

User Manual

Preface

Thank you for purchasing our products!

This manual is about meter functions, settings, connection methods, operation flow, and methods to identify the faults. Please read this manual carefully before operating and using it correctly.

After reading it, please keep it properly in the place where you may read it any time for your reference.

Note

Modification of this manual contents will not be notified as a result of some factors, such as function upgrading.

We try our best to guarantee that the manual content is accurate, if you find something wrong or incorrect, please contact us.

Any reprint and copy of the manual content are strictly prohibited either in whole or in part.

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Chapter 1 Safety Instructions

1.1 Manufacturer's Safety Instructions

Copyright and Data Protection

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For every purchase of products, they are applicable to product documentation and manufacturer's sale terms.

As for document contents including this disclaimer, the manufacturer reserves and has the right to modify at any time in any way for any reason without any notice in advance, and it will not bear the responsibility for the consequences coming out of any forms of change.

Product Liability and Warranty

The operator judges whether the flow meter serves the purpose and bear the responsibility for it. The manufacturer does not assume the consequences caused by operator's misuse of meter. Wrong installation and operation of flow meter (system) will lead to deprive of warranty rights. In addition, the corresponding 'standard sales terms' applies as well, and the clause is the basis of purchase contract.

Document Details

In order to avoid harm or damage to the equipment when used improperly, please make sure reading the information in this document before using it. In addition, you must comply with national standards, safety regulations and accident prevention rules.

If you can't understand this document, please ask the manufacturer for help. The manufacturer will not take the responsibility for property loss or physical injuries due to misunderstanding of the information contained in the document.

This document will help you to establish favorable operating conditions so as to make sure that you use the equipment in a safe and effective way. In addition, something of particular attention and safety measures in the document are marked by the following marks.

Display Convention

The following symbols will make it easier for you to use this document.



Danger!

This symbol signifies related and important safety tips.



Warning!

Such warnings must be paid attention to. Slight negligence may lead to serious health threat, and may damage the equipment itself or the operating factory facilities.



Note!

Such warnings must be paid attention to. Any slight negligence may also lead to functional fault of the equipment itself.



Tips!

This symbol signifies related important information concerning operating instrument.

1.2 Safety Instructions for Operators



Warning!

Only corresponding personnel who got trained and authorized is allowed to install, use, operate and maintain the equipment. This document will help you to establish favorable operating conditions so as to make sure that you use the equipment in a safe and effective way.

1.3 Transportation Guidance and Battery Handling



Warning!

The electromagnetic water meter uses lithium batteries as the main power supply, which contains high energy and can pose potential hazards if not used properly.



Tips!

The manufacturer does not assume any responsibility for the consequences caused by improper use by users. Please comply with local laws and regulations for the transportation and use of batteries t.

Chapter 2 Equipment Introduction

2.1 Scope of Delivery



Tips!

Please check whether the boxes are damaged or not, and whether they have been handled roughly or not. Please report the damage to the deliverer and the manufacturer.



Note!

Please check the packing list to make sure that all the goods you received are integrated.



Note!

Please check the name plate of the equipment, and confirm whether the power supply is the same as your order. If incorrect, please contact manufacturer or supplier.

2.2 Name Plate

**Note!**

Please check the name plate of the equipment and confirm whether the power supply is the same as your order and is correct. If incorrect, please contact the manufacturer.

LXE-50	18073037
$Q_3 = 40m^3/h$	T50
$Q_3/Q_1 = 400$	E2,0
$Q_2/Q_1 = 1.6$	MAP16, Δp_{25}

Accuracy: 1%

Battery replacement time: June 2024

Chapter 3 Installation

3.1 Installation Tips



Note!

Please check carefully whether the boxes are damaged .



Note!

Please check the packing list to make sure the goods that you receive is complete.



Note!

Please check the instrument nameplate, and confirm the delivery item is same with your order. Check the nameplate voltage is correct. If not correct, please contact the manufacturer.

3.2 Storage

- The instrument should be stored in a dry and clean place.
- Avoid exposure in direct sunlight for long.
- Instrument should be stored in the original package.

3.3 Installation Requirements



Note!

In order to ensure the installation reliably , the following measures must be taken.

- Enough space should be spared by its side
Converter shouldn't be suffered by violent vibration

3.4 Piping design



Note!

The following considerations are taken into account in piping design:

1. place:

The electromagnetic water meter should be installed in a dry and ventilated place.

Electromagnetic water meter should avoid sun exposure and rain, when installed in the open air, there should be protection against rain and sun protection facilities. The environment temperature is between $-20\text{ }^{\circ}\text{C} \sim +60\text{ }^{\circ}\text{C}$.

The electromagnetic water meter should avoid being installed in places with large temperature changes and exposed to high temperature radiation of the equipment. If necessary, it should be insulated and ventilated.

The electromagnetic water meter should avoid being installed in the environment containing corrosive gas. When installation is necessary, ventilation and anti-corrosion measures should be taken.

The installation site of the electromagnetic water meter should avoid strong vibration as far as possible. For example, the vibration of the pipe is large, and there should be a fixed pipe bracket on both sides of the electromagnetic water meter.

The sensor part of the electromagnetic water meter with IP68(3 meters under water) protection level can be placed in water. The electromagnetic water meter with protection class IP65 shall not be immersed in water and installed in the open air.

2. Avoid magnetic field interference:

The electromagnetic water meter should not be installed near motors, transformers or other power sources that may cause electromagnetic interference. Electromagnetic water meter should not be installed near the converter or get power from the converter distribution cabinet to avoid interference

3. straight pipe section:

In order to ensure the measurement accuracy of the flow meter, it is recommended that the length of the upstream straight pipe segment of the sensor should be at least 5 times the pipe diameter (5D) and the length of the downstream straight pipe segment should be at least 3 times the pipe diameter (3D). (see figure 9 and figure 10).

4. maintenance space:

For the convenience of installation, maintenance and maintenance, sufficient installation space is required around the electromagnetic water meter.

5. A pipeline in which flow interruption is not allowed in the process:

The by-pass pipe and cleaning port should be added in the installation of electromagnetic flow timing, as shown in figure 11. This device can guarantee the continuous operation of the equipment system when the

meter is out of use.

6. Support of electromagnetic water meter:

Do not install the electromagnetic water meter in isolation on the freely vibrating pipe, use an installation base to fix the measuring pipe. When the electromagnetic water meter needs to be installed in the ground, supports should be set in both the inlet and outlet pipelines, and metal protective plates should be installed on the top of the water meter.

Straight pipe length requirements

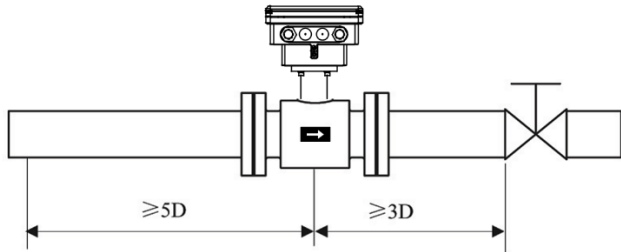


figure 4

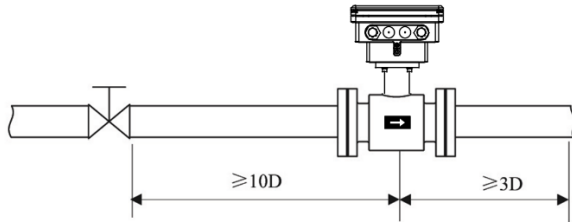


figure 5

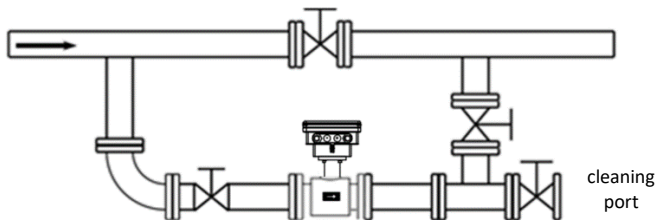
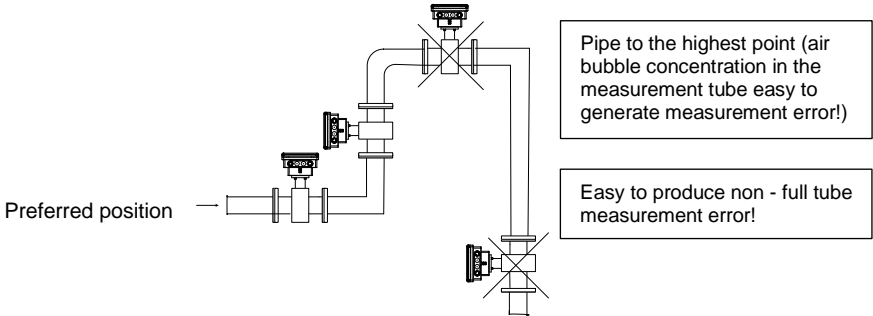


figure 6

3.5 Sensor installation process

This water meter can be set to automatically detect the positive and negative flow direction. The flow arrow on the sensor housing is the positive flow direction specified by the manufacturer. Generally, when installing the instrument, the user should keep the flow arrow in line with the field process flow.

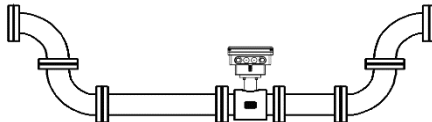
Preferred position for electromagnetic water meter installation



Installation direction of electromagnetic water meter and installation direction of sensor electrode

Sensors can be installed horizontally and vertically. Sensors in a horizontal when installation should make electrodes in a horizontal position, in this way, once the medium containing bubbles or precipitation, bubble not adsorption in the vicinity of the electrode, converter signal side open, also won't cover the precipitation electrode, the phenomenon such as zero drift.

Recommended mounting position



For liquid containing solid particles or the slurry suggestion vertical installation of electromagnetic water meter, a can prevent the phase separation of measured medium, the second lining wear can make the sensor is evener, three impurities were not able to measure the sediment at the bottom of the tube.

Technical parameters

The flow direction must be ensured from the bottom up to ensure that the sensor

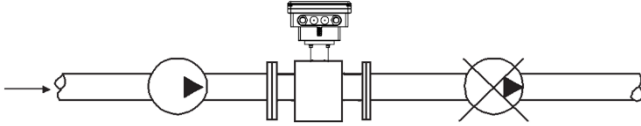
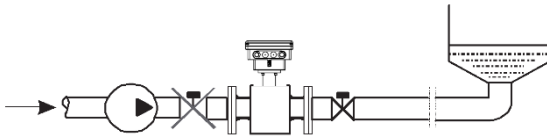


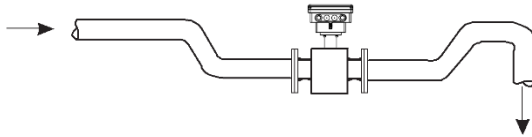
Figure: Electromagnetic water meters cannot be installed on the suction side of the pump to prevent the negative pressure produced by vacuum.



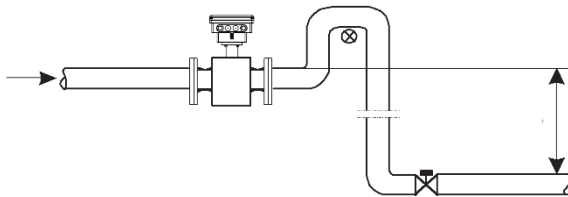
Installation that downstream of the sensor has the back pressure.

the electromagnetic water meter shall be installed in the bottom section

(lower



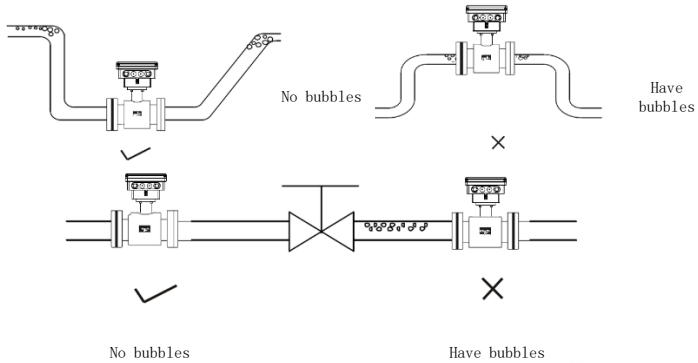
part of the pipe) of the open-drain pipe.



air valves shall be installed downstream of the electromagnetic water meter

where the pipe drop exceeds 5 meters

no bubbles in the pipe



The piping design shall ensure that no gas is separated from the liquid

The water meter should be installed upstream of the valve because the pressure in the pipe will be reduced due to the action of the valve, resulting in bubbles

At the same time, instruments should be installed in the lower section to reduce the influence of entrained air bubbles on the measurement

Liquid conductivity

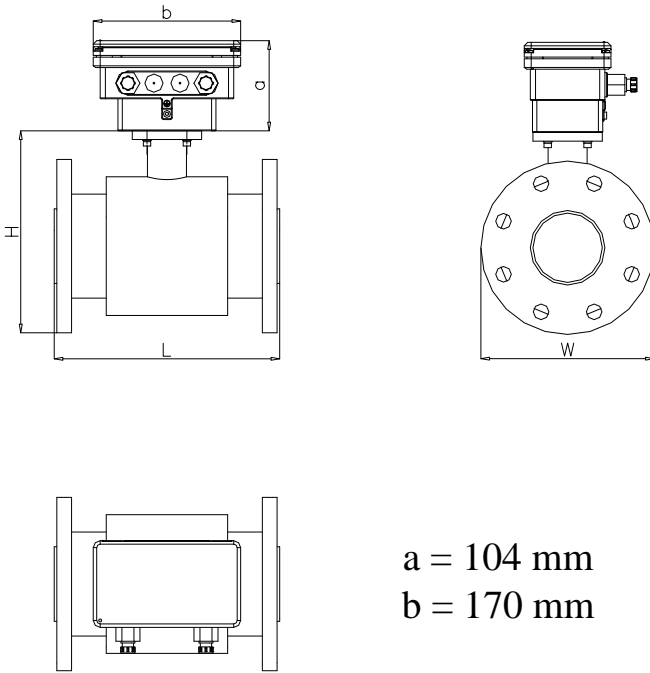
Do not install electromagnetic flow meters in areas with extremely uneven liquid conductivity. Injecting chemical substances upstream of the instrument can easily lead to uneven liquid conductivity, which can seriously interfere with the flow indication of the instrument. In this case, it is recommended to inject chemicals downstream of the instrument; If it is necessary to inject chemical substances upstream of the instrument, it is necessary to ensure that the upstream straight pipe section has a minimum diameter of 30 times, ensuring that the liquid is fully mixed.

Grounding

Because the induction signal voltage of electromagnetic flow meters is very small and easily affected by external noise or other electromagnetic signals, electromagnetic flow meters need to be grounded in many situations. Its function is to form an internal space that shields against external interference through the grounding of the flow meter casing, thereby improving measurement accuracy.

Technical parameters

Dimensions



$a = 104 \text{ mm}$
 $b = 170 \text{ mm}$

Nominal Diameter DN[mm]	Size [mm]		
	L	H	W
50	200	195	165
80	250	200	200
100	250	220	220
150	298	285	285
200	348	340	340
250	450	390	390
300	492	445	445

3.6 Machinery installation

Installation of water meter pipelines

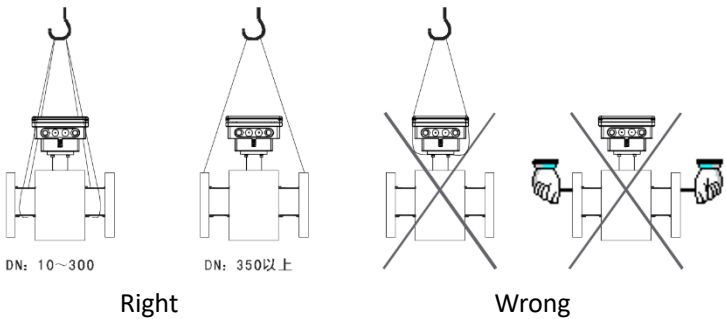
1. Before installing the water meter, the pipeline should be calibrated to ensure that the meter's diameter has a good coaxial degree with the user's pipeline. For sensors with nominal through-diameter under 50mm, the axis of the sensor shall not exceed 1.5mm on the high side, the nominal through-diameter between 65-300mm shall not exceed 2mm, and the nominal through-diameter between 350mm and above shall not exceed 4mm.

2. The newly installed pipe usually has foreign matter (such as welding slag). Before installing the water meter, the sundries should be washed away, which can not only prevent the lining from being damaged, but also prevent the measurement error caused by the foreign matter passing through the measuring tube during the measurement period.

matters needing attention

Operating instructions:

(1) Be careful not to damage the instrument when unpacking. It is best not to unpack before transportation to the installation site to avoid damaging the instrument. When lifting the instrument, use a mounting ring and do not use a rod or rope to pass through the sensor measuring tube to lift the instrument. The correct lifting method is shown in the figure below.



Installation of water meter pipe

(2) Preventing instruments from vibration

Technical parameters

Prevent heavy falls and pressure on the instrument, especially the surface of the flange, which may damage the lining and prevent the instrument from working properly.

(3) Flange surface protection

After unpacking the instrument, attention should be paid to the protection of the flange. The flange should not be placed on the ground without a gasket or other uneven plates at will

(4) Junction box

Do not open the junction box cover before conducting electrical wiring. After the wiring is completed, please pour the special junction box sealant configured by our company into the junction box as soon as possible, cover the junction box cover, and tighten the screws to ensure its sealing.

If the electromagnetic water meter is selected with a protection level of IP68, the instrument has been waterproof and sealed before leaving the factory.

(5) Long term non use

After the instrument is installed, long-term non use should be avoided. If the instrument is not used for a long period of time, the following measures must be taken:

A. Check the sealing of the end cover and wiring port to ensure that moisture and water do not enter the instrument.

B. Regular inspections. Check the measures mentioned above and the condition inside the junction box at least once a year. When there is a possibility of water immersion in the instrument (such as after heavy rain), the instrument should be checked immediately.

Installation of water meters

(1) Installation direction

The flow direction of the measured fluid should be consistent with the flow direction markings on the water meter.

(2) The flange gaskets installed between the flanges should have good corrosion resistance and should not extend into the interior of the pipeline.

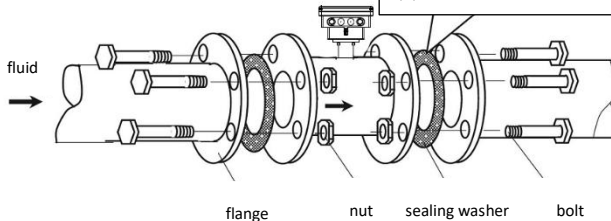
(3) When welding or flame cutting the pipeline adjacent to the sensor, isolation measures should be taken to prevent the lining from being deformed due to heat.

(4) If installed in a negative well or immersed in water for operation, the sensor junction box must be sealed with sealant after system installation and debugging.

(If the protection level of the electromagnetic water meter is IP68 when selecting, the instrument has been waterproof and sealed before leaving the factory.)

(5) During on-site installation, bolts are used to connect the flange on the sensor to the flange on the pipeline. The bolts and nuts of the instrument are tightened, and their threads should be intact and well lubricated; Use both flat and spring washers together. Torque wrench shall be used to fasten bolts according to flange size and torque. In daily use, bolts should be tightened regularly to prevent them from loosening.

When installing the flowmeter, the inner diameter of the sealing gasket must be slightly larger than the inner diameter of the pipeline to prevent interference with pipeline fluid



Chapter 4 Electrical Connection

4.1 Safety Tips



Danger!

Only when power is switched off, can we do all the work about electrical connections. Please pay all attention to the power supply on the name plate!



Danger!

Please observe national installation regulations



Danger!

Please strictly observe local occupational health and safety regulations.
Only those who have got properly trained are allowed to operate on the electrical equipment.



Tips!

Please check the name plate of the equipment, and confirm whether the supply is the same as your order. Check whether voltage and E-supply on the nameplate is correct. If incorrect, please contact manufacturers.

4.2 Connect Signal and Magnetic Field Current Cable



Danger!

Only when power is cut off can you connect signal and magnetic field current conductor.



Danger!

The equipment must be grounded in accordance with regulations so as to protect the operator from electrical shock.



Danger!

In case that equipment be used in explosion danger areas, special notes are given to explosion-proof instructions for safety tips.



Warning!

Please strictly observe local occupational health and safety regulations. Only those who have got properly trained are allowed to operate on the electrical equipment.

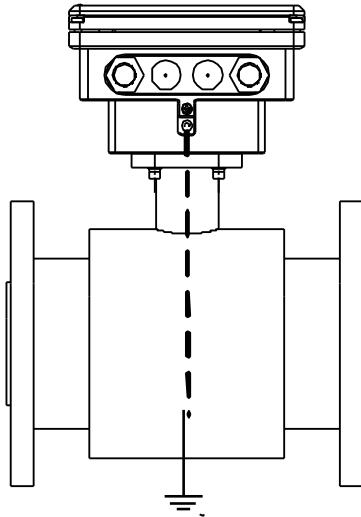
4.3 Measurement Sensor Ground



Danger!

There allows no permission of potential difference between measurement sensor and housing or converter protection ground.

- Measurement sensor must be fully grounded
- Grounding conductor should not transfer any disturbing voltage.
- Grounding conductor is not allowed to be connected to other electrical equipment at the same time.

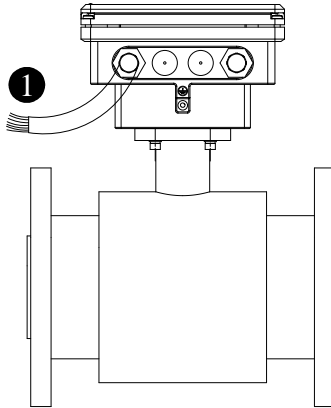


4.4 Connection of output cables



Warning!

Only personnel who have received corresponding training and authorization are allowed to install, use, and operate the machine for maintenance. This document will help you establish operating conditions, which will ensure your safe and effective use of the instrum.



①: Output cable with color

If the output function is ordered, the wiring instructions for the output cable are as follows:

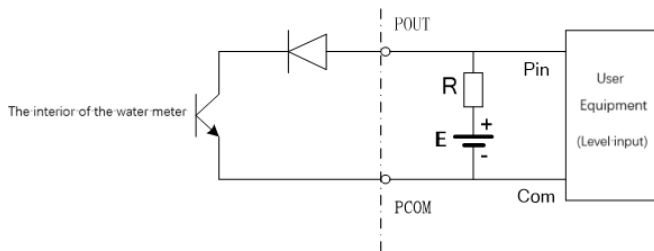
colour	function	notes
red	External power supply positive pole	Input voltage: 6V-25V
black	External power supply negative pole	It can also be used as a 485 signal ground
orange	Pulse output positive	
yellow	Pulse output negative	
blue	485A	
brown	485B	

Communication output

- 485A, 485B: 485 serial communication output.
- 485 signal ground: black wire, used as an external power supply negative pole, can also be used as a 485 serial communication ground.
- Protocol: ModBus RTU.

Passive pulse/frequency output

- $f \leq 1500\text{HZ}, I \leq 10\text{mA}, V: 12\text{-}24\text{V}$
- Output electrical isolation: photoelectric isolation, isolation voltage: $>1000\text{VDC}$
- scale:
Frequency output: default frequency of 1KHz corresponds to the upper limit of the flow range
- Pulse output: Each pulse corresponds to the volume of flow (configurable), output pulse width: 0.1ms~100ms, duty cycle 1:1, $F_{\text{max}} \leq 1500 \text{ cp/s}$;
- Wiring schematic diagram:



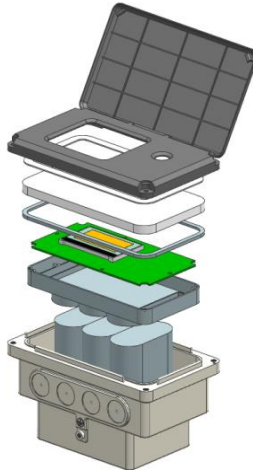
Additional remarks : pulse output for OC gate output, need external power supply. General counter all wear resistance, signal can be directly connected to the counter.

Manufacturer recommendations: upper pull resistance R is recommended to use 2 k, 0.5 W resistor, another power E recommended 24 v dc power supply.

Chapter 5 Startup

5.1 Battery

Each electromagnetic water meter contains up to three pairs of unused batteries, and the batteries are already connected by the manufacturer.

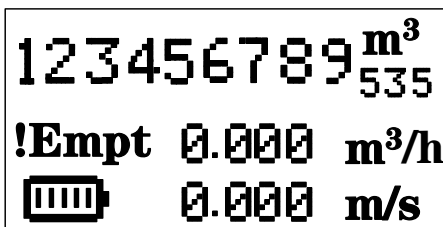


5.2 Converter startup

Measuring instrument consists of measuring sensor and signal converter, the supply has been already in a state of putting-in-service.

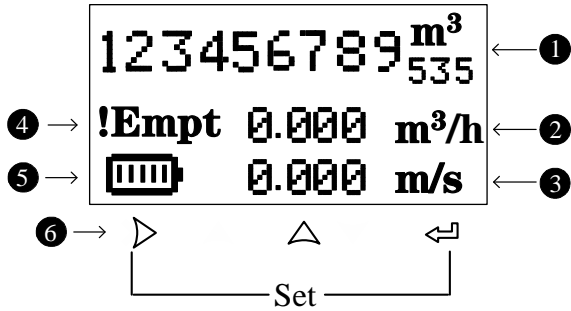
All the operation data and engineering contents have been set according to customer order. It will have a self-check after turning on the power supply. After that, measuring instrument will immediately begin to measure and display the current values.

Startup picture



Chapter 6 Operation

6.1 Display and operation by



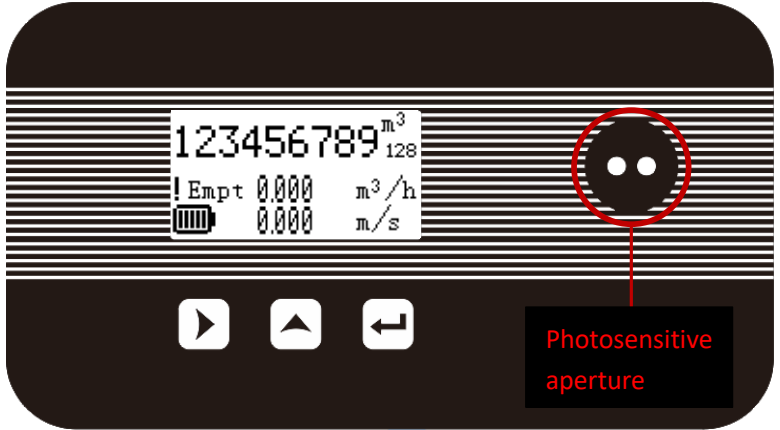
1. Accumulated total amount
2. Instantaneous flow rate and unit
3. Instantaneous flow rate and unit
4. System alarm information
5. Battery level
6. Capacitive touch button/magnetic control button

Signal	Measuring Mode	Menu Mode	Function Mode	Data Mode
➤	-	switch menu categories	-	Data right shift
↵	Switch accumulative amount	Switch menu subclass	confirmation	Confirm data
△	-	-	selection	Change data
➤ + ↵ or Long press ↵	Enter menu	Exit menu	-	-

Note: The capacitive touch button is usually in sleep mode. Before operation, it is necessary to long press any button for more than 3 seconds to wake up the button function.

6.2 Infrared photosensitive function

The instrument is equipped with a light sensor, which turns off the screen display when the meter cover is closed, reducing power consumption. When opening the watch cover, if the surrounding light is dim, the screen may still be closed, and tools such as a flashlight can be used to increase the brightness of the light.



6.3 Operating instruction

Parameter selection and adjustment

Press **⏏** and **⏪** together , enter into parameter setting interface .

Password need to be input by then

Initial users password: 200000 (used for modifying the user level parameter)

Initial manufacture password:100000 (used for modifying the manufacture level parameter)

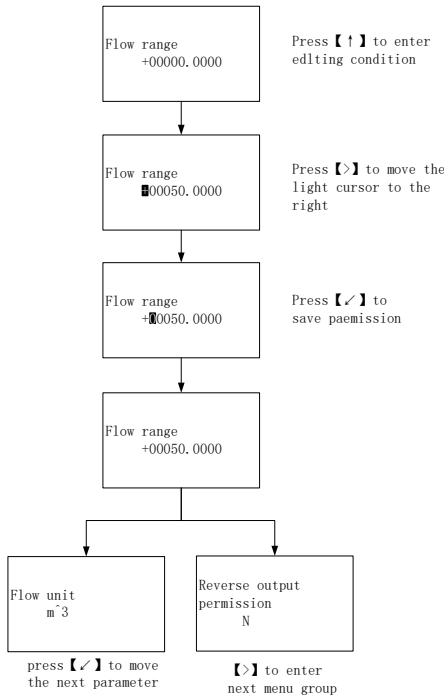
Initial manufacture password:300000 (to set up parameter quickly)

Pressure password:202000(to set up pressure)

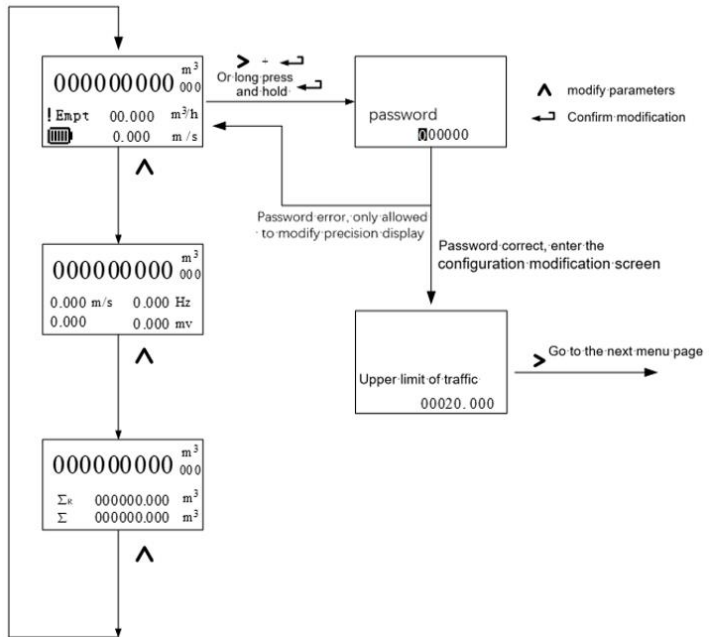
After entering the configuration parameters , the parameters can be modified by the following operation :

User can conduct the switch operation in the menu by pressing the **⏏** button , switch among the parameter

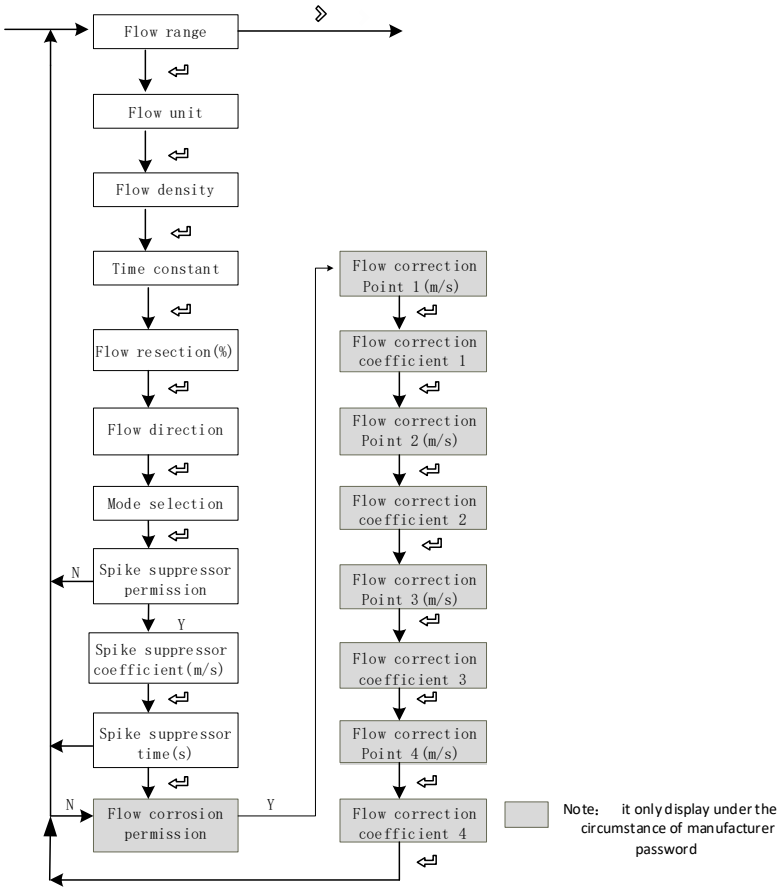
menu by pressing the **⏪** button, and store a modified parameter value at the same time , adjust the parameter value by pressing the **⏴** and **⏵** buttons.



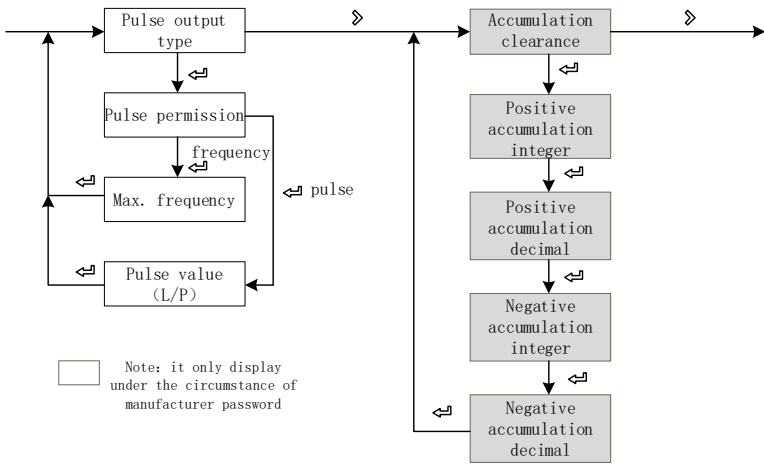
Measurement screen



Traffic Settings Menu

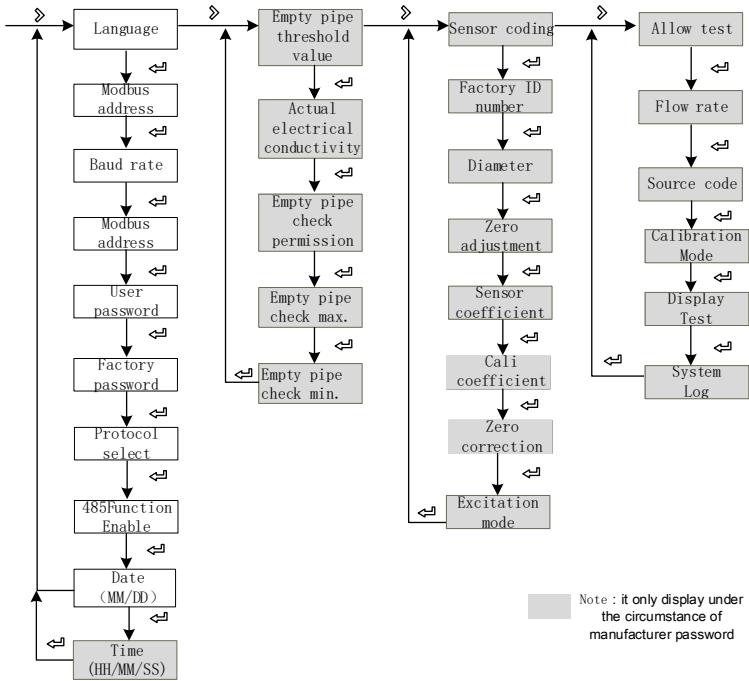


Pulse output and total set menu



System function, empty pipe function , sensors function, test function setup

menu



6.4 Configuration details

NO.	Parameter	Setting mode	Password level	Parameter range	Default
1-Flow rate					
1-0	Flow range	Figure	User	0-99999	35.000
	Set the maximum flow limit value. Used to calculate the frequency, output current limit calculation; Alarm threshold calculation, etc				
1-1	Flow unit	Option	User	L, m ³ , Kg, t, gal, lgal /s, min, h	m ³ /h
	Choose L, m ³ , gal, lgal such as volume unit, the density will not participate in calculation; Choose Kg, t, such as mass unit, need to cooperate with 1-2 density parameter.				
1-2	Fluid density	Figure	User	0.000-99.000	1.000
	Used to calculate the mass flow rate, $QM = \rho V_M$ when flow volume unit is volume unit t, this parameter will not be displayed. Density of the unit : g/cm ³				
1-3	Time constant	Figure	User	0-99S	2s
	Damping coefficient of the filter, select the parameters of the selected period of time as the average of the instantaneous flow				
1-4	Flow resection	Figure	User	0-10%	1%
	Flow volume is regarded as zero if it is below the setting value Zero means not remove				
1-5	Flow direction	Option	User	Positive, Negative	Positive
	Used to change the direction of flow, when the user signal lines negative pole and positive pole are reverse connection, or reverse sensor installation, use this feature				
1-6	Mode selection	Option	User	Positive,Negative Bidirection	positive
	Set the direction of the flow measurement, forward direction indicates only for forward direction measurement flow, reverse indicate only measure the reverse flow, two-way indicate two-way flow measurement				
1-7	spike suppressor permission	Option	User	Y, N	N
	Indicate whether to enable peak inhibition function, this function is applied to the operation condition of the larger jamming signal , is used to filter the jamming signal.When set to N doesn't show 1-8, 1-9 configuration screen.When the range of the signal pulse is greater than 1-8 sets parameters and the time duration is less than 1-9 set time, the system will consider it an interference signal and will not display and measure .				

Electrical Connection

1-8	spike suppressor coefficient	Figure	User	0.01-0.8m/s	0.8
	The peak amplitude (it is not shown when peak inhibition allows configuration closing)				
1-9	spike suppressor time	Option	User	0-3s	1
	Peak duration time(it is not shown when peak inhibition allows configuration closing)				
1-10	Flow correction permission	Option	User	Y、N	N
	<p>Indicates whether the non-linear correction function for traffic is enabled.</p> <p>In principle, it is used for linear adjustment below low flow rate (0.5m/s),</p> <p>This function is designed with 4 stages of correction, divided into 4 flow velocity points and 4 correction coefficients.</p> <p>The flow rate corresponding to the correction point must meet:</p> <p>Correction point 1 \geq Correction point 2 \geq Correction point 3 \geq Correction point 4 \geq 0.</p> <p>The correction calculation is carried out on the original sensor flow coefficient curve, therefore, the non-linear correction function should be turned off first and the sensor coefficient should be marked. Then allow the non-linear correction function to set correction coefficients based on the marked sensor nonlinearity and perform segmented correction. If the coefficient is set appropriately, there is no need to recalibrate.</p> <p>The original flow velocity in the formula is the actual standard flow velocity, and the corrected flow velocity is called the corrected flow velocity. The corrected calculation formula is as follows:</p> <p style="padding-left: 40px;">In the range of correction point 1>original flow rate \geq correction point 2;</p> <p style="padding-left: 80px;">Corrected flow rate=correction coefficient 1 \times Original flow rate;</p> <p style="padding-left: 40px;">In the range of correction point 2>original flow rate \geq correction point 3;</p> <p style="padding-left: 80px;">Corrected flow rate=correction coefficient 2 \times Original flow rate;</p> <p style="padding-left: 40px;">In the range of correction point 3>original flow rate \geq correction point 4;</p> <p style="padding-left: 80px;">Corrected flow rate=correction coefficient 3 \times Original flow rate;</p> <p style="padding-left: 40px;">In the range of correction point 4>original flow rate \geq 0;</p> <p style="padding-left: 80px;">Corrected flow rate=correction factor 4 \times Original flow rate;</p> <p>Note: When setting correction points, the following relationship should be maintained:</p> <p>Correction point 1>Correction point 2>Correction point 3>Correction point 4>0</p> <p>The intermediate value of the correction coefficient is 1.0000. If the coefficient is greater than 1, the flow velocity will be corrected for higher values, and if the coefficient is less than 1, the flow velocity will be corrected for lower values.</p>				
1-11	Flow correction point 1	Figure	Factory	0.0-99.999	0
	Flow rate modified point 1, when The flow rate function shut down , this parameter does				

Electrical Connection

	not display.				
1-12	Flow correction coefficient 1	Figure	Factory	0.0-99.999	1.000
	Flow rate correction factor 1, when The flow rate function shut down , this parameter does not display.				
1-13	flow correction point 2	Figure	Factory	0.0-99.999	0
	Flow rate modified point 2, when The flow rate function shut down , this parameter does not display.				
1-14	Flow correction coefficient 2	Figure	Factory	0.0-99.999	1.000
	Flow rate correction factor 2, when The flow rate function shut down , this parameter does not display.				
1-15	Flow correction point 3	Figure	Factory	0.0-99.999	0
	Flow rate modified point 3, when The flow rate function shut down , this parameter does not display.				
1-16	Flow correction coefficient 3	Figure	Factory	0.0-99.999	1.000
	Flow rate correction factor 3, when The flow rate function shut down , this parameter does not display.				
1-17	Flow correction point 4	Figure	Factory	0.0-99.999	0
	Flow rate modified point 4, when The flow rate function shut down , this parameter does not display.				
1-18	Flow correction coefficient 4	Figure	Factory	0.0-99.999	1.000
	Flow rate correction factor 4, when The flow rate function shut down , this parameter does not display.				
	Used to set the upper limit absolute value of the measured flow rate. The default flow velocity is 12m / s.				
	Display the current output of current value(mA)				

Electrical Connection

3- Pulse/frequency/alarm output					
3-0	Pulse output type	Option	User	Frequency, Pulse, Alarm (integrated)	Freque ncy
	Optional frequency ,pulse equivalent/alarm output.				
3-1	Pulse permission	Option	User	High level, Low level	High level
	Optional High level and Low level output.				
3-2	Max. frequency	Figure	User	0-5000	2000
	Set the corresponding value of the instantaneous flow upper limit ; when select for frequency output , this parameter display.				
3-3	Pulse value (L/P)	Option	User	0.001-999.999	1.0
	Set the cumulant that each pulse stand for ; When selecting is the pulse output, this parameter display.				
	The OC status can be selected, and the default is active.				

Electrical Connection

4-Accumulation					
4-1	Accumulation clearance	Option	Factory	Y、N	N
	Clear accumulation amount				
4-2	Positive accumulation integer	Figure	Factory	0-999999999	0
	Set total positive integer part				
4-3	Positive accumulation decimal	Figure	Factory	0.0-0.999	0.0
	Set total positive decimal part				
4-4	Negative accumulation integer	Figure	Factory	0-999999999	0
	Set reverse total integer part				
4-5	Negative accumulation decimal	Figure	Factory	0.0-0.999	0.0
	Set reverse total decimal part				
8-System					
8-0	Language	Option	User	Chinese/English	Chinese
	Set configuration display language				
	Contrast ratio of Liquid crystal display				
8-3	Modbus address	Figure	User	1-247	8
	Communication agreement instrument address Based on the RS485 protocol Modbus RTU				
8-4	Baud rate	Option	User	1200、2400、 4800、9600、 19200、38400、 57600	9600
	Baud rate of serial communication verification mode				
8-6	User password	Figure	User	00000-999999	000000
	User-level password for viewing and modifying user-level parameter configurations, User initial password: 200000				
8-7	Factory password	Figure	Factory	00000-999999	000000
	Factory-level password for viewing and modifying user-level parameter configurations, Factory initial password: 100000				
8-8	Protocol select	Option	user	ModBus/DZ_188	ModBus
	Select a communication protocol.				
8-9	485 Function Enable	Option	user	Y/N	Y
	Whether the 485 communication function is enabled for date selection is enabled				

Electrical Connection

	by default.				
8-10	date (MM/DD/YY)	Option	user		
	Set the instrument date in YY/MM/DD order as year/month/day.				
8-11	time (HH/MM/SS)	Option	user		
	Set the instrument date, HH/MM/SS in order of hours/minutes/seconds.				

9-Empty tube parameters					
9-0	Empty pipe threshold value	Figure	Factory	0-100%	30%
	Empty tube alarm judgement gate value				
9-1	Actual electrical conductivity	Display	Factory		
	Display the measured conductivity equivalent of the fluid. For general natural water: equivalent < 200 when tube is full, when empty tube > 1200 (the equivalent is related to the fluid conductivity and the length of measuring line , it is recommended double shielded wire is used when the wiring distance is 20m , otherwise it will affect empty detection function .				
9-2	Empty pipe check permission	Option	Factory	Y , N	Y
	Set whether open empty detection function				
9-3	Empty pipe check max.	Figure	Factory	0-9999	2500
	Measured conductivity equivalent value when the tube is empty, default values can be used for general natural water. which need to observe the empty wipe for special fluid is 9-1 value, write in 9-3				
9-4	Empty pipe check min.	Figure	Factory	0-9999	0
	Measured conductivity equivalent value when the tube is full, default values can be used for general natural water. which need to observe the empty wipe for special fluid is 9-1 value, write in 9-4				

Electrical Connection

10-Sensor					
10-0	Sensor coding	Figure / symbol	Factory	14 digital	
	Used for identify sensors				
10-1	Factory ID number	Figure	Factory	6 digital	
	Identification number				
10-2	Diameter	Option	Factory	3-2000	50
	Sensor size				
10-3	zero adjustment	Option	Factory	N/Y	N
	The code value of the sensor under static full tube condition (average value within 30 seconds)				
	Generally, when the sensor symmetry and wiring are good (with good shielding), the code value can be adjusted within ± 0.1 range.				
10-4	Sensor coefficient	Figure	Factory	0-99999	
	The water meter coefficient was calibrated according to the actual flow volume by sensor manufacture				
10-6	Zero correction	Figure	Factory	0-99.999	
	Sensor nonlinear correction when used for small flow (below 0.3 m/s)				
10-7	Excitation mode	Option	Factory	3.125Hz、6.25 Hz、12.5 Hz、25 Hz	12.5Hz
	The choice of excitation frequency: 3.125Hz 、6.25Hz、12.5Hz、25 Hz				
10-9	Gain selection	Option	Factory	1/3/9	1
	Gain choice: adjust the gain can change the range of flow speed Gain adjustment : 1、3、9				
11-Test					
11-0	Allow test	Option	Factory	Y/N	N
	Set Y allow simulate velocity, After the power failure automatically restored to N.				
11-1	Flow rate (m/s)	Figure	Factory	-99.999~99.999	1.000
	Set value of simulate velocity, "11-0 allow test" should be set to "Y"				
11-2	Source code	Option	Factory	Y/N	N
	After setting Y, the original signal code will be displayed in the running screen. This screen also displays the firmware version and product serial number.				

Electrical Connection

11-3	Calibration mode	Option	Factory	Common/Calibration	Common
	You can choose the Calibration mode.				
11-4	Display test		Factory	Press Up key test	
	Press the key to view the main page when all the displayable screens are in the display state. Press the key to exit the [Display Test] interface.				
11-5	System Log		Factory	Query(Up key)	
	Press the key to enter, and then press the key to check the manufacturer's modified settings from back to front (Y → N: off; N → Y: on). A total of 10 messages can be recorded. Press the key to exit the [System Log] interface.				

Electrical Connection

202000					
1	Pressure acquisition permission	Option	Factory	Y/N	N
	Pressure can be set to allow.				
2	Pressure lower limit set	Option	Factory	Y/N	N
	Pressure lower limit calibration can be set.				
3	Pressure upper limit set	Option	Factory	Y/N	N
	Pressure upper limit calibration can be set.				
4	Sensor lower set (mv)	Figure	Factory	-99.999~99.999	+00.000
	The lower limit mv value of the sensor can be set.				
5	Sensor upper set (mv)	Figure	Factory	-999.99~999.99	+120.00
	The lower limit mv value of the sensor can be set.				
6	Zero pressure tune	Figure	Factory	-99.999~99.999	+00.000
	Zero pressure adjustment can be set.				
7	Pressure range	Figure	Factory	-99.999~99.999	+01.600
	The upper pressure limit value can be set.				
8	Pressure acquisition interval (s)	Figure	Factory	0~9999	0015
	The interval time for pressure collection can be set.				

Chapter 7 Functions

7.1 Quick setup menu

1. Press on \triangleright and \triangleleft at same time ,Instrument parameter is set at the interface.Password need to be input at this time.

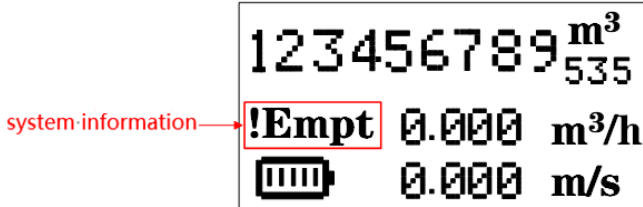
Quickly set the password : 300000

2. The user can use the key \triangleright to switch between menu pages, use the key \triangle and key ∇ to adjust the parameter value, then use the key \triangleleft to confirm.
3. The parameters that can be set are shown in the table below.
4. After modification, move to the menu page [exit config], select Y and press on \triangleleft .

NO.	Parameter words	Setting mode	Parameter range	default
1	Diameter(mm)	Option	1-2000	50
2	Flow range	Figure	0-99999	35.000
3	Sensor coefficient	Figure	0-99	1.000
4	Zero correction	Figure	0-99	+00.000
5	Accumulation clearance	Option	Y、 N	N
6	Flow resection(%)	Figure	0-9.9	0.3
7	Time constant	Figure	0-99	05
8	Sample interval	Figure	0-999	008

7.2 System information

Flow meter itself has the self-diagnosis function, in addition to the power supply and circuit board hardware failures, it can correctly provide the corresponding alarm message to the fault in general application .

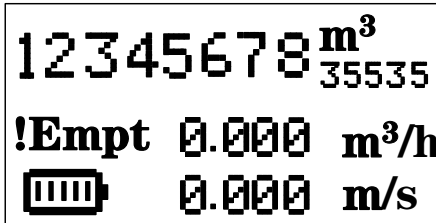


System information sheet

Display	Alarm content
Empt	Sensor empty pipe
Pls	Pulse output frequency exceeds the set frequency limit
AD_Hi	The sensor signal is greater than the upper limit of system AD sampling
Rng	The current instantaneous traffic exceeds the user set traffic limit
Rng_Hi	The current instantaneous flow rate exceeds the setting flow limit
Pls_Hi	The range range set by the user exceeds the upper limit of pulse output

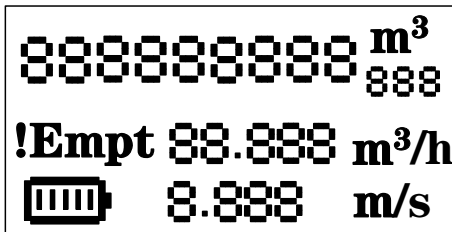
7.3 Calibration mode

The instrument can be set to a calibration mode (menu numbers 11-3 are set to Y), and in the calibration mode, it can be increased to 5 decimal places to obtain higher accuracy counts.



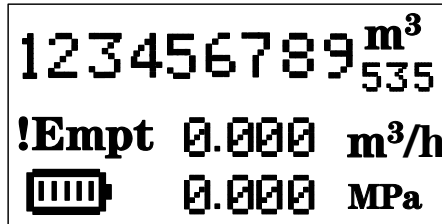
7.4 Display test screen

When the instrument enters configuration 11-4, press the key to view the main page when all displayable screens are in the display state. Press the key to exit the [Display Test] interface



7.5 Pressure input

When selecting the pressure function, replace the flow rate parameter on the main interface with the pressure parameter.



7.6 Pulse/frequency output

Pulse equivalent output

Mainly used for sensor manufacturer coefficient calibration and user measurement. Set in the third set of configuration parameters:

The pulse equivalent corresponds to the cumulative quantity, representing the corresponding volume of each pulse.

For example: set the parameter to 0.1L/p

The current instantaneous volume is 3.6m³/h

The number of pulses output per second is: $3.6 \times 1000/3600/0.1=10$ pieces

notice: When the parameter is set to 0.4L/p

The current instantaneous volume is 3.6m³/h

The number of pulses output per second is $3.6 \times 1000/3600/0.4=2.5$ pieces

When encountering the above situation, the decimal part of 2.5 pulses will automatically accumulate into the next second of output, and there will be no data loss.

When the flow rate in the pipeline is large, it is not advisable to choose a pulse equivalent that is too small, otherwise it will cause the pulse output to exceed the upper limit. At this time, the main screen will display the PIs system alarm message. The user needs to reset the pulse equivalent parameters. Similarly, when the flow rate in the pipeline is small, the

selected pulse equivalent should not be too large, otherwise it will cause the instrument to output a pulse for a long time, causing measurement errors.

The pulse equivalent output is different from the frequency output, and the pulse output can accumulate enough to output one pulse, so the pulse output is uneven. When measuring pulse output, a counter instrument should be used instead of a frequency meter instrument.

Frequency output

Mainly used for factory coefficient calibration and user measurement. Set in the third set of configuration parameters:

The frequency corresponds to the instantaneous quantity, and the upper limit of the frequency corresponds to the maximum flow rate.

Note: The maximum frequency setting is 1500Hz

7.7 Serial Communication

This instrument provides a standard RS485 serial communication interface, using the international standard Modbus-RTU communication protocol, and supports the 04 read hold register command.

Register address

The communication data and register addresses are shown in the table below

Parameter	Type	Address	Illustrate
Real flow rate	float	100	
Real flow velocity	float	102	
Flow percentage	float	104	50 stands for 50%
Electric conductivity	float	106	
Forward flow accumulation of integer	ulong	108	
Forward flow accumulation of decimal	ulong	110	The decimal part magnifies 1000 times 123stand for 0.123
Reverse flow accumulation of integer	ulong	112	
Reverse flow accumulation of decimal	ulong	114	The decimal part magnifies 1000 times 123stand for 0.123
Pressure	float	136	Unit MPa
Battery level percentage	ushort	138	80 represents the remaining 80% of battery capacity
Battery voltage	ushort	139	Zoom in 100 times, 340 represents the battery voltage of 3.4V

Passive note: float/ulong/long type data, communication transmission in byte order 2-1-4-3; Ushort type data, transmitted as 2-1.

When selecting the pressure function, the pressure value can be read.

Communication configuration

Mailing address: 1-247.

Default address: 8

Baud rate: 1200, 2400, 4800, 9600, 19200, 38400, 57600;

Default baud rate: 9600.

Verification: no verification, odd verification, even verification;

Default no verification.

Arranges 32-bit data (long integer or floating point number) in communication frame.

Example: Long plastic surgery 16909060 (01020304H): 03 04 01 02

Floating point 4.00 (40800000H): 00 00 40 80

Example of reading real-time quantity floating point number communication:

Real time quantity floating point reading

Sending message: 08 04 00 63 00 02 81 4C

Return message: 08 04 04 22 6E 41 3F 79 61 (instantaneous flow rate: 11.95)

Forward traffic accumulation read

Sending message: 08 04 00 6B 00 04 80 8C

Return message: 08 04 08 00 6C 00 00 00 7B 00 00 00 D6 8E (cumulative integer: 108,
cumulative decimal: 0.123, cumulative: 108.123)

7.8 Firmware Upgrade Instructions

1. Connect the instrument and computer through the RS485 serial communication interface, open the [DFU Firmware Online Upgrade] software, and click [Next].
2. Enter the [1/5 Open Upgrade Package] interface, click the folder to select the given upgrade package file. The file name is: Current Version → Upgrade Version, and the format is [. dfu], such as [Q70F1015 → Q70F1016. dfu], and click [Next].
3. Enter the [2/5 Communication Configuration] interface, select [Serial Port], [Communication Address], [Baud Rate], [Verification Method] (note that the parameters set in the instrument should correspond one by one).
4. Enter the [3/5 Connect Instrument] interface, confirm that the [Instrument String Code] is the current firmware version of the instrument (to be upgraded), and click [Next].
5. Enter the [4/5 Upgrade Warning] interface and enter the [Upgrade Authorization Code] provided by the manufacturer. To upgrade the 485 communication firmware online, you need to first adjust the instrument screen to [11-2 Test Source Code], select [Y], and then click [Next] in the DFU software.
6. Enter the 【 5/5 Download Firmware 】 interface, wait for the firmware upgrade to display 【 Complete 】 , and then click 【 Complete 】 . Enter the instrument configuration interface and confirm the firmware version in the upper right corner.

7.9 Operation instructions of flow correction function

In principle, used for small flow rate less than (0.5 m/s) linear adjustment. Correction calculation is conducted on the original sensor flow coefficient curve correction, therefore, should be closed nonlinear correction function, mark sensor coefficient. Then allow the nonlinear correction function, according to the nonlinear of sensor, setting correction coefficient, piecewise corrected. If the coefficient is set right, no need to calibration.

The functional design with 4 period of correction, is divided into four flow point and correction coefficient.

The corresponding velocity of correction point must meet:

Correction point 1 \geq Correction point 2 \geq Correction point 3 \geq Correction point 4 \geq 0.

The original velocity stand for the real standard velocity, the revised flow velocity is called modified velocity, the modified computation formula is as follows:

- The original flow velocity \geq The modified point 1
The flow velocity keep unchangeable.
- At the interval of the modified point 1 $>$ The original flow velocity \geq The modified point 2
The modified flow velocity = Correction factor 1 \times The original flow velocity
- At the interval of the modified point 2 $>$ The original flow velocity \geq The modified point 3
The modified flow velocity = Correction factor 2 \times The original flow velocity
- At the interval of the modified point 3 $>$ The original flow velocity \geq The modified point 4
The modified flow velocity = Correction factor 3 \times The original flow velocity
- At the interval of the modified point 4 $>$ The original flow velocity \geq 0
The modified flow velocity = Correction factor 4 \times The original flow velocity

Note: when set the modified point, should keep the following relationship Modified point 1 $>$ Modified point 2 $>$ Modified point 3 $>$ Modified point 4 $>$ 0. The intermediate value of Correction coefficient is 1.0000, if the correction coefficient is greater than 1, then increase the flow velocity; if the correction coefficient is less than 1, then decrease the flow velocity.

Case1:

The original flow velocity:0~0.4m/s, correction factor changes to 1.2.

Parameter setting

Flow correction point 1	Flow correction point 2	Flow correction point 3	Flow correction point 4
0.4	0	0	0
Flow correction coefficient 1	Flow correction coefficient 2	Flow correction coefficient 3	Flow correction coefficient 4
1.2	1	1	1

The modified flow velocity

The original flow velocity	The modified flow velocity
0~0.4m/s	1.2 × The original flow velocity

Case2:

The original flow velocity:0.2~0.4m/s, correction factor changes to 0.9.

The original flow velocity:0.4~0.5m/s, correction factor changes to 1.1.

Parameter setting

Flow correction point 1	Flow correction point 2	Flow correction point 3	Flow correction point 4
0.5	0.4	0.2	0
Flow correction coefficient 1	Flow correction coefficient 2	Flow correction coefficient 3	Flow correction coefficient 4
0.9	1.1	1	1

The modified flow velocity

The original flow velocity	The modified flow velocity
0.2~0.4m/s	0.9 × The original flow velocity
0.4~0.5m/s	1.1 × The original flow velocity

Case3:

The original flow velocity:0.1~0.2m/s, correction factor changes to 0.9.

The original flow velocity:0.2~0.3m/s, correction factor changes to 1.1.

The original flow velocity:0.3~0.4m/s, correction factor changes to 0.8.

Parameter setting

Flow correction point 1	Flow correction point 2	Flow correction point 3	Flow correction point 4
0.4	0.3	0.2	0.1
Flow correction coefficient 1	Flow correction coefficient 2	Flow correction coefficient 3	Flow correction coefficient 4
0.8	1.1	0.9	1

The modified flow velocity

The original flow velocity	The modified flow velocity
0.1~0.2m/s	0.9 × The original flow velocity
0.2~0.3m/s	1.1 × The original flow velocity
0.3~0.4m/s	0.8 × The original flow velocity

Case4:

The original flow velocity:0.1~0.2m/s, correction factor changes to 0.9.

The original flow velocity:0.3~0.4m/s, correction factor changes to 1.1.

Parameter setting

Flow correction point 1	Flow correction point 2	Flow correction point 3	Flow correction point 4
0.4	0.3	0.2	0.1
Flow correction coefficient 1	Flow correction coefficient 2	Flow correction coefficient 3	Flow correction coefficient 4
1.1	1	0.9	1

The modified flow velocity

The original flow velocity	The modified flow velocity
0.1~0.2m/s	0.9 × The original flow velocity
0.3~0.4m/s	1.1 × The original flow velocity

Case5:

The original flow velocity:0~0.2m/s, correction factor changes to 0.9.

The original flow velocity:0.2~0.3m/s, correction factor changes to 1.1.

The original flow velocity:0.3~0.4m/s, correction factor changes to 0.8.

The original flow velocity:0.4~0.5m/s, correction factor changes to 0.9.

Parameter setting

Flow correction point 1	Flow correction point 2	Flow correction point 3	Flow correction point 4
0.5	0.4	0.3	0.2
Flow correction coefficient 1	Flow correction coefficient 2	Flow correction coefficient 3	Flow correction coefficient 4
0.9	0.8	1.1	0.7

The modified flow velocity

The original flow velocity	The modified flow velocity
0~0.2m/s	$0.7 \times$ The original flow velocity
0.2~0.3m/s	$1.1 \times$ The original flow velocity
0.3~0.4m/s	$0.8 \times$ The original flow velocity
0.4~0.5m/s	$0.9 \times$ The original flow velocity

7.10 Accumulated Report Description

Users can change the page to the cumulative report interface by pressing the **▲** button, and a total of 72 pieces of information can be recorded. As shown in the figure below, the top left corner of the page is the year/month of the time, and the top right corner is the number/total number of records of the time. Press the key **➤** to adjust the year/month time forward, and press the key **➤** to adjust the year/month time backward.

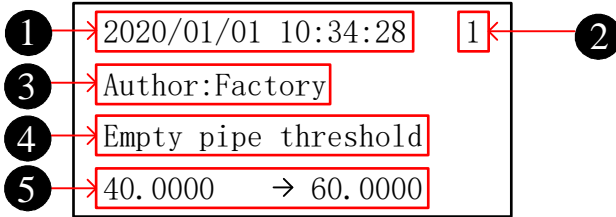
2020/07		12/72
Σ_F	5.025	m³
Σ_R	1.000	m³
Σ	4.025	m³

Σ_F : Positive cumulative value, Σ_R : Reverse cumulative value, Σ : Net cumulative value ($\Sigma = \Sigma_F - \Sigma_R$) .

7.11 System log description

The instrument enters the configuration [11-5 System Log] and presses the key to enter the system log interface. A total of 10 messages can be recorded.

Press the button to query the modified settings of the manufacturer/user from the back to the front according to time, and press the button to exit the [System Log] interface.



1. The upper left corner of the page shows the time of the configuration modification: year/month/day/hour/minute/second;
2. The number of the modified record is located in the upper right corner of the page, and the closer it is to the query time, the smaller the number;
3. The permissions for this modification (from 100000 to manufacturer and from 200000 to user);
4. The positive total integer for this modification;
5. The specific operation for this modification;

Chapter 8 Technical parameters

8.1 Technical parameters

Measuring system

Measuring principle	Faraday's law of electromagnetic induction
Function	Instantaneous flow rate, flow velocity, mass flow (when the density is constant)
Module configuration	Measurement system is made up of signal converter and measurement sensor.
Converter	
All-In-One	Protection grade
Measuring sensor	
Caliber	DN50-DN300

Function

Communication	Serial
Output	Pulse, frequency
Function	ATC recognition, electrode contamination
Cumulative report	A total of 72 messages can be recorded
System log	A total of 10 messages can be recorded

Display user interface

Graphic display	Monochrome LCD, white backlight, 128*64 pixels
Display function	2measurement value screens (measurements, condition, etc.)
Language	Chinese
Unit	Units can be selected through configuration, refer to "1-1 Flow Units" in "6.4 Configuration Details".
Operation buttons	3 capacitive touch buttons

Technical parameters

Measurement range and accuracy

Nominal Diameter DN[mm]	50	80	100	150	200	250	300
Range Ratio R[Q3/ Q1]	400	400/250	400/250	400/250	400/250	400/250	400/250
Minimal Flow Q3[m3/h]	40	100	160	400	630	1000	1600
Overload flow Q4[m3/h]	50	125	200	500	788	1250	2000
Demarcation flow Q2[m3/h]	0.16	0.4/0.63	0.64/1.0	1.6/2.56	2.56/4.0	4/6.4	6.4/10.24
Minimum flow Q1[m3/h]	0.1	0.25/0.4	0.4/0.63	1.0/1.6	1.6/2.56	2.5/4.0	4.0/6.4
Accuracy	2%/1%						
Maximum permissible error	2%: High zone ($Q2 \leq Q \leq Q4$) \pm 2%, low zone ($Q1 \leq Q < Q2$) \pm 5% 1%: High zone ($Q2 \leq Q \leq Q4$) \pm 1%, low zone ($Q1 \leq Q < Q2$) \pm 3%						
Maximum measured flow rate	12m/s						

Technical parameters

Operating environment

Temperature	
Pressure loss level	Δp 25
Pressure rating	MAP 16
Temperature rating	T50
Accuracy class	2%
Environment	-20°C~+60°C
Storage	-40°C – 65°C
Conductivity	> 30us/cm
Sensitivity of flow profile	U5/D3
Protection grade	IP68
Output	Pulse, RS485 (optional), GPRS (optional)
Conductivity	
Water	$\geq 30\mu S/cm$

Material

Die-casting aluminum	Standard
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Technical parameters

Electrical connections

Supply voltage	Internal battery: 6 packs of battery cells (lithium battery, 3.6V, 114Ah)
Battery	5+1 years
Double shielded cable	Signal part, wire: 0.5mm ² Cu/AWG20
Shielded cable	Magnetic field part, wire: 0.7mm ² Cu

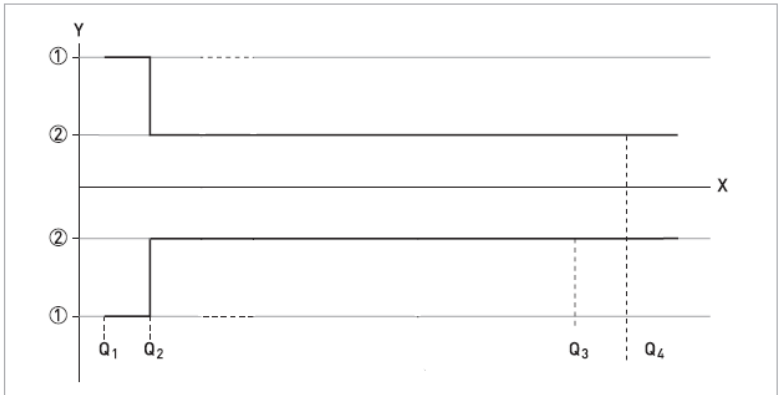
Output

Pulse and frequency output		
function	Can be set as pulse output or frequency output	
Pulse output	Basic	Output pulse width: 0.1ms~100ms Duty cycle: 50% (pulse frequency greater than 5Hz) $F_{max} \leq 1500$ cp/s
	Setting	0.001L – 1m3
frequency	Max	$F_{max} \leq 5000$ Hz
	setting	0-1500Hz
passive	Outer ≤ 36 VDC	

8.2 Accuracy

Reference conditions

- Medium: Water
- Temperature level: T30
- Pressure level: MAP16
- Flow field sensitivity level: U5D3



- X [m/s]: Flow velocity
- Y [%]: Maximum measurement error
- 2% table: low zone ($Q_1 \leq Q < Q_2$) $\pm 5\%$, high zone ($Q_2 \leq Q < Q_4$) $\pm 2\%$
- 1% table: low zone ($Q_1 \leq Q < Q_2$) $\pm 3\%$, high zone ($Q_2 \leq Q < Q_4$) $\pm 1\%$

