Bove® Technology

Installation & User Guide

B39 VW-M Bulk

Ultrasonic Water 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.
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CONTENT

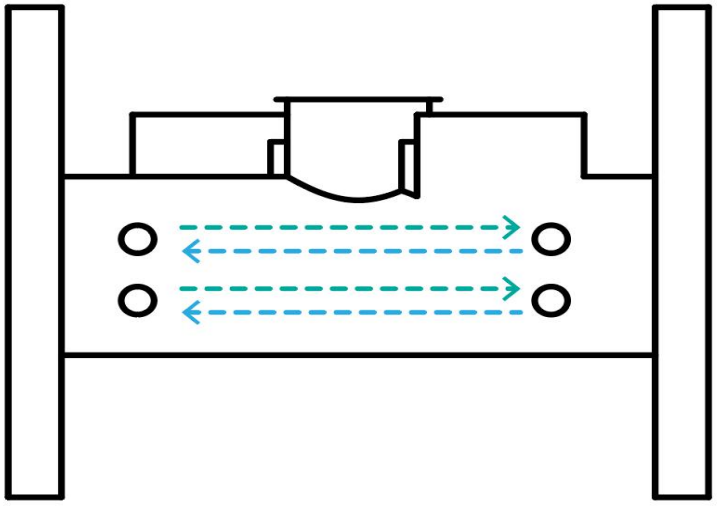
1. General Information

Please note that the following installation conditions must be obeyed:
Pressure Requirement: MAP16.
Environmental Class: E2, M1,O
Installation requirement: There must be a distance of minimum 25 cm between signal cables and other installations
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.

2. Technical Specification

2.1. Flow Sensor

The flow sensor is a device used to measure the velocity of flow by using the principle of ultrasound. It can measure the average velocity along the path of an emitted beam of ultrasound by averaging the difference in measured transit time between the pulses of ultrasound propagating into and against the direction of the flow. The flow measurement is based on an acoustic wave time of flight principle. The flow meter body is equipped with 4 ultrasonic transducers.



2.2. Calculator

The calculator (MCU) is a device that calculates the flow volume consumed based on signals from flow sensor. It's also the control, display and data store part for the meter.

2.3. Complete meter

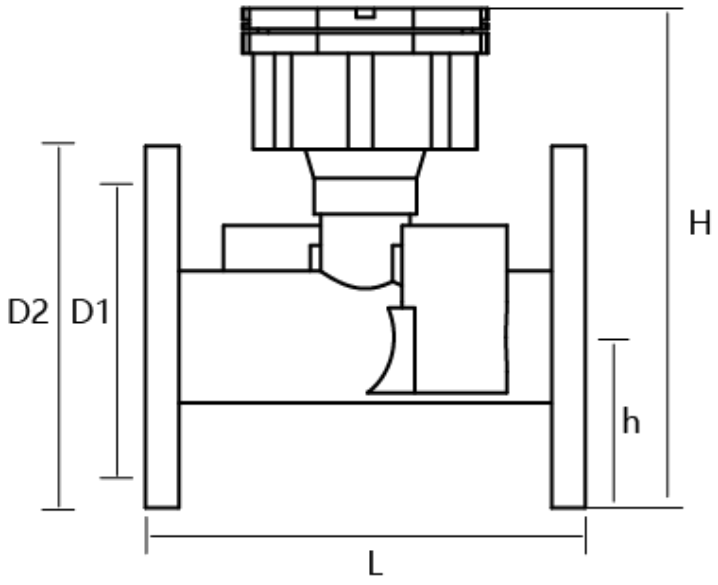
Manufacturer	*Bove*

Flow Measurement									
DN (mm)	Flow Rate (m^3/h)				Dimensions (mm)				Connection
	Q_1	Q_2	Q_3	Q_4	Length	Height	D1	D2	Bolt (flange)
50	0.05	0.08	25	31.25	200	300	125	165	4*M16
65	0.08	0.128	40	50	200	305	145	182	4*M16
80	0.126	0.201	63	78.75	225	315	160	197	8*M16
100	0.2	0.32	100	125	250	335	180	218	8*M16
125	0.32	0.512	160	200	250	355	210	245	8*M16
150	0.5	0.8	250	312.5	300	385	240	283	8*M20
200	0.8	1.28	400	500	350	440	295	335	12*M20
250	1.26	2.016	630	787.5	450	500	355	405	12*M24
300	2	3.2	1000	1250	500	550	410	460	12*M24
350	2	3.2	1000	1250	500	640	470	520	16*M24
400	3.2	5.12	1600	2000	500	700	525	580	16*M27
450	5	8	2500	3125	500	760	585	640	20*M27
500	5	8	2500	3125	500	800	650	715	20*M30
600	20	32	4000	5000	600	920	770	840	20*M33
700	50.4	80.6	6300	7875	800	1000	840	910	24*M33
800	80	128	10000	12500	800	1100	950	1025	24*M36
900	128	205	16000	20000	800	1200	1050	1125	28*M36

Pressure Loss (△P)	≤25 KPa
MAP	1.6 MPa
Water temperature range	0.1 to 50°C
Q_3/Q_1 (Optional)	R160/ R250/ R400/ R500
Accuracy	Class 2
Maximum permissible error in upper flow rates range $Q_2 \le Q \le Q_4$	± 2 % (at temperature ≤ 30°C) ± 3 % (at temperature > 30°C)
Maximum permissible error in lower flow rates range $Q_1 \le Q < Q_2$	± 5 %
Scale interval (m^3)	0.01/ 0.1/1
Capacity of calculator	9999999,99
Type of liquid	Drinking Water

Installation requirements	*U0D0*
Basic mounting orientation and other specified orientations	*Horizontal*
Display & Indication	
Display unit (Optional)	*m^3/ L/ gallon*
Display LCD	*9-digit*
Volume (m^3)	*1/0.1/ 0.01*
Time to LCD off	*Always on*
Environmental Requirement	
Electromagnetic Class	*E2*
Mechanical Class	*M1*
Ambient temperature	*5 ~ 55°C (Indoor and non-condensing)*
Storage temperature	*-20 ~ 60°C*
Protection Class	*IP68*
Data history	*24 /120 logs (daily/ weekly/ monthly)*
Interface & Communication	
Output signal for normal operation (Optional)	***Wired communication***
	M-Bus/ RS485/ 4-20mA/ Pulse
	Wireless communication
	LoRaWAN/ NB-IoT/ Sigfox/ GPRS/ 4G(CAT1)/ Wireless M-Bus/ LoRaWAN & Wireless M-Bus
Output display/signal for testing	*M-Bus/ RS485/ Infrared*
Power Supply	
Battery	*3.6V Lithium Battery*
Battery Life (Optional)	*10 Years / 16 Years*
24V DC (Optional)	*External supply for special version*
Optional function	
Pressure Sensor	*Range: 0~20 Bar* *Working temperature: -20℃~85℃* *Accuracy class： 2%FS*
Mechanical Specification	
Meter body	*Ductile iron*

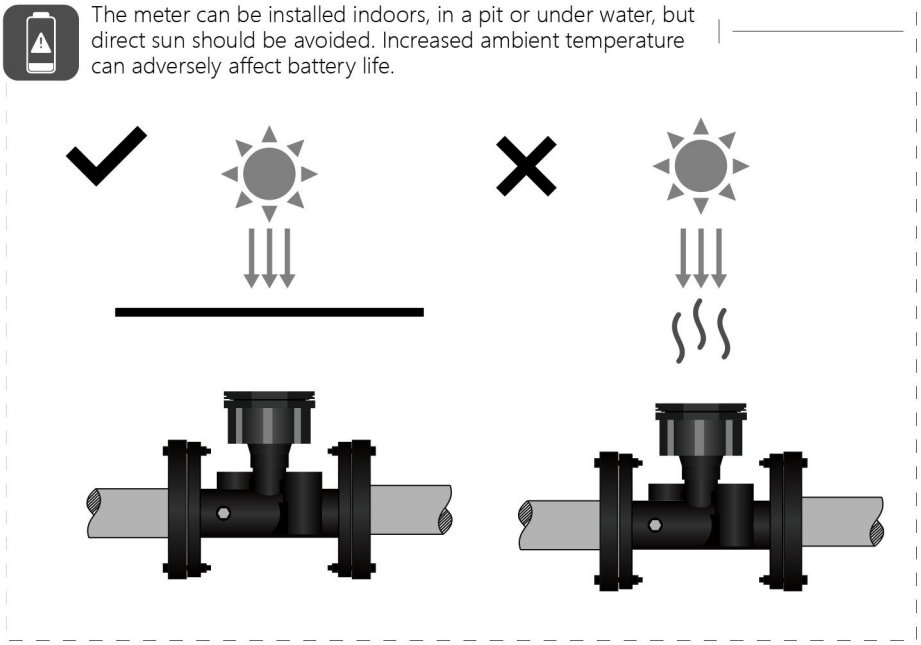
2.4. Physical dimensions



3. Installation

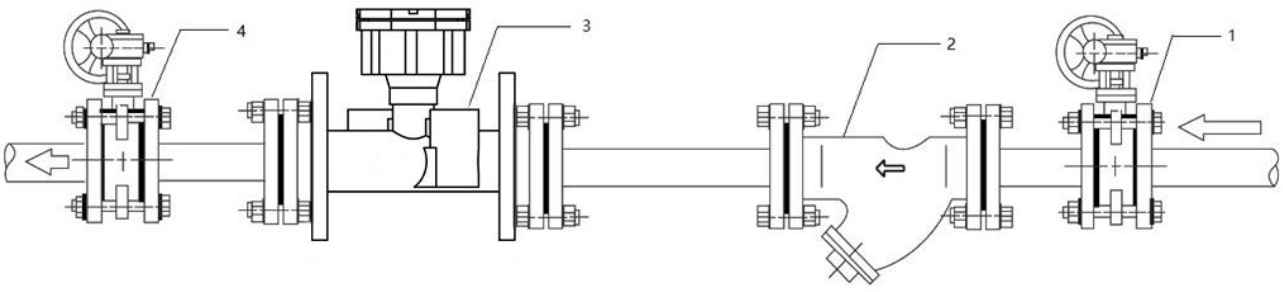
3.1. Requirements for installation environment

B39 VW-M series ultrasonic water meter 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. Installation Specification



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

3.3. Before Installation

The pipe must be completely cleaned before installing the ultrasonic water meter to prevent the debris from damaging the water meter;
Ultrasonic water 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 water meter should pay special attention. The water 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 water meter shall be the same as the diameter of the water meter and shall not be reduced in diameter;
The direction indicated by the arrow on the surface of the ultrasonic water meter is the direction of water flow, and shall not be reversed;
It is recommended that the front end of the ultrasonic water 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.

3.4. 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).

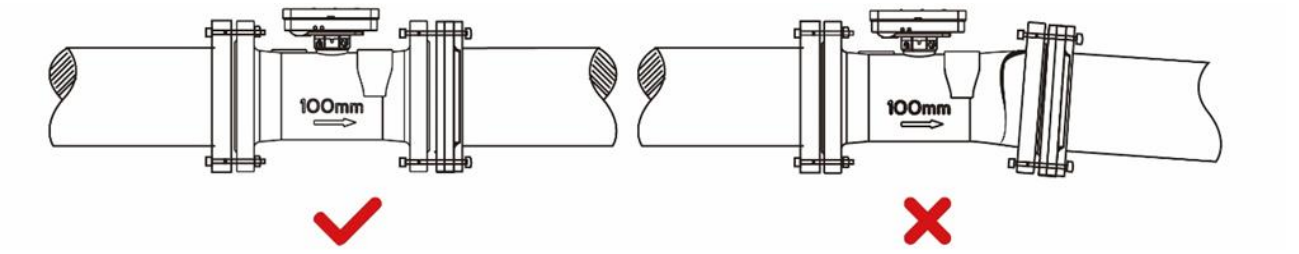


Figure (A)

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 measured (as shown in Figure B).

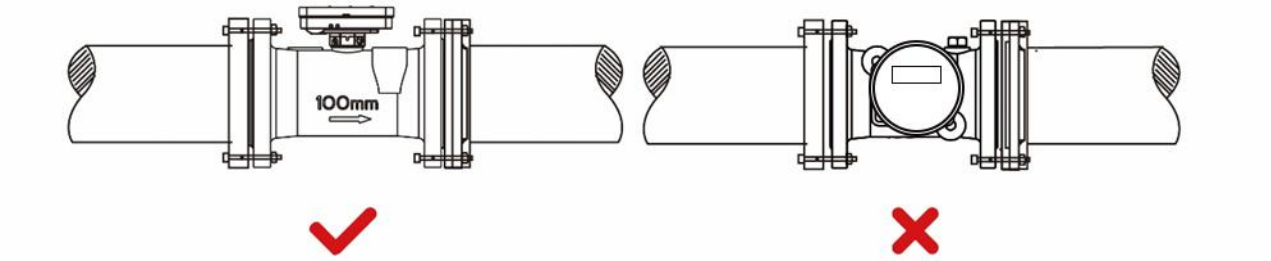


Figure (B)

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

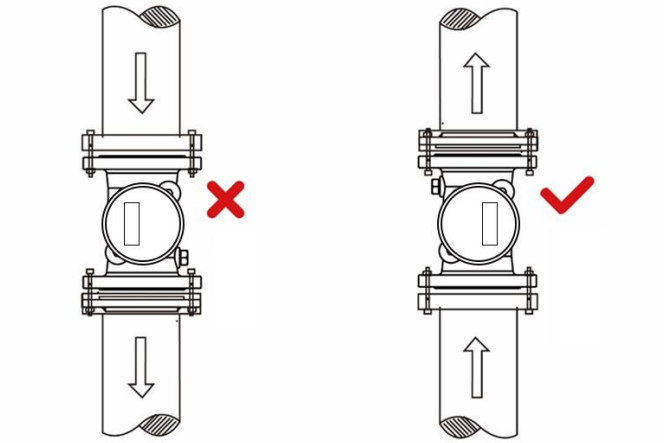


Figure (C)

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 measurement. (Shown in Figure D).

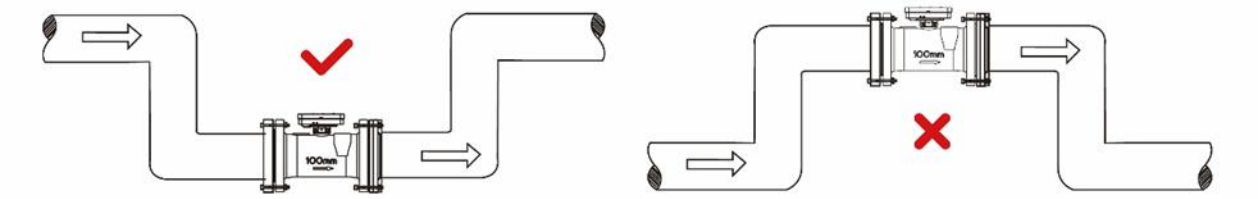


Figure (D)

3.5. 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.

3.6. 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 is positive, the volume is 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

B39 VW-M Series can be fitted with ER18505/ ER26500/ SPC1520 with operating time of 6/ 10/ 16 years respectively. The battery use depends on the communication and the service life.

Brand	*EVE*		
Type	*Lithium Battery*		
Model No.	*ER18505*	*ER26500*	*SPC1520*
Rated capacity	*4000mAh*	*8500mAh*	*45mAh*
Rated voltage	*3.6V*		
Max recommended continuous operating current	*130mA*	*150mA*	*500mA*
Max pulse current	*180mA*	*300mA*	*2000mA*
Reference weight	*28g*	*52g*	*10g*
Max dimension	*18.7x50.5mm*	*26.2x50mm*	*15x20mm*
Operating temperature	*-60°C ～ +85°C*		

5. Interface & Communication

5.1. IrDA

B39 VW-M 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 (Optional)

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) is 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 0.75mm^2 (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.
Note: The meter reading interval should be over than 1 hour

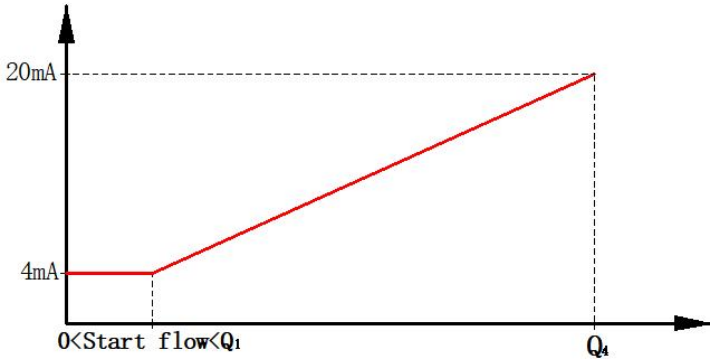
Version/Color	Pulse	M-Bus (2-wire)
Red	*Pulse*	*M-Bus*
Black	*GND*	*M-Bus*

5.3. Pulse Output (Optional)

Pulse output for heat or volume, with 2m cable connected, with galvanic isolation
Pulse significance: 1 pulse per 100/1000 liter
Pulse length: 100 ms (Programmable)
Heat / Volume: Specify in order or change with service-software
Voltage: Max. 6 V
Current: Max. 0.1 mA
Classification OC (acc. to EN1434-2)
Note: The meter pulse generate interval should be over than 1 minute.

5.4. 4-20mA (Optional)

The current changed from start flow; Q_4 is 20mA. Is a linear relationship. Double core wire.
Current flow rate=(I-4)(20-4)*Q4



5.5. RS-485 (Optional)

Cable: Connected with four-core cable
Voltage: 5-24V.
Note: The meter reading interval should be over than 1 hour

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

5.6. LoRaWAN (Optional)

Band	*EU433*	*EU868*	*IN865*	*US915*	*AU915*	*AS923*
Class	*Class A*					
Network Access Mode	*OTAA or ABP*					
Transmitting Power	*12.15dBm*	*14dBm*	*20dBm*			*16dbm*
Data transmission	*Each 6h as default*					

5.7. NB-IoT (Optional)

LTE Band	*B5*	*B8*	*B20*	*B28*
Data transmission	*Each 12h as default*			

5.8. Sigfox (Optional)

RCZ Serial	*RCZ 1*	*RCZ 2/4*
EIRP/dBm	*16*	*24*
Data transmission	*Each 6h as default*	*Each 12h as default*

5.9. GPRS (Optional)

Operator	*2G (GPRS)*
Data transmission	*Each 24h as default*

5.10. 4G CAT1 (Optional)

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

5.11. Wireless M-BUS (Optional)

Frequency	*433 Mhz*	*868 Mhz*
Mode	*T1 or C1*	
Transmitting Power	*10 dBm(max)*	
Data transmission	*Each 1 minute as default*	

5.12. LoRaWAN & Wireless M-BUS (Optional)

For LoRaWAN:

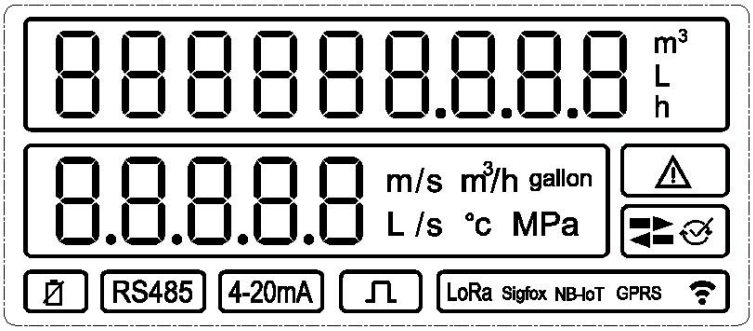
ISM Band	*EU868*
Class	*Class A or Class C*
Network Access Mode	*OTAA or ABP*
Transmitting Power	*16 dBm(max)*
Data transmission	*Each 6h as default*

For Wireless M-BUS:

Frequency	*868 Mhz*
Mode	*T1 or C1*
Transmitting Power	*14 dBm(max)*
Data transmission	*Each 120s as default*

6. Operation & Display

B39 VW-M Series is fitted with an easily readable LCD, including 9 digits, measuring units and information field.
The LCD will keep display for easy checking the data.



No.	*Icon*	*Name*	*Meaning*
1	⚠	Error Warning	Warnings for error
2	⎍	Pulse	Pulse output
3	4-20mA	4-20mA	4-20mA output
4	Sigfox	Sigfox	Sigfox communication

5	LoRa	LoRaWAN	LoRaWAN communication
6	GPRS	GPRS	GPRS communication
7	NB-IoT	NB-IoT	NB-IoT communication
8		TTL Reading	The wireless communicate, not get the meter reading.
9		Flow towards	Positive flow towards
10		Flow towards	Negative flow towards
11		Calibration mode	In calibration mode
12		Battery warning	Low battery

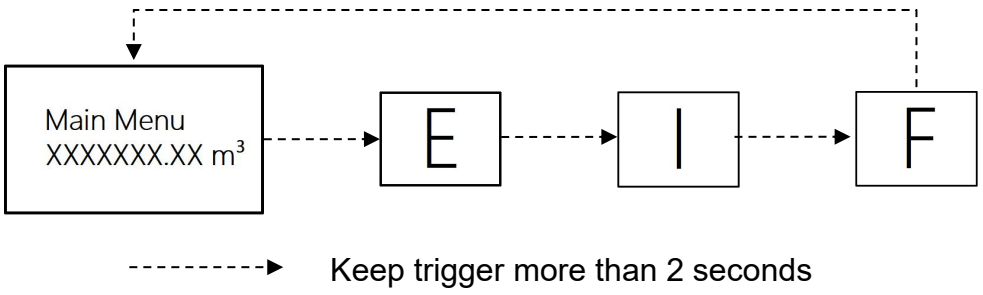
Fig. I: LCD Display

6.1.Operations on how to display

Users may touch off the button (Hall) to read the meter information such as Accumulated volume, current flow rate, etc.
The following information is displayed in order by short trigger the hall: accumulated flow, instant flow, date, time, accumulated working time, Meter ID, address, meter type, software version, checksum, etc.

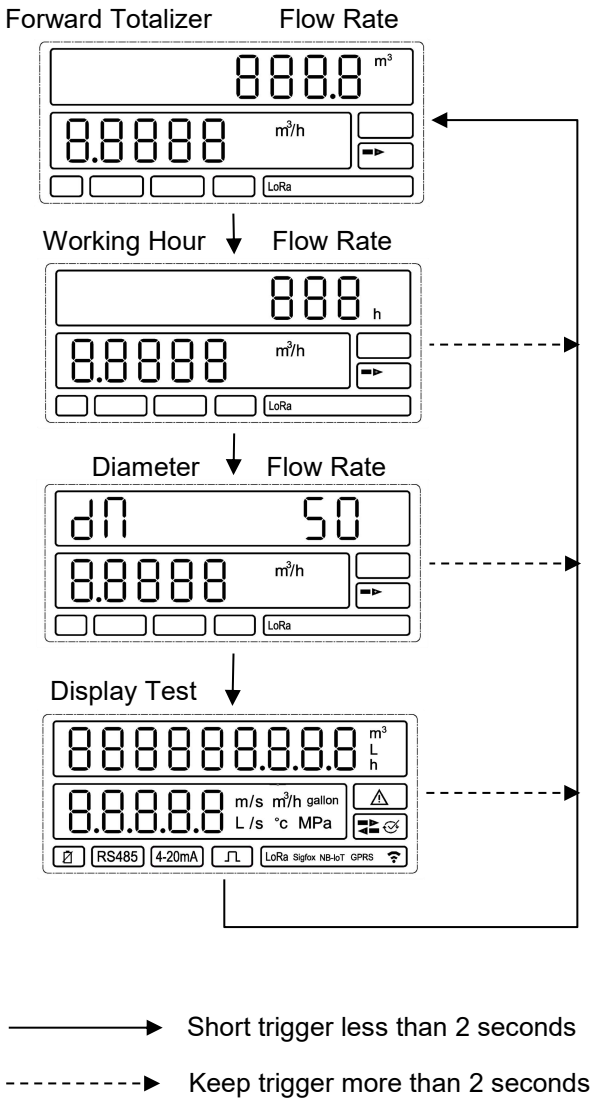
6.1.1 Menu List (User Loop)

Touching off the Hall for 2 seconds and holding it on will bring up the four menus for users to select.



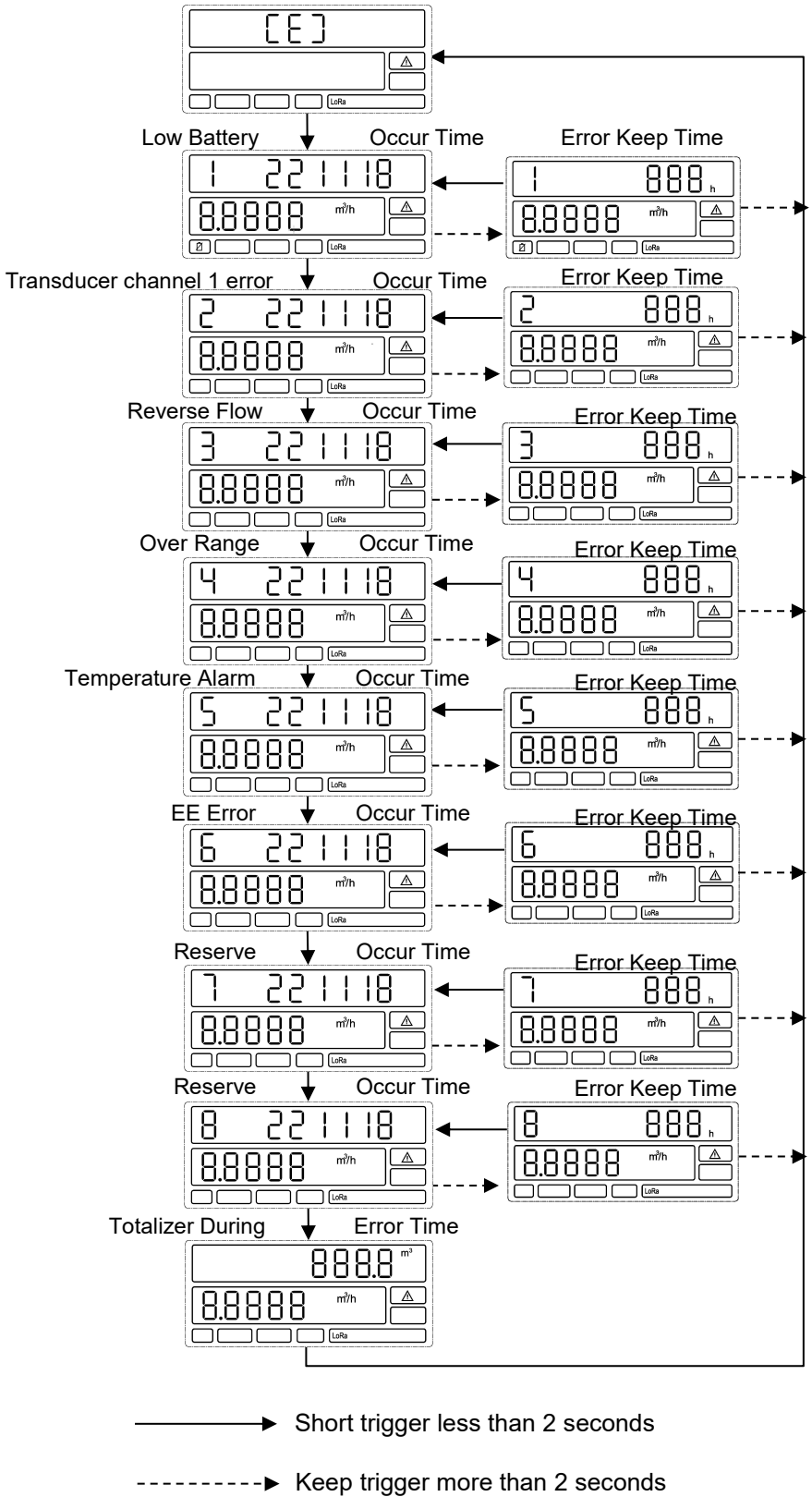
6.1.2 Main Menu

Shortly touching off the hall to display items under the Main Menu one by one in the following order to check the measurement data:



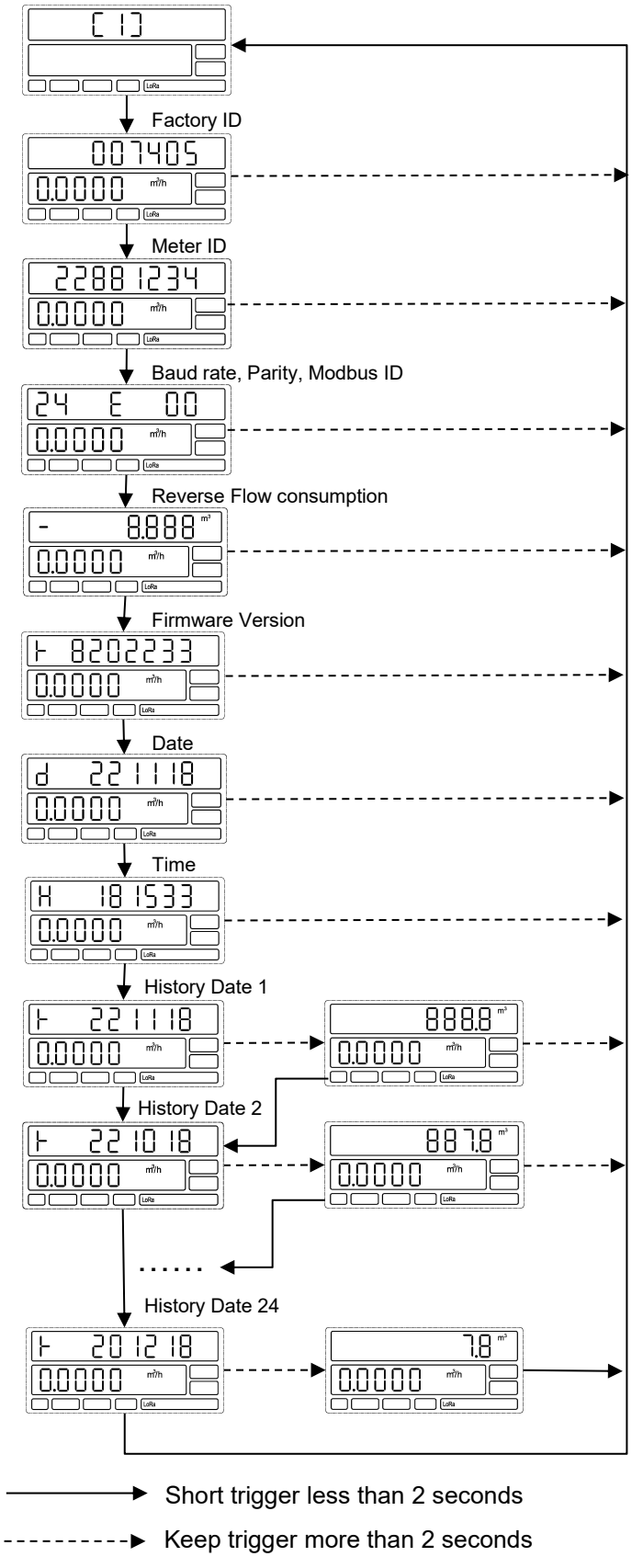
6.1.3 Menu E

Shortly touching off the hall to display items under Menu E one by one in the following order to check the meter information:



6.1.4 Menu I

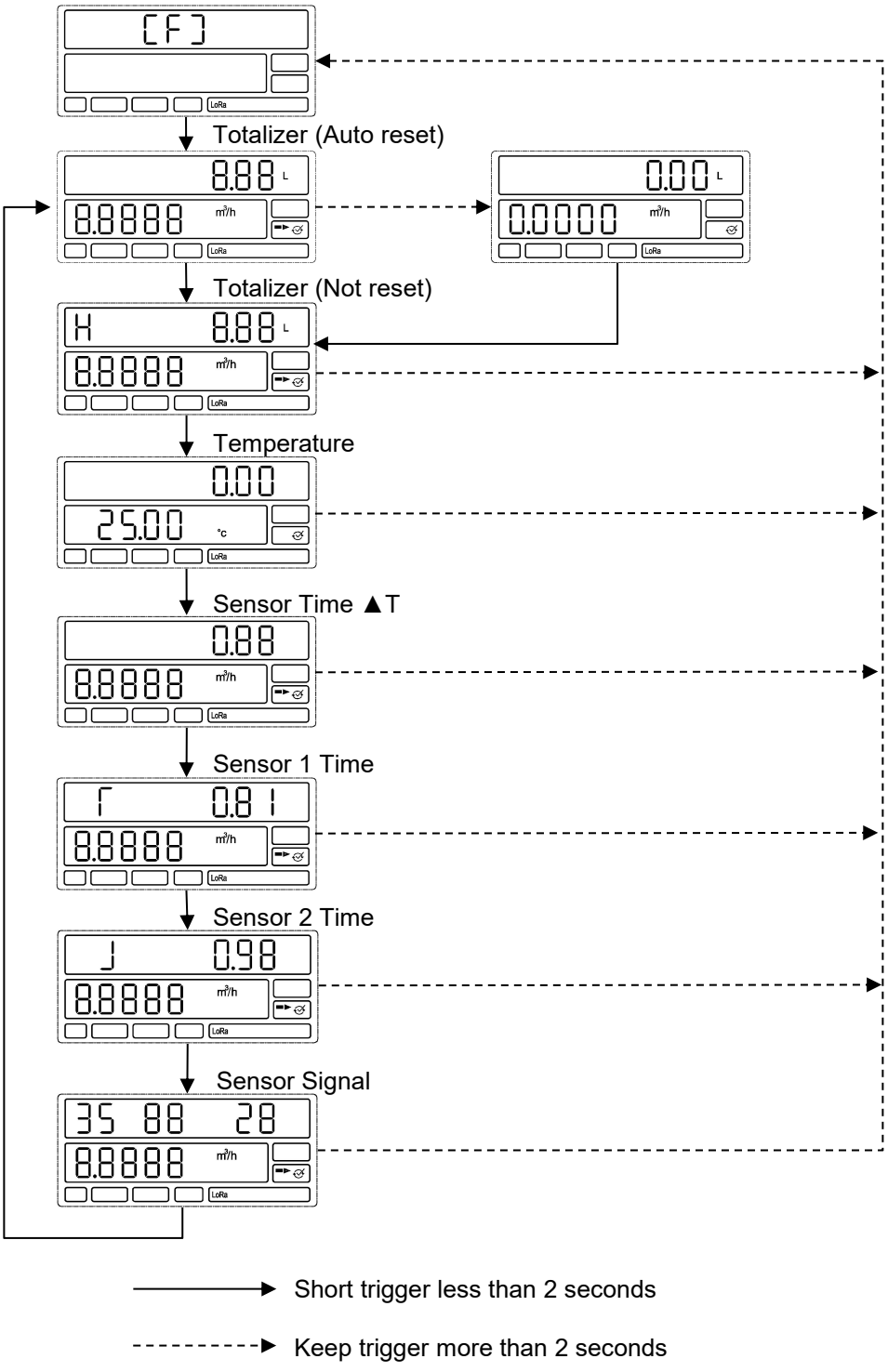
This Menu shows history date records of last 24 months. Touching off the hall to select the month, then the month, monthly flow consumption will be displayed in turn.



6.1.5 Menu F

The following diagram shows Menu F (Calibration mode only). In F mode, Accumulated flow value is able to reset automatically, when flow is zero and starts to exceed the preset value then the current accumulated value is clear to zero. Also the value can be reset by long-trigger the button (over 2 seconds). The meter exit the calibration mode if no operation for 2 hours.

Note: Preset value is pre-set to make sure zero calculation when there's no water flow in the pipe, usually the value equals to 0.1% of Q_3.



6.2. Monthly Data

The calculator stores the following values for 24/120 days/ weeks/ months at each end of day/ week/ month.
- Volume (meter reading)

Example: From the month set day display (Only show 24 logs on display), touch off the hall shortly to enter the previous month's values.
The month values can also be read out via the optical interface and other communication ports.

7. Error and Warning

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

Fault	Meaning	How to handle the error
1	*Low battery*	*Communication circuit to be checked*
2	*Sensor Channel alarm*	*Fulfill the pipe with water, no air bubbles.*
3	*Reverse Flow*	*Reverse the water pipe.*
4	*Over Range (High Instant flow rate)*	*Lower the instant flow rate, or change a higher Range water meter.*
5	*Water Temperature Error*	*Lower the water temperature*
6	*EE Memory Error*	*Change circuit board.*
7	*Flow Sensor Error (water-in)*	*Change sensor*
8	*Flow Sensor Error (water-out)*	*Change sensor*

Corporate Profile

Bove provides comprehensive solutions on flow metering and control to over 30 countries in the globe. We design and manufacture range of flow metering solutions and IoT (internet of things) consumer products, which includes high accuracy water meter, thermal energy meter, testing bench, smart communication software for residential, commercial and industrial sectors. Since 2009 Bove has always been moving on the edge of technology to deliver state of the art products and solutions to customers all around the world.

A couple of our engineers are dedicated in metering and Communication industry for over 10 years, core team are previously working in Huawei, Baidu, IBM, and CitiGroup, etc. With these talents Bove are able to provide prompt services and reliable products to our global customers.

Bove is committed to address the unique challenges that the residential and industry are facing, including increasing customer demand, water scarcity, and environment conservation. With hope, honor and our hard and quality work, we are looking to future to make Bove one of the best brands in metering industry in the world.

Our Mission

To exceed our customers expectation by providing prompt, quality and reliable technology.

Our Vision

Creating an Eco Society