YSQD02 Wall Mounted Doppler Flowmeter User Manual





SIBO.X INDUSTRIAL CO.,LTD.
Add: No. Building 1, No. 1, Jingshi Road, Cicheng Town Industrial Park, Jiangbei District, Ningbo City, Zhejiang, China
https://www.sbxsun.com
Email: info@sbxsun.com
Tel: +86-15958288207

Preface

- Dear user, thank you for purchasing our company's instruments.
- Before using this product, please read this manual carefully and keep it properly.
- This manual is a manual about the various functions, wiring methods, setting methods, operation methods, fault handling methods, etc. of the product.
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- When receiving the instrument, please carefully open the pack- aging and check if the instrument and accessories are damaged due to transportation. If any damage is found, please contact our company's after-sales service department or regional custom- er service center, and keep the packaging for return processing. When the instrument malfunctions, please do not repair it your- self. Please contact our company's after-sales service department or regional customer service center.
- If you have any questions, please contact our company's after s- ales service department or regional customer service center.

Safety precautions

For safe use of this product, please be sure to follow the safety precautions described here during operation.

- Before operation, please read the user manual carefully and h- ave a deep understanding of the product.
- Before operation, please read the user manual carefully and h- ave a deep understanding of the product. When customers choose products, they need to have an understanding of the intend- ed use of the product. Our company does not guarantee that the product is suitable for a specific user's needs.
- When installing lightning protection devices or other protective circuits for this product, it is necessary to use other external devices to achieve this.
- This product is not suitable for systems that directly affect personal safety, such as nuclear power equipment, equipment that uses radioactive energy, railway systems, aviation, aerospce, medical, etc. If used, the user is responsible for using additional protective equipment or systems to ensure personal safety.
- When connecting the power, please ensure that the voltage is consistent with the required voltage of the product, otherwise it may cause irreversible damage to the product. To prevent electric shock, static electricity, interference, etc., please ensure good grounding.
- When installing outdoors, it is necessary to carry out lightning protection engineering construction, share the grounding network for equipotential grounding, shielding, reasonable wiring, and appropriate use of surge protectors.
- When checking for faults, the power should be cut off to avoid accidents.
- Please regularly check the grounding protection status. If you believe that the grounding protection measures are not comple- te enough,please do not operate.
- If you need to replace the components of the product, please u- se the model specifications specified by our company.
- Do not modify this product.



Danger signs, if appropriate preventive measures are not taken, can lead to serious personal injury, product damage, or significant property damage accidents.

- Before connecting the power supply of this product, please confirm whether the power supply voltage of the product is consistent with the supplied power supply voltage.
- Please do not operate this product in places with flammable gases, explosive gases, or vapors.
- To prevent electric shock and accidental operation, it is necessary to provide good grounding protection.
- It is necessary to do a good job in lightning protection engineering facilities: using a shared grounding network for equipotential grounding, shielding, reasonable wiring, and appropriate use of surge protectors.
- Some internal components have high voltage. Non company or non company approved maintenance personnel should not open the front panel to avoid electric shock accidents.
- Be sure to cut off the power supply before conducting var- ious inspections to avoid accidents.
- Please regularly check the condition of the terminal screws . If any looseness is found, tighten them before use .
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- Please regularly check the condition of the terminal screws . If any looseness is found, tighten them before use . Unauthorized disassembly, processing, modification, or repair of products is strictly prohibited, as this may result in abnor- mal operation,electric shock, or fire accidents. Please use a dry cotton cloth to wipe the product, and do not use alcohol , gasoline, or other solvents. Be careful not to splash various liquids onto the product.If the product falls into water, please immediately cut off the power supply, otherwise there may be electric leakage,electric shock, and even fire accidents .
- Please regularly check the grounding protection status . If you believe that the grounding protection and fuse protect- ion measures are not complete enough, please do not operate .
- The ventilation holes on the product shell must be kept unobstructed to prevent malfunctions, abnormal movements, shortened lifespan, and fires due to high temperatures.
- Please strictly follow the instructions in this manual for operation, otherwise it may damage the protective device of the product.



Warning signs remind you to pay extra attention to important information related to the product or special parts of this manual.

- If the product is found to be damaged or deformed during unboxing, please do not use it.
- During installation, avoid dust, wire ends, iron filings, or other substances from entering the product, otherwise Abnormal operation or malfunction may occur.
- During operation, if it is necessary to modify the configuration, signal output, start, stop and other operations, full consideration should be given to operational safety. In- correct operations may cause product and controlled equipment to malfunction or even damage.
- Each component of the product has a certain lifespan, and to ensure long-term use, regular maintenance and upkeep must be carried out.
- When scrapping this product, dispose of it as industrial waste to avoid environmental pollution.
- Please make sure to turn off the power switch when not using this product.
- If any abnormal situations such as smoking, odor, or noise are detected from the product, please immediately turn off the power switch and contact our company in a timely m- anner.

Disclaimers

- For terms beyond the scope of this product warranty, our company does not make any warranties.
- When using this product, any direct or indirect damage c- aused by improper user operation any instrument damage or loss of parts, as well as unforeseen damages, shall be the sole responsibility of our company not responsible.

Confirm packaging content

After opening the packaging box, please confirm the packaging content before starting the operation. If the model and quantity are found when there is an error in quantity or physical damage to the appearance, please contact our company.

Inventory

List of Wall Mounted Doppler Flowmeter Products

No.	name	number	notes
1	Wall mounted Doppler host	1	
2	electrode	1	
3	AC220 change DC24Vac adapter	1	
4	Instructions	1	
5	Certificate of conformity	1	
6	Installation bracket	1	Optional configuration

Directory

Chapter 1 Product Introduction 1
Chapter 2 Product Features 2
Chapter 3 Technical Parameters 3
Chapter 4 Electrical Connection 4
Chapter 6 Key Operations 6
Chapter 7 Menu Settings 7
Chapter 8 Communication Protocol 9
Chapter 9 Fault Analysis and Troubleshooting 11

Chapter 1 Product Introduction

Doppler flow meters are measured using the principle of ultrasonic Doppler, which means that any liquid flowing in a pipeline has discontinuous disturbances. These discontinuous disturbances can be suspended solid p- articles or bubbles, or interfaces caused by fluid disturbances. This disturbance causes the reflected ultrasound to produce a Doppler frequency shift Δf. Doppler frequency shift Δ f is a linear function off low velocity. By measuring the Doppler frequency shift f and based on the propagation speed of sound waves in water, the disturbance flow velocity can be calculated, thereby determining the water flow velocity. According to different application scenarios, it can also be called river flow meter, sewer flow meter, channel flow meter, farmland irrigation flow meter, non full pipe flow meter, etc. It does not need to cut off the pipeline and install segmented sensors like electromagnetic flow meters, nor does it require the use of interception devices, nor does it require the installation of fixed weirs to control the flow of water from the fixed outlet. Doppler flow meters can measure in both clear and turbid water, and can measure in both directions.



Figure I. Wall mounted Doppler host



Figure 2: Doppler sensor

At present, it is mainly used for online automatic monitoring of flow in urban drainage networks (rainwater pipes, sewage pipes, rainwater and sewage convergence pipes), rivers, and channels, providing accurate flow data for flow simulation and verification of drainage networks, water logging simulation, drainage network maintenance, river hydrological monitoring, and irrigation area informatization.

Chapter 2 Product Features

- Using a 2.8-inch color LCD display with menu switching between Chinese and English, all detection data can be viewed intuitively, making the operation simpler and more convenient.
- No standard slots required, can be directly put into use.
- Solve the problem of non full pipe flow measurement, with 20 coordinate point positioning, programmable measurement of flow in any shape of open channels and non full pipe pipelines.
- The measurable flow rate range is 0.02-5m/s, with an accuracy of l%.
- It can measure the flow velocity in both positive and negative directions, and has a positive and negative accumulation function.
- The pressure sensor and ultrasonic sensor measure the liquid level simultaneously with an accuracy of l%. The ultrasonic sensor has coordinate correction function.
- Added pressure compensation function to ensure the accuracy of pressure sensor measurement of liquid level when external pressure changes.
- Using digital processing (DSP) to make signal acquisition more stable and flow measurement more accurate.
- Adopting a low-power design, it can be powered by batteries.
- The overall sensor is sealed, with a protection level of IP68.
- 4-20mA, RS485/MODBUS interface output mode, optional with GPRS.
- configurable USB export.

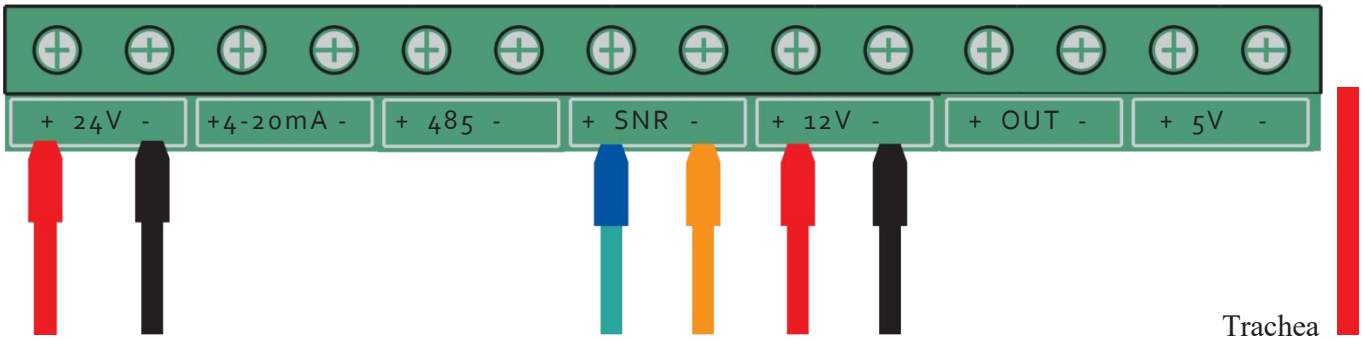
Chapter 3 Technical Parameters

Product Name	Wall mounted ultrasonic Doppler flowmeter
Model	HR-DPB901
Measuring range	Liquid level: 0-10m Flow rate: 0-5m/s Instantaneous flow rate: 0~999999999m ³/ H Accumulated traffic: 0~999999999m ³ Temperature: 0-60 ℃
Resolution	Liquid level: 0.001m Flow rate: 0.001mm/s Instantaneous flow rate: 0.1m ³/ Temperature: 0.1 ℃
Power supply voltage	AC220, DC24V, DC12V solar rechargeable batteries, input power ≥ 5W
Output	RS485, 4-20mA, relay (optional), Hart protocol (optional), NB GPRS LORA communication (optional)
Display	TFT color screen LCD
Protection level	IP65 (host)/IP68 (sensor)
Working temperature	0~60 ℃ (non freezing)
Storage temperature	-10~60℃
Installation method	Installation of plug-in brackets
External dimensions	Wall mounted 156mm x 150mm x 85mm
Opening size	Wall mounted 156mm x 94mm
Cable length	Standard configuration of 10 meters (customizable extension)

Chapter 4 Electrical Connection

Wall mounted instrument wiring

Attention: In order to improve the safety of staff and instruments, the instruments are powered by DC24V (if AC220V is required, please use the manufacturer's standard 220V to 24V adapter).



24V power cord
water to enter

Attention: The airway should not be bent or allow

Figure 3. Wall mounted instrument DC24V wiring diagram

Interface annotation description	
+24-	power supply · DC24V
+4~20mA-	4~20mAPower supply analog signal output
A 485 B	485Digital signal output
+ SNR -	Sensor signal line
+ 12V -	Sensor power supply

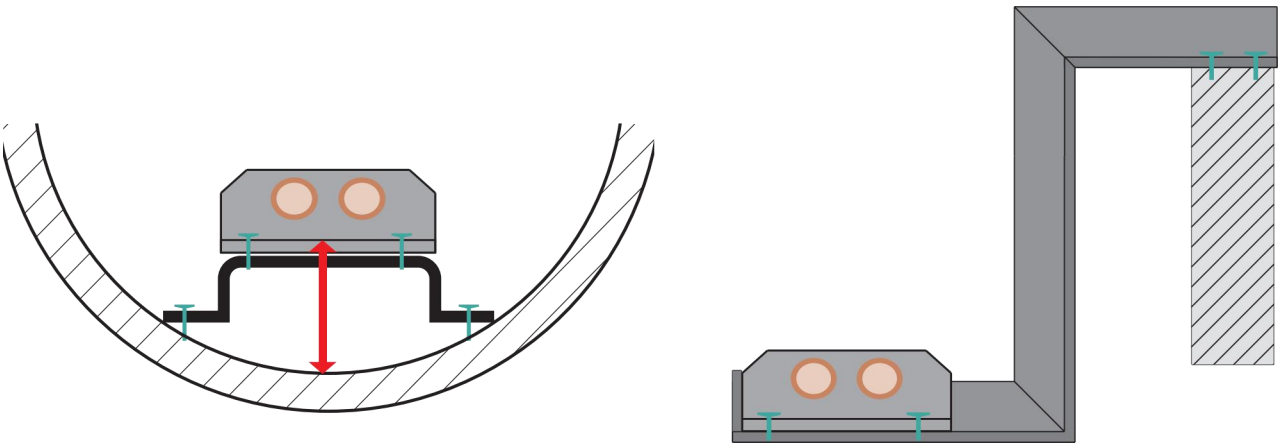
Chapter 5 Fixed Installation

Instrument installation

Fix the sensor at the bottom of the tested pool or pipeline, ensuring that there is no sludge at the position of the pressure sensor. Water can be measured when it is more than 6cm below the sensor.

Matters needing attention

- The water level should exceed 6cm above the probe to accurately m- easure the flow velocity.
- There is a gas duct in the sensor wiring that needs to be connected to the atmosphere. It should be ensured that the cable is not bent, other- wise it will affect the accuracy of liquid level measurement.
- Do not let water enter the trachea, otherwise it will flow back into the sensor and burn out the internal pressure sensor.



Note: Elevating the installation bracket can prevent mud from obstructing the sensor probe, and increasing the distance can be used for liquid level compensation without affecting measurement accuracy.

Figure 4. Schematic diagram of bracket installation

Chapter 6 Key Operations

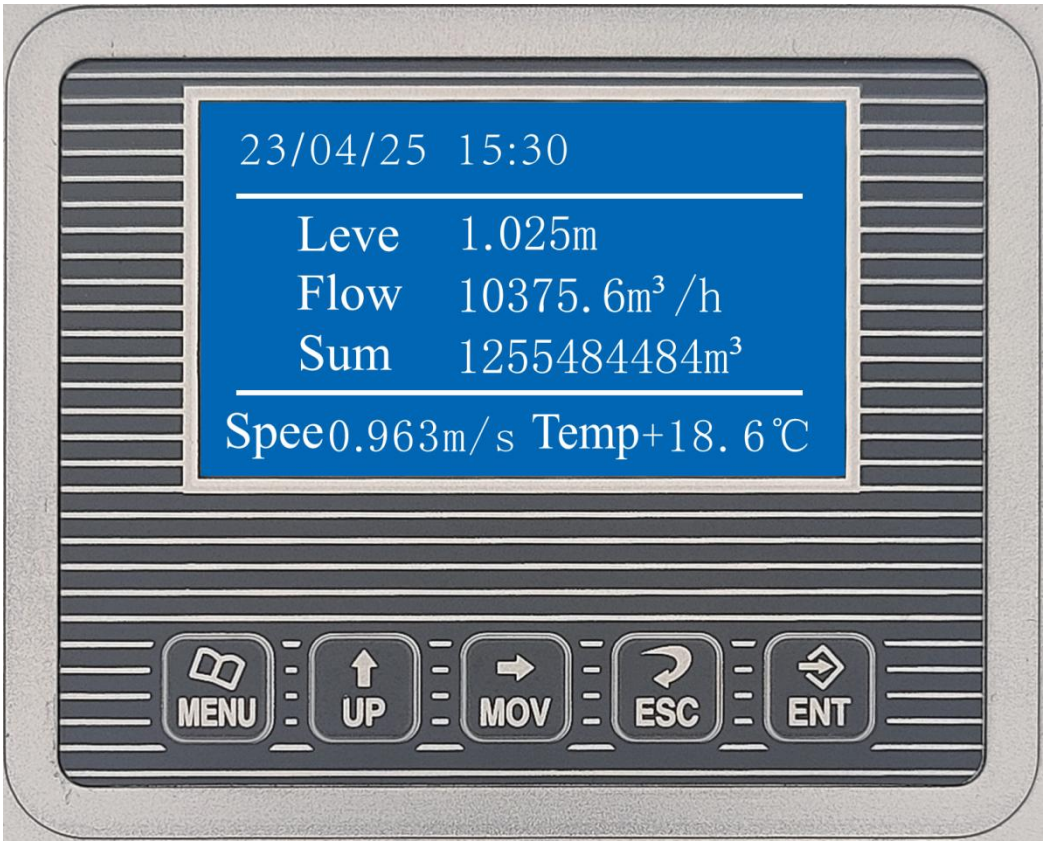


Figure 5. Wall mounted Doppler host display interface

Description of measurement mode display interface	
display screen	Display information such as instantaneous flow rate, cumulative flow rate, flow rate, liquid level, etc
MENU	Menu key: Enter menu options
UP	Add key: used to adjust parameters 0-9 loop and menu option adjustment
MOV	Shift key: used to adjust the cursor position or switch the main interface menu
ESC	Shift key: used to adjust the cursor position or switch the main interface menu
ENT	Confirm key: Set current parameters, confirm and save

Chapter 7 Menu Settings

Press the MENU key to enter the menu, press the UP key to enter the pass- word 3000, press the ENT key to enter the menu options, select the section type, set according to the actual needs of the site, if the site is a pipeline, select the circular section type, if the site is a channel, select the quadrilateral, select the correct section type, press the ENT key to enter, and enter the corresponding parameters according to the prompts (enter the radius for circular pipelines, enter the top bottom, bottom bottom, and height for quadrilaterals)

Set password instructions	Enter menu	3000
	Switching between Chinese and English	0006+0060

MENU Description	
Instrument information	Version information of the instrument (not supported in English)
Section type	Select different cross-sectional types (such as quadrilaterals, circles, etc.) according to usage requirements
Current setting	Input the instantaneous flow rates corresponding to 20mA and 4mA respectively
Communication settings	Enter the ID for 485 communication
Relay Setting I	Select the upper or lower limit alarm and enter the corresponding alarm value.
	Set the return value required to cancel the alarm
Relay Setting 2	Select the upper or lower limit alarm and enter the corresponding alarm value.
	Set the return value required to cancel the alarm
Relay Setting 3	Select the upper or lower limit alarm and enter the corresponding alarm value.
	Set the return value required to cancel the alarm
Relay Setting 4	Select the upper or lower limit alarm and enter the corresponding alarm value.
	Set the return value required to cancel the alarm
Time setting	Enter the corresponding time
Current calibration	Correct the deviation between 4mA and 20mA outputs. Under normal circumstances, 4mA corresponds to 200 and 20mA corresponds to I000.

Flow calibration	The value of instantaneous flow that needs to be increased or decreased (only supports fine-tuning)
Temperature calibration	Input temperature modification value (only supports fine-tuning)
Small signal removal	Remove small liquid level flow rate (default to 0)
Interference removal	The allowable range value for sudden changes in liquid level
Statistics of cumulative traffic	Accumulated traffic statistics table (within the last 7 hours)
Font color settings	Can modify background color, font color, prompt color, and border color
Modify cumulative traffic	Enter the cumulative traffic that needs to be modified (change password 8080)
Accumulated running time	View the current cumulative running time value (default infinite time)
Allow running time	Current allowed runtime value (default infinite time)
Mode settings	Choose different modes based on operating conditions (it is recommended to choose the default mode)
Unit settings	The instantaneous flow unit can be freely switched to m^3/h or L/s
Blind spot setting	Currently unavailable
Damping setting	The larger the damping number, the smoother the change
Restore factory settings	Restore all settings to factory default values

The section type settings include circular sections, quadrilateral sections, and other sections. Set the value of pipeline radius R in the circular interfa- ce. Set the values of the upper bottom L2, lower bottom L1, and height h in the quadrilateral interface. Set the coordinates and electrode positions of e- ach point on the corresponding cross-section for other cross-sections.

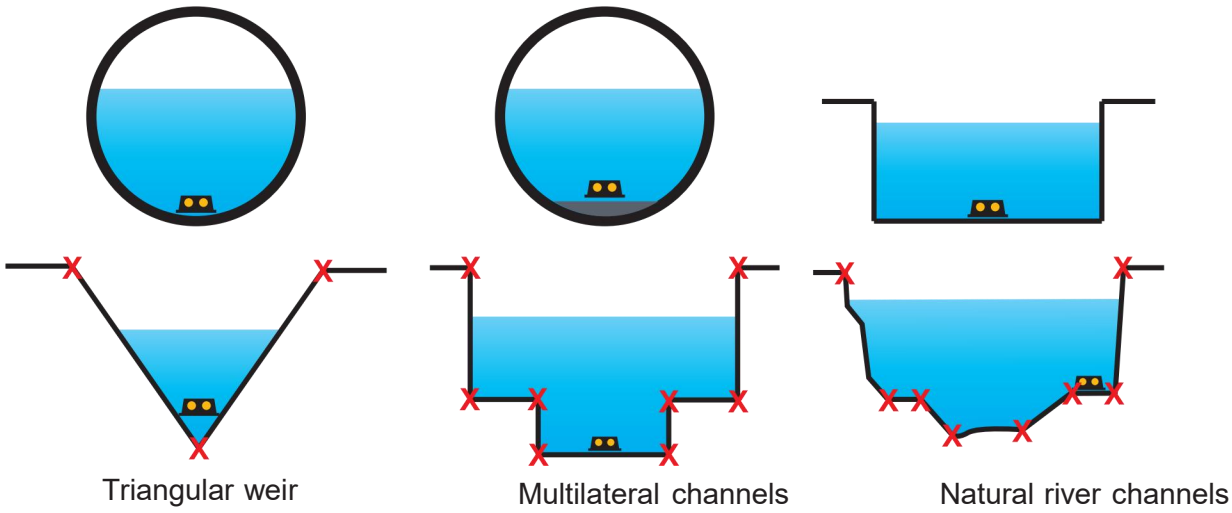


Figure 6. Schematic diagram of sensor installation cross-section setting

Chapter 8 Communication Protocol

Modbus communication protocol

byte	Send (PC end)	Example	Response	Example
0	Address (ID)	0x01	Address (ID)	0x01
1	Function code	ox03	Function code	ox03
2	Data header address high bit	0x00	Data length	OXOE
3	Low bit of data header address	0x00	Instantaneous flow rate (I0 times the actual flow rate, for example, a value of 29I and a flow rate of 29. I) (unsigned long)	0x00
4	High bit data length	0x00	Instantaneous flow rate	0x00
5	Low bit data length	0x07	Instantaneous flow rate	0x01
6	CRC check low	ox04	Instantaneous flow rate	ox23
7	CRC check high	0x08	Accumulated flow rate (in cubic meters)(unsigned long)	0x00
8			Accumulated traffic	ox04
9			Accumulated traffic	oxI2
10			Accumulated traffic	ox03
11			High flow rate (I000 times the true value, for example, the value is 29I, The actual value is 0.29Im/s	0x01
12			Low flow rate	ox23

13			High liquid level (1000 times the true value, for example, the value is 291 and the actual value is 0.291m)	0x01
14			Low level liquid level	ox23
15			High temperature level (100 times the true value, for example, if the value is 291, the true value is 2.91 ℃)	0x01
16			Low temperature	ox23
17			CRC	ox43
18			CRC	ox2e
19				

For example: PC host sends: 01 03 00 00 00 07 04 08
Instrument return value: 01 03 0E 00 00 01 23 00 04 12 03 01 23 01 23 01 23 43 2E

The returned value parsing information is as follows (the above data has been converted from hexadecimal to decimal):

Instantaneous flow rate: 29.1m³/H (0x0000123), cumulative flow: 266755m³ (0x00041203), flow rate: 0.291m/s (0x0123), liquid level: 0.291m(0x0123), Temperature: 2.91℃ (0x0123)

Note: The baud rate 9600 data is 8 stop bits and 1 checksum None

Chapter 9 Fault Analysis and Troubleshooting

Fault phenomenon: Large deviation in measurement data

Troubleshooting method:

1. Is the wiring correct
2. Is the power supply powered on normally
3. Is the liquid level too low
4. Is the ultrasonic probe covered by foreign objects
5. Is the measurement time too short
6. Is the selection of measurement points reasonable (whether the length of the straight pipe section is sufficient and whether the water flow is smooth)
7. Is the liquid too clear (turbidity ≥ 20mg/L is required)
8. Is the external temperature too low or too high (required to be betwe- en -20 ℃ and+70 ℃)
9. Is the installation angle of the sensor parallel to the direction of water flow
10. The above methods still cannot solve the problem. Please contact the manufacture