# LIQUID TURBINE FLOW METER

USER MANUAL

# Introduction

This instruction manual is a guide material for the liquid turbine flowmeter, please do not use it on other models. The user who uses the liquid turbine flowmeter for the first time must read this manual carefully. It will also help the users who have used it to re-understand the knowledge and experience. Please read the content carefully and fully understand it before applying it in practice.

It is recommended that after the equipment starts to operate normally, this manual should be handed over to equipment operators and maintenance personnel for use, and the operation and production should be carried out according to the requirements of the manual.

The company will continue to research and improve the liquid turbine flowmeter products. The content of this manual may sometimes be different from the products and details purchased by the user. If the user has any questions about the purchased product or the content of the manual, please contact our company inquires.

**For your safety, please read the following safety warnings carefully before using the meter.**

1. The fluid will not corrode the meter body and the materials of wetted parts.

2. When measuring flammable liquids, take care to prevent fire or explosion.

3. When handling hazardous liquids, you must follow the manufacturer’s safety practices.

4. When working in a dangerous environment, follow the correct operation steps.

5. When the turbine flowmeter is removed, it may cause liquid splashing. Please follow the safety operation specification of the fluid equipment manufacturer to prevent splashing.

6. Do not use compressed air to purge the turbine flowmeter.

7. Pay attention to the turbine blades inside the flowmeter, even small scratches or gaps will affect the accuracy.

8. In order to achieve the best results, the longest calibration period of the meter should not exceed 1 year.

# Catalog

# I. Overview

## 1. 1 Application

Turbine flowmeter is a precision flow measuring instrument that measures the flow and total volume of impurity-free and non-corrosive liquids. It is widely used in petroleum, chemical, metallurgy, scientific research and other fields.

## 1.2 Working principle

When the measured liquid flows through the sensor, the impeller rotates under the action of the fluid, and its speed is proportional to the average flow velocity of the pipeline. The rotation of the impeller periodically changes the magnetic resistance value of the magnetic circuit, and the magnetic flux in the detection coil changes periodically to generate an induced electromotive force with the same frequency as the blade rotation frequency. After being amplified, it is converted and processed.

## 1.3 Product structure

The basic structure of a turbine flowmeter is shown in Figure 1-1. It is mainly composed of a meter body, a front guide, a rear guide, an impeller, a signal connector, and a converter.

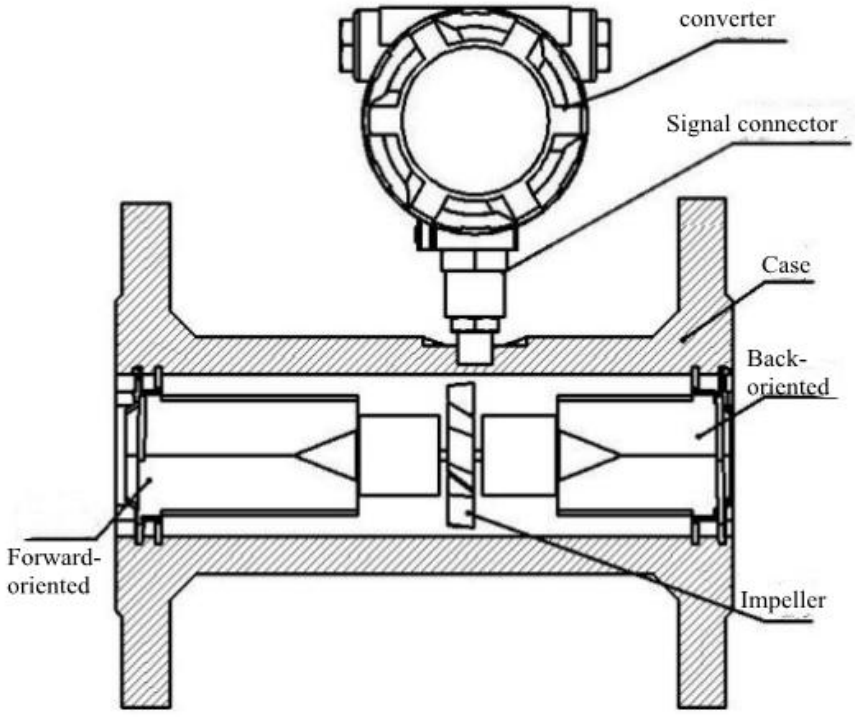



Figure 1-1 Flange turbine structure drawing

# Ⅱ、Flow meter types

## 2.1 Converter

| | | |
|---|---|---|
|  |  |  |
| Pulse output type | Current output type | Intelligent display type |

## 2.2 Sensor

| | | |
|---|---|---|
|  |  |  |
| Thread connection | Tri-clamp connection | Flange connection |
|  |  | |
| Accessories: filter and straight pipe section | Accessories: clamp, chuck | |

# Ⅲ. Technical Parameters

## 3.1 Applicable medium

No impurities, low viscosity, no strong corrosive liquid.

## 3.2 Nominal diameter

Applicable caliber: Dn4-200mm

DN4-50mm (Thread connection)

DN4-100mm (tri-clamp connection)

Dn4-200mm (Flange connection)

## 3.3 Temperature

Ambient temperature: (-20~+60)℃

Relative humidity: 5%~90%

Atmospheric pressure: (86~106)kPa.

Medium temperature: (-20~+200) ℃ (Standard)

(-20~+130) ℃. (customization)

## 3.4 Power supply

Main power: 24VDC

Battery-powered: 3.6V lithium battery.

## 3.5 Output signal

Pulse; 4 ~ 20 mA; RS485 Modbus protocol communication.

## 3.6 Flow range

| Caliber（mm） | Flow range(m3/h) | Extended flow rangem3/h) |
|---|---|---|
| 4 | 0.04～0.25 | 0.04～0.4 |
| 6 | 0.1～0.6 | 0.06～0.6 |
| 10 | 0.2～1.2 | 0.15～1.5 |
| 15 | 0.6～6 | 0.5~5 |
| 20 | 0.8～8 | 0.45～9 |
| 25 | 1～10 | 0.5～10 |
| 32 | 1.5～15 | 0.8～15 |
| 40 | 2～20 | 1～20 |
| 50 | 4～40 | 2～40 |
| 65 | 7～70 | 5～70 |
| 80 | 10～100 | 7～100 |
| 100 | 20～200 | 10～200 |
| 125 | 25～250 | 13～250 |
| 150 | 30～300 | 15～300 |
| 200 | 80～800 | 40～800 |
| Accuracy | 0.5 % | 1.0% |

# LWGY Turbine Flow Converter

# Manual

# Ⅳ. Menu and Parameters

## 4.1 Menu

| FLOW RATE | TOTAL FLOW | CALIBRATION | OUTPUT | COMMUNICATION | FACTORY SETUP |
|---|---|---|---|---|---|
| PV Units | Total Units | Loop Out Zero | Signal output | Mode | Sensor Size |
| PV Decimal | Total Decimal | Loop Out Full | Pulse output | Baud rate | K-factor |
| Flow Range | Total Preset | | Frequency output | Parity | Linearity |
| Cut Off | | | | Device ID | Density |
| High Alarm | | | | | Language |
| Low Alarm | | | | | |
| Damping | | | | | |

## 4.2 Selection of Basic Parameters

### 4.2.1 FLOW RATE

| | |
|---|---|
| 1.1 PV Units | Selection: L/s L/m L/h m3/s m3/m3/h Nm3/s Nm3/m Nm3/h USG/s USG/mUSG/h kg/s kg/h t/s t/m t/h<br>The default value is m3/h |
| 1.2 PV Decimal | Select item: 0 1 2 3<br>The default value is 2 |
| 1.3 Flow Range | Floating points:99999999.00-0.00 m3/h<br>The default value is 100.0 m3/h |
| 1.4 Cut Off | Floating point:9.90 - 0.00 %.<br>The default value is 0.0 % |

| | |
|---|---|
| 1.5 High Alarm | Floating point:99.00 - 0.00 %.<br>The default value is 100.0 percent |
| 1.6 Low Alarm | Floating point:99.00 - 1.00 %<br>The default value is 0.0 % |
| 1.7 Damping | Floating points: 90.0 - 0.1<br>The default value is 1.0s |

### 4.2.2 TOTAL FLOW

| | |
|---|---|
| 2.1 Total Units | Select item: L m3 Nm3<br>USG kg t<br>The default value is m3 |
| 2.2 Total Decimal | Select item: 0 1 2 3<br>The default value is 1 |
| 2.3 Total Preset | Floating points:999999999- 0.00 m3<br>When this value is set, the current total is overwritten by this setting value |

Note: If the total amount shows "Over Flow! " ,please deal with it in a timely manner (zeroing or preset) so as not to affect normal measurements.

### 4.2.3 CALIBRATION

| | |
|---|---|
| 3.1 Loop Out Zero | Floating points: 5.0 - 3.0<br>The default value is 4.000mA |
| 3.2 Loop Out Full | Floating points: 21.0 - 19.0<br>The default value is 20. 000mA |

### 4.2.4, OUTPUT

| | |
|---|---|
| 4.1 Signal output | Signal output |
| 4.2 Pulse output | Select item: High,<br>low<br>The default value is |
| 4. 3 Frequent output | Floating points: Max:5000-0.00 Hz<br>The default value is2000Hz |

## 4.2.5 CONMMUNICATION

| | |
|---|---|
| 5.1 Mode | Selection: RTU ASCII<br>The default value is RTU |
| 5.2 Baud rate | Select item: 9600 19200 38400 57600<br>The default value is 9600 |
| 5.3 Parity | Select item: NONE (no checks) ODD (parity) EVEN (parity).<br>The default value is 8 |
| 5. 4 Device ID | Number of words: 253 - 1<br>The default value is 001 |

Note: Please refer to the Turbine MODBUS User Manual for specific operation of the communication.

## 4.2.6 FACTORY SETUP

Please enter our designated password 100000

| | | |
|---|---|---|
| 6.1 Sensor Size | Select item :D N 9999-0000 m<br>The default value is DN 0050 mm | |
| 6.2 K-factor | Floating points: 99999999.9999 - 0000000.0000<br>The default value is 10000.0000 | |
| 6.3 Linearity | 6.3. 1 Linear Correction 1 | Floating points: 999999.9 - 000000.0Hz<br>The default value is 0.0Hz<br>Floating points: 999999.9999 - 000000.0000N/m3<br>The default value is 0.0000N/m3 |
| | 6.3. 2 Linear Correction 2 | Floating points: 999999.9 - 000000.0Hz<br>The default value is 0.0Hz<br>Floating points: 999999.9999 - 000000.0000N/m3<br>The default value is 0.0000N/m3 |
| | 6.3. 3 Linear Correction 3 | Floating points: 999999.9 - 000000.0Hz<br>The default value is 0.0Hz<br>Floating points: 999999.9999 - 000000.0000N/m3<br>The default value is 0.0000N/m3 |
| | 6.3. 4 Linear Correction 4 | Floating points: 999999.9 - 000000.0Hz<br>The default value is 0.0Hz<br>Floating points: 999999.9999 - 000000.0000N/m3<br>The default value is 0.0000N/m3 |

| | | |
|---|---|---|
| | 6.3. 5<br>Linear<br>Correction 5 | Floating points: 999999.9 - 000000.0Hz<br>The default value is 0.0Hz<br>Floating points: 999999.9999 - 000000.0000N/m3<br>The default value is 0.0000N/m3 |
| 6.4 Density | Floating points: 9999.99-0000.00kg/m3<br>The default is 1000. . 00kg/m3<br>Set the exact density when you need to use quality units! | |
| 6.5<br>Language | Select item: Chinese English<br>The default value is Chinese | |

## 4.3 Parameter Settings

### 4.3.1 FLOW RATE

Press the key under the main display to enter the instantaneous traffic settings interface.

1, PV Units

- After selecting the applicable unit using the or key, press the key to store the settings.

- Selectable units: L/s, L/m, L/h, m3/s, m3/m, m3/h, Nm3/s, Nm3/m, Nm3/h, USG/s, USG/m、USG/h、kg/s、kg/m、kg/h、t/s、t/m、t/h

2, PV Decima

- After selecting the scale using the or key, press the key to store the settings.

- You can select the number of numbers: 0,1,2,3

3, Flow Range

- After setting the corresponding value of 20mA with or , press the key to store the setting.

Note: Scale flow means that when the momentary flow reachs this set value, the current output is 20mA, and changing this parameter will affect: current output, high and low flow alarm, etc.

4, Cut Off

- Use or , key to set the percentage you want to cut, and then press the key to store the setting twice.

Note: When the absolute value of the instantaneous traffic is less than the scale traffic × this set percentage, the instantaneous flow volume is 0.

5, High Alarm

- Use or , key to set the low flow alarm percentage, and then press the key to store the setting.

Note: A high alarm signal is output when the absolute value of the momentary flow is greater than the scale flow × this set percentage. This setting value must be the setting value of the low flow alarm percentage!

6, Low Alarm

- Use or , key to set the percentage of high flow alarm, then press the key to store the setting.

Note: A low alarm signal is output when the absolute value of the momentary flow is less than the scale flow × this set percentage. This setting value must be the setting value of the high flow alarm percentage!

7, Damping

- Use or , key to set the damping time, and then press the key to store the setting.

Note: Defines the time constant for flow smoothing filtering, and the larger the flow, the more stable the flow, but the longer the response time.

### 4.3.2 TOTAL FLOW

Press the key under the main display screen to select the total amount settings interface with the or key.

1, Total Units

- After selecting the applicable unit using the or key, press the key to store the settings.

- Selectable units:L,m3,N/m3,USG,kg,t

2, Total Decimal

- After selecting the scale using the or key, press the key to store the settings.

- You can select the number of numbers: 0,1,2,3

3, Total Preset

- After setting the preset total using or , and then press the key to store the setting.

### 4.3.3 CALIBRATION

Press the key under the main display screen, then press the key, until the bottom line of the screen 4.000 or 20.000 appears, use or key to choose to enter the instrument correction interface.

1, Loop Out Zero

- After setting the analog output correction value with or , press the key to store the setting.

- Set range: 3.0-5.0

Note: Perform this function while measuring the 4-20mA current output with a precision current meter and input the reading into the meter, which automatically completes the calibration operation inside the meter.

2, Loop Out Full

- After setting the analog output correction value with or , press the key to store the setting.

- Set range: 19.0-21.0

Note: Perform this function while measuring the 4-20mA current output with a precision current meter and input the reading into the meter, which automatically completes the calibration operation inside the meter.

### 4.3.4 OUTPUT

Under the main display, press the key to select the or key to enter the output settings interface.

1, Signal output

- After selecting the signal output using or , key, press the key to store the settings.

Note: The converter directly outputs the measured sensor pulse signal, which can be used for instrument calibration

2, Pulse output

- After selecting the equivalent output using or , the key, press the key to select the low/high level and set the relevant values, and then press the key to store the settings.

Note: Effective high and low level, effective level pulse width(ms),pulse equivalent (range unit per pulse) can be set.

3, Frequency output

- After selecting the equivalent output using or , key, press the key to set the relevant value, and then press the key to store the setting.

Note: The space-to-air ratio is 50%, the frequency size is proportional to the flow, the maximum frequency can be set, and the maximum frequency corresponds to the set range flow.

### 4.3.5 CONMMUNICATION

Press the key under the main display screen to select the access to the communication settings interface using the or key.

1, Mode

- After selecting the mode using the or key, press the key to store the settings.

- Selectable items:RTU,ASCII

2, Baud rate

- After selecting the Baud rate using the or key, press the key to store the settings. Baud rate (9600/19200/38400/57600).

3, Parity

- After using the or key to select the check method, press the key to store the settings.

- Optional checks: EVEN ( parity), ODD (parity), NONE (no checks).

4, Device ID

- After setting the device address using or , key, press the key to store the setting. Device address (1-253).

### 4.3.6 FACTORY SETUP

Press the key under the main display, or select the key to enter the factory parameter interface. (A secret code needs to be entered.)

100000）

1, Sensor Size

- After selecting the sensor caliber using the or key, press the key to store the settings.

2, K-factor

- After setting the gauge factor using the or key, press the key to store the setting.

Note: This parameter is determined at the time of the real flow calibration. This parameter is sensor-only and represents the characteristic value of the sensor.

3, Linearity

- Use or , key to select a linear correction item and set the appropriate value, then press the key to store the settings.

4, Density

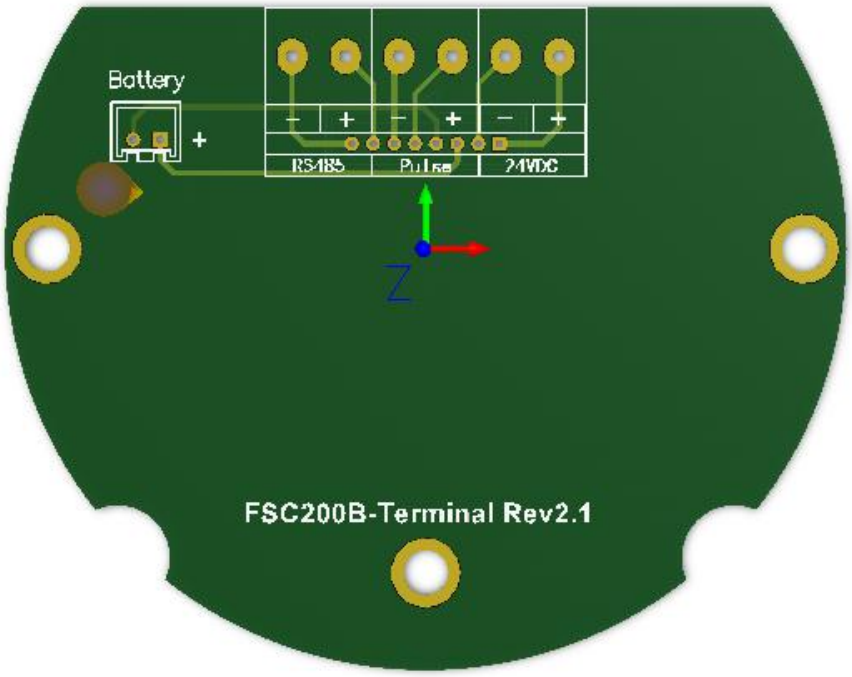
- After setting the fluid density with or , and then press the key to store the setting.

5, Language

- After selecting the language using the or key, press the key to store the settings.

# Ⅴ. Terminal Board Wiring Instructions

## 5.1 Terminal Schematic




## 5.2 Terminal Board Wiring Instructions

| Marked | | Function | N |
|---|---|---|---|
| 24VDC | + | DC 18-36V Power | Power supply 24V plus |
| | - | DC 18-36V Power - | Power 24V- |
| | | | With a two-wire |
| Pulse | + | Frequency or pulse | The frequency or pulse output is passive |
| | - | Frequency or pulse | |
| RS485 | + | RS485 Output . . | RS485 output |
| | - | RS485 Output - | |

# Report:

## Ⅵ. RS485 Mailing Address Table

Variable address definition:

| **The name of the variable** | **Register first address** | **Register length** | **The instruction code** | **The data type** |
|---|---|---|---|---|
| Flow rate | 0x01 | 0x02 | 0x04 | Float |
| Flow rate units | 0x03 | 0x01 | 0x04 | int |
| Total | 0x04 | 0x04 | 0x04 | Double |
| Total units | 0x08 | 0x01 | 0x04 | int |
| Total (m3) | 0x0d | 0x02 | 0x03 0x04 | Float |
| | | | | |
| Flow rate | 0x14 | 0x02 | 0x04 | Float |
| Total | 0x16 | 0x02 | 0x04 | Float |
| | | | | |
| Flow rate | 0x1e | 0x02 | 0x04 | float inverse |
| Total | 0x20 | 0x02 | 0x04 | float inverse |

Unit definition:

| | Unit | Code |
|---|---|---|
| Flow rate | m3/h | 0x03 |
| | m3/m | 0x04 |
| | m3/s | 0x05 |
| | L/h | 0x06 |
| | L/m | 0x07 |
| | L/s | 0x08 |
| | usg/h | 0x09 |
| | usg/m | 0x0a |
| | usg/s | 0x0b |
| | kg/h | 0x0c |
| | kg/m | 0x0d |
| | kg/s | 0x0e |
| | t/h | 0x0f |
| | t/m | 0x10 |
| | t/s | 0x11 |
| Total | m3 | 0x01 |
| | L | 0x02 |
| | usg | 0x03 |
| | kg | 0x04 |
| | T | 0x05 |

# Ⅶ. Use and Adjustment

## 6.1 Precautions

◆ When using, keep the tested liquid clean and free of impurities such as fibers and particles.

◆ When the sensor starts to use, the sensor should be filled with liquid slowly, and then the outlet valve should be opened. It is strictly forbidden that the sensor is impacted by high-speed fluid when it is in a liquid-free state.

◆ The maintenance period of the sensor is generally half a year. During maintenance and cleaning, please be careful not to damage the parts in the measuring chamber, especially the impeller. When assembling, please pay attention to the position relationship between the guide and the impeller. ·

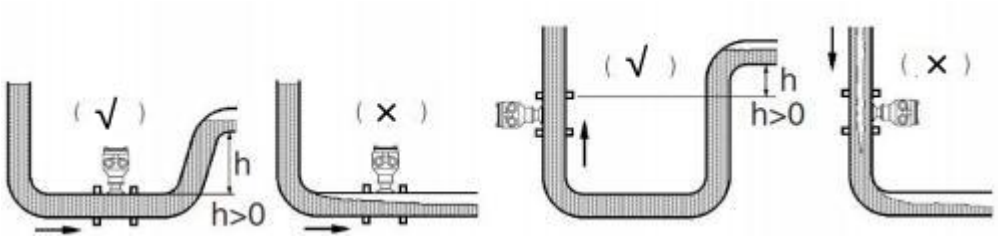
◆ When the sensor is not in use, the internal liquid should be cleaned, and protective sleeves should be added to both ends of the sensor to prevent dust from entering, and then stored in a dry place.

◆ The filter should be cleaned regularly when it is used. When not in use, the internal liquid should be cleaned, as with the sensor, with a dust cover, and stored in a dry place.

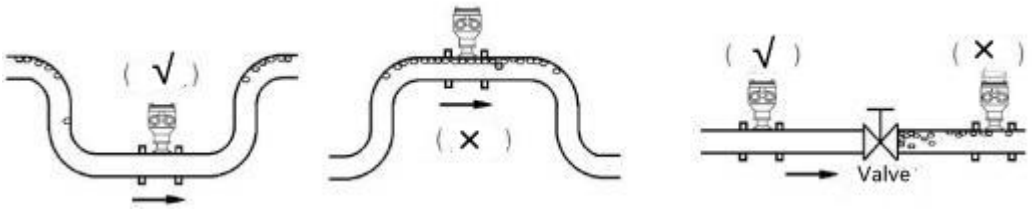
◆ Before the sensor is installed, connect the line with the display instrument, turn on the power, blow or turn the impeller by hand to quickly rotate it to observe whether there is display. When there is a display, install the sensor. If there is no display, check the relevant parts and troubleshoot.

## 6.2 Installation Location

**The pipe must be completely filled with liquid.** It is important to keep the pipeline completely filled with liquid at all times, otherwise the flow rate display will be affected, which may cause measurement errors.



**Avoid air bubbles.** If air bubbles enter the measuring tube, the flow rate display may be affected, which may cause measurement errors.




# Ⅷ. Malfunction Repair

| Fault phenomenon | Fault Analysis | Solution |
|---|---|---|
| There is flow, but the instantaneous flow is zero | 1. Wiring error | Check meter wiring |
| | 2. The internal parameters of the instrument are modified | Test instrument parameters in accordance with the verification certificate |
| | 3. The signal acquisition coil is damaged, which affects the signal transmission, even if there is traffic passing through, the signal cannot be transmitted to the converter | Use a magnetic screwdriver to slide the signal acquisition coil |
| | 4、Impeller jammed | Check imperller |
| No flow through the meter, instantaneous flow display | 1. The pipe has severe vibration | It is recommended to add vibration reduction measures |
| | 2. Whether the meter is well grounded | Check the grounding |
| | 3. There are strong electromagnetic field interferences on site, such as inverters, motors, solenoid valves, etc. (50Hz power frequency interference on site. To a certain extent, it may affect the use of the instrument. The calculation of power frequency interference =3600f/k , f=50Hz, k = Meter coefficient) | Through calculation, it can be judged whether the instrument has power frequency interference, and it is recommended to change the installation position. |
| | 4. Meter pipe stop valve is not properly closed | Check Valve |
| Instrument normal measurement, measurement value is not accurate | 1. The internal parameters of the instrument are faulty | Test instrument parameters according to verification certificate |
| | 2. On-site pipelines are not required by symbols, contain gas or have high viscosity | Strictly operate in accordance with the installation instructions and precautions of the manual |
| The meter measures normally, the on-site LCD display is normal, and the meter current output is incorrect | 3. The movement of the meter is in question, remove the meter and blow the impeller to run with the slider | In case of damage, contact the manufacturer |

# Ⅸ. Ordering Instruction

1. When ordering the turbine flow sensor, the user should pay attention to selecting the appropriate specifications according to the nominal diameter of the fluid, working pressure, working temperature, flow range, fluid type and environmental conditions. When explosion-proof requirements are required, explosion-proof sensors must be selected, and the explosion-proof grade must be strictly observed.
2. When you need our company's display instrument matching, please refer to the corresponding manual and select the appropriate model, or our company's technical staff can design and select the model for you according to the information provided by you. Specify the specification length when you need a cable for signal transmission.