



SCL-61HF Ultrasonic Water Meter

Installation & User Guide

Huizhong Instrumentation Co., Ltd.

Dear Users and Friends,

Thank you for your choice of our company's ultrasonic flow measuring meters. Huizhong Instrumentation Co., Ltd. is currently China's R & D and manufacture base of series ultrasonic heat meters, water meters and flowmeters and related systems. It is also a new and high-tech and software enterprise of Hebei Province.

Huizhong owns all the proprietary intellectual property of all the products and it has always been in the leading edge of ultrasonic flow measuring field. Huizhong has also participated in industry/national standards, such as "Ultrasonic Flowmeter for Water Supply and Drainage Application (operating on the principle of propagation velocity difference)", "Regulations on Calibration of Ultrasonic Flowmeter", "Heat Meter" and "Drinking Cold Water and Hot Water Meter".

In 2008, Huizhong participated in the research of "Flow Sensor and System for Industrial Process Control"—the 863 Program assigned by the Ministry of Science and Technology, which has contributed to the independent R & D and industrialization of advanced sensors in China.

Incessant technical innovation lays a solid foundation which enables the company's products to maintain all along technologically a leading position and win the acclaim of numerous users both at home and abroad for their leading technology and superior quality. Among them, the series ultrasonic flowmeters and water meters have been sold in batch quantities to European, African, Australian, North American and South Asian countries and regions, and the products are well accepted by users.

Huizhong will innovate the ultrasonic flow measuring technology, to satisfy needs of users with world-class products and services, and make contributions to the development of global water and energy conservation course.

Quality Assurance:

The standards and approved certifications for the series of products:

- The design and production are in accordance with the national standards of the P.R.C. GB/T 778-2018 “Meters for Cold Potable and Hot Water”.
- The factory verification according to the P.R.C. national metrological verification regulations JJG162-2009 “Cold Potable Water Meters” and JJG 686-2015 “Hot Water Meters”.
- P.R.C. type approval certificate of measuring instruments 2021F205-13, 2022F162-13.

Important Tips:

- Please do read the *Installation & User Guide* carefully prior to the use of the meter.
- Please keep this instruction manual for reference whenever necessary.
- Please operate the meter strictly in accordance with the instructions. Huizhong bears no responsibility for any consequence resulted from user's failure to follow the directives.
- All the diagrams shown in this instruction manual are illustrated instructions for operation, and do not serve as a basis for meter inspection. If there exists in the instruction manual any data that is inconsistent with that of the meter for use, take the meter actually used as the criterion, or consult with our company.
- The meter has been subjected to fine calibration before delivery. Huizhong bears no responsibility for any damage resulted from arbitrary disassembly of the meter by user.
- When the product is reported as on, the battery life will be seriously shortened in the following cases: there is no base station, core network or server in the product location.
- The installation environment of this product requires that the signal coverage level is 0 or 1^[1], otherwise it will shorten the battery life and reduce the success rate of reporting. Huizhong bears no responsibility for this loss.
- It is forbidden to install the product in the metal box.
- NB-IoT system has the risk of operator's network service interruption. The company will not be responsible for the relevant losses caused by operator's network service interruption.
- NB-IoT firmware update risk statement: there is a security risk in firmware update. It is recommended that users only use the official channel for firmware update. If users use unofficial firmware package to upgrade, the security risk and loss caused by it shall be borne by users.

- When the symbol “” or “” comes to display, please refer to the List of Common Troubles for remedy. Otherwise, meter-measured data may get lost.
- If the meter does not work properly or it needs repair and maintenance, contact us or our authorized agency.
- Once the products were sold, prohibit opening the lead sealing, otherwise Huizhong bears no responsibility for any damage resulted from it.

Note1: Indicator of signal coverage level 0/1: RSRP \geq -115dBm (LCD is 25), SNR \geq -3dB (LCD is -30) .

 Warning: Please proceed with your meter installation and operation strictly in accordance with the instructions for a avoiding the loss of your interest.

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Safety Warning

Please proceed with following precautions and use the meter correctly for avoiding economic loss, personal injury and death.

1. The meter is a precision device and must be operated by specialized personnel.
2. Battery-related points for special attention:
 - The battery is non-rechargeable. Never short circuit or retrofit it without permission.
 - Never allow battery to get overheated or soldered up.
 - Keep battery away from flame or water.
 - Protect battery against strong physical impact.
 - The battery has undergone special treatment. Never use any battery of the same type of replacement.
 - When battery power is low, replace it in time. Otherwise, meter-measured data may get lost. The battery must be replaced by trained personnel or by Huizhong, if the meter is sent back to Huizhong by user.
 - The replaced battery should have its electronic contracts insulated using adhesive tape for avoiding fire or explosion hazard caused by their contact with other metallic objects or battery.
 - The replaced battery should have its electronic contracts insulated using adhesive tape for avoiding fire or explosion hazard caused by their contact with other metallic objects or battery.
 - The used battery should be treated by environmental protection or sent to Huizhong for unified recovery and treatment.
 - The replaced battery should have its electronic contracts insulated using adhesive tape for avoiding fire or explosion hazard caused by their contact with other metallic objects or battery.
 - The used battery should be treated by environmental protection or sent to Huizhong for unified recovery and treatment. In case of contact of your eyes, skin or clothes with battery leakage, lose no time to wash them with plenty of fresh

water (Do not try to rub your affected part) and immediately seek medical advice.

3. Any exposed threaded parts of the product may cause skin scratches. Please be careful for operations.
4. Try to avoid using it in an acidic environment or in a salty environment, which will speed up the aging of the product and cause the product to fail to meet hygiene standards.
5. This product is a precision measuring instrument, do not drop it or cause it to be hit.
6. The product storage temperature is -25°C~+55°C. Avoid corrosive gas or liquid, and direct sunlight to the display panels of meter for a long time.

1. Product Introduction

- SCL-61H Valve-Control Ultrasonic water meter is designed to work on “propagation velocity difference” principle. It is a meter working with measurement-integration-display-valve control integrated functions and micro-power consumption technology. A flowrate as low as 0.006m³/h can be precisely measured. It owns the merits of small size, high stability and anti-interference capability.
- Due to its use of ultrasonic measuring technology, the meter can be installed in different angles without affecting its measuring accuracy. Moreover, the pressure loss of pipe flow can be reduced to a minimum.
- The meter is widely used in a residential area, buildings and sub-district water supply system.
- With the valve-control function, the valve core and sealing element adopts the innovative technology of processing and surface treatment, to ensure that the valve can work normally and stably in corrosion, scaling and impurity.
- NB-IoT water meters, wired water meters and RF water meters communicate with IoT platforms and collection devices through NB-IoT network, wired and RF transmission methods for data upload and download.
- With remote and near valve-control function, it enhances the control of water department, and effectively shortens the arrear time of water charges.

2. Technical Parameters

Table 2-1 Technical Parameters

Item	Parameter
Accuracy class	Class 2
Nominal diameter (mm)	DN15~DN25
Maximum working pressure	1.6MPa
Temperature range	0°C~+55°C, ≤100%RH

ambient	(If exceed this range, please specify when ordering)	
Dynamic range	R250, R400	
Water temperature class	T30, T50, T70, T90	
Upstream field profile sensitivity class	U0	
Downstream field profile sensitivity class	D0	
Category of climate & mechanical environment conditions	Class O	
Electromagnetic class	E2	
Valve forms	Butterfly valve	
Material of valve and valve spool	304 stainless steel	
Valve life	More than 10000 times	
type of connection	Ultrasonic water meter integrated structure	
Operation	Photosensitive key	
Display indication	LCD, 10 digits + prompting characters	
Values displayed	Accumulated flow rate (L), Accumulated flow rate (m ³), Instantaneous flow rate (m ³ /h), Water temperature (°C), Cumulative effective running time (h), Date (y/m/d), Time (h/m/s), Software version/ Meter ID, Display test	
Display resolution	Accumulated flow rate: 0.001m ³ (1L), Instantaneous flow rate 0.001 m ³ /h, Water temperature: 0.01°C (The decimal digits of accumulated flow rate and instantaneous flow rate can be customized up to 5 digits.)	
Display range	Accumulated flow rate: 0m ³ ~ 1999999.999m ³	
Data communication	Photoelectric interface	Baud rate 2400bps; Even parity; Protocol EN13757
	NB-IoT network	NB-IoT network, data report period once per day
	RS-485 /M-Bus	Baud rate: 2400bps, 4800bps, 9600bps, default: 2400bps Check bit: odd parity, even parity and no parity, default: even parity Support CJ/T 188 protocol, EN13757 protocol, default: EN13757 protocol Transmission distance≤1200m
	RF	470MHz/868MHz

Data storage	NB-IoT	1. Current 24 months of monthly accumulated flow rate, cumulative running time and maximum flow rate. 2. Current 730 records of daily frozen cumulative quantity, cumulative running time and diagnostic code. 3. Reported historical data for at least latest 1 month. 4. Latest 60 reported log records. 5. Latest 100 alarm records. The data can be kept in 100 years after power off.
	RF/RS-485/M-Bus	1. Current 24 months of monthly accumulated flowrate, cumulative running time. 2. Current 24 months of daily frozen cumulative quantity, cumulative running time and diagnostic code.
Power supply		Battery supply DC3.6V (Continuous working years: more than 7 years/8 years/ 10 years optional)
Protection class		IP68
Storage temperature		-25°C ~ +55°C
Installation position		Water supply pipe

* Note:

1. The cumulative flow unit L is only used for drinking water meter.
2. Weak signal, re-sending data and high alarm frequency will shorten battery life.
3. Test for battery lifetime at ambient $25\pm5^{\circ}\text{C}$. Beyond the range, the battery lifetime will be reduced.
4. It cannot be used for reverse measurement.

Table 2-2 Flowrate Parameters(R250)(Unit of Fowrate: m^3/h)

Nominal diameter (mm)	Minimum Flowrate Q_1	Transitional Flowrate Q_2	Permanent Flowrate Q_3	Overload Flowrate Q_4	Q_3/Q_1	Pressure Loss
DN15	0.0064	0.010	1.6	2.0	250	$\Delta p40$
	0.010	0.016	2.5	3.125	250	$\Delta p63$
DN20	0.010	0.016	2.5	3.125	250	$\Delta p40$
	0.016	0.025	4.0	5.0	250	$\Delta p63$
DN25	0.016	0.025	4.0	5.0	250	$\Delta p40$
	0.025	0.040	6.3	7.875	250	$\Delta p63$

Table 2-3 Flowrate Parameters(R400)(Unit of Fowrate: m^3/h)

Nominal diameter (mm)	Minimum Flowrate Q_1	Transitional Flowrate Q_2	Permanent Flowrate Q_3	Overload Flowrate Q_4	Q_3/Q_1	Pressure Loss

DN15	0.00625	0.010	2.5	3.125	400	$\Delta p63$
DN20	0.010	0.016	4.0	5.0	400	$\Delta p63$
DN25	0.01575	0.0252	6.3	7.875	400	$\Delta p63$

3. Product Dimensions

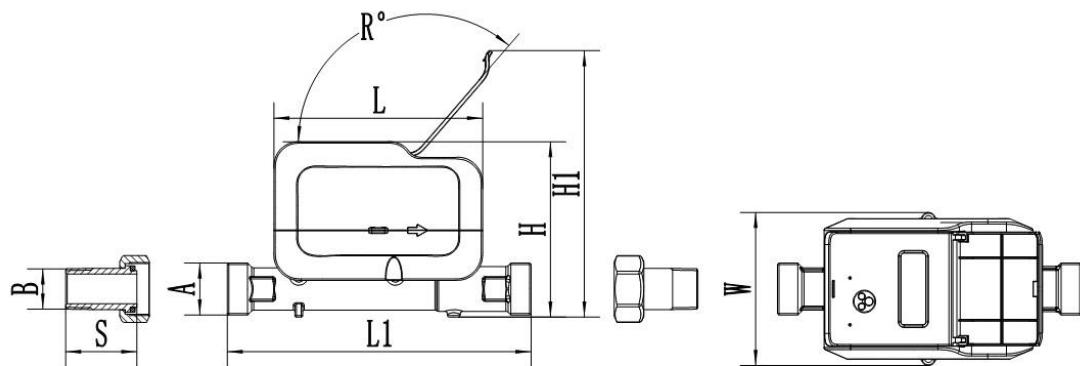


Figure 3-1 Ultrasonic Water Meter Size Diagram (DN15-DN25)

Table 3-1 Product Dimensions of Ultrasonic Water Meter(DN15-DN25)

Nominal Diameter(mm)	DN15	DN20	DN25
A without Connections	G3/4B	G1B	G1 1/4B
B with Connections	R1/2B	R3/4B	R1B
L (mm)	134	134	134
L1 (mm)	165	195	225
H (mm)	109	112	119
H1 (mm)	167	171	178
W (mm)	98	98	98
R (angle)	130	130	130
Connection Length S (mm)	45	50	59

4. Operating Instruction

- Front panel description (Panel information is subject to actual object.)



Figure 4-1 Front Panel

Display content description:

The LCD adopts 10-digit display to satisfy the customers' different needs for display resolution and dynamic range. For easy reading, the decimal parts use box display. In the meantime, LCD can display various symbols as information hints. The symbols' meanings are as shown in table 4-1:

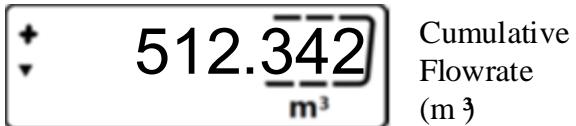
Table 4-1 Symbol Meanings

Symbol	Meaning	Symbol	Meaning
±	+/-	▼	Valid operation of button
■■■	Signal strength indicator	❖	NB-IoT communication indication
⌚	Arrear	□	Reserve
滴	Continuous Low Flow Alarm (Leakage Indicators)	⚡	Continuous High Flow Alarm
🌡	High Temperature Alarm	🌡	Low Temperature Alarm
⚠	Empty Pipe or Abnormal Transducer	🔋	Low Battery
m³L/h	Flowrate unit, able to be used in combination	°C	Temperature Unit (Celsius)

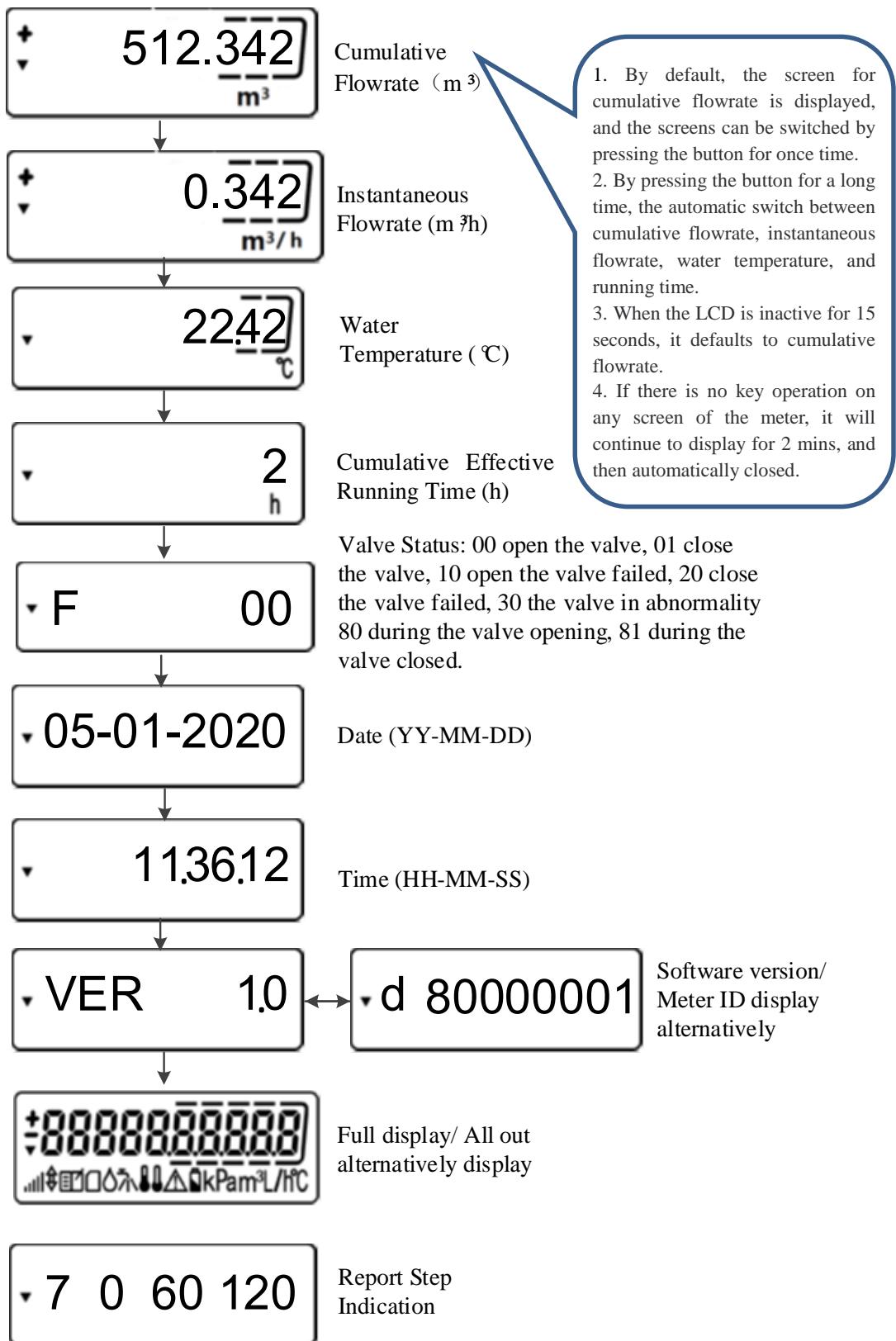
kPa	Pressure unit	-	-
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- Operating Instruction

Main screen display is as follows:



The photosensitive key can be used to switch to the various displays as desired for the view of various measured data which appear cyclically as follows:



- **Valve Control**

NB-IoT Remote control: Platform docks payment system. According to the payment status of users in the system, it can control valve on or off remotely, automatically, or manually.

Near end trigger report: When the valve is closed and the payment is successful, use the appropriative “Huizhong frequency flashlight” software to aim the flash at the photosensitive button and control the distance within 10cm. Flash at an appropriative frequency for 8 seconds, and trigger the metering report. After successful report, the system will automatically issue the valve opening instruction.

Near end infrared control: Install special mobile phone debugging software, the infrared reader connected to the OTG interface of the mobile phone, and open/close the valve by the infrared interface.

RF valve control: The RF interface valve control water meter is connected to the data collector through RF transmission for RF valve control. The remote valve control function can be realized through the collecting device, and the valve control can also be realized through the handheld wireless meter reading device.

Wired valve control: The valve control water meter with wired interface is connected to the data collecting device through wired transmission, and the valve is opened and closed through the collecting device.

5. Installation and Connection

5.1. Requirements

5.1.1. The meter must be mounted at the design-specified position. It is strictly forbidden to mount it at other positions.

5.1.2. Replacement of battery must be done by professional personnel.

5.2. Meter Mounting Position

5.2.1. A vertical pipe with upward (or oblique upward) flow is the most preferable location, followed by a horizontal pipe. Never mount the meter on a pipe with downward or oblique downward flow, for in this case the pipe may not be full

of water.

- 5.2.2. Installation position shall not be the highest point of the pipe flow direction, in case there are bubbles inside the pipe affecting normal measurement.

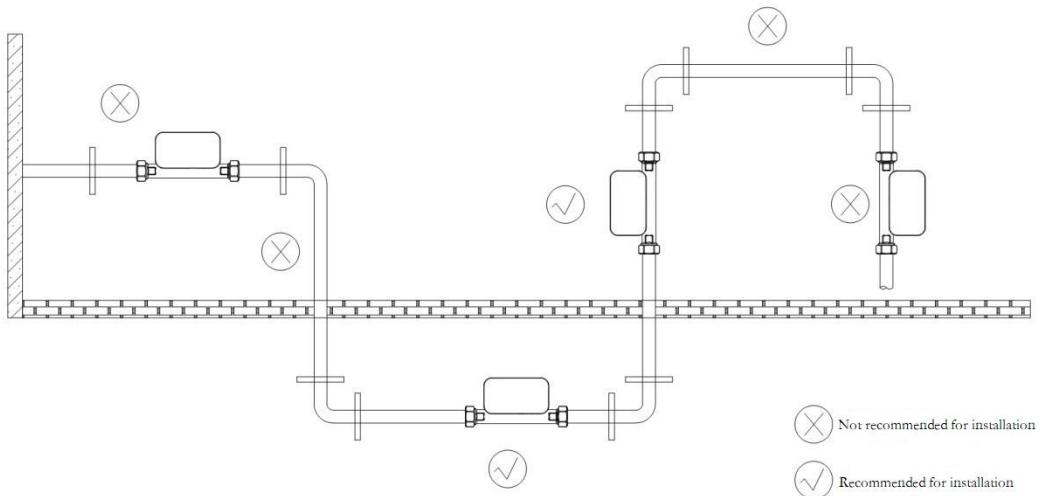


Figure 5-1-1 Installation Location Diagram

- 5.2.3. When the liquid (water) in the pipeline contains rust or other impurities, please install a filter in front of the table.

- 5.2.4. It is recommended to install a check valve on the pipe before the water meter (or purchase a connector with a built-in check valve) to prevent reciprocating surging of the liquid in the pipe network due to pressure changes, thus causing invalid measurement.

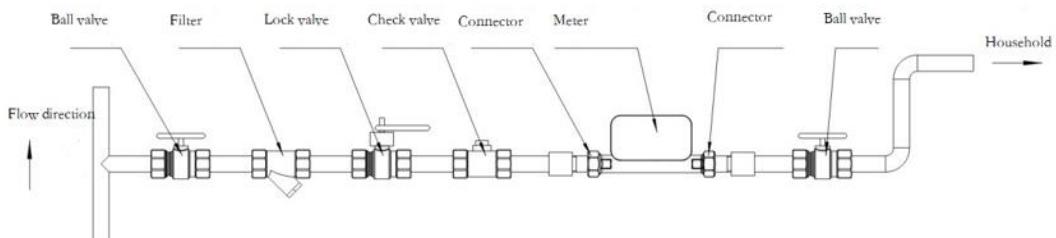


Figure 5-1-2 Installation Diagram of Front Check Valve

- 5.2.5. When there is no ideal installation location so that it needs to be installed in the highest point of the pipeline in the household, it is suggested that the

check valves be installed in front of and behind the meter (Or purchase connector with check valve), preventing the abnormal phenomenon in measurement causing by bubble aggregation. (**When the meter is installed in the highest point and bubbles are produced in non-flowing circumstance, if there is reasonable installation position, this kind of installation location should be avoided.**)

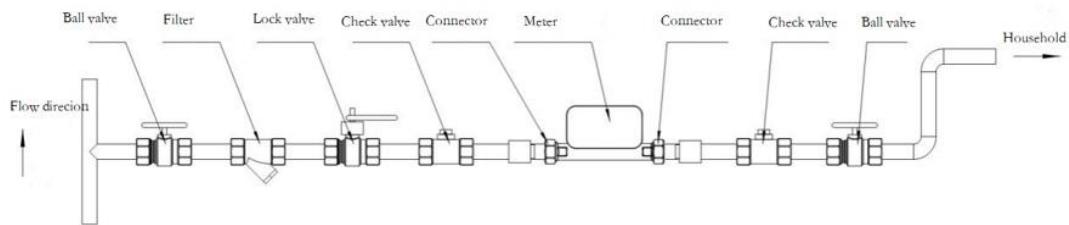


Figure 5-1-3 Diagram of Installing Check Valve in Front and Behind the Meter

- 5.2.6. It is recommended to carry out exhaust treatment for the newly installed water meter to avoid gas expansion and compression caused by pressure changes, thus causing invalid measurement.
- 5.2.7. When installing with a built-in check valve connector, ensure that the direction of the arrow on the connector is consistent with the direction of the water flow in the pipeline.

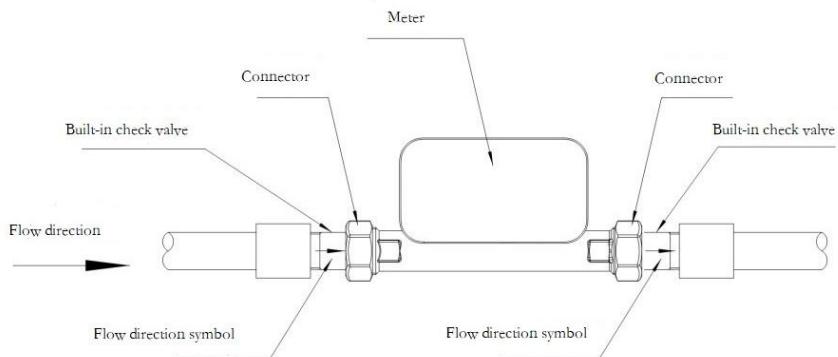


Figure 5-1-4 Installation Diagram of Built-in Check Valve Connector

- 5.2.8. Please pay attention to the difference between flow identification with and

without built-in check valve fittings.

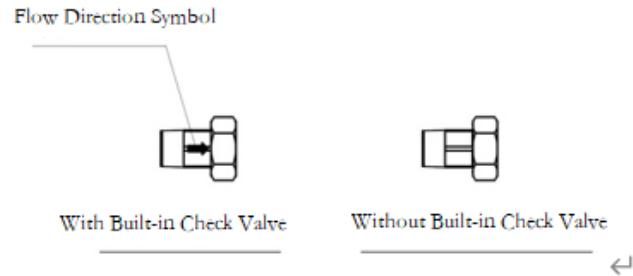


Figure 5-1-5 Diagram of Flow Direction Symbol of Built-in Check Valve Connectors

! Attention: The installation position should be away from magnetic field, the distance between the meter's antenna and the wall should be at least 50 mm.

5.3. Mounting Method

! Attention: a) Pay attention to sealing work to avoid leakage when installing !
b) The direction of arrow must be complied with the flow !

5.3.1. Meter mounted without connecting fittings

- 1) Cut apart the pipe at the point for meter mounting to leave the required mounting space (Figure 5-1).

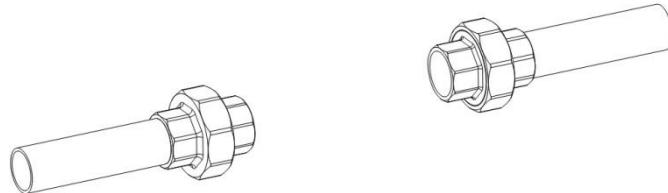


Figure 5-2-1 Meter Mounting Diagrammatic Sketch

- 2) Align the meter and pipe concentrically. Screw the union on the meter's connecting threads and then tighten up with a spanner (Figure 5-2-2).

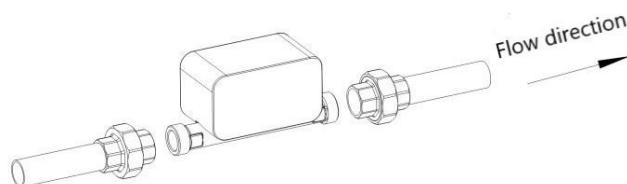


Figure 5-2-2 Meter Mounting Diagrammatic Sketch

5.3.2. Meter mounted with connecting fittings

- 1) Cut off the installation instrument of the water supply pipe section to leave the installation location of the instrument and its connecting accessories, as shown in Figure 5-2-1.
- 2) Tighten the connection attachment at the cut-off of the water supply pipeline, as shown in Figure 5-2-3.

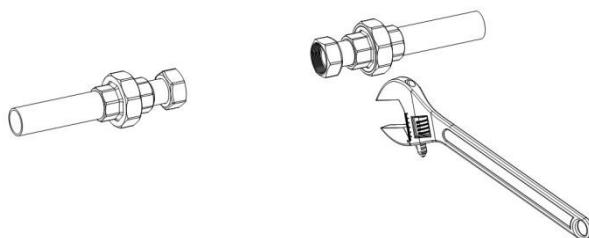


Figure 5-2-3 Meter Mounting Diagrammatic Sketch

- 3) Converse the instrument with the connecting accessories and install it, as shown in Figure 5-2-4.

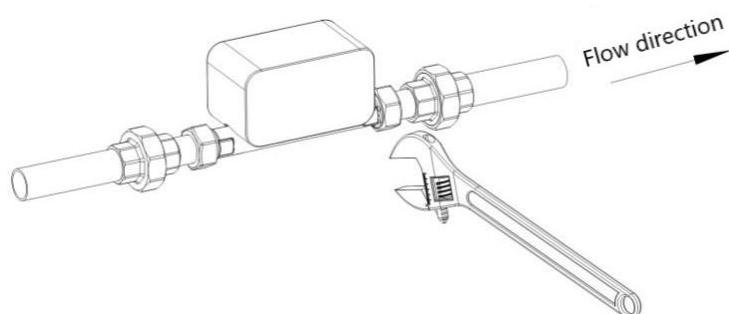


Figure 5-2-4 Meter Mounting Diagrammatic Sketch

5.4. External Antenna Installation

- 5.4.1. If external antenna is chosen, firstly external antenna bracket should be installed on the concrete or brick surface by cement steel nails or expansion bolts, as shown in Figure. 5-6.

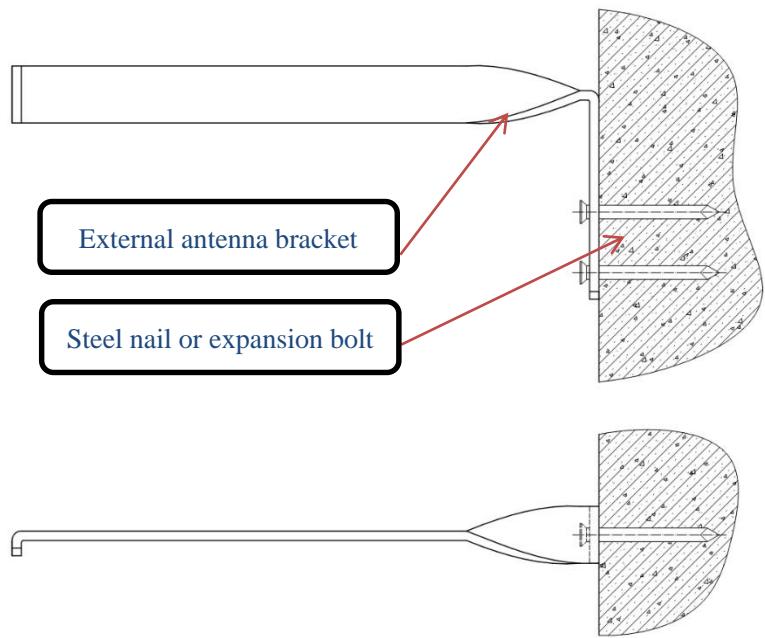


Figure 5-3 External Antenna Installation Diagrammatic Sketch

5.4.2. Place the external antenna on the installing position and adjust the antenna position, then tighten the screws on the bracket to finish this step, as shown in Figure 5-4.

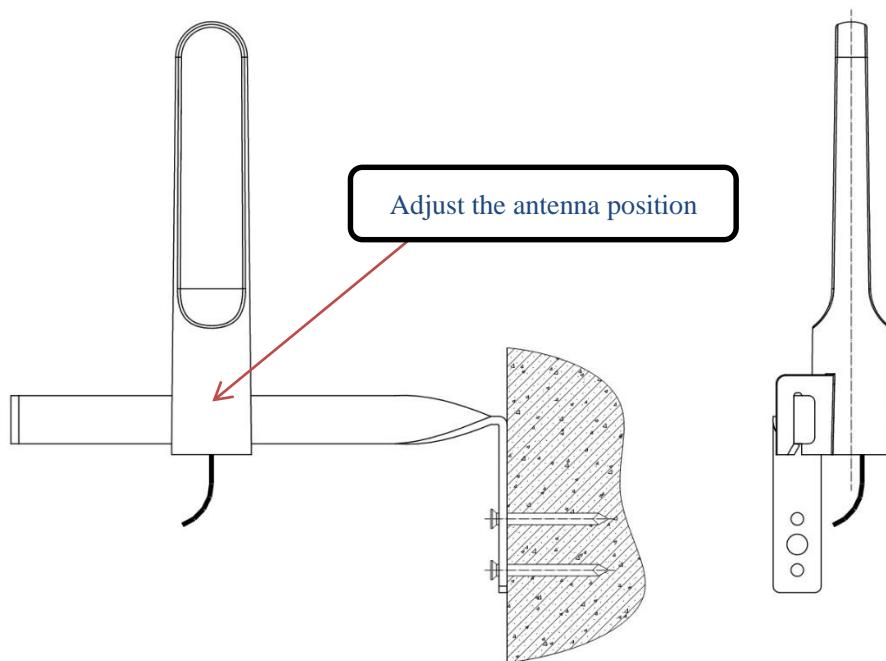


Figure 5-4 Antenna Installation

5.5. Wired Connection

The wired meters include-Bus and RS-485 communication interface, and connections are shown in Table 5-1.

Table 5-1 Connection methods of meters with RS-485/M-Bus

RS-485/M-Bus output cable color	Connect to meters	
	RS-485	M-BUS
Red	A+	M(positive/negative)
White	B-	M(positive/negative)

6. Battery Replacement

It is a 3.6V lithium battery. When the symbol  is on display, it indicates the battery is low and needs to be replaced for avoiding loss of measured data or abnormal communication. When the battery needs to be replaced, it must be operated by professional personnel under the guidance of the manufacture, or having the meter sent back to Huizhong for battery replacement. After battery is replaced, the *Cumulative Flowrate and Cumulative Effective Running Time* remain in storage.

7. Calibration Function

The meter calibration methods follow JJG162-2019 “Cold Potable Water Meter”, the calibration requires a complete set of special tools, the setting of calibration status and related parameters are detailed in the special tool operation instruction.

8. Troubleshooting and After-sales Service

8.1. Troubleshooting

In case of malfunction, firstly refer to this trouble remedy guide. If no remedy solution can be found, please contact Huizhong for support.

Table 8-1 Troubleshooting

Troubles	Content	Solution
Display  in long term	1.Empty pipe 2.Thick scale deposit on transducer surface 3. Meter malfunction	1.Keep pipe full of liquid 2.Clean the transducer 3.Contact Huizhong
Frequently display 	Excessive air bubbles or impurities in water or medium	Remove the bubbles or impurities
Simultaneously display of low and high temperature alarm	Faulty temperature sensor	Contact Huizhong
Display  in long term	Low battery	Replace the battery soon
Display on screen 	Battery is too low with the readout on the screen to indicate the current voltage. Now the meter is no longer measuring, but can browse the stored data.	Battery must be replaced
Display “88888888” for a long time	EEPROM malfunctions	Contact Huizhong immediately for repair
Abnormal NB-IoT	1.Abnormal SIM card 2.Abnormal base station or core network 3. Abnormal IoT platform 4. Low battery	1.Contact carrier for its service status 2. Contact carrier for confirming normal NB network 3. Contact carrier for confirming normal IoT platform 4. Contact Huizhong for repair

Table 8-2 Troubleshooting When Reported by NB-IoT

Troubles	Content	Solution
Low success rate of large data reporting	Signal strength lower than 30, low reporting rate	Contact operators to optimize base station placement, or enhance the transmission power.
	Signal strength higher than 30, low reporting rate	1.Contact the manufacture and operation operator for solution. 2.Avoid reporting all water meters at the same time.
Data report failed	End steps 2-0 or 1	Module failure, replace a new instrument.
	End steps 3-0 or 1	No SIM card or damaged SIM card,

		replace a new meter.
	End step 5 (no signal strength)	1. Check the signal strength first. 2. Check whether the SIM card service is normal.
	End step 5 (with signal strength)	1. Check whether the SIM card service is normal. 2. Connect operators to troubleshoot base station problems.
	End step 4	Platform registration failed, contact after-sales staff.
	End step 7-2	The IoT platform failed to communicate. Please make sure the platform registration information is correct and the activation has been completed. If the registration activation is normal, please contact the manufacturer.
The activation time exceeds 240s per day	Supplementary reporting caused by low reporting rate.	1. Refer to the solutions to low reporting rate. 2. Contact the operator to confirm whether the card opening business is correct.

8.2. After-sales Service Commitment

Huizhong Instrumentation Co., Ltd. operates by adhering to the principle of “being users’ most trustworthy friend and providing users our quality products and timely first-rate after-sale service”. Our specific commitments are as follows:

- 8.2.1. After receiving user’s call, we promise to make a response within 2 hours.
- 8.2.2. The search for overseas market problems is based on remote assistance. Some products will be equipped with a certain proportion of spare meters for customers to be used as return maintenance turnover meters.
- 8.2.3. “Free repair” is only limited to the repair of the damaged main measuring unit and key functional components like transducers. Repair of damaged cables is out of the promised scope.
- 8.2.4. Repair of any meter beyond its guaranty period will be conducted on site,

with the travel expenses and cost of components covered by user.

8.2.5. The “free repair” provisions shall not cover any of the following damages:

- 1) Damage of meter due to purely artificial reasons, such as mechanical impact.
 - 2) After-sales service for non-instrument failure, such as system shutdown, abnormal operation, failure to operate according to product instructions, etc.
 - 3) Damage to the meter caused by force majeure, such as thunder strike.
 - 4) Due to the above reasons, maintenance travel costs will be charged for on-site maintenance. If the product is damaged, an additional device cost will be charged.
- 8.2.6. If user sends the meter’s core part or the entire meter back to Huizhong for repair, both parties shall respectively bear the transportation expenses and the costs of components for replacing damaged ones shall be responsible by user.

Huizhong Instrumentation Co., Ltd.

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