

# BTU Meter Ultrasonic Heat Meter

Model: ULTA-15-40



User manual

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# 1. Heat Meter Work Principle and Structure

## ◆ Heat meter definition

Heat meter is one kind of meter which measure and display heat energy when water through the heat exchange system .

## ◆ Working principle

When the water through the heat meter which installed in the heat exchange system, then meter's calculator calculates and display the release or absorption of heat energy according to flow quantity from the flow sensor and the temp. signal of Inlet and Return flow from matching temp. sensors, and the water flow through time.

## ◆ The advantages of ultrasonic heat meter

- ◇ Adopt imported precision electronics components, high measurement accuracy, low power consumption, good stability;
- ◇ No dirt deposited dead angle, no impurities by the medium, chemical material and the interference of magnetic materials, suitable for our country water quality;
- ◇ Measurement mechanism has no moving parts, then never wear, long service life;
- ◇ Minimal loss of pressure, to improve heating quality;
- ◇ M-bus, RS-485, LoRaWAN, LoRa RF, Pulse output and NB-IoT remote transmission modes for option;
- ◇ Using in wide range, both for cold and hot water;

## ◆ The key components of ultrasonic heat meter

### ◇ ultrasonic Flow sensor:

Installed in the heat exchange system, this part collect water flow quantity and send the signal.

### ◇ Temperature sensor(PT1000):

One pair of metrological characteristics consistent or similar temperature sensor respectively measure the inflow and outflow temperature in the heat exchanging system on the same heat meter.

### ◇ Calculator:

Receiving the signals from the flow sensor and matching temperature sensors, then calculating, storage and display the heat (cold) value in the heat exchanging system.

### ◇LCD display:

Mainly display the heat, flow rate, temperature, time and other information.

### ◇Battery:

Power supply for the calculator.

# 2. Implementation Standards

Our heat meters are designed and manufactured in compliance with the following international standards and certifications:

**MID (2014/32/EU):** Certified for use in custody transfer and billing applications within the European Union, ensuring measurement accuracy and legal compliance.

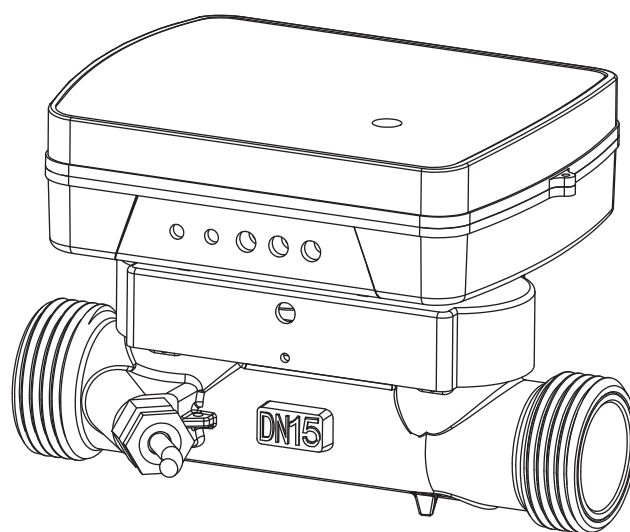
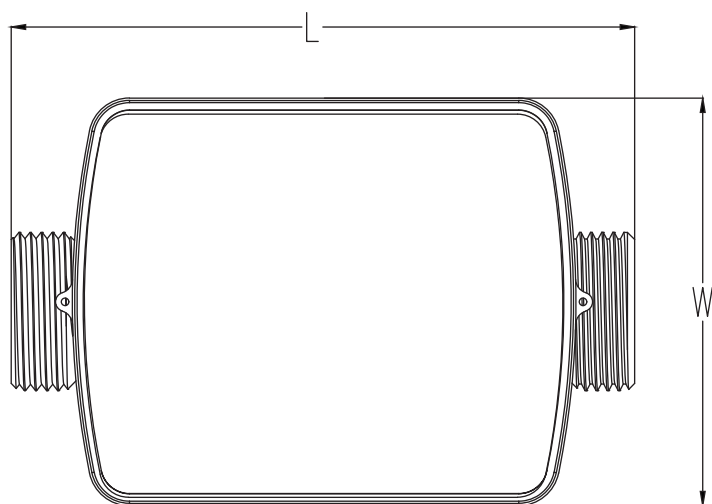
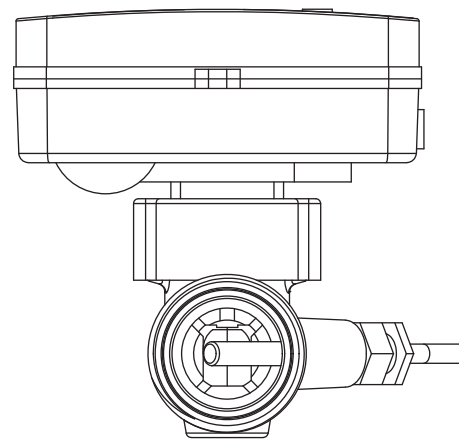
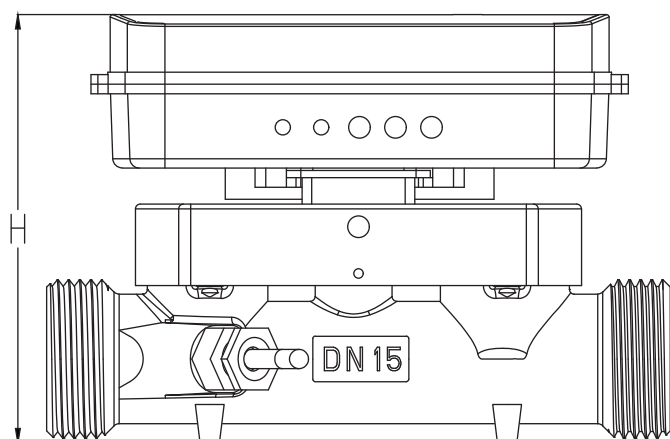
**EN 1434:** The metering performance and remote communication of this heat meter series comply with European Standard EN1434.

**CE Marking:** Declares conformity with EU directives on safety, electromagnetic compatibility (EMC), and environmental protection.

### 3. Technology specification

| Diameter(mm)                   | Q <sub>n</sub> (m³/h)                                                                                                                                                                           | Q <sub>min</sub> (m³/h) | Q <sub>max</sub> (m³/h) |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------|
| DN15                           | 1.5                                                                                                                                                                                             | 0.015                   | 3.0                     |
| DN20                           | 2.5                                                                                                                                                                                             | 0.025                   | 5.0                     |
| DN25                           | 3.5                                                                                                                                                                                             | 0.035                   | 7.0                     |
| DN32                           | 6.0                                                                                                                                                                                             | 0.060                   | 12.0                    |
| DN40                           | 10.0                                                                                                                                                                                            | 0.100                   | 20.0                    |
| Measurement Accuracy           | EN1434 Class 2                                                                                                                                                                                  |                         |                         |
| Connection                     | Threaded connection                                                                                                                                                                             |                         |                         |
| Pressure Loss                  | ≤ 20KPa                                                                                                                                                                                         |                         |                         |
| Maximum Working Pressure (MWP) | ≤ 1.6MPa                                                                                                                                                                                        |                         |                         |
| Flow Measuring Range           | 1:50                                                                                                                                                                                            |                         |                         |
| Temperature sensor             | 1.5m standard a pair of PT1000 Temperature Sensor ( cable length could be changed )                                                                                                             |                         |                         |
| Data Storage                   | Continuous store of 38 months record                                                                                                                                                            |                         |                         |
| Power-off Protection           | After power-off, meter could save all the record of before flow rate and the corresponding time, after power back, it recovery measure function automatically, and ensure the time continuation |                         |                         |
| Communication mode             | Mbus, RS485, LoRaWAN, LoRa RF, Pulse output and NB-IoT                                                                                                                                          |                         |                         |
| Communication protocol         | EN1434, Modbus                                                                                                                                                                                  |                         |                         |
| Power Supply                   | ER18505 Lithium battery                                                                                                                                                                         |                         |                         |
| Protection Class               | IP67                                                                                                                                                                                            |                         |                         |
| Environmental Class            | Class B                                                                                                                                                                                         |                         |                         |
| Temperature Range              | (4~95) °C                                                                                                                                                                                       |                         |                         |
| Temperature Difference         | (3~90)K                                                                                                                                                                                         |                         |                         |
| Installation Way               | Inflow or Return flow<br>( Default is Inflow, for return flow need to indicate when ordering )                                                                                                  |                         |                         |
| Installation Position          | Horizontal / Vertical                                                                                                                                                                           |                         |                         |
| Battery life                   | Service cycle ≥ 10 years                                                                                                                                                                        |                         |                         |
| Display                        | 8-bit LCD display                                                                                                                                                                               |                         |                         |
| Anti-magnetic Disturbance      | When the intensity of magnetic field interference is not more than 100 ka/m, should not affect water meter measurement and remote transmission characteristics.                                 |                         |                         |

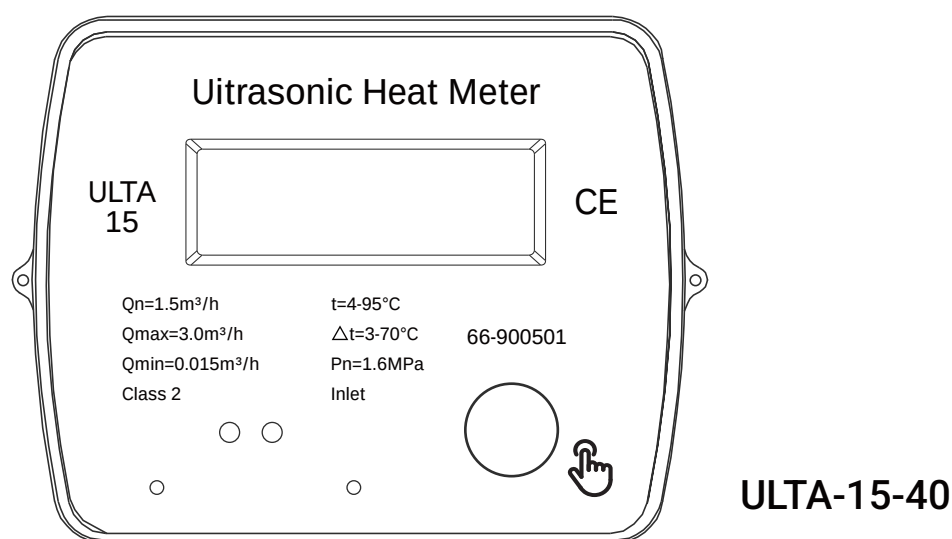
## 4. Outline dimension



| Dimensions(mm) | L(mm) | W(mm) | H(mm) |
|----------------|-------|-------|-------|
| DN15           | 110   | 85    | 85    |
| DN20           | 130   | 85    | 95    |
| DN25           | 160   | 85    | 105   |
| DN32           | 180   | 85    | 105   |
| DN40           | 200   | 85    | 115   |

## 5. Panel Design

Example:



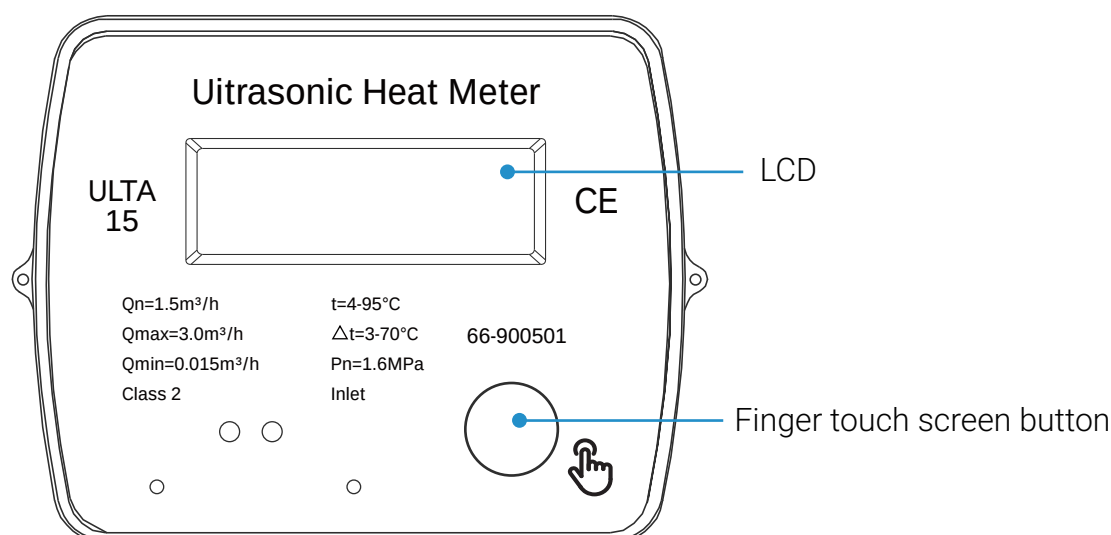
## 6. Operation and display

### 6.1 Operation

6.1.1 Users can use their fingers to touch buttons to switch the display content and view relevant data measured by the instrument. The instrument displays data in a cyclic menu structure.

6.1.2 The LCD main menu consists of 4 modes: User Menu, Test Menu, Information Menu, and Error Message Menu. The conversion between 4 modes, with a key press time  $>3\text{s}$ ; Switching of menu display in the same mode, key press time  $<1\text{s}$ .

6.1.3 User mode allows viewing of the following parameters: accumulated heat, accumulated cooling capacity, power, accumulated volume, flow rate, inlet temperature, return temperature, temperature difference, accumulated working time, meter number, nominal diameter, and full-screen display.



## 6.2 Display

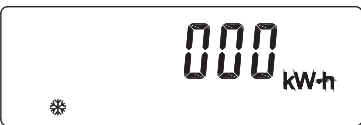
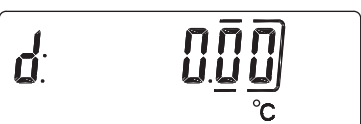
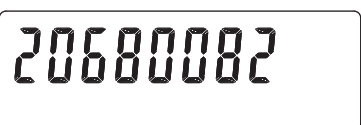
### 6.2.1 Full screen display

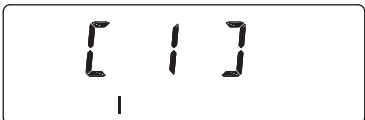
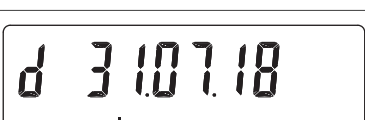
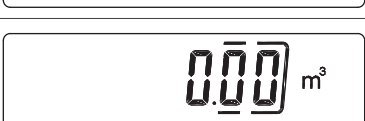
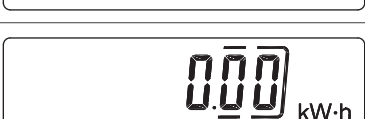
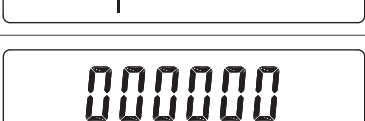


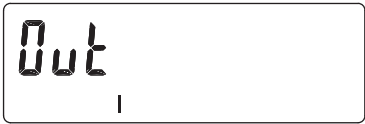
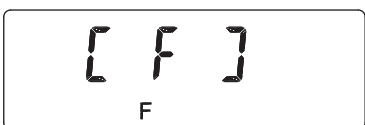
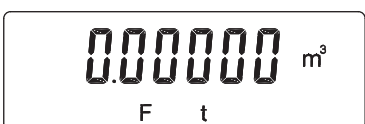
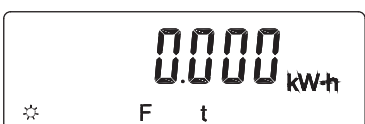
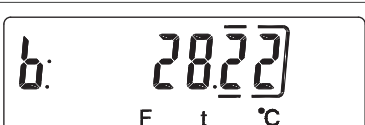
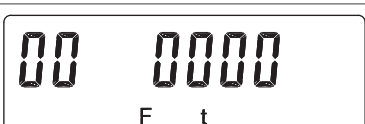
### 6.2.2 Display Icons definition

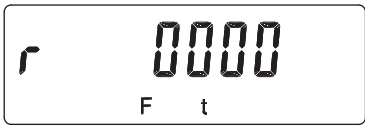
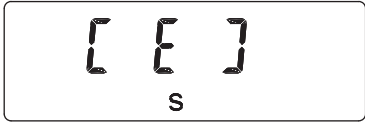
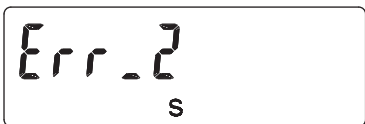
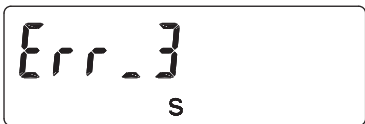
| Icons                                                                               | Definition           | Description                                                      |
|-------------------------------------------------------------------------------------|----------------------|------------------------------------------------------------------|
|  | Heat Symbol          | Indicates the displayed value is heat energy.                    |
|  | Battery Alarm Symbol | Indicates the battery needs to be replaced.                      |
|  | Cooling Symbol       | Indicates the displayed value is cooling energy.                 |
| I                                                                                   | Info Menu Symbol     | Indicates the current menu is the information menu.              |
| F                                                                                   | Test mode symbol     | Appears together with "t" to indicate the meter is in test mode. |
| t                                                                                   | Test mode symbol     | Appears together with "F" to indicate the meter is in test mode. |

### 6.2.3 Display menu description

| Serial Number | Example                                                                             | Item                            | Description                                               |
|---------------|-------------------------------------------------------------------------------------|---------------------------------|-----------------------------------------------------------|
| 1             |    | Accumulated heat consumption    | Accumulated heat consumption is displayed as 25 kW·h.     |
| 2             |    | Full-screen display             | All LCD segments are illuminated as shown.                |
| 3             |    | Accumulated cooling consumption | Accumulated cooling consumption is displayed as 000 kW·h. |
| 4             |    | Power                           | Instantaneous power is displayed as 0.00 kW.              |
| 5             |   | Accumulated volume              | Accumulated volume is displayed as 0.00 m³.               |
| 6             |  | Instant flow rate               | Instantaneous flow rate is displayed as 0.800 m³/h.       |
| 7             |  | In temperature                  | Inlet temperature is displayed as 28.22 °C.               |
| 8             |  | Return temperature              | Return temperature is displayed as 28.22 °C.              |
| 9             |  | Temperature difference          | Temperature difference is displayed as 0.00 °C.           |
| 10            |  | Accumulated working hours       | Accumulated working hours are displayed as 00 h.          |
| 11            |  | Meter serial number             | Meter serial number is displayed as 20680082.             |
| 12            |  | Nominal diameter                | Meter size is displayed as DN15.                          |

| Serial Number | Example                                                                             | Item                                  | Description                                                               |
|---------------|-------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------|
| 13            |    | Software version                      | Software version is displayed as u-A.2.5A.                                |
| 14            |    | Information menu                      | The display is currently in the information menu.                         |
| 15            |    | Current time                          | Current time is displayed as 10:58:20.                                    |
| 16            |    | Current date                          | Current date is displayed as 2018.08.23.                                  |
| 17            |    | Historical data                       | Historical data for 2018.07.31 is being displayed.                        |
| 18            | .....                                                                               | .....                                 | .....                                                                     |
| 19            |  | Total 38 months data                  | Historical data for 2015.06.30 is displayed, covering 38 months in total. |
| 20            |  | Accumulated heat consumption (kWh)    | Accumulated heat consumption is displayed as 0.00 kW·h.                   |
| 21            |  | Volume (m³)                           | Accumulated volume is displayed as 0.00 m³.                               |
| 22            |  | Accumulated cooling consumption (kWh) | Accumulated cooling consumption is displayed as 0.00 kW·h.                |
| 23            |  | Primary address                       | The primary address identifier is P-Adr.                                  |
| 24            |  | Primary address value                 | Primary address value is displayed as 000000.                             |
| 25            |  | Secondary address                     | The secondary address identifier is S-Adr.                                |

| Serial Number | Example                                                                             | Item                               | Description                                                           |
|---------------|-------------------------------------------------------------------------------------|------------------------------------|-----------------------------------------------------------------------|
| 26            |    | Secondary address value            | The value of the secondary address is 12345678.                       |
| 27            |    | Installation location: supply side | Installation side is IN, indicating the supply / inlet side.          |
| 28            |    | Return side                        | Installation side is OUT, indicating the return / outlet side.        |
| 29            |    | Nominal diameter                   | Meter size is displayed as DN15.                                      |
| 30            |    | Software version                   | Software version is displayed as u-A.2.5A.                            |
| 31            |   | Test menu                          | The system is currently in Test Menu mode.                            |
| 32            |  | Accumulated volume                 | Accumulated volume in test mode is displayed as 0.00000 m³.           |
| 33            |  | Accumulated heat consumption       | Accumulated heat consumption in test mode is displayed as 0.000 kW·h. |
| 34            |  | Instantaneous flow rate            | Instantaneous flow rate in test mode is displayed as 0.000 m³/h.      |
| 35            |  | In temperature                     | Inlet temperature in test mode is displayed as 28.22 °C.              |
| 36            |  | Return temperature                 | Return temperature in test mode is displayed as 28.22 °C.             |
| 37            |  | Temperature difference             | Temperature difference in test mode is displayed as 0.00 °C.          |
| 38            |  | Ultrasonic time difference         | Ultrasonic time difference is displayed as 00 0000.                   |

| Serial Number | Example                                                                             | Item                                     | Description                                                                          |
|---------------|-------------------------------------------------------------------------------------|------------------------------------------|--------------------------------------------------------------------------------------|
| 39            |    | Forward flow time                        | Downstream ultrasonic transit time is displayed as r 0000 Ft.                        |
| 40            |    | Reverse flow time                        | Upstream ultrasonic transit time is displayed as l 0000 Ft.                          |
| 41            |    | Error message menu                       | The display is currently in the error / fault diagnosis menu ( indicated by [ E ] ). |
| 42            |    | Abnormal power supply                    | Error code Err_1 is displayed, indicating abnormal power supply.                     |
| 43            |    | Abnormal Inlet temperature               | Error code Err_2 is displayed, indicating abnormal inlet temperature.                |
| 44            |   | Abnormal outlet temperature              | Error code Err_3 is displayed, indicating abnormal outlet temperature.               |
| 45            |  | Abnormal flow sensor                     | Error code Err_4 is displayed, indicating abnormal flow sensor.                      |
| 46            |  | Fault occurrence time                    | The meter records the exact time when a fault occurs, displayed as d_00.00.00.       |
| 47            |  | Accumulated Heat at time of last error   | Accumulated heat at the time of last error is displayed as 0.00 kWh.                 |
| 48            |  | Accumulated volume at time of last error | Accumulated volume at the time of last error is displayed as 0.00 m³.                |
| 49            |  | Accumulated cold at time of last error   | Accumulated cooling at the time of last error is displayed as 0.00 kWh.              |

## 7. Rated operation conditions

- Flow range:  $Q_{\min} \leq Q \leq Q_n$ .
- Working environment temperature range:  $-25^{\circ}\text{C} \sim 55^{\circ}\text{C}$ .
- Water temperature range:  $4^{\circ}\text{C} \sim 95^{\circ}\text{C}$ .
- Working environment humidity range:  $\leq 93\% \text{RH}$ .
- Working pressure range:  $0.03 \text{ MPa} \sim 1.6 \text{ MPa}$ .

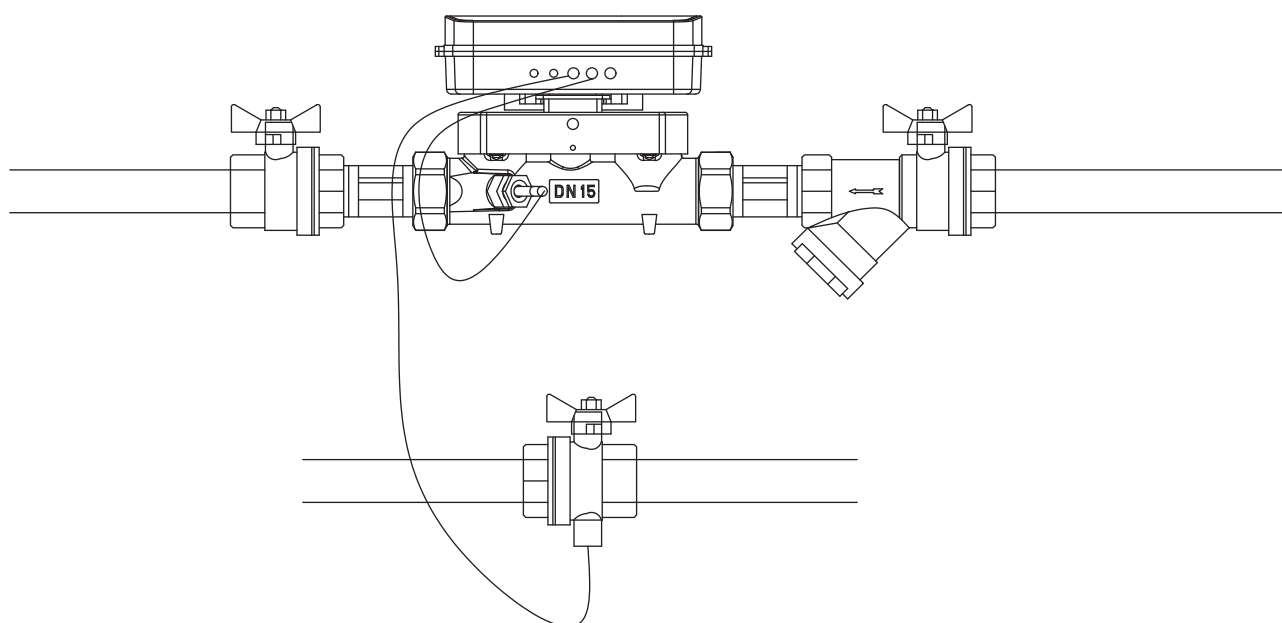
## 8. Actively report the abnormal information of the meter

- Battery level detection: When the battery is low, the LCD will display , indicating that the battery needs to be replaced.

## 9. Installation and Attentions

1. Heat meter must be installed in dry accessible place.
2. Using professional installation tools to install the heat meter.
3. The heat meter both can be installed in Inflow pipe or Return flow pipe (factory default installed in the inflow pipe, if need to install on the return pipe, must be clearly indication before the factory during the production). When installation, should pay attention to the flow direction of medium is as the same as the arrow on the heat meter pipe body.

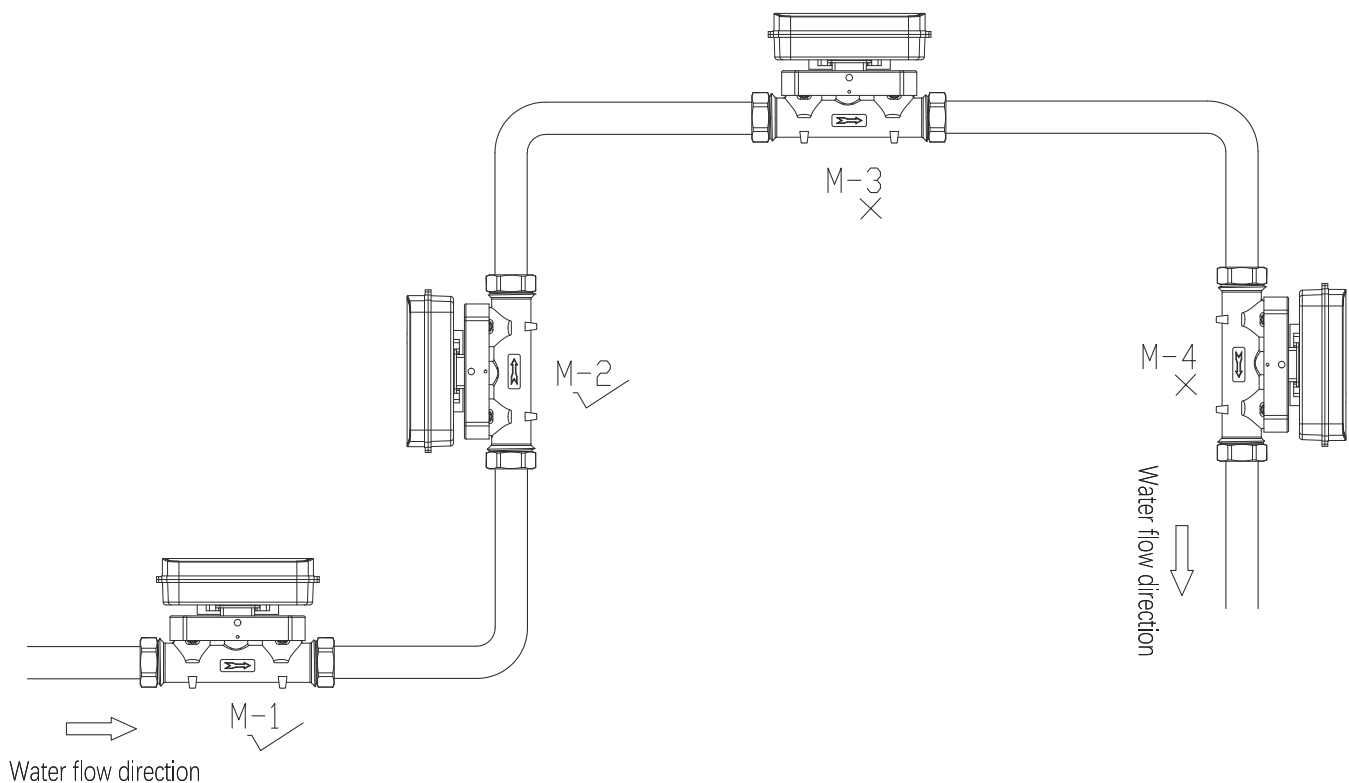
**Special note:** no matter the heat meter installed on inflow pipe or return flow pipe, the temperature sensor should be properly connected ( red label for inflow pipe, blue label for return pipe).



#### 4. The installation position of heat meter

◇ In the pic, the M-1, M-2 show the right installation (M-1 is horizontal installation M-2 is vertical installation), The heat meter installed in the bottom of the pipeline, there is back pressure behind the meter, won't produce bubbles affect measurement accuracy.

◇ In the picture, M-3, M-4 show the wrong installation, M-3 easy to accumulate bubbles, affect the accuracy of measurement, M-4 although vertical installation, but there is not back pressure in the behind of meter, may cause the fluid cannot be completely full of pipes, affect measurement accuracy.



5. When install the heat meter, front straight pipe length should not be less than 5 times of the pipe diameter, back straight pipe length should not be less than 2 times of the pipe diameter (see: «JGJ173-2009 heating metering technology rules» Article 6.3.4).

6. Pipe should be keep horizontal as much as possible, and pipeline's sectional area should be not big changes.

7. In order to ensure the meter accuracy, the cable of temperature sensor shall not be cut short or make longer.

8. When the meter is vertical installation in the same position in each floor, between each meter should have partition wall, prevent pipeline leaking or other things falling to damage the meter.

9. Heat meter horizontal installation as the best location, which is beneficial to the meter is normal working.

10. Suggest the meter installed in special box, and with lock, in order to avoid Damage.

11. Replace the battery must by professional staff.

## 10. Attentions

1. Should be installed filters and valves in front and behind the meter.

2. Before heat meter installation, should be clean pipe, and the system.

3. In the installation process of pipe, fittings and meters, must not use "linen silk" sealing the fitting, because when turning screws, the "linen silk" will cut off by thread, the broken part is easy to cause congestion with flow through the meter.

4. The meter has temperature sensor cable, when leave factory, no tighten. When installation, the cable should tighten, in order to avoid leaking (note: the meter installed in inflow temperature sensor when the meter in the factory, according to the actual situation to properly installed the inflow or return flow temperature sensor).
5. After installation, all parts should test, check whether leakage.
6. The lead seal on the ultrasonic heat meter cannot be damaged. If the seal is damaged, the manufacturer will not ensure the quality and accuracy;
7. Abnormal using condition (artificial and bad using environment, etc) caused by damage of ultrasonic heat does not belong to free warranty, when installation, should peruse the discipline, careful operation;

## 11. Troubleshooting

### 11.1 The meter cannot work normally

- ◇ Heating system is working or not;
- ◇ Globe valve is opened entirely or not;
- ◇ the pipe is blocked or not;
- ◇ the lead seal is complete or not;
- ◇ Battery is good or not;
- ◇ heat meter isn't counting
  - ① heat meter reversed installation
  - ② transducer cables are broken
  - ③ the filter is blocked on heat supply pipe of in the resident room

### 11.2 How to determine the filter whether block?

Inflow temp. is normal, return flow temp. is too low, the temp. difference of inflow and return flow is more than 10°, flow rate is too low (m<sup>3</sup>/h), or now flow rate, usually the filter is blockage, or user does not use. Solution: Close the valve (inflow and return flow valve), remove the filter, to observe whether filter is black, clean filter and inside of it, then install the filter, open pipe valves, wait 3 mins to check whether the flow rate and temp. is normal.

### 11.3 Heat meter data abnormal or jumping

- ① Installation position is not correct, down water level.
- ② Front and back straight pipes are too short, bend is too big, front pipe diameter is changing bigger.

### 11.4 Heat meter has flow quantity, no heat, or heat is very big

- ① Without heat is usually reversed installation of inflow and return flow temp. sensors.
- ② Heat is very big, because the temp. sensor measure temp. incorrectly, temp. difference is very big.

### 11.5 Heat meter abnormal temp., or the temp. is 0

- ① The temp. sensor cable is broken.
- ② Temp. sensor stainless steel casing is broken.

## 12. Transportation and storage

1. The heat meter should be stored in the original package, the ambient temperature is 5-55℃, and the air is free of corrosive gases.
2. When heat meters are stored on shelves, the stacking height of the boxes should not exceed 1.5 meters.
3. During transportation, avoid being squeezed by heavy objects to prevent damage to the heat meter.

## 13. Warranty terms

1. The warranty period for this heat meter is 6 years.
2. Within 6 years of using our company's heat meter, if the installation is reasonable and the heat meter is used under its rated conditions, and if there is any damage or malfunction to the components (excluding freezing damage) caused by manufacturing quality, our company is responsible for repairing or replacing them while maintaining the integrity of the lead seal.

## 14. After-sales services

1. Our company provides lifelong after-sales service for heat meters.
2. When there is a quality problem with the heat meter, the user or manager should first provide feedback to the after-sales service department of our company and seek solutions to the problem. Without the permission of our after-sales service personnel, it is not allowed to damage the lead seal or open the heat meter without authorization.
3. During the warranty period, if the heat meter is damaged or malfunctioning (excluding freezing damage) due to manufacturing quality, our company will be responsible for repairing or replacing it free of charge while maintaining the integrity of the lead seal. After exceeding the warranty period, our company provides paid services.