

Installation & User Guide

B39 VW-M Bulk Ultrasonic Water Meter



Read this Guide before installing the meter

 ■ Thank you for choosing our products ■

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1. General Information

Please note that the following installation conditions must be obeyed:

Pressure Requirement: MAP16.

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.

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 2 ultrasonic transducers facing 2 acoustic reflectors.

Flow sensor data:

Manufacturer	<i>Bove</i>
Type	<i>B39 VW-M</i>
Accuracy class	<i>Class 2</i>
MAP	<i>16 bar</i>
Max Pressure loss at Q ₃	<i>≤40kPa</i>
Max admissible temperature	<i>50°C</i>
Limits of temperature (Θ _{min} and Θ _{max})	<i>0.1-30°C, 0.1-50°C</i>
Installation requirements	<i>Min. 5*DN length of straight pipe before the meter, and Min. 3*DN length of straight pipe after the meter (DN is the diameter of meter)</i>
Basic mounting orientation and other specified orientations	<i>Horizontal/Vertical</i>
Output signal for testing	<i>Analog signal 1Mhz</i>
power supply	<i>Lithium Battery</i>
Current used	<i>Average 20uA, Peak 4mA</i>
Climatic and mechanical class	<i>B</i>
Electromagnetic class	<i>E1</i>

Mechanical class	M1
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2.2. Calculator

The calculator 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.

Calculator specification:

Manufacturer	<i>Bove</i>
Climatic and mechanical class	<i>B</i>
Electromagnetic Class	<i>E1</i>
Mechanical Class	<i>M1</i>
Display unit	<i>m³, L, gallon</i>
Battery power supply requirements	<i>See part: 4 Power supply</i>
Pulse input device class	<i>N/A</i>
Max permissible flow sensor signal (Pulse rate)	<i>N/A</i>
Output signal for normal operation	<i>M-Bus, Infrared, RS485, LoRaWAN, NB-IoT, Sigfox, GPRS, 4-20mA</i>
Pulse output device class	<i>N/A</i>
Output signal for testing	<i>M-Bus, Infrared, RS485</i>
Liquid if other than water	<i>N/A</i>

2.3. Completer meter

Manufacturer		<i>Bove</i>							
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)
<i>50</i>	<i>0.05</i>	<i>0.08</i>	<i>25</i>	<i>31.25</i>	<i>200</i>	<i>300</i>	<i>125</i>	<i>165</i>	<i>4*M16</i>
<i>65</i>	<i>0.08</i>	<i>0.128</i>	<i>40</i>	<i>50</i>	<i>200</i>	<i>305</i>	<i>145</i>	<i>182</i>	<i>4*M16</i>
<i>80</i>	<i>0.126</i>	<i>0.201</i>	<i>63</i>	<i>78.75</i>	<i>225</i>	<i>315</i>	<i>160</i>	<i>197</i>	<i>8*M16</i>
<i>100</i>	<i>0.2</i>	<i>0.32</i>	<i>100</i>	<i>125</i>	<i>250</i>	<i>335</i>	<i>180</i>	<i>218</i>	<i>8*M16</i>
<i>125</i>	<i>0.32</i>	<i>0.512</i>	<i>160</i>	<i>200</i>	<i>250</i>	<i>355</i>	<i>210</i>	<i>245</i>	<i>8*M16</i>
<i>150</i>	<i>0.5</i>	<i>0.8</i>	<i>250</i>	<i>312.5</i>	<i>300</i>	<i>385</i>	<i>240</i>	<i>283</i>	<i>8*M20</i>
<i>200</i>	<i>0.8</i>	<i>1.28</i>	<i>400</i>	<i>500</i>	<i>350</i>	<i>440</i>	<i>295</i>	<i>335</i>	<i>12*M20</i>
<i>250</i>	<i>1.26</i>	<i>2.016</i>	<i>630</i>	<i>787.5</i>	<i>450</i>	<i>500</i>	<i>355</i>	<i>405</i>	<i>12*M24</i>
<i>300</i>	<i>2</i>	<i>3.2</i>	<i>1000</i>	<i>1250</i>	<i>500</i>	<i>550</i>	<i>410</i>	<i>460</i>	<i>12*M24</i>
<i>350</i>	<i>2</i>	<i>3.2</i>	<i>1000</i>	<i>1250</i>	<i>500</i>	<i>640</i>	<i>470</i>	<i>520</i>	<i>16*M24</i>
<i>400</i>	<i>3.2</i>	<i>5.12</i>	<i>1600</i>	<i>2000</i>	<i>500</i>	<i>700</i>	<i>525</i>	<i>580</i>	<i>16*M27</i>

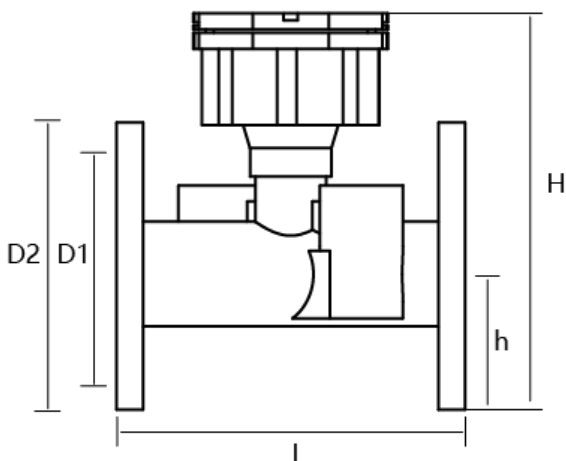
450	5	8	2500	3125	500	760	585	640	20*M27
500	5	8	2500	3125	500	800	650	715	20*M30
600	20	32	4000	5000	600	920	770	840	20*M33
700	50.4	80.6	6300	7875	800	1000	840	910	24*M33
800	80	128	10000	12500	800	1100	950	1025	24*M36
900	128	205	16000	20000	800	1200	1050	1125	28*M36
Pressure Loss ΔP			≤ 40 KPa						
MAP			1.6 MPa						
Water temperature range			0.1 to 30°C, 0.1 to 50°C						
Q ₃ /Q ₁			R125/ R160/ R250/ R500						
Accuracy			Class 2						
Maximum permissible error in upper flow rates range Q ₂ ≤ Q ≤ Q ₄			± 2 % (at $\theta \leq 30^\circ\text{C}$) ± 3% (at $\theta > 30^\circ\text{C}$)						
Maximum permissible error in lower flow rates range Q ₁ ≤ Q < Q ₂			± 5%						
Scale interval(m ³)			0.01/ 0.1						
Capacity of calculator			999999999						
Type of liquid			Drink Water						
Installation requirements			Min. 5*DN length of straight pipe before the meter, and Min. 3*DN length of straight pipe after the meter (DN is the diameter of meter)						
Basic mounting orientation and other specified orientations			Horizontal/ Vertical						
Display & Indication									
Display unit options			m ³ , L, gallon						
Display LCD			9-digit						
Volume (m ³)			0.1/ 0.01						
Time to LCD off			LCD on all the time						
Environmental Requirement									
Electromagnetic Class			E1						
Mechanical Class			M1						
Ambient temperature			5 ~ 55°C (Indoor and non-condensing)						
Storage temperature			-20 ~ 60°C						
Protection Class			IP68						

Data history	<i>24/ 120 days/ weeks/ months</i>
Interface & Communication	
Output signal for normal operation	<i>Wired communication</i>
	<i>M-Bus (Optional)/ RS485 (Optional)/ 4-20mA (Optional)</i>
	<i>Wireless communication</i>
	<i>LoraWAN / NB-IoT/ Sigfox/ GPRS (Optional)</i>
Output display/signal for testing	<i>M-Bus/ RS485/ Infrared</i>
Power Supply	
Battery	<i>3.6V Lithium Battery</i>
Battery Life	<i>≥ 6 Years</i>
24V DC	<i>External supply for special version (Optional)</i>
Mechanical Specification	
Meter body	<i>Cast steel</i>

2.4.Data Storage

1	<i>Accumulated flow for the current month</i>
	<i>Note:1 will be registered at 00:00 on the balance day, and the calculator stores the data of last 24 months.</i>
2	<i>Flow correction coefficient (Only stored when manufacturing).</i>
3	<i>Meter ID</i>
4	<i>Balance Date</i>
	<i>Note:2 to 4 are upgraded as per each command</i>
5	<i>Accumulated flow volume</i>

2.5.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.

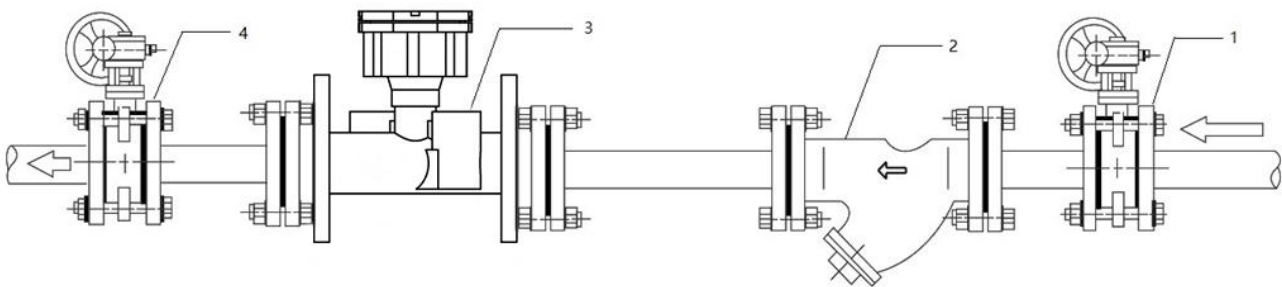
Protection class IP68 allows long-term submergence, provided that all cable unions have been correctly mounted and that the plastic cover has been properly fastened.

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).

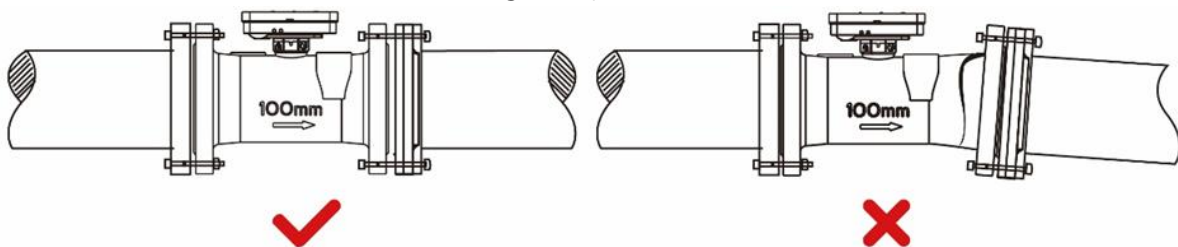


Figure (A)

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).

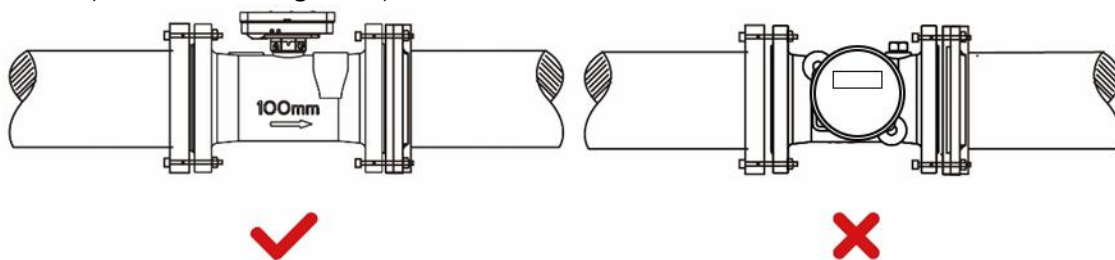


Figure (B)

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).

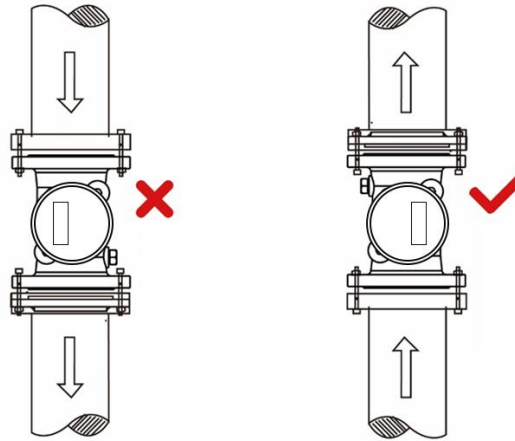


Figure (C)

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).

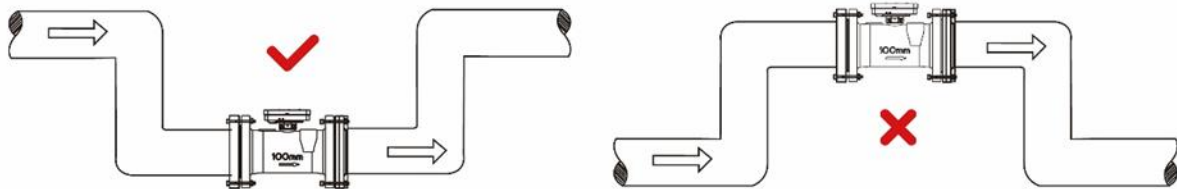


Figure (D)

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 be measurement (as shown in Figure E).

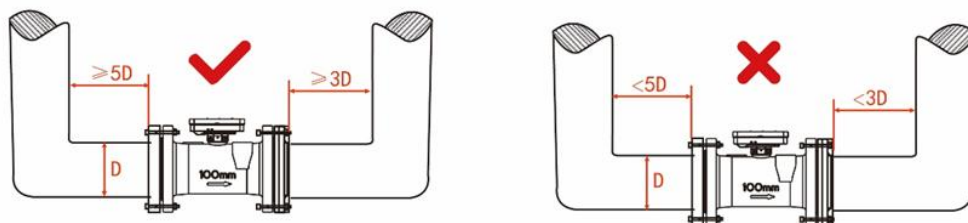


Figure (E)

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).

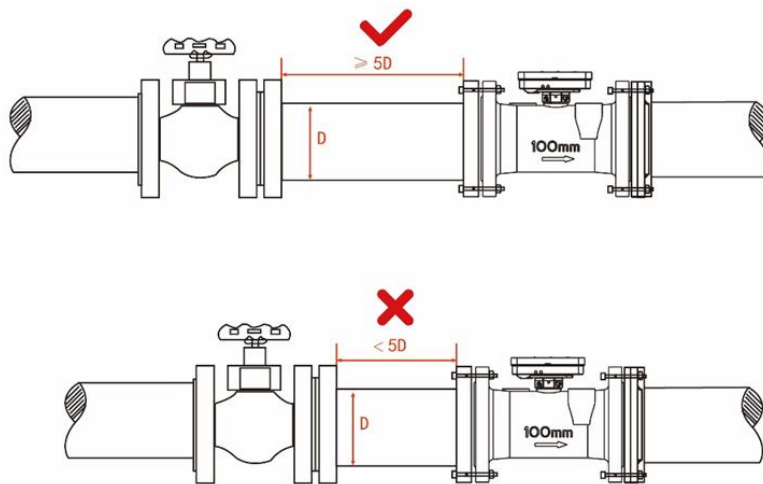


Figure (F)

3.5. 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 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

B39 VW-M Series can be fitted with one ER26500 battery with operating time of 10 years .

Brand	<i>EVE</i>
Type	<i>Lithium Battery</i>
Model No.	<i>ER26500</i>
Rated capacity	<i>9000mAh</i>
Rated voltage	<i>3.6V</i>
Max recommended continuous operating current	<i>130mA</i>
Max pulse current	<i>180mA</i>
Reference weight	<i>28g</i>
Operating temperature	<i>-55°C ~ +85°C</i>

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

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)
<i>Red</i>	<i>Pulse</i>	<i>M-Bus</i>
<i>Black</i>	<i>GND</i>	<i>M-Bus</i>

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

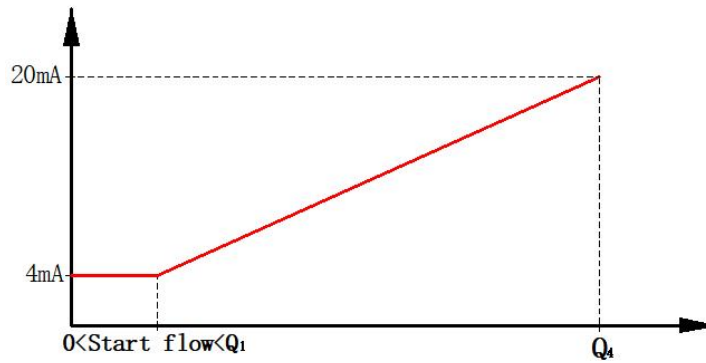
Current: max. 0.1 mA

Classification OC (acc. to EN 1434-2)

5.4. 4-20mA (Optional)

The current changed from start flow; Q₄ is 20mA. Is a linear relationship. Double core wire.

Current flow rate= $(I-4)(20-4)*Q_4$



5.5. RS-485 (Optional)

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

Version/Color	RS-485
<i>Red</i>	<i>VCC</i>
<i>Black</i>	<i>GND</i>
<i>Yellow</i>	<i>A</i>
<i>Green</i>	<i>B</i>

5.6. LoRaWAN (Optional)

ISM Band	<i>EU433</i>	<i>EU868</i>	<i>IN865</i>	<i>US915</i>
Class	<i>Class A</i>			
Network Access Mode	<i>OTAA or ABP</i>			
Transmitting Power	<i>12.15 dBm(max)</i>	<i>16 dBm(max)</i>	<i>20 dBm(max)</i>	<i>20 dBm(max)</i>
Data transmission	<i>Each 6h as default</i>			

5.7. NB-IoT (Optional)

LTE Band	<i>B3</i>	<i>B5</i>	<i>B8</i>	<i>B20</i>	<i>B28</i>
Data transmission	<i>Each 12h</i>				

5.8. Sigfox (Optional)

RCZ Serial	<i>RCZ 1</i>	<i>RCZ 2/4</i>
EIRP/dBm (max)	<i>16</i>	<i>24</i>
Data transmission	<i>Configurable</i>	

5.9. GPRS (Optional)

Operator	<i>2G (GPRS)</i>
Data transmission	<i>24h</i>

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.

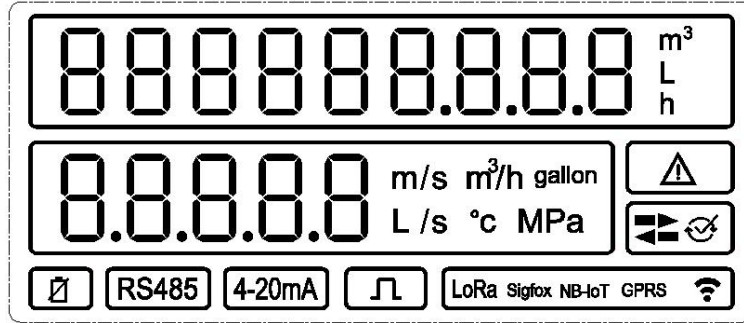














Fig. I: LCD Display

No.	Icon	Name	Meaning
1		Error Warning	Warnings for error
2		Pulse	Pulse output
3		4-20mA	4-20mA output
4		Sigfox	Sigfox communication
5		LoRaWAN	LoRaWAN communication
6		GPRS	GPRS communication
7		NB-IoT	NB-IoT communication
8		TTL Reading	The wireless communicate, 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

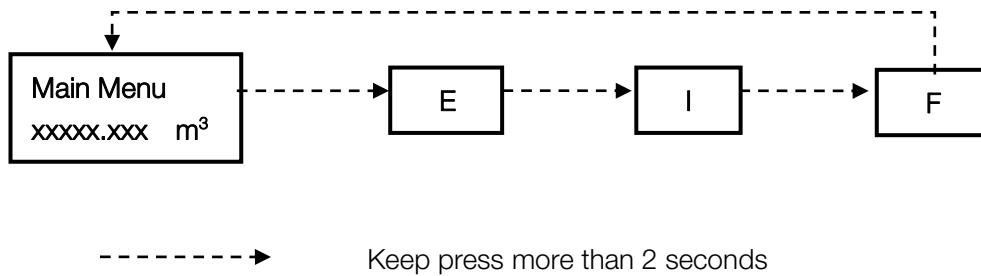
6.1. Operations on how to display

Users may touching off the button to read the meter information such as Accumulated volume, current flow rate, etc.

The following information is displayed in order by short trigger the button: accumulated flow, instant flow, date, time, accumulated working time, Meter ID, address, meter type, software version, checksum, etc.

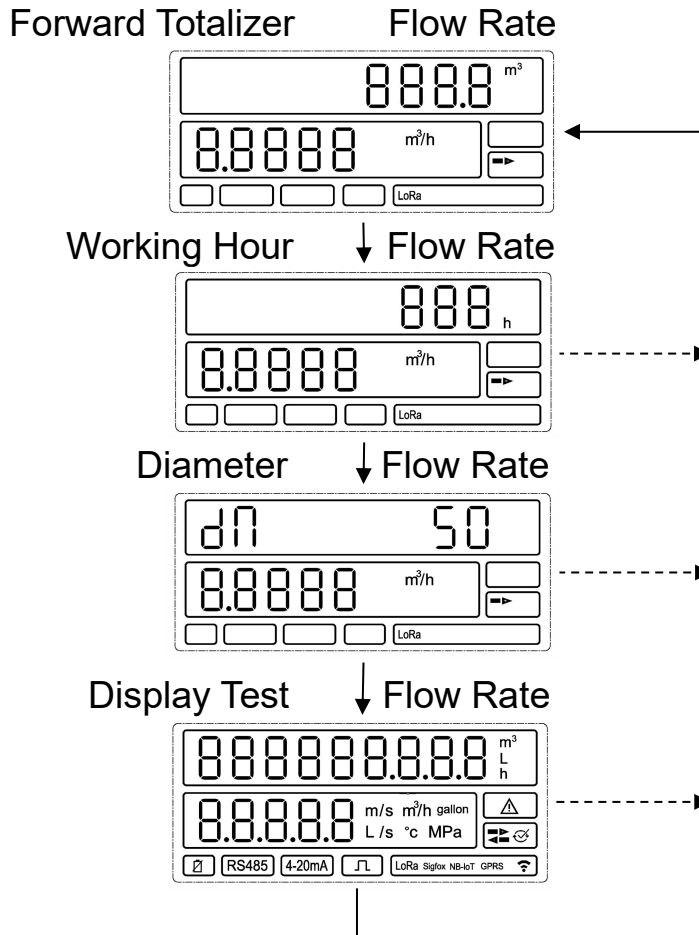
6.1.1 Menu List (User Loop)

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



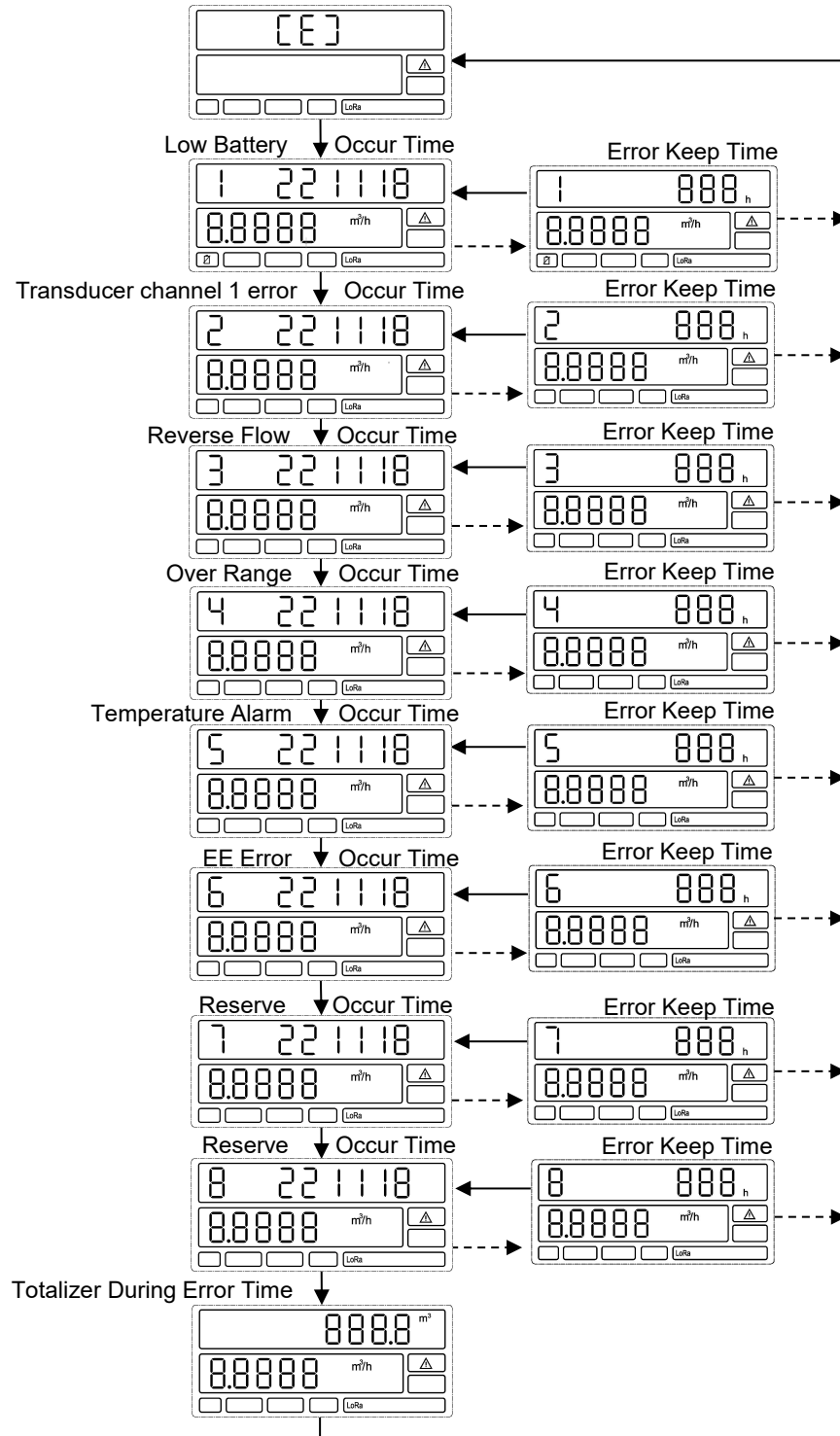
6.1.2 Main Menu

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

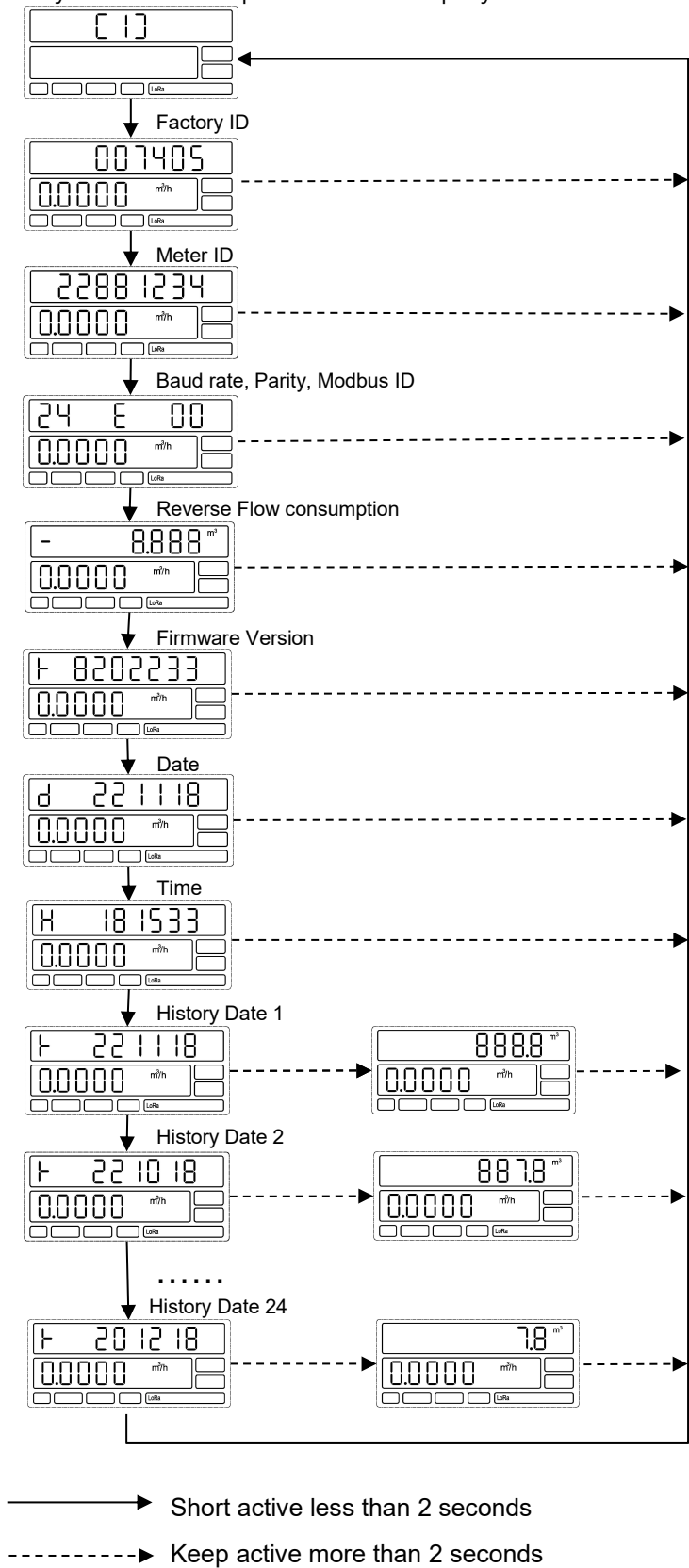


—————> Short active less than 2 seconds

- - - - -> Keep active more than 2 seconds

6.1.4 Menu I

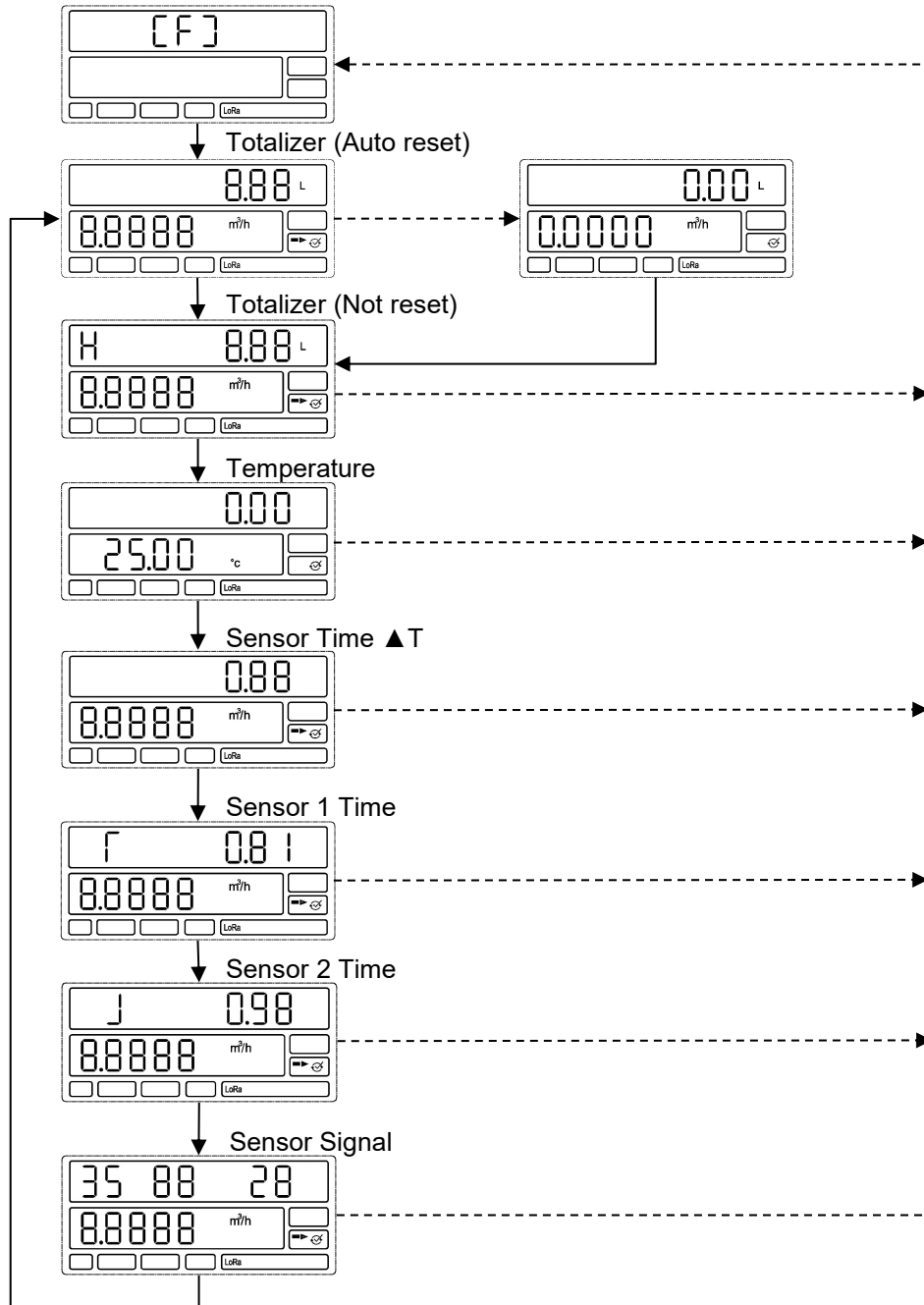
This Menu shows history date records of last 24 months. Touching off the button to select the month, then the month, monthly flow consumption will be displayed in turn.



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 .



- ▶ Short active less than 2 seconds
- - - - -▶ Keep active more than 2 seconds

6.2. Monthly Data

The calculator stores the following values for 24 months at each end of month

- Volume (meter reading)

From the month set day display, press the button 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	<i>Low battery</i>	<i>Communication circuit to be checked</i>
2	<i>Transducer 1 channel error</i>	<i>Check the sensor surface or change the sensor</i>
3	<i>Reverse Flow</i>	<i>Reverse the water pipe.</i>
4	<i>Over Range (High Instant flow rate)</i>	<i>Lower the instant flow rate, or change a higher Range water meter.</i>
5	<i>Water Temperature Error</i>	<i>Lower the water temperature</i>
6	<i>EE Memory Error</i>	<i>Change circuit board.</i>
7	<i>Reserve</i>	-
8	<i>Reserve</i>	-

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 softwares 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

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