NEO WAVE®

Installation & User Guide

UTM22

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℃ or above 90℃ 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: 4°C~95°C*
TemperatureSensors	*Placed in forward and return pipes sense the cooling, by the difference between in flow and out flow temperatures.* *Θ: 4°C~95°C*
Calculator	*Calculates heat energy consumption based on flow volume and temperature loss of heating water.* *Θ: 4°C~95°C △Θ: 3K~65K*
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.*

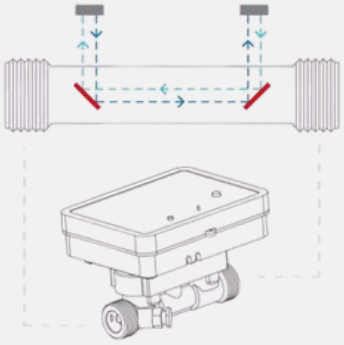
2. Technical specification

2.1 Complete meter

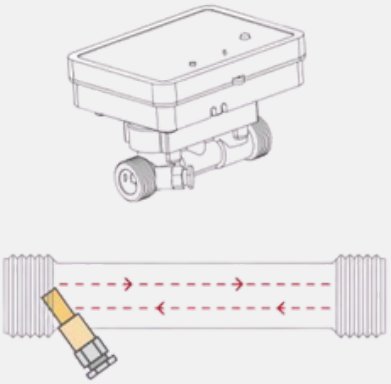
Mode	UTM22 15	UTM22 20	UTM22 25	UTM22 32	UTM22 40
Pipe Diameter	DN15	DN20	DN25	DN32	DN40
Minimum Flow Rate, qi(m^3/h)	0.03	0.05	0.07	0.12	0.2
Permanent Flow Rate, qp(m^3/h)	1.5	2.5	3.5	6	10
Maximum Flow Rate, (m^3/h)	3.0	5.0	7.0	12	20
Connection	G3/4''	G1''	G1/4''	G1/2''	G2''
Length (mm)	110	130	160	180	200
Width (mm)	100	100	100	100	100
Temperature	Range:4℃ - 95℃, △T: 3k - 65k				
Temperature Sensor	A pair of PT1000 platinum resistor				
Metrological Class	Class 2, (EN1434)				
Maximum Operation Pressure	1.6Mpa				
Pressure Loss	P<25kPa at Qp				
Protection Class	IP65				
Battery	3.6VDC, lithium battery, 6-10-15 years lifetime option.				
Data Storage	·18 months history data, including accumulated heating/colding energy and volume,etc. ·Total heating/colding energy, volume, running hours,etc.				
Operating Temperature					
Interface & Communication	·M-Bus ·Opticalport ·PulseOutput/PulseInput ·LPWAN (LoRaWAN, Sigfox) ·4G(CAT1) ·RS-485				
Installation	Horizontal or Vertical ·Unit: kWh, MWh,				
Display and Indication	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

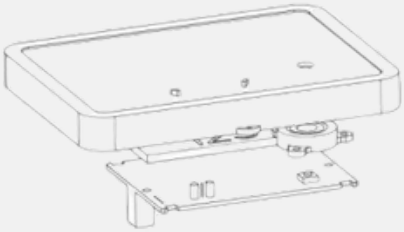
2.2.1 Ultrasonic Flow Metering Unit:Ultrasonic flow meter measures by the transfer of ultrasound signals between transducers with the help of mirrors



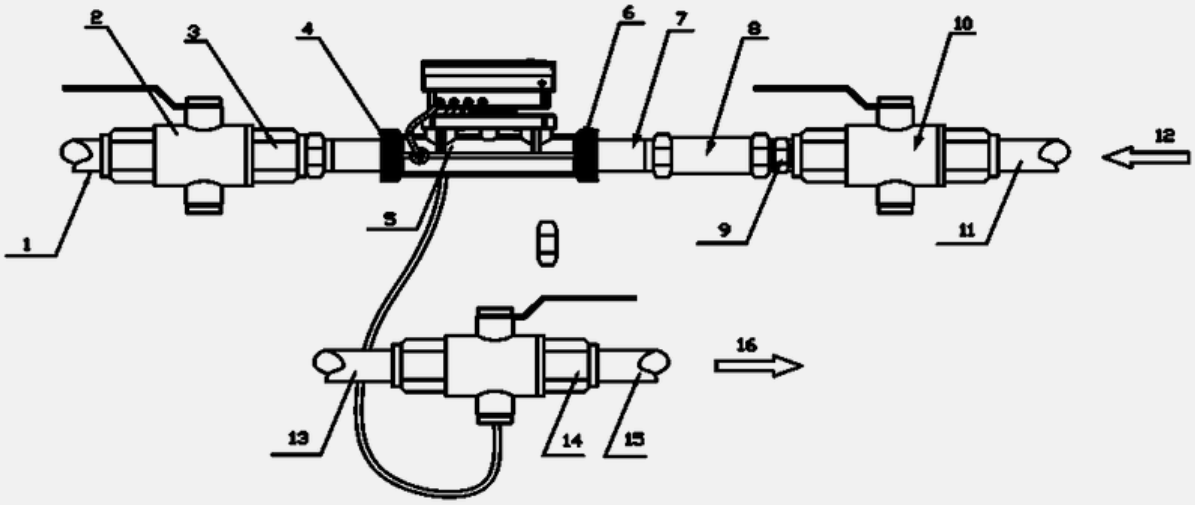
2.2.2 Temperature Metering Unit:PT1000 type heat sensors are used which they are calibrated, certified. If input water temperature metering prob is integrated with the meter body where flow meter is, thus the output water temperature metering prob is mounted to a suitable point on the network return 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

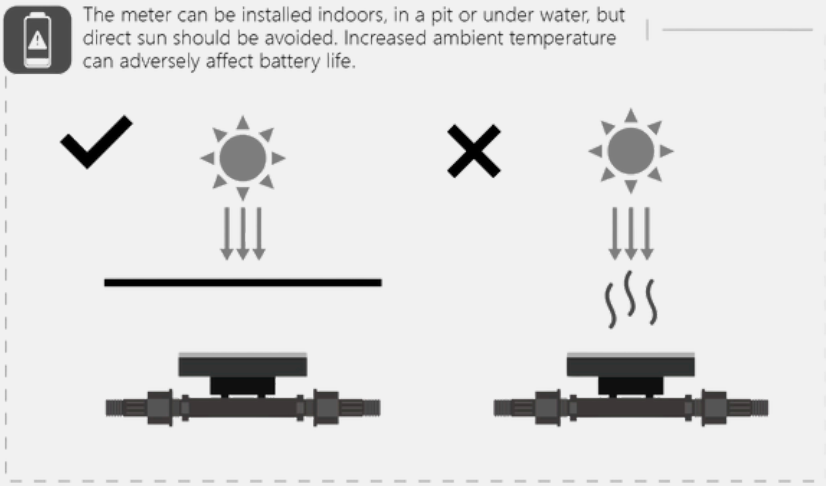


Installation diagram

1	*OutflowPipe*	9	*Fitting*
2	*Valve*	10	*Valve*
3	*ValveBody*	11	*InflowPipe*
4	*Threadofflowsensor*	12	*Inflowdirection*
5	*Calculator*	13	*ReturnPipe*
6	*Threadofflowsensor*	14	*ValveBody*
7	*InflowPipe*	15	*ReturnPipe*
8	*InflowPipe*	16	*Outflowdirection*

The below general principles prior to and after mounting the system shall be followed.

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 IP66 allows short-term submergence, provided that all cable unions have been correctly mounted and that the plastic cover has been properly fastened.

 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

Prior to installation of the flow sensor, the pipe shall be thoroughly flushed out, and any dirty, stone alike items must be removed from the pipe. Cavitation in the system must be avoided. If a risk of frost exists, empty the system and, if necessary, remove the meter. If the water is soiled, fit the strainer in the pipe before the meter.

3.3 Mounting of Flow Sensor

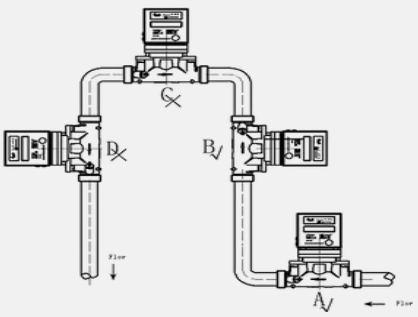
Consider the dimensions of the heat meter, and the distance with surroundings, minimum 3 cm free space.

Straight sections of 10 × DN before and 5 × DN after the meter are recommended, to homogenize the temperatures of water.

The meter is to be installed so that the direction of the arrow on the meter housing corresponds to the direction of flow. Avoid the collection of air bubbles in the meter during the installation process.

The connecting pipe at the two ends must be on the same horizontal level. Install horizontally or vertically only, not tilted, inclined or overhead. Install the flow sensor into horizontal or up streaming pipelines.

Do not install at highest point of piping to avoid air inside the flow sensor. The flow sensor must NOT be installed in the positions where swirling flow exists (swirling flow is normally caused by bending pipe), or pulsatile flow exists (pulsatile flow is normally caused by pump, therefore the flow sensor must be installed as far as possible from pump and must not be installed on the outlet of pump) or air may build up.



A:Recommended flow sensor position

B:Recommended flow sensor position

C:Unacceptable flow sensor position

D:Unacceptable flow sensor position in open system; acceptable in closed system.

3.4 Mounting of Temperature Sensors

Temperature sensors used to measure the flow temperature are usually installed ex-factory, i.e. integrated into the flow pipe. Installation instructions for sensor used to measure pipe and return temperature are as followings:

3.4.1 Matched Pairs

The Sensors are color-coded. The one marked with a red sign is to be installed in the flow pipe normally within the sensor pocket; the other marked with a blue sign is to be installed in the return pipe.
The two temperature sensors are a matched pair and must not be separated, so the sensors must be replaced in pairs. The connecting cables may not be buckled, extended or shortened. The standard cable length according to EN1434 or OIML R75 is 1.5m and must not be changed. If the length has to be changed due to restriction of installation environment, the meter shall be specially dealt within the factory.

3.4.2 Install Position

The end of the sensors must extend in any case as far as the center of the pipe cross-section. Installation of the temperature sensors should be preferably symmetrical and direct installation. Do not remove the flow sensor if already mounted in the flow sensor.
Temperature sensors are to be installed in the area where water temperature is relatively stable. The installation conditions for the two sensors shall be identical. Sensors shall not be installed in the high convex segment of the pipe. Temperature sensors typically can be installed within Tee pipe, ball valve or sensor pocket.

3.4.3 Sealing

Temperature sensors and screw connections must be sealed against manipulation, and the seal may not be damaged.
Attach the O-ring for the installation aid, and insert the O-ring into the installation point according to a slight circular motion.
Insert the temperature sensor into the installation point and screw it in tightly until the dead stop of the seal. Secure the sensor after installation against unauthorized removal with appropriate sealing.
Generally, the seals have been installed on the meter before delivery from factory.

3.5 Mounting of Calculator

The calculator is mounted directly on the plate of flow sensor. Having been mounted, the calculator is sealed with seal and thread. In case of strong condensation or water temperature above 90 ℃, we recommend wall mounting of the calculator.
The ambient temperature of the calculator must not exceed 55° C and it should avoid direct sunlight. Mounting can be vertical or horizontal with respect to the flow sensor. The calculator can also be removed from the flow sensor, and plug it in the required position.

3.6 Mounting Step

Step 1: Flush the piping system thoroughly before mounting the meter.
Step 2: Sufficient distance 10 × DN straight pipe in upstream and 5 × DN straight pipe in downstream. (DN: Diameter)
Step 3: The specific seal gasket and connector only supplied by NeoWave
Step 4: On the two sides of the meter, there should be one filter (if the water is soiled) and two shut-off valves.
Step 5: After finishing the above operations, seal the meter only if the sealing has not been done before delivery from factory.

3.7 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 water inlet end of meter when installing.

3.8 After the installation

The tightness must be proved by pressurizing with cold water, 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 and temperature difference are positive, the energy and the volume are summated.
Make the segment test, in order to display 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 Max	*130mA*	*150mA*
pulse current	*180mA*	*300mA*
Reference weight	*28g*	*52g*
Max dimension	*18.7×50.5mm*	*26.2x50mm*
Operating 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.

Version/Color	***RS-485***
Red	*VCC*
Black	*GND*
Yellow	*A*
Green	*B*

5.5 LoRaWAN (Optional)

ISM Band	*EU433*	*EU868*	*IN865*	*US915*
Class Network	*Class A*			
Access Mode	*OTAA or ABP*			
Transmitting Power	*12.15 dBm(max)*	*14 dBm(max)*	*20 dBm(max)*	*20 dBm(max)*
Data transmission	*Each 6h*			

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.l LCD Full Display

No.	Icon	Name	M eaning
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 cold consumption*
7	🌡	*Temperature of in/outflow water*	*Water temperature in/return pipe*

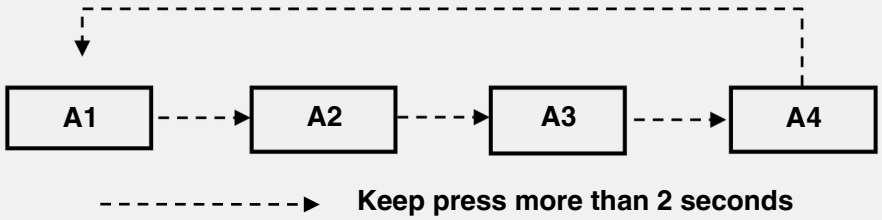
6.1 Operations on how to display

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.

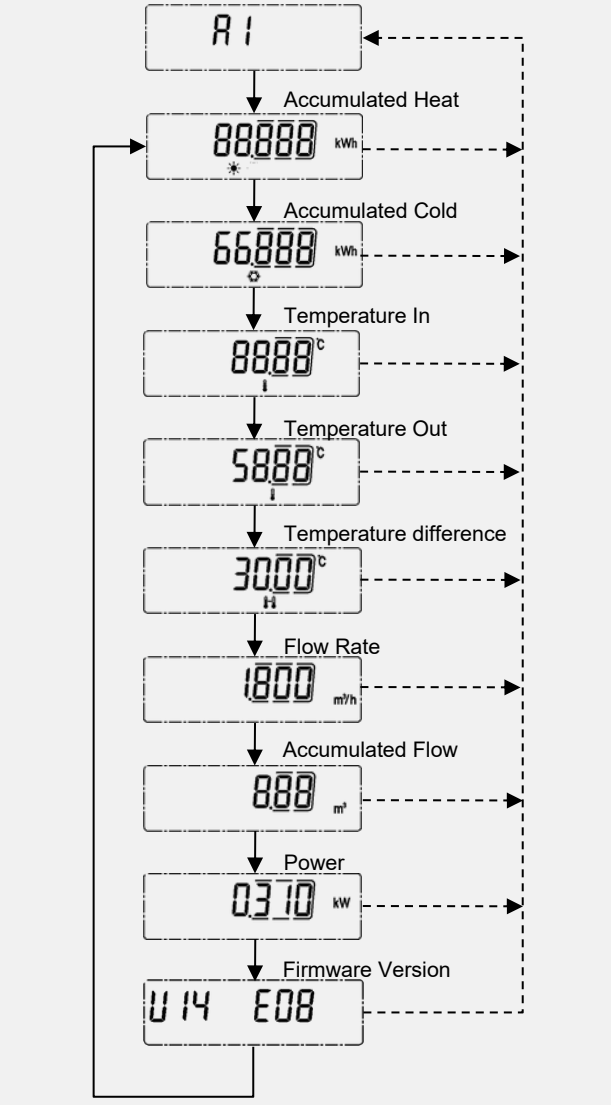
6.1.1 Menu List (User Loop)

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



6.1.2 Menu A1

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

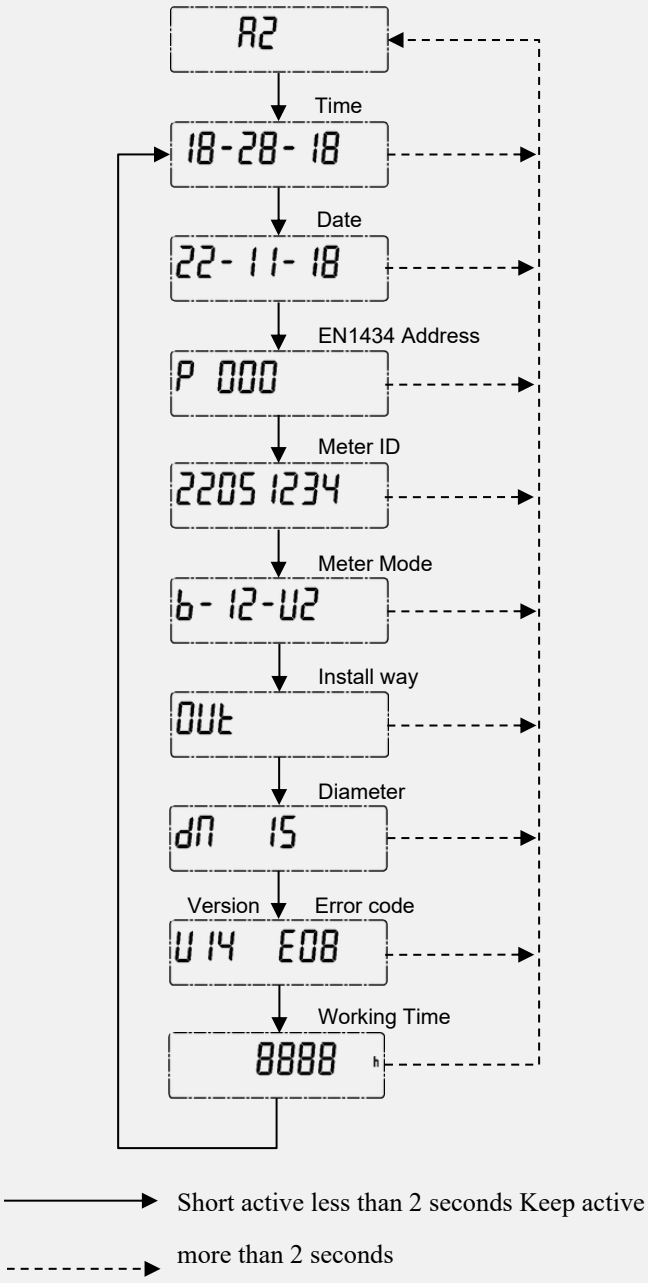


Short active less than 2 seconds Keep

active more than 2 seconds

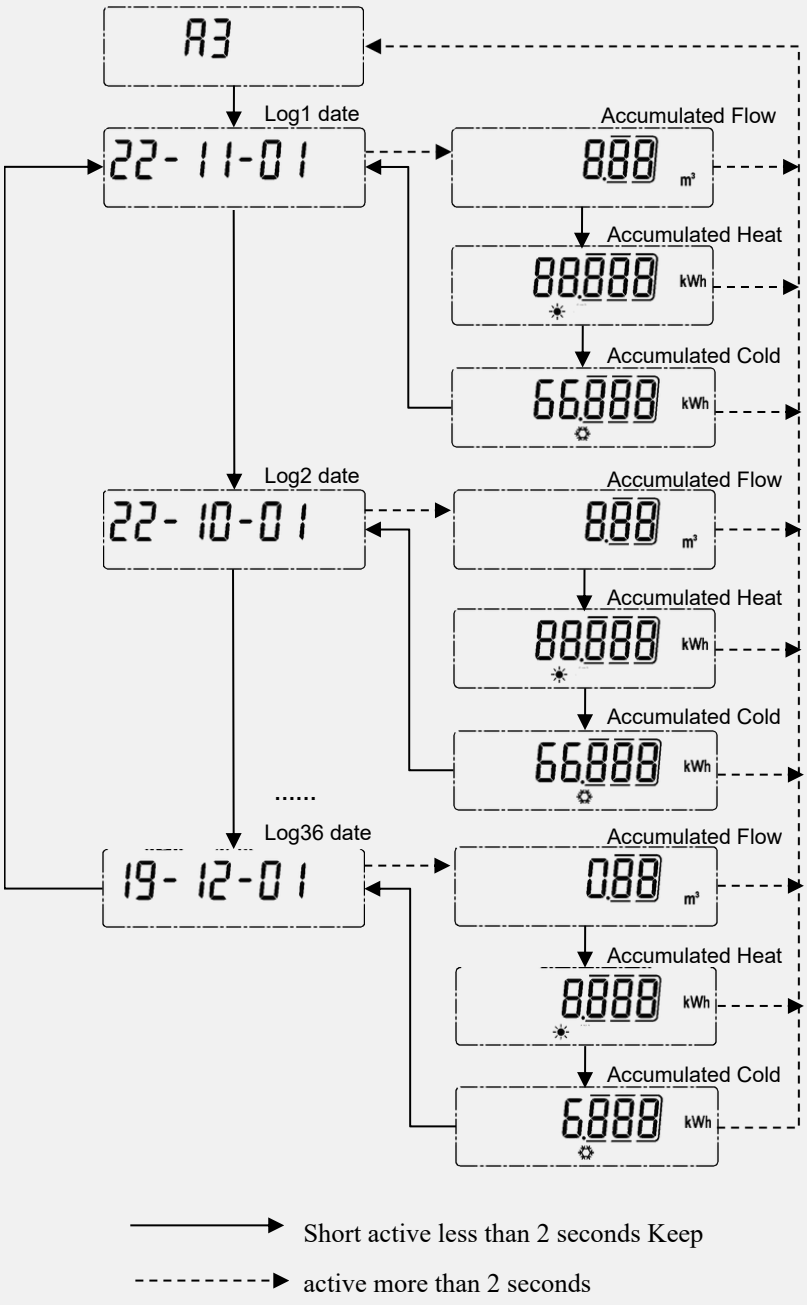
6.1.3 Menu A2

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



6.1.4 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.

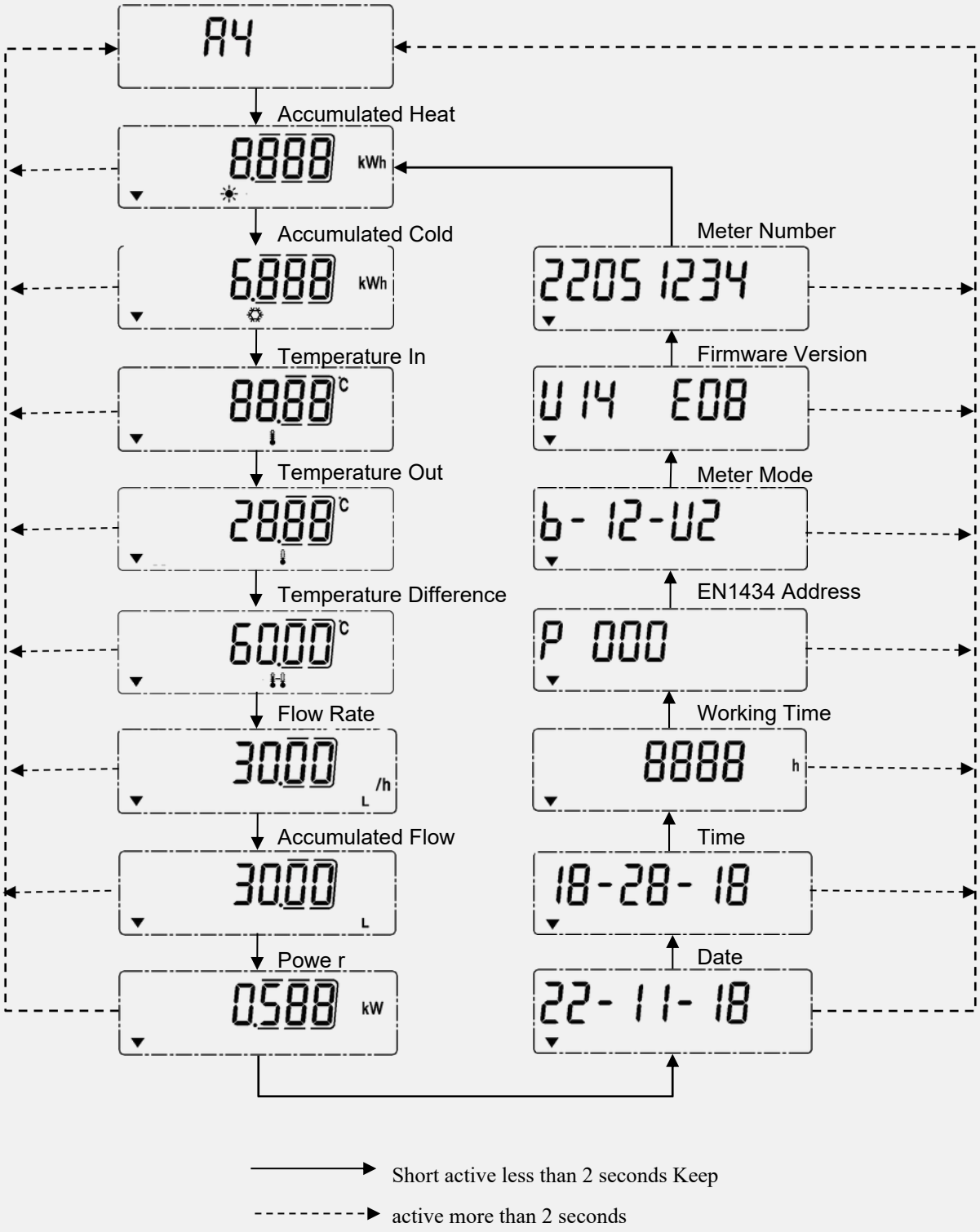


Short active less than 2 seconds Keep

active more than 2 seconds

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

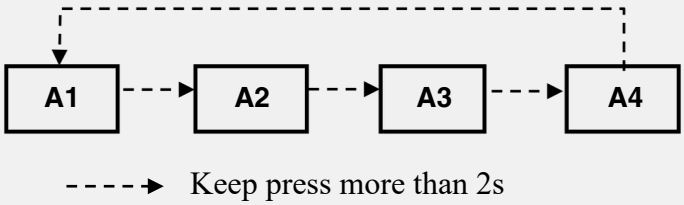


Fig. Display Structure

1.0 A	2.0 A2	3.0 A3	4.0 A4
1 1.1 Accumulated heat	2.1 Time	3.1 Accumulated flow	4.1 Accumulated heat
1.2 Accumulated cold	2.2 Date	last month	4.2 Accumulated cold
1.3 Water-in temperature	2.3 Meter address	3.2 Accumulated heat	4.3 Water-in temperature
1.4 Water-out temperature	2.4 Meter ID	last month	4.4 Water-out temperature
1.5 Temperature difference	2.5 Model	3.3 Accumulated cold	4.5Temperature difference
1.6 Instant flow	2.6 Install type	last month	4.6 Instant flow
1.7 Accumulated flow	2.7 Diameter and factor	……	4.7 Accumulated flow
1.8 Instant power	2.8 Software version error	3.106 Accumulated	4.8 Instant power
1.9 Version number	and code	flow last 36 months	4.9 Date
	2.9 Working time	3.107 Accumulated	4.10 Time
		heat last 36 months	4.11 Accumulated working
		3.108 Accumulated	time
		cold last 36 months	4.12 Meter address
			4.13 Meter model
			4.14 Software version
			4.15 Meter ID

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	*Lowbattery*	*Contact service*
E08	*Empty pipe*	*Check the pipe if stop water supply or the meter in storage*
E09	*Lowbattery+Emptypipe*	*Contact service*
E40	*Temperatureislowerthan3°C*	*Check the storage temperature*
E41	*Low battery + Temperature is lower than 3°C*	*Contact service*
E48	*Emptypipe+Temperatureislowerthan3°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.*
Faulty Icon		*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: Empty pipe*

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For technical support please contact: support@neowave.tech

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