatically return to the main menu page if no any operating over 3 minutes (except in menu【F】).

Please pay attention, no matter in which menu (except in menu【F】), as long as there is water flowing through the water meter, the flow value will be automatically accumulated in the water meter and there will be no missing or under counting of the measurement data due to viewing the menu content or key stroking.

The following diagrams show the cyclic operation of each menu

1) Main Menu



Remarks: In the figure above, the parameters of each menu in order of arrows are shown below:

a) Accumulated flow

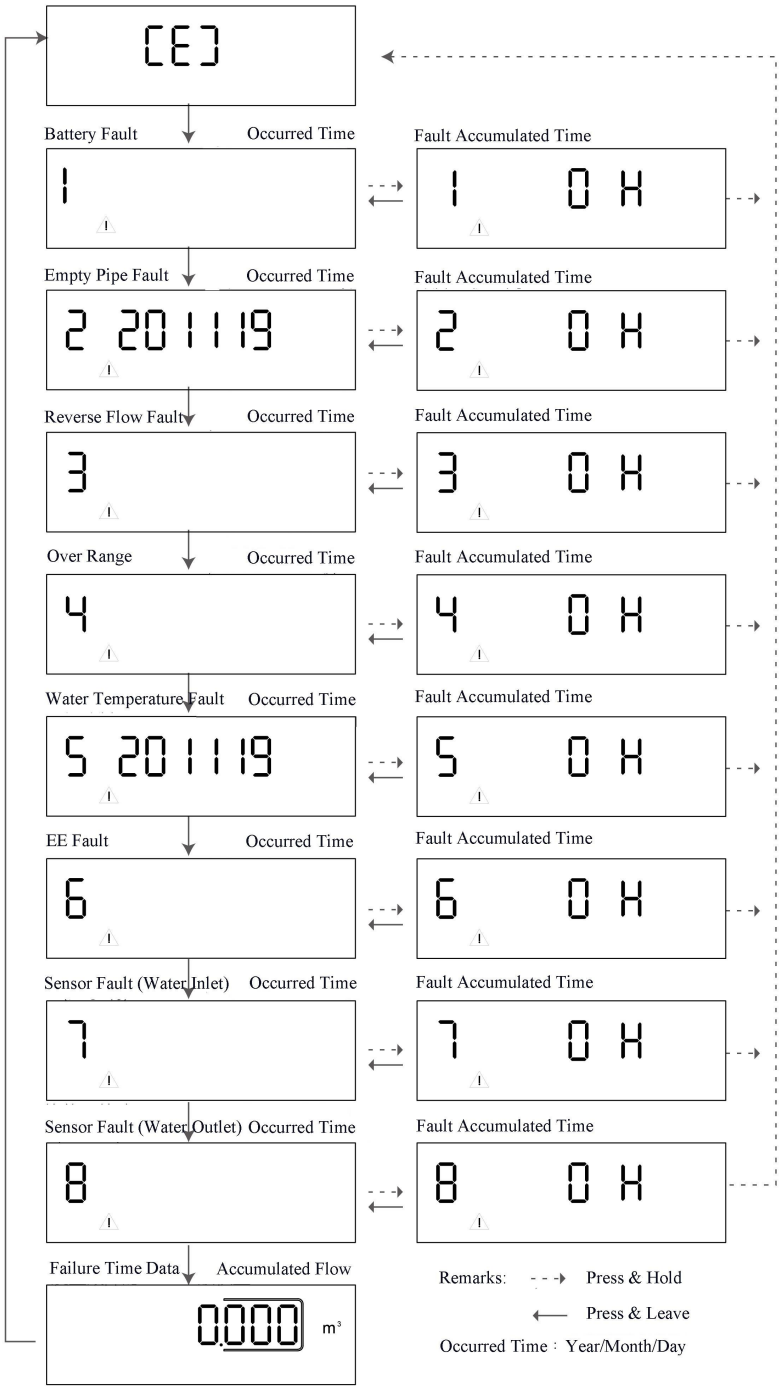
b) Instantaneous flow

c) Accumulated working time (hour)

d) Pipe diameter

e) Full screen

2) Error Menu【E】

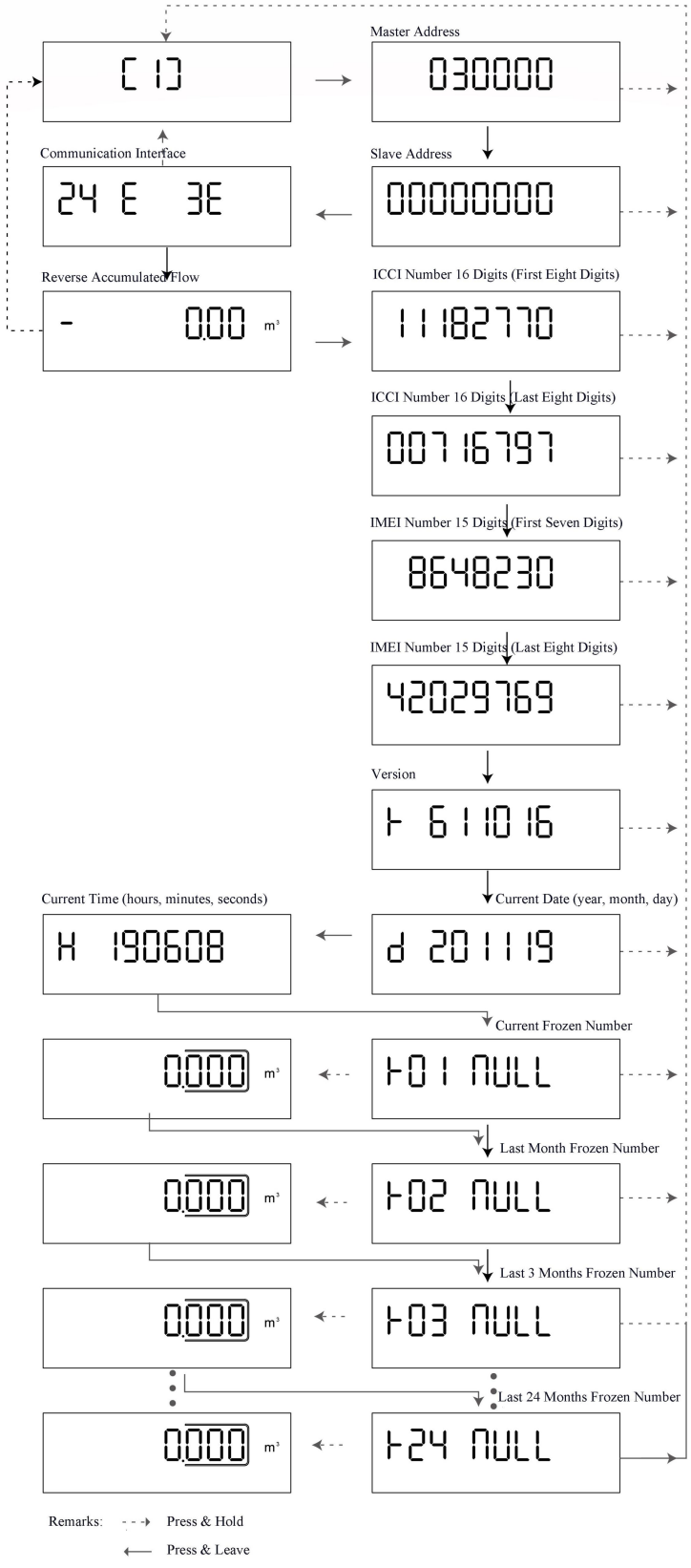


Remarks: Number 1-8 is fault code.

1 Battery fault Occurred time (year/month/day)
2 Empty pipe fault Occurred time (year/month/day)
3 Reverse flow fault Occurred time (year/month/day)
4 Over range fault Occurred time (year/month/day)
5 Water temperature fault Occurred time (year/month/day)
6 EE fault Occurred time (year/month/day)
7 Sensor fault(water inlet) Occurred time (year/month/day)
8 Sensor fault(water outlet) Occurred time (year/month/day)

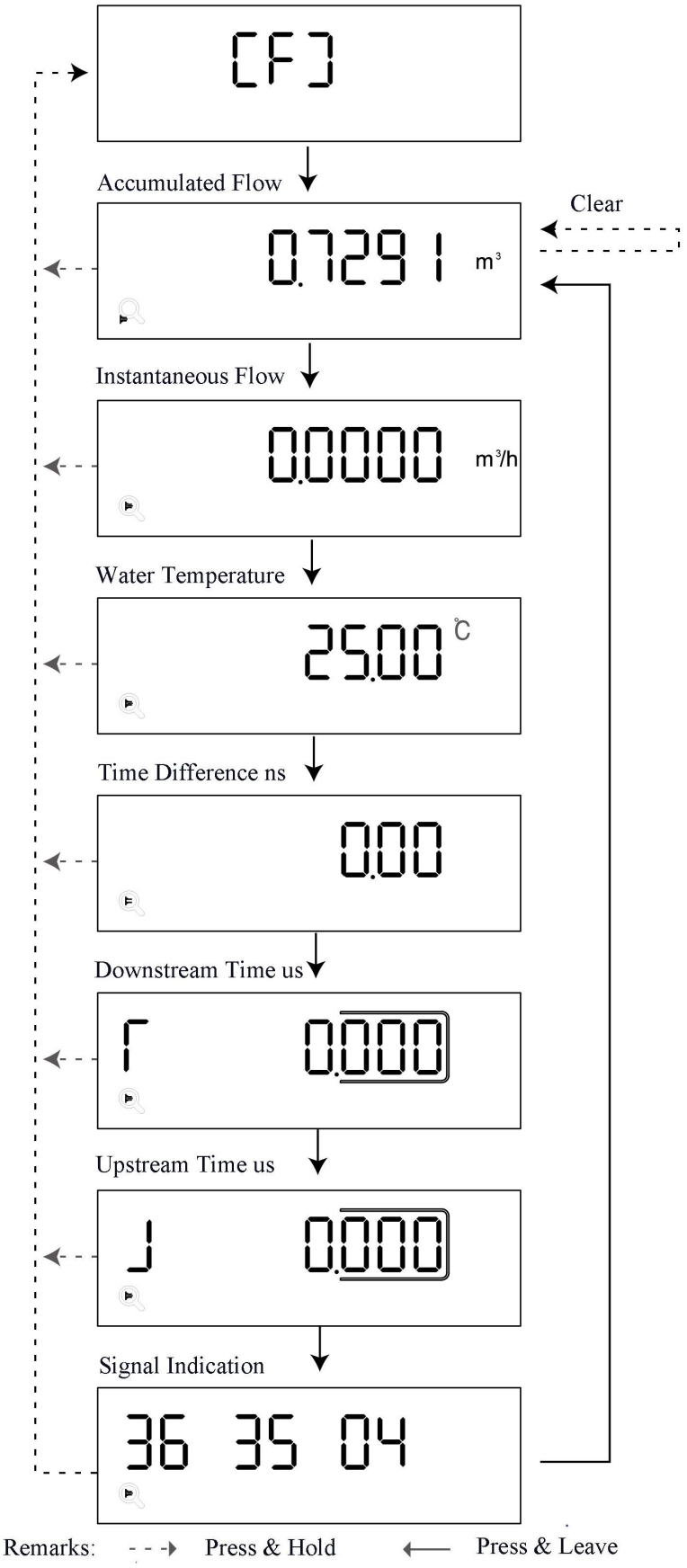
Use Press & Hold on the corresponding fault menu can view the duration of fault time.

3) Information Menu【I】



Notice：If the meter reading freeze time is displayed as "NULL", it means that there is no historical data on that date

4) Testing Menu【F】



5. Infrared Meter Reading

6. Users can be equipped with a hand-held meter reading machine to record the accumulated flow, running time and other information of the water meter. The meter reading method can refer to the operation instructions of the handheld machine.

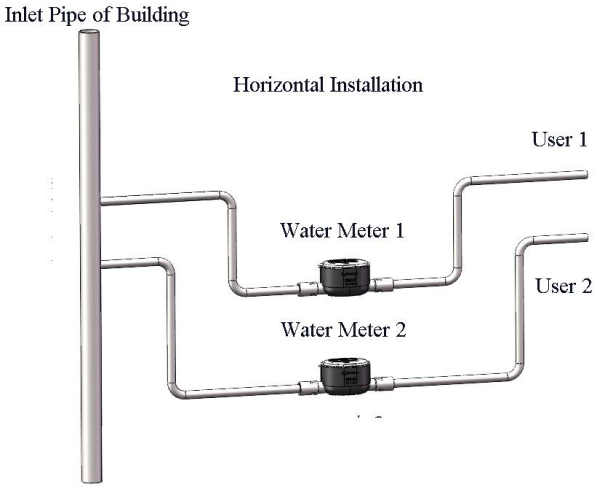
7. Installation

1) Installation Dimension

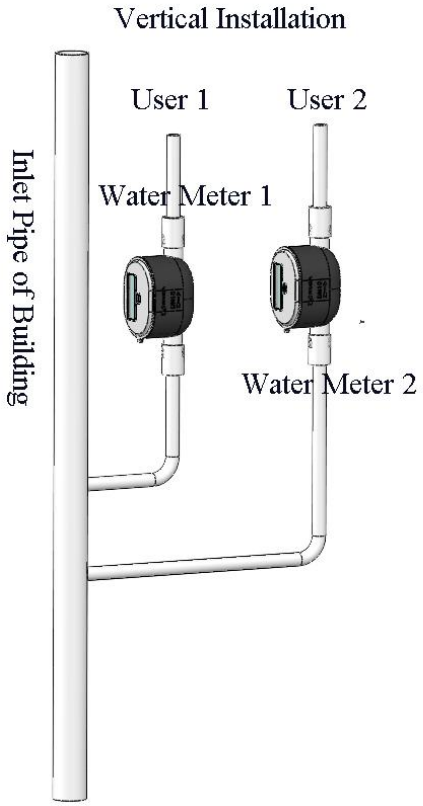
Norminal Size DN(mm）		15	20	25
Dimension	Length L（mm）	165	195	225
	Width W(mm)	83.5	89.5	89.5
	Height H(mm)	69.5	73	73
	Weight(kg)	0.7	0.95	1.15
Interface Size of Flow Pipe Segment	Thread Specification	G 3/4B	G1B	G1 1/4B
	Thread Length(mm)	12	12	12
Pipe Joint Size	Pipe Joint Length(mm)	53.8	60	70
	Thread Specification	R1/2	R3/4	R1
	Thread Length(mm)	15	16	18

2）Ultrasonic Water Meter Installation Requirements（A check valve must be installed before the water meter）

Because the measuring principle of ultrasonic water meter is different from the mechanical water meter, the pipe can’t be empty or accumulate much air bubbles, otherwise the ultrasonic signal can’t be transmitted and resulting in not counting or inaccurate measurement. Based on the above reasons, the recommend installation method is as follows:



For horizontal installation, it is recommended to install as above and make the pipe line into "U". In this case, the pipe of ultrasonic water meter in the lower section can be filled with water.

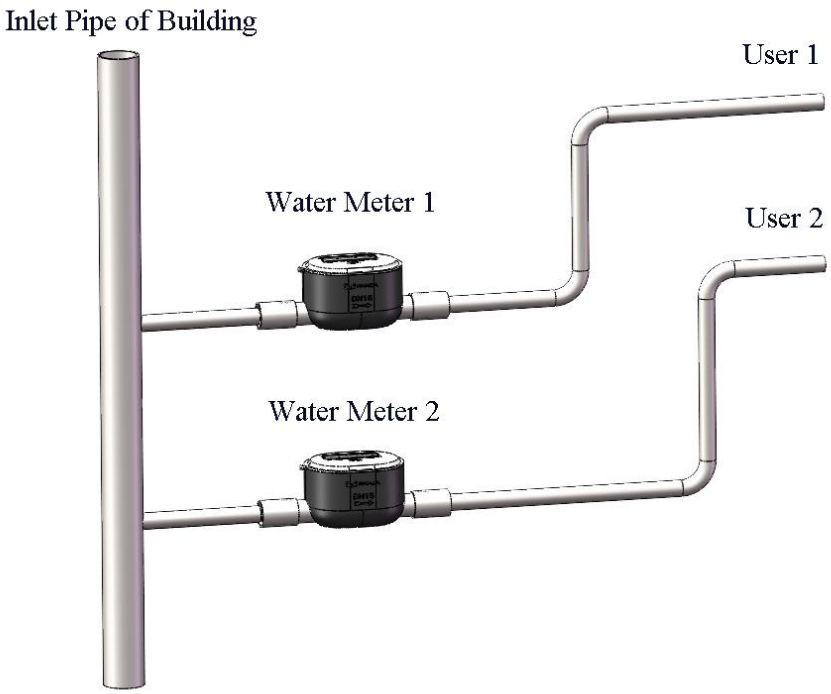


In vertical installation, as shown in the figure above, the water flow direction is inflow at the water meter at the lower end and outflow at the upper end.

In this case, when water flows through, bubbles can be avoided to gather in the meter measuring pipe.

Compromised installation (horizontal)

If it is difficult to implement the recommended horizontal installation conditions due to the objective conditions on site, at least install as shown below



In the figure, the pipe section in front of the water meter can be parallel to the water meter body (the right-angle bending structure is eliminated compared to the recommended method), but the pipe at the back of the water meter must be arranged as shown in the figure, so as to avoid bubbles forming in the pipe.

3) Precautions before installation

（1）The pipeline must be thoroughly cleaned before installing the ultrasonic water meter to avoid debris damage the water meter;

（2）Ultrasonic water meter is a relatively expensive precision instrument, you must be careful when picking up and putting down, do not directly lift the meter head or sensor line; It is strictly prohibited to be close to high temperature heat sources (such as electric welding, to prevent battery explosion, injury people and damage to the instrument);

（3）Special attention should be paid to the installation location of the ultrasonic water meter. It should be avoided to install the water meter on the upper end of the pipe (there will be bubbles in the pipe section), avoid installing it near the elbow (it will generate vortex flow), and keep it away from the pump and other equipment (it will cause pulsating flow).

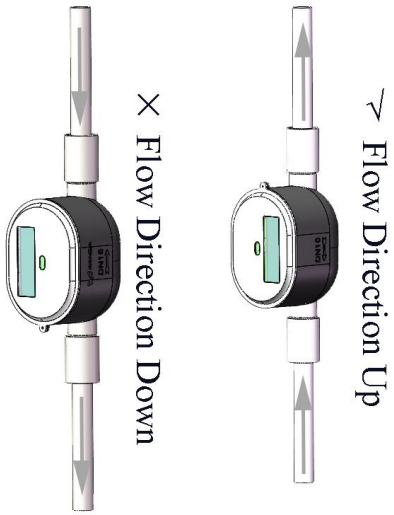
（4）The connecting pipes upstream and downstream of the ultrasonic water meter should be consistent with the diameter of the water meter and should not be reduced;

（5）The direction indicated by the arrow on the surface body of the ultrasonic water meter is the direction of water flow, and reverse installation is not allowed.

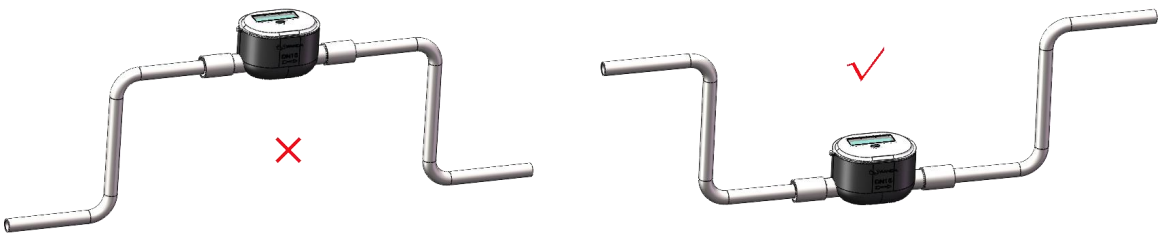
（6）It is suggested that the ultrasonic water meter is equipped with a filter of corresponding caliber in front of the meter; front and back of the meter is equipped with the corresponding diameter of the valve and it can be separated from the meter body, which is convenient for future maintenance and overhaul.

4) Common Error Installation Examples

(1) When the meter is installed vertically, it must be installed in a straight pipe with water flowing upwards, because the downward pipe with water flowing downwards will be affected by the gravity of the earth, which will cause the the pipe can't be filled up. In this case, the meter measurement will be inaccurate or even not measured (as shown in Figure C).



(2) When installing at the "U"-shaped pipe, please install the meter at the lowest point, because the pipe may gather air at a high place, causing the meter measurement to be inaccurate or not measured (as shown in Figure D)



Figure(D)

(3) When the meter is installed at the elbow, it must be ensured that the distance between the front straight pipe ≥5 times the pipe diameter and the rear straight pipe ≥ 3 times the pipe diameter, otherwise the meter may be inaccurate (as shown in Figure E).

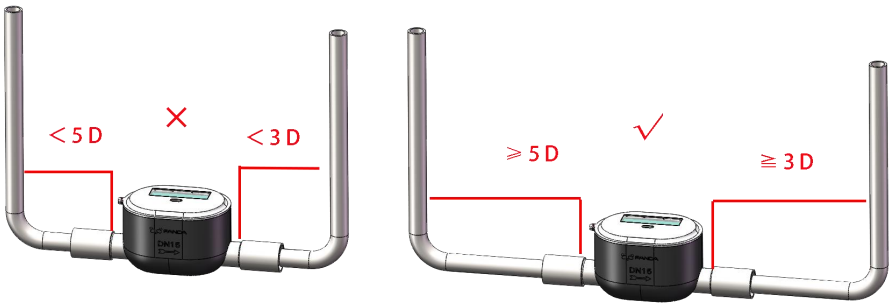
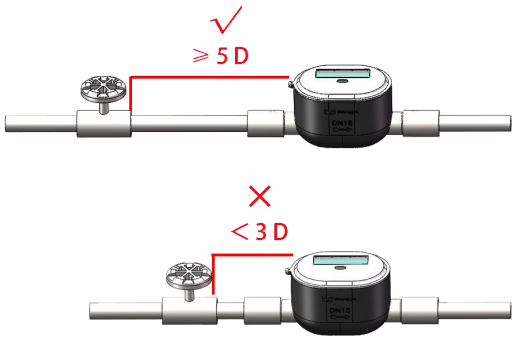


Figure (E)

(4) When the valve or other objects are installed in front of the meter, the distance between the meter and this object must be ≥5 diameters, otherwise the meter may be inaccurate; (as shown in Figure F)



Figure（F）

5) Wire Connection

●Power Wire

Default is built-in lithium battery power supply, extra power line is not needed.

External power supply mode (optional), red wire connects positive pole, black wire connects negative pole, voltage is DC (7.5-24)V

● Communication Wire

M-BUS communication mode: connect two communication wires with M-BUS directly, without positive and negative pole.

RS485 communication mode: there are 4 pieces of wires: A(Yellow), B(Green), Ground(Black), Power(Red), DC（7.5～24V), connect correspondingly (pay attention to the pole, the meter will be burned down if connect incorrectly)

6) Daily Maintenance

（1）Please check the meter condition before using.

（2）Please don’t damage the seal on water meter, otherwise we can’t guarantee the quality and accuracy.

（3）The water meter is powered by built-in lithium battery, working life is up to 6 years. When battery is going not to work any more or LCD displays the symbol (indicating low power), please inform after-sale service workers in time to avoid the meter can’t work normally.

7) Common Fault and Troubleshooting

No.	Error Type	Symbol	Cause	Solution
1	Battery	Be on	Battery under voltage or poor connection	Check attachment plug and change battery.
2	Empty Pipe	Blink	Have no water in pipe or partially filled pipe	Make the pipe full of water and eliminate air bubbles.
3	Reverse Flow	Be on	Pipe inlet and outlet are reversed	Change the inlet and outlet.
4	Over range	Be on	Flow rate is too high	Reduce flow or change higher range meter
5	Water Temperature	Be on	Water temperature fault	Reduce water temperature or change higher temperature meter
6	EE	Be on	EE memory failure	Change circuit board
7	Sensor	Be on	Inlet sensor fault	Change or re-install inlet sensor
8	Sensor	Be on	Outlet sensor fault	Change or re-install outlet sensor

8. LoRaWAN Protocol

1) Instructions for Registering Platform

LoRaWAN module(figure 1-1) has 4 parameters: EUI, working frequency, APPKEY and APPEUI，EUI is the factory fixed parameter , each module is fixed and unique. Generally working frequency is fixed, users can choose suitable frequency as needed. APPKEY and APPEUI are changeable as needed. Our water meter use fixed parameters, detailed parameters are as below:

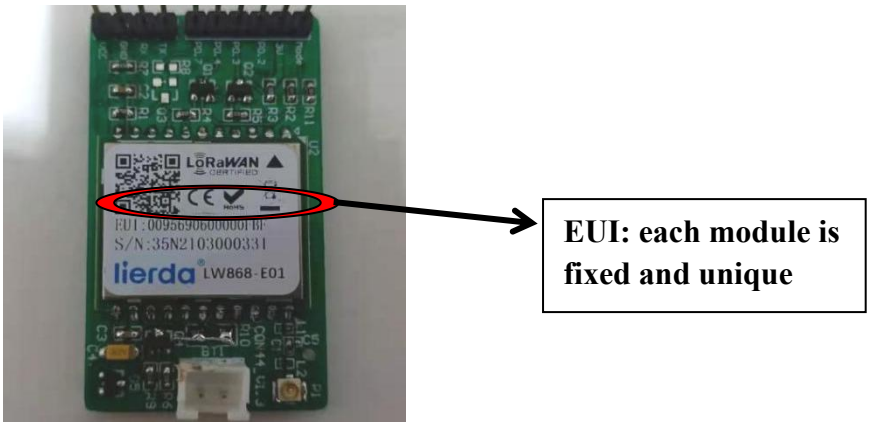


Figure 1-1

Note：The corresponding module parameters of 3 water meters are as follows

85 Type LoRAWAN Each Meter Corresponding Parameters				
Meter Address	Frequency	EUI	APPKEY	APPEUI
68202104080006	920MHz	0095690E00001C62	00112233445566778899aabbccddeeff (Consistent)	1122334455667788 (Consistent)
68202104080007	920MHz	0095690E00001C50		
68202104080008	920MHz	0095690E00001C53		
LoRAWAN Module has 3 parameters: EUI, APPKEY and APPEUI. EUI is the factory fixed parameter, each module is fixed and unique. APPKEY and APPEUI are all fixed value. Users can make relevant configurations on platform according to the three parameters.				

Users can enter LoRaWAN parameters on their own platform for platform registration as needed, as shown in figure 1-2.

At present we offer LoRaWAN with CN470, IN865, EU868, AU915, AS923 frequency. Any other frequency required please contact us.

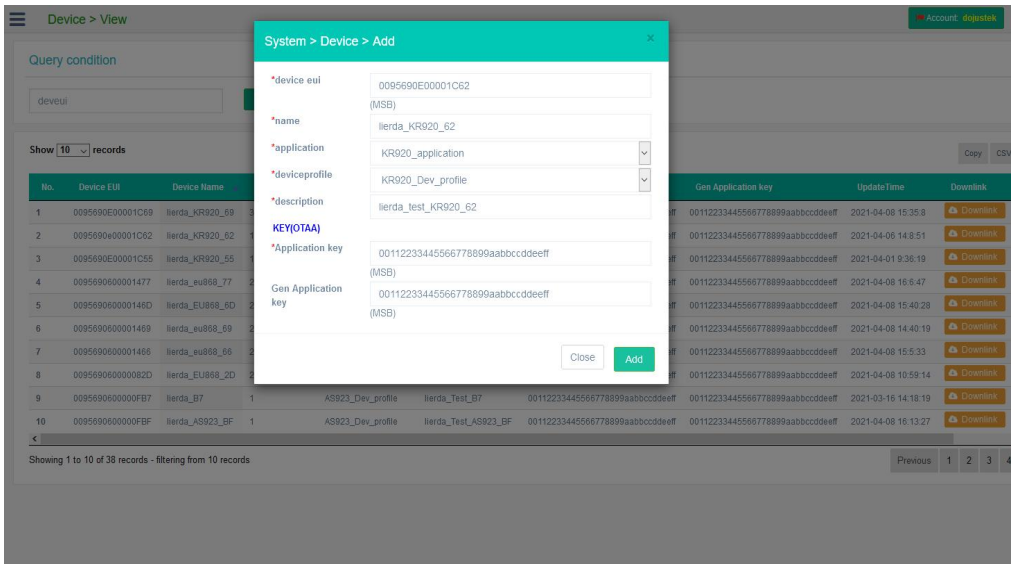


Figure 1-2

2) Instructions for Replacing Platform

If users replace platform, please perform the following operations after changing the platform:

Firstly, as shown in figure 2-1 main interface use magnet to trigger for a time, then enter figure 2-2 alarm menu interface. Then trigger for short time to enter figure 2-3, continue to trigger for short time to enter figure 2-4.

Trigger for a time：Use magnet to touch induction area and keep about 3 seconds then move away.

Trigger for short time：Use magnet to touch induction area and keep about 1 second then move away.

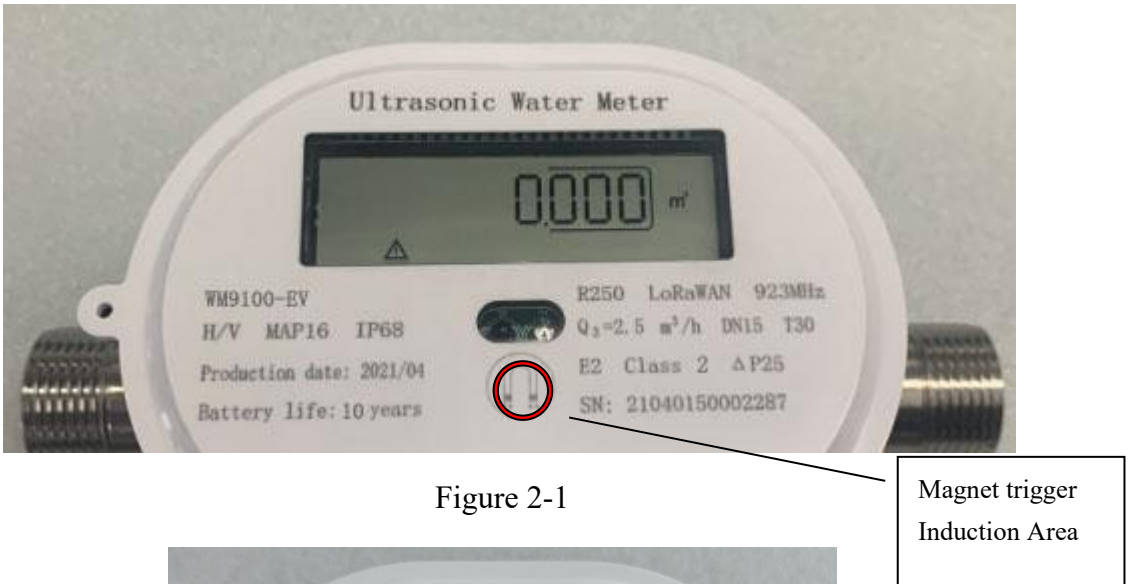


Figure 2-1

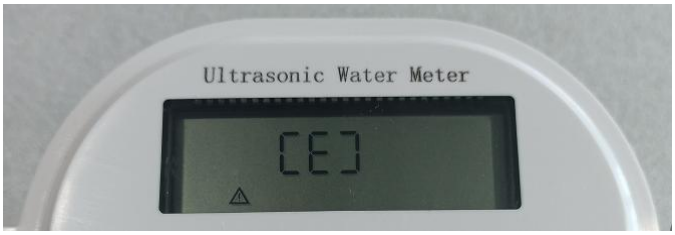


Figure 2-2

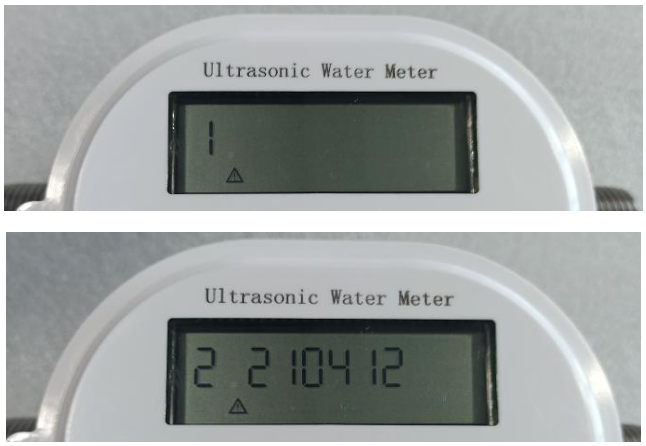


Figure 2-3
Figure 2-4

In the figure 2-4 interface continue to trigger for short time to enter figure 2-5 interface. Continue to trigger for short time to enter figure 2-6 interface.

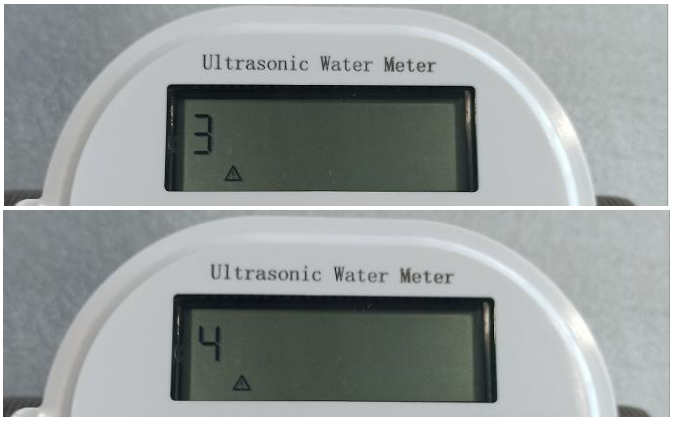


Figure 2-5
Figure 2-6

In the figure 2-6 interface continue to trigger for short time to enter figure 2-7 interface. Continue to trigger for short time to enter figure 2-8 interface.

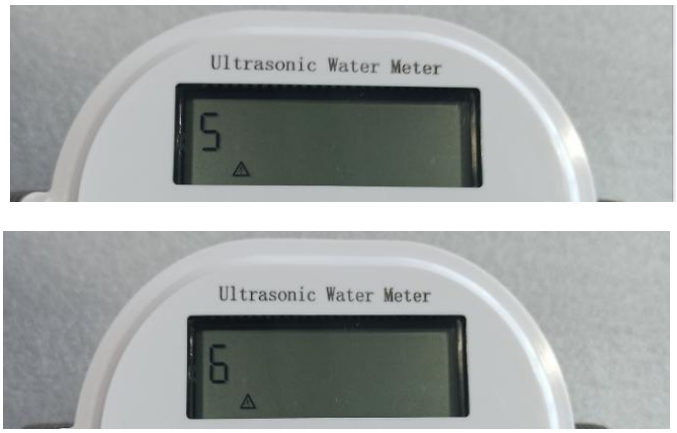
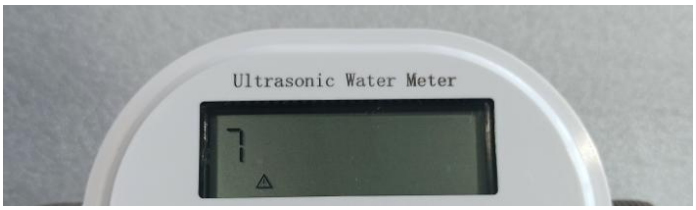


Figure 2-7
Figure 2-8

In the figure 2-8 interface continue to trigger for short time to enter figure 2-9 interface.



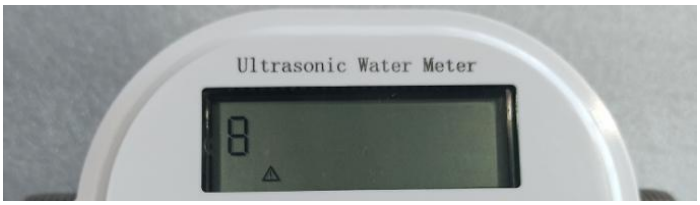


Figure2-9
Figure 2-10

In the figure 2-9 interface continue to trigger for short time to enter figure 2-10 to change platform interface. In the interface continue to trigger for a time to enter figure 2-11 to make configurations of LorAWAN Module for changing platform interface, no other operations required, about after 10-20 seconds configuration is successful and display the corresponding EUI of module, as show in figure 2-12, in the interface trigger for short time again, it will display the last eight digits of EUI, as shown in figure 2-13. After finishing the operation, users can upload data normally according to instructions. After operating as instructions, if in the figure 2-14 has no any changes or not display the corresponding EUI of module correctly, or during the operation entering other interfaces by mistake, please use magnet to trigger for a time back to main interface, then retry 1-2 times as the original steps.

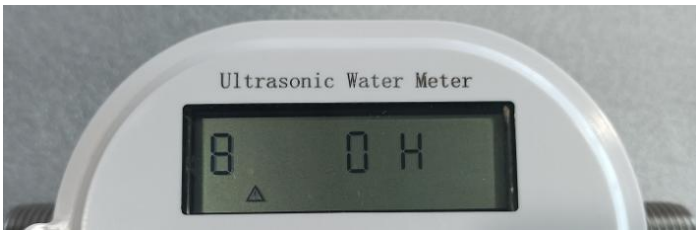


Figure 2-11

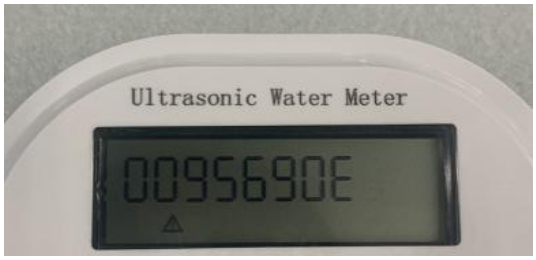


Figure2-12

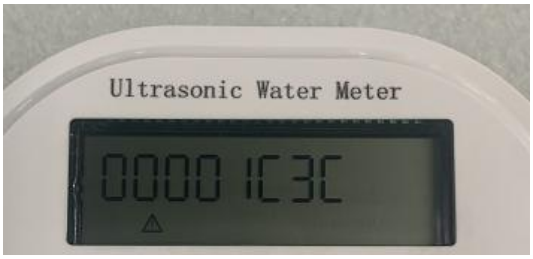


Figure 2-13

3) Instructions for Uploading Data

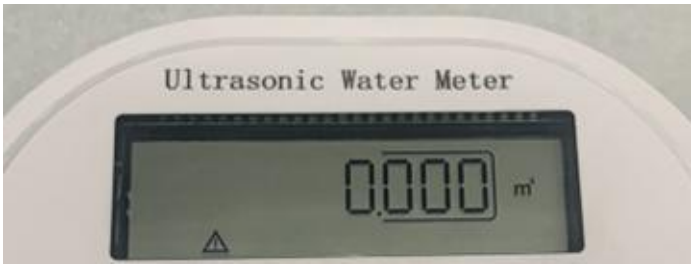


Figure 3-1

Main interface is as shown in figure 3-1， it displays the total flow. In the induction area, use magnet to trigger for a time to enter figure 3-2 alarm menu interface.

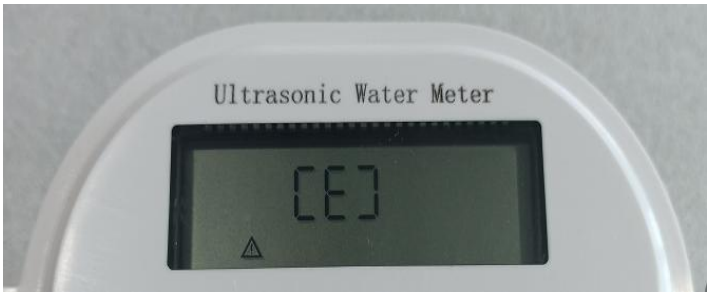


Figure 3-2

In the figure 3-2 alarm menu interface use magnet to trigger for a time to enter figure 3-3 information menu interface.

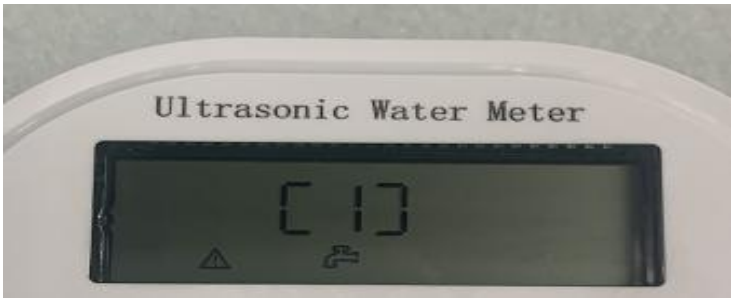


Figure 3-3

In the figure 3-3 information menu interface use magnet to trigger for short time to enter figure 3-4 interface, continue to trigger for short time to enter figure 3-5 interface.

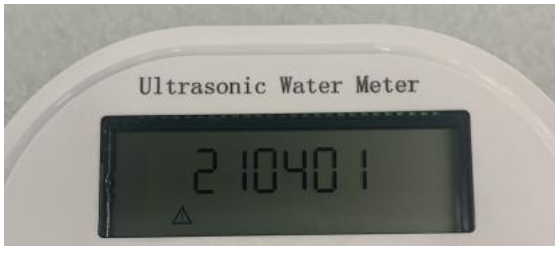


Figure 3-4

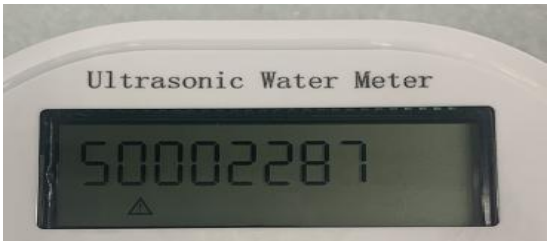


Figure 3-5

In the figure 3-5 interface continue to trigger for short time to enter figure 3-6 interface, continue to trigger for short time to enter figure 3-7 interface.

Figure 3-6

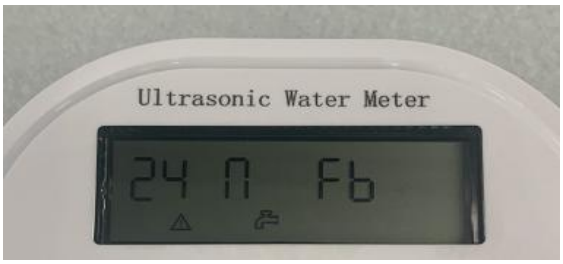


Figure 3-7

In the figure 3-7 interface continue to trigger for short time to enter figure 3-8 interface, trigger for short time again to enter figure 3-9 upload interface, upload at this moment, no other operations required, if upload successfully it will return to figure 3-10 main interface automatically, if upload failed it will return to figure 3-11 flow rate interface.

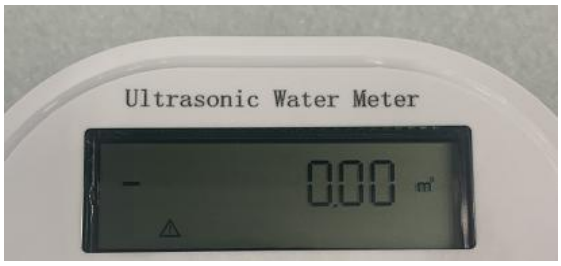


Figure 3-8

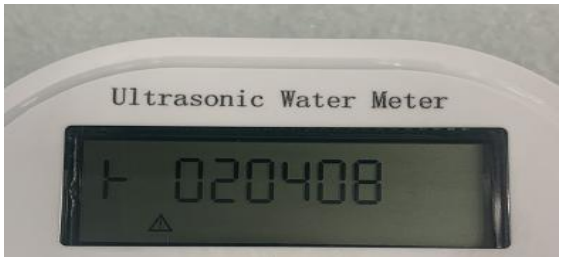


Figure 3-9

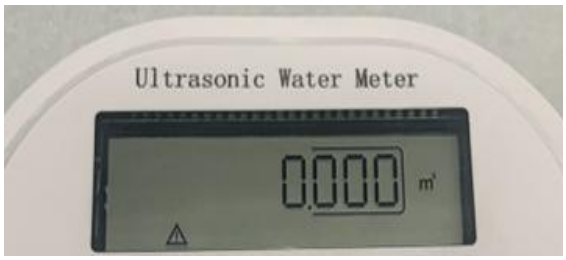


Figure 3-10

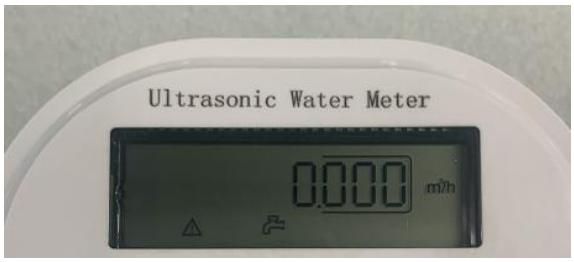


Figure 3-11

If upload failed, or during the operation entering other interfaces by mistake, please use magnet to trigger for a time back to main interface, then retry 1-2 times as the original steps.

Attachment：Operating Instructions

When replacing LoRaWan Upload Data platform, users need to reconfigure LoRaWAN parameters and change the default binding platform of the module. After getting the water meter, please ensure to follow the operating instructions to replace the platform firstly, and then upload data.

Attachment: LoRaWAN data report uploads command protocol

Data example:
681000000000000000081XX9012002C601300002C000000002C00000000355635370004360030301611111920000000XX16
//==========
// Data analysis:
68 Start code
10 Meter type
00000000000000 Meter address
81 Reporting Indicates
XX Length, variable
901200 Protocol identification code, fixed
2C60130000 Cumulative flow 13.60m3
2C00000000 Cumulative daily flow 0.00m3
2C00000000 Reverse flow 0.00m3
3556353700 Instantaneous flow 37.3556m3/h
043600 Real-time temperature 36.04℃
30301611111920 November 11, 2019 16:30:30
00 Alarm status
0000 Spare
XX Check code, that is, the sum of all accumulated digits from 68 to XX, divided by the remainder of 256.
16 Ending code

Flow unit: 2C unit is 0.01m³, 2D unit is 0.1 m³, 2E unit is 1 m³
Instantaneous flow rate: 35 means 0.0000 m³/h

9. Transport and Storage

1) Please handle with care during transport and avoid violently crashing.
2) Storage temperature is（-10～+50）℃, relative humidity is lower than 80％, avoid strong electromagnetic field and direct sunlight.
3) The stored product shall be at least 30cm from the ground, at least 1m from the walls, and at least 2m from the heating equipment.
4) The warehouse shall be kept dry and free from corrosive substances, gas and dangerous goods.

10. Warranty

The ultrasonic water meter defaults to a free warranty within one year from the date of shipment.(Customers can pay extra to extend the free warranty period, maximum is 6 years), lifetime maintenance. However, damage caused by the following conditions is not covered by the warranty：

1) The seal signs of each part of the ultrasonic water meter are opened or destroyed.
2) The components of the ultrasonic water meter are artificially destroyed.
3) The components of the ultrasonic water meter are exposed to sun exposure, flooding, freezing and chemical pollution.
4) The pipeline is not cleaned before installation or there are too many impurities in the pipeline, which results in damage to the flow sensor.
5) Failure and damage caused by not selecting a suitable product model.

Warranty Card

User Name		Contact Number	
User Address		Purchasing Date	
Product Model		Product SN	
Fault			

Notice：

Please read the user manual carefully before using meter.

Hope you can contact with us regularly to get the latest information, cause our product is constantly updated and improved.

11. Recycling Instructions for Waste Products

1) Purpose

When the product can’t be maintained or used and need to be recycled, please follow the requirements of local environmental department to minimize the possible damage to the environment.

2) Range

Suitable for products of Lanry Instruments (Shanghai) Co.,Ltd.

3) Details

(1) Regulations on waste products and emissions.

(2) Dispose of all waste products properly.

(3) When handling and disposing of the treated liquid, comply with applicable environmental regulations.

Clean up all spilled liquids according to safety and environmental protection regulations, and report all environmental emissions to relevant departments.

4) Electrical Parts

(1) For electrical equipment recycling requirements, please consult local power company.

(2) Recycling Guidelines

(3) Please strictly abide by local laws and regulations when recycling.

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All promotional photos are for reference only, please refer to the actual products