NEO WAVE®

Installation & User Guide

UTM22

DN 50-400

Ultrasonic BTU Meter



Read this Guide before installing the meter

Thank you for choosing our products

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the meter's performance and functions.

- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact NEO WAVE.

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1. General Information

Please note that the following installation conditions must be obeyed: Pressure Requirement: PN16. Environmental Class: E1, M1 Installation requirement: There must be a distance of minimum 25 cm between signal cables and other installations If medium temperature is below 10°C or above 90°C in flow sensor, It's recommended that the calculator be wall-mounted. Note: Seal or any safety marks on the meter must not be damaged or removed, and doing so will void the warranty and calibration of the meter.

Key Information:

Flow Sensor	*Registers the amount of district heating water in m³/h circulating through the heating system. Θ: 3°C~150°C*
Temperature Sensors	*Placed in forward and return pipes sense the cooling, by the difference between in flow and out flow temperatures. Θ: 1°C~150°C*
Calculator	*Calculates heat energy consumption based on flow volume and temperature loss of heating water. ΔΘ: 3K~95K*
Electromagnetic Environment	*E1 (housing/light industry). The meter's control cables must be drawn at min. 25 cm distance to other installations.*
Mechanical Environment	*M1 (fixed installation with minimum vibration).*
Climatic Environment	*The meter must be installed in environments with non-condensing humidity as well as in closed locations (indoors). The ambient temperature must be within 5~55°C.*
Maintenance and Repair	*The district heating supplier can replace temperature sensor and battery. The flow sensor must not be separated from the calculator. UTM22 Series must be connected to a temperature sensor pair type Pt1000.*
Battery for Replacement	*UTM22 Series can be fitted with ER18505 or ER26500 with operating time of 6/10/15 years replaceable.*

2. Technical specification

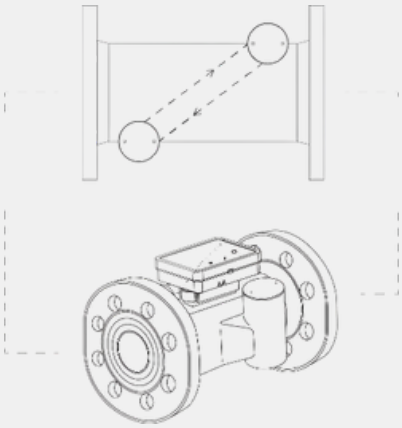
2.1 Complete meter

Model	Diameter	Nominal FlowRate	Maximum FlowRate	Minimum FlowRate	Flange Outer Diameter	Length	Connection
	DN(mm)	Qp(m³/h)	Qs(m³/h)	Qi(m³/h)	mm	mm	
UTM22-50	50	15	30	0.3	165	200	4×M16
UTM22-65	65	25	50	0.5	185	200	4×M16
UTM22-80	80	40	80	0.8	200	225	8×M16
UTM22-100	100	60	120	1.2	220	250	8×M16
UTM22-125	125	100	200	2	250	250	8×M16
UTM22-150	150	150	300	3	280	300	8×M20
UTM22-200	200	200	400	4	335	345	12×M20
UTM22-250	250	400	800	8	405	445	12×M24
UTM22-300	300	600	1200	12	460	500	12×M24
UTM22-350	350	800	1600	16	520	500	16×M24
UTM22-400	400	1000	2000	20	580	600	16×M27

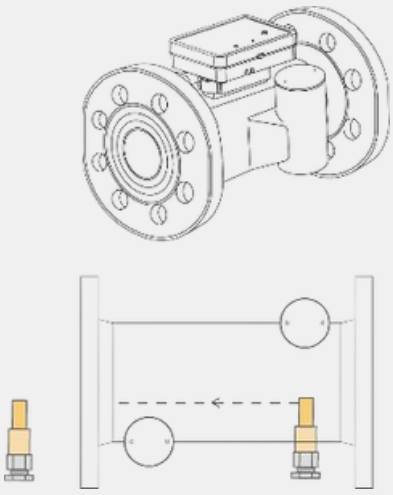
Temperature	Range:1℃-150℃,ΔT:3k-95k
TemperatureSensor	ApairofPT1000platinumresistor
Metro-logicalClass	Class2
MaximumOperationPressure	1.6Mpa
PressureLoss	P<25kPaatQp
PressureStage	PN16
ProtectionClass	IP65
Battery	3.6VDC,lithiumbattery,6-10-15yearslifetimeoption.
DataStorage	·24 months history data, including accumulated heat energy and volume,etc. ·Total heat energy, volume, running hours, etc.
Operating Temperature	-30℃ - 55℃
Interface & Communication	·M-Bus ·Optical port ·Pulse Output / Pulse Input ·RS-485 ·LPWAN (LoRaWAN, Sigfox) ·4G(CAT1)
Installation	Horizontal or Vertical
Display and Indication	· Unit: kWh, MWh, GJ (optional) · LCD: 8-digit (back illumination) · Accumulated: 0.1kWh-9999999.9kWh.
Standard Compliance	·EN1434 ·EN13757

2.2 The main consist unit of UTM22 Series Ultrasonic Heat Meters

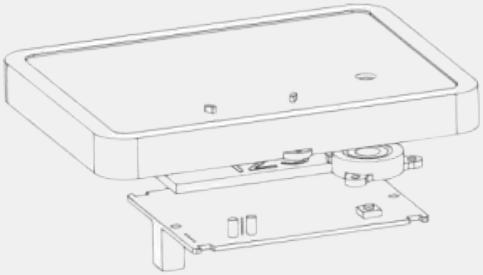
2.2.1 Ultrasonic Flow Metering Unit: Ultrasonic flow meter measures by the transfer of ultrasound signals between transducers with the help of mirrors.



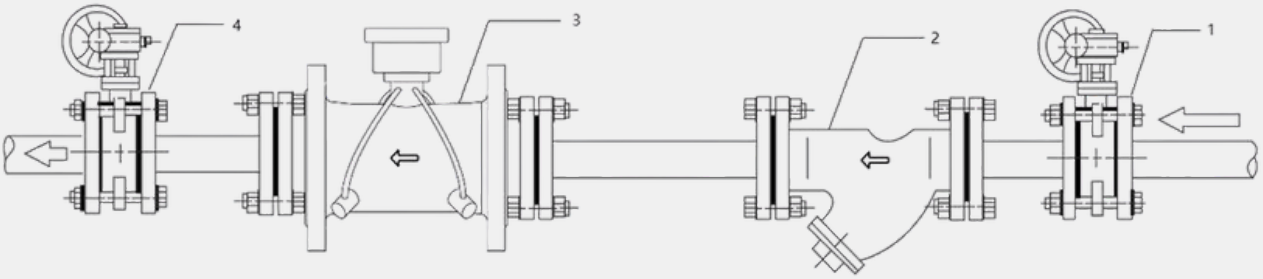
2.2.2 Temperature Metering Unit: PT1000 type heat sensors are used which they are calibrated, certified. If input water temperature metering prob is integrated with the meter body where flow meter is, thus the output water temperature metering prob is mounted to a suitable point on the network return water direction. Also meter could be installed in out flow position. Default cable length is 1.5m, but 3m length is also available as per request.



2.2.3 Calculator Unit: It is the unit that process energy calculation by the flow rate data received from flow rate metering unit and temperature data received from temperature metering unit. Its calibration is performed in software at factory. Calculated energy and other information is displayed on the LCD when button is pushed. These information may be remotely read via optical port and communication unit.



3. Installation

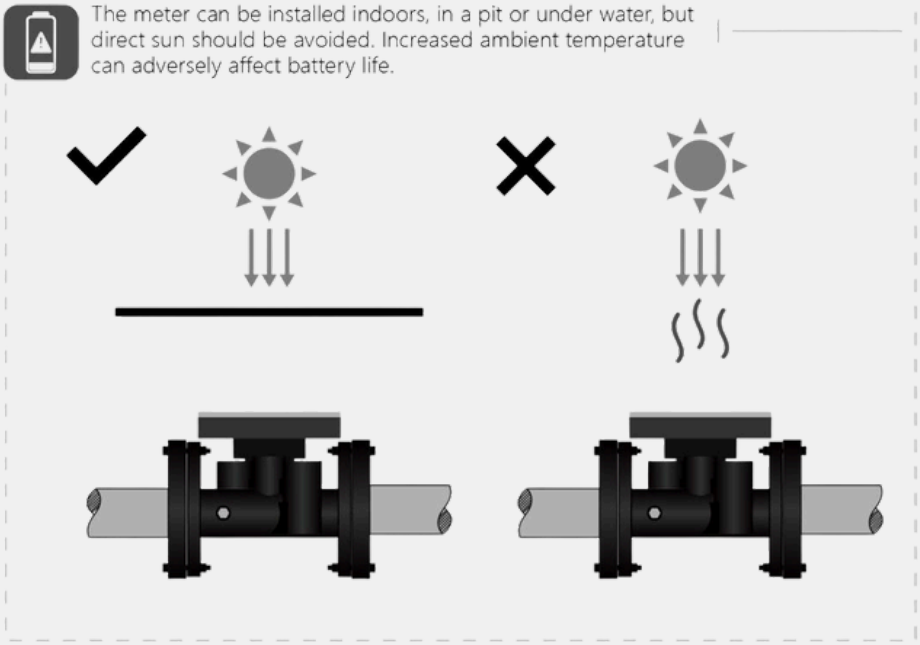


Installation diagram

No.	*Description*
1	*Valve Inlet*
2	*Strainer*
3	*Water Meter*
4	*Valve Outlet*

3.1 Requirements for installation environment

UTM22 Series has been designed for indoor installation in non-condensing environments with ambient temperatures from 5~55°C.



- The meter must not be under any mechanical stress when installed in the pipe. The meter must be protected against pressure shocks in the pipe.
- Protection class IP68 allows long-term submergence, provided that all cable unions have been correctly mounted and that the plastic cover has been properly fastened.
- Make sure the meter is installed sufficiently far away from possible sources of electromagnetic interference (switches, electric motors, fluorescent lamps, etc.).
- All control cables must be drawn separately and not parallel to e.g. power cables or other cables with the risk of inducing electromagnetic interference. There must be a distance of min. 25cm between signal cables and other installations.
- If two or more meters are to be installed shall be in parallel, the axis-center distance between two meters shall be at least 135mm minimum.

3.2 Before Installation

The pipe must be completely cleaned before installing the ultrasonic heat meter to prevent the debris from damaging the heat meter. Ultrasonic heat meter is an expensive precision instrument. Care must be taken when transporting. It is forbidden to directly lift the meter head or sensor line; it is strictly prohibited to approach a higher temperature heat source (such as electric welding to prevent battery explosion and injury and damage to the instrument). The installation position of the ultrasonic heat meter should pay special attention. The heat meter should be avoided to be installed at the upper end of the pipeline (there will be bubbles in the pipe), avoiding installation near the elbow (which will generate vortex flow), and should be kept away from pumps and other equipment (which will cause pulsating flow); The connecting pipe at the upstream and downstream of the ultrasonic heat meter shall be the same as the diameter of the heat meter and shall not be reduced in diameter.

The direction indicated by the arrow on the surface of the ultrasonic heat meter is the direction of heat flow and shall not be reversed. It is recommended that the front end of the ultrasonic heat meter be equipped with a strainer of the corresponding diameter; the valve is installed in front of the meter and it can be separated from the meter body for future maintenance and repair.

3.3 Common error installation examples

If the flange on the pipe is welded, the position reserved for welding is too large, or the unevenness of the flange welding has an angle with the flange of the meter. Do not forcibly tighten the bolt now otherwise the body may be broken. The correct approach should be removed and reinstalled (as shown in Figure A).

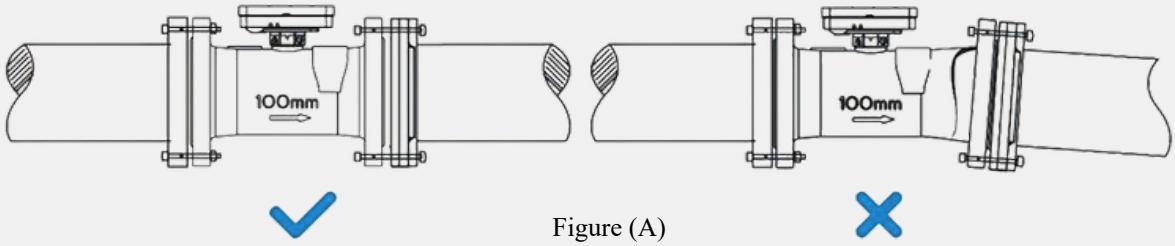


Figure (A)

When the meter is installed horizontally, the direction of the calculator should be upwards. If the direction of the calculator is facing to the side, the two transducers will not be on one level, and the transducer at the high point may collect air. The measurement is not accurate or not measure (as shown in Figure B).

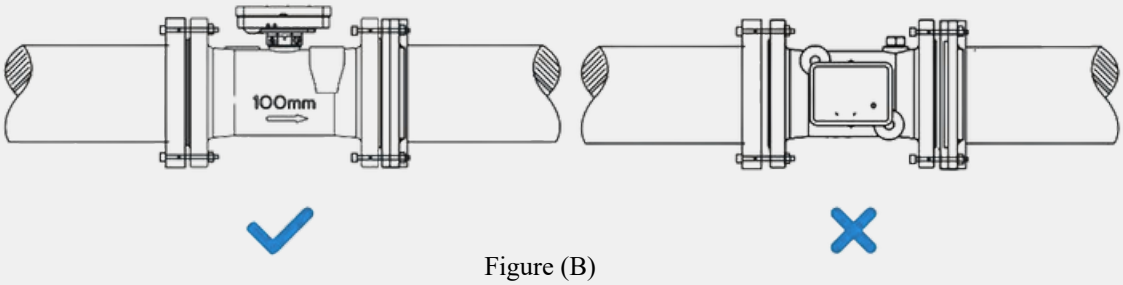


Figure (B)

When the meter is installed vertically, it must be installed on the straight pipe with the heat flow upwards. Because the pipe with the downward flow of heat is affected by the gravity of the center of the earth, the heat in the pipe cannot be filled. This may result in inaccurate metering or even cause the meter don't measure (Shown in Figure C).

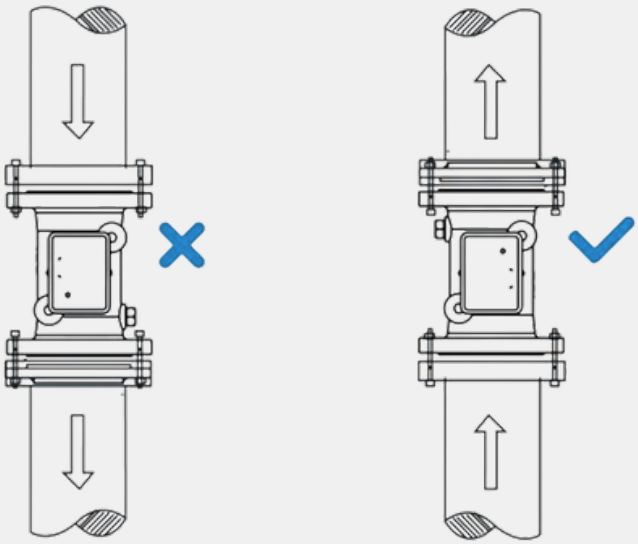


Figure (C)

When installing at the “U” tube, install the meter at the lowest position, because the pipe may accumulate air in the high place, causing the meter to be inaccurate or not measure. (Shown in Figure D).

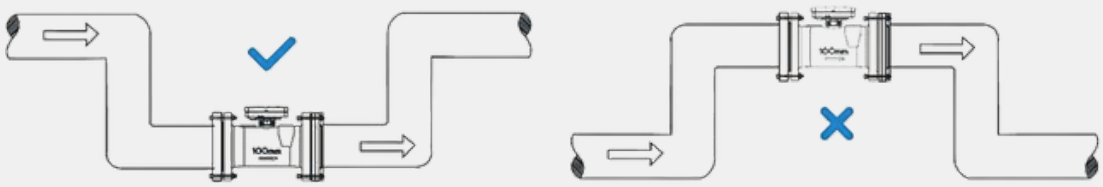


Figure (D)

When the meter is installed at the elbow, it must be ensured that the distance between the front straight pipe is ≥5 pipe diameter and the rear straight pipe is ≥3 pipe diameter. Otherwise, the meter may not measure (as shown in Figure E).

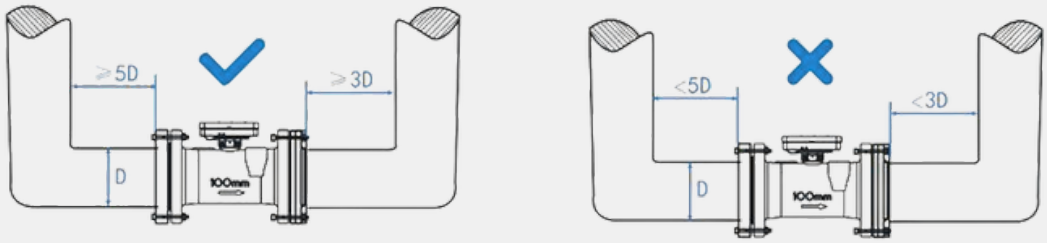


Figure (E)

When installing valves or other objects in front of the meter, it must be ensured that there is a distance of ≥ 5 times the diameter between the meter and the object, otherwise the meter may not be metered; (as shown in Figure F).

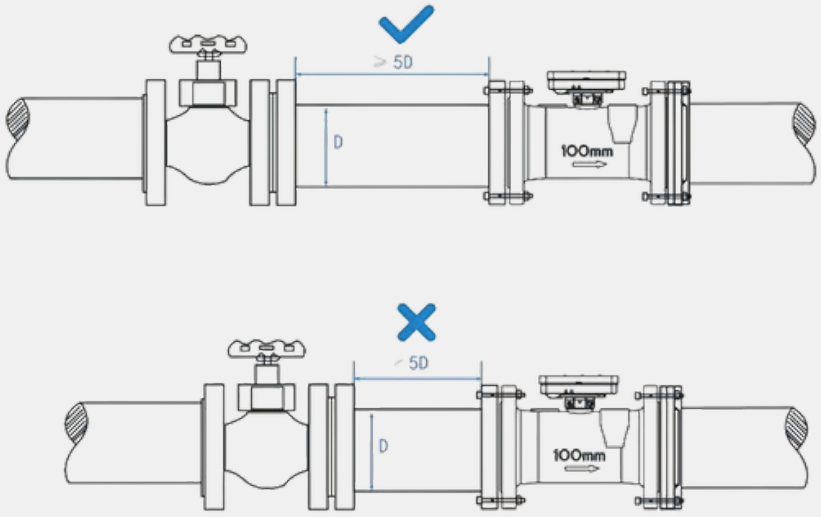


Figure (F)

3.4 Installation of Non-Return Valve

The meter can be supplied with a non-return valve (if required) on request. The non-return valve must be installed on the heat inlet end of meter when installing.

3.5 After the installation

The tightness must be proved by pressurizing with cold heat, slowly filling the pipe on completion of the installation. Open the shut-off valves carefully and check installation for leakage. While the piping system is operating, check whether the volume display correctly and the temperatures display corresponding with the actual temperatures (see the display information). When the response thresholds are exceeded and the flow rate is positive, the volume is sum-mated. Make the segment test, in order to displays all display segments for test purposes. The operating hours are counted from initial connection of the battery. The date is incremented daily. As a standard the meter is delivered with the local time, or destination time if required.

4. Power Supply

UTM22 Series can be fitted with one ER18505 or ER26500 with operating time of 6 or 11 or 15 years respectively.

Brand	*EVE Lithium*	
Type	*Battery*	
Model No.	*ER18505*	*ER26500*
Rated capacity	*4000mAh*	*8500mAh*
Rated voltage	*3.6V*	
Max recommended continuous operating current	*130mA*	*150mA*

Max pulse current	*180mA*	*300mA*
Reference weight Max	*28g*	*52g*
dimension Operating	*18.7×50.5mm*	*26.2x50mm*
temperature	*-55°C ～ +85°C*	

5. Interface & Communication

5.1 Optical port

UTM22 Series are all equipped with an optical interface IrDA to IEC62056-21 as a standard. In addition, one of the following options can be ordered for remote output.

5.2 M-BUS

Cable: connected with galvanic isolation Voltage: 50V max. Current: M-Bus loads Addressing: primary or secondary Note: A higher frequency is not allowed and may result in meter malfunction! Data transmission in the compatibility mode (= standard, one data frame) or in the full mode (3 data frames) possible. If the meter is equipped with “M-bus”, it is delivered with a two-wire cable, which can be lengthened with a cable 2 x 0.75mm2 (put a distributing box). Pay attention to the proper polarity in case of the pulse output. If the meter is read out via M-bus, the allowed mean frequency of reading must not be exceeded. Any more reading is not allowed and may result in a damage to meter. The M-Bus or pulse variant of the meter is supplied with a 2-wire cable with wire end ferrules.

Version/Color	Pulse	M-Bus(2-wire)
Red	Pulse	M-Bus
Black	GND	M-Bus

5.3 Pulse Output (Optional)

Pulse output for heat or volume, with 2m cable connected, with galvanic isolation
Pulse significance: 1 pulse per kWh, 1 pulse per 100 liter or 1 pulse per 0.001 Gcal
Pulse length: 100 ms (Programmable)
Heat / Volume: specify in order or change with service-software
Voltage: max. 30 V
Current: max. 30 mA
Pulse break: min. 25ms
Classification OC (acc. to EN 1434-2)
Voltage drop: ca. 1.3V at 20 mA

5.4 RS-485(Optional)

Cable: connected with four-core cable. Voltage: 5-24V.

V ersion/Color	R S-485
Red	*VCC*
Black	*GND*
Yellow	*A*
Green	*B*

5.5 LoRaWAN (Optional)

ISM Band	*EU433*	*EU868*	*IN865*	*US915*
Class	*Class A*			
Network Access Mode	*OTAA or ABP*			
Transmitting Power	*12.15 dBm(max)*	*14 dBm(max)*	*20 dBm(max)*	*20 dBm(max)*
Data transmission	*Each 4h*			

5.6 Sigfox (Optional)

RCZ Serial	RCZ1	RCZ 2/4
EIRP/dBm (max)	16	24
Data transmission	Each 6h as default	Each 12h as default

5.7 4G CAT1 (Optional)

LTE Band Data	B1/2/3/4/5/7/8/20/28/66
transmission	Each 24h as default

6. Operation & Display

UTM22 Series is fitted with an easily readable LCD, including 8 digits, measuring units and information field.



Fig.1 LCD Full Display

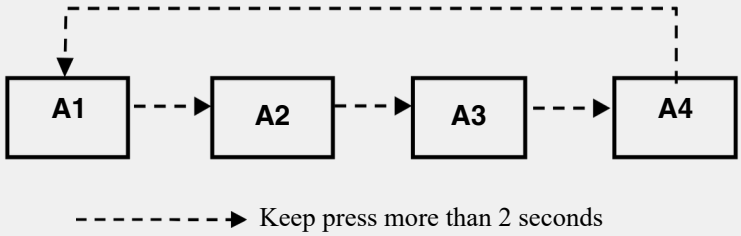
No.	Icon	Name	Meaning
1	▼	*Calibration mode*	*Under calibration*
2	⎍	*Pulse*	*Pulse output*
3	▯	*Low battery warming*	*User is reminded to replace the battery with a new one.*
4	⚠	*Error warning*	*Warnings for error*
5	☀	*Heat*	*Accumulated heat consumption*
6	❄	*Temperature of inflow water*	*Accumulated heat consumption*
7	🌡	*Temperature of in/outflow water*	*Accumulated heat consumption*

6.1 Operations on how to display

Users may press the button to read the meter information such as Accumulated volume, current flow rate, water temperature, etc. The following information is displayed in order by short pressing the button: temperature in,
temperature out, temperature difference, instant flow rate, cumulative flow volume, instant heat power, cumulative hear consumption, date, time, continuous working time, meter ID, software ID, type ID, M-bus address, etc.

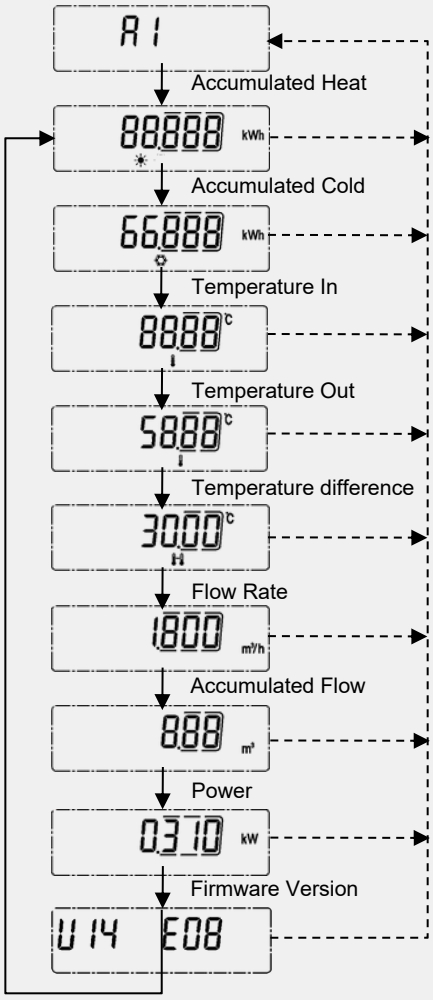
6.1.1 Menu List (User Loop)

Pressing the button for 2 seconds and holding it on will bring up the four menus for users to select.



6.1.3 Menu A1

Shortly pressing the button to display items under Menu A1 one by one in the following order to check the measurement data:

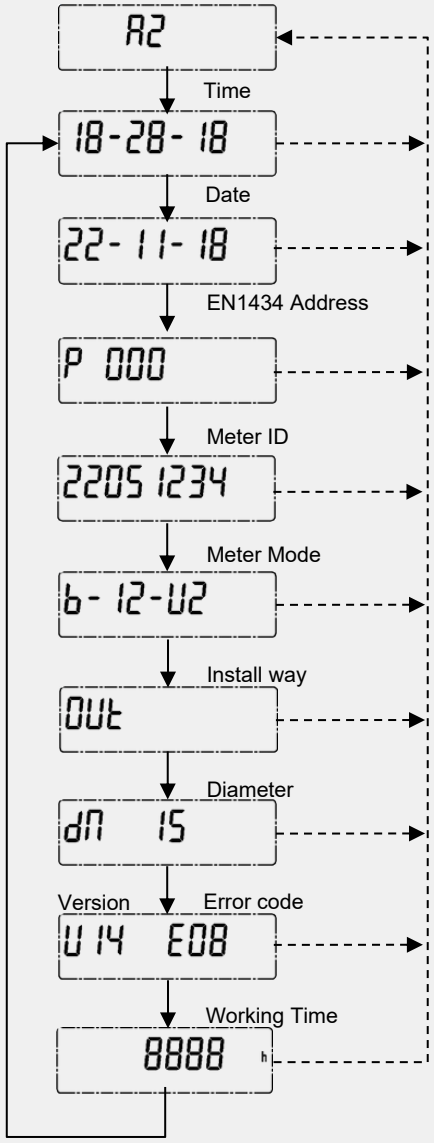


Short active less than 2 seconds Keep

active more than 2 seconds

6.1.4 Menu A2

Shortly pressing the button to display items under Menu A2 one by one in the following. Order to check the meter information.

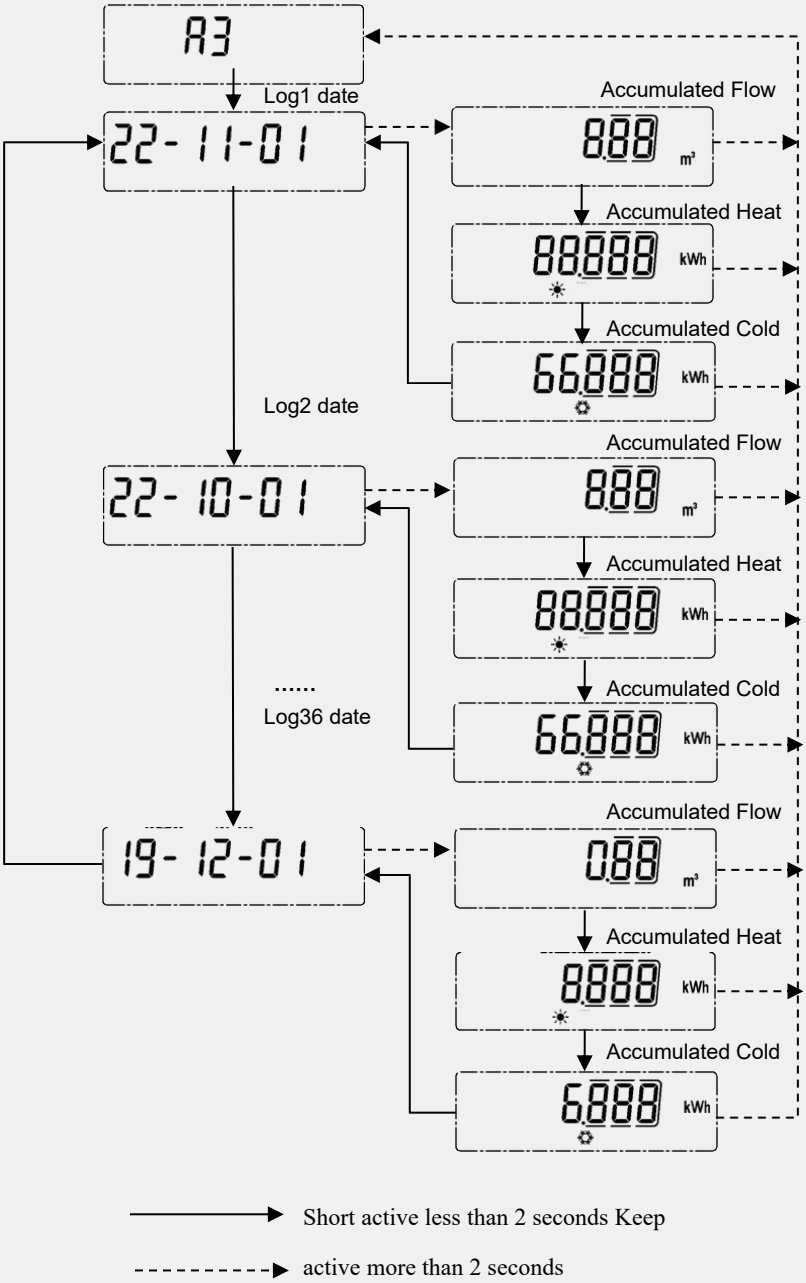


Short active less than 2 seconds Keep active

more than 2 seconds

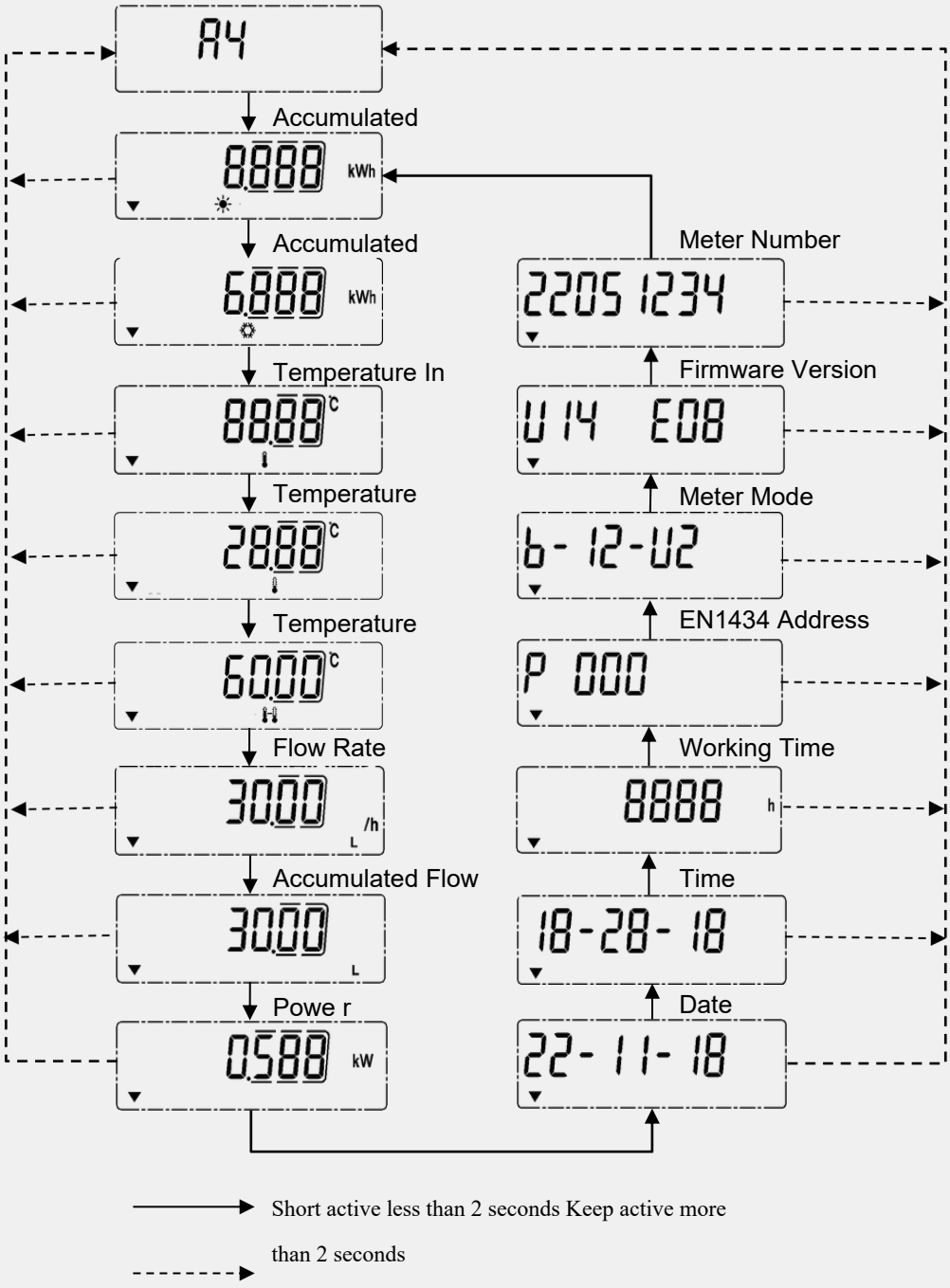
6.1.5 Menu A3

This Menu shows history date records of last 36 months. Click the button to select the month, then the month, monthly flow and monthly heat consumption will be displayed in turn.



6.1.6 Menu A4

The content are similar to Menu A1, but for calibration only. The following diagram shows Menu A4 (Calibration mode only).



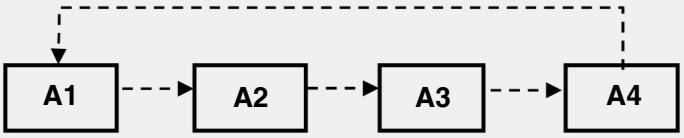
6.2 Monthly Data

The calculator stores the following values for 36 months at each end of month -Volume (meter reading) -Heat Energy (meter reading) -Cold Energy (meter reading)

From the month set day display, press the service button for 2s to enter the previous month's values.

The month values can also be read out via the optical interface.

6.3 Display structure



Keep press more than 2s

1.0 A1	2.0 A2	3.0 A3	4.0 A4
1.1 Accumulated heat	2.1 Time	3.1 Accumulated flow last month	4.1 Accumulated heat
1.2 Accumulated cold	2.2 Date	3.2 Accumulated heat last month	4.2 Accumulated cold
1.3 Water-in temperature	2.3 Meter address	3.3 Accumulated cold last month	4.3 Water-in temperature
1.4 Water-out temperature	2.4 Meter ID	……	4.4 Water-out temperature
1.5 Temperature difference	2.5 Model	3.106 Accumulated flow last 36 months	4.5 Temperature difference
1.6 Instant flow	2.6 Install type	3.107 Accumulated heat last 36months	4.6 Instant flow
1.7 Accumulated flow	2.7 Diameter and factor	3.108 Accumulated cold last 36 months	4.7 Accumulated flow
1.8 Instant power	2.8 Software version error and code		4.8 Instant power
1.9 Version number	2.9 Working time		4.9 Date
			4.10 Time
			4.11 Accumulated working time
			4.12 Meter address
			4.13 Meter model
			4.14 Software version
			4.15 Meter ID

Fig. Display Structure

7. Error and Warning

7.1 Error Display

The meter constantly performs self-diagnosis and can display various faults. Visual indication on the LCD display in the event of an error.

Error code	Meaning	How to handle the error
E01	*Low battery*	*Contact service*
E08	*Empty pipe*	*Check the pipe if stop water supply or the meter in storage*
E09	*Low battery+Empty pipe*	*Contact service*
E40	*Temperature is lower than 3°C*	*Check the storage temperature*
E41	*Low battery + Temperature is lower than 3°C*	*Contact service*
E48	*Empty pipe + Temperature is lower than 3°C*	*Check the storage temperature*
E49	*Low battery + Empty pipe + Temperature is lower than 3°C*	*Contact service*

7.2 Warnings

Permanent visual indication on the LCD:

1) Fault / failure of ultrasonic or temperature measurement
2) Low temperatures (below 3 °C)
3) Air in the measuring path, no volume measurement
4) Low battery Warning Icons:

Low battery warning		It appears on the LCD screen if the battery voltage falls off to 2.7V. When the battery voltage increases back to over 2.7V, the icon disappears. Battery self-checking commits every 30s.
FaultyIcon		It appears when the following faults are sensed: 1: temperature is lower than 3°C 2: temperature is higher than 95°C 3:temperature sensor with short circuit 4: temperature sensor with open circuit 5: memory errors 6: blank pipe

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For technical support please contact: support@neowave.tech

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