

# LWGY Intelligent Turbine Flow Meter

## Using Instruction



- High quality turbine, beyond the scope of normal range
- Supporting a variety of transmitter, suitable for different application requirements

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## Overview

LWGY series turbine flow sensor (hereinafter referred to as the sensor), on the basis of the principle of moment balance belongs to speed type flow meter, paratus has simple structure, light, high accuracy, good reproducibility, responsive, use of installation and maintenance is convenient wait for a characteristic, is widely used in petroleum, chemical industry, metallurgy, water supply, paper and other industries, is an ideal instrument to flow measurement and energy saving.

Sensor and display instrument, suitable for measuring the closed pipeline and 1 cr18ni9ti stainless steel, 2 cr13 and corrode corundum Al<sub>2</sub>O<sub>3</sub>, cemented carbide, and no fiber, particle impurities such as liquid. If with display instrument with special functions, can also be quantitatively control and excessive alarm, etc. And the use of this product explosion-proof type (ExmIIIT6), can be used in a environment with explosion danger.

Sensor is suitable for the viscosity under the working temperature is less than 5 x 10<sup>-6</sup> m<sup>2</sup> / s medium, for viscosity is greater than 5 x 10<sup>-6</sup> m<sup>2</sup> / s of the liquid, to be used after solid solution to calibrate the sensors. If users need special kind of sensor, can negotiate orders, sensor explosion-proof type, in order to illustrate.

## LWGY basic type turbine flow sensor

### 1. Structural characteristics and working principle

#### (1) Structural characteristics

Sensor is cemented carbide bearing thrust type, not only guarantee the accuracy, wear-resisting performance improvement, and has simple structure, strong and easy disassembling, etc.

#### (2) Working principle

Fluid flowing through the sensor shell, as a result of the impeller blade and flow to a certain point of view, the impact of fluid blade with rotational torque, to overcome the friction torque and fluid resistance, blade rotation speed stability after the moment balance, under certain conditions, the speed is proportional to the velocity of flow, because there are magnetic conductivity blade, it is in the signal detector (consists of permanent magnets and coils) magnetic field, rotating blade cutting lines, periodically changing coil magnetic flux, so that the coil ends induction electrical pulse signal, the signal after amplifier amplification plastic, form a certain amplitude of continuous rectangular pulse wave, can be spread far to display instrument, show the instantaneous flow or volume of the fluid. ithin the scope of a certain flow, pulse frequency f and flows through the sensor of fluid is proportional to the instantaneous flow rate Q, flow equation is:

$$Q = 3600 \times \frac{f}{k}$$

f—Pulse frequency [Hz]

k—The instrument coefficient of the transducer [1/m<sup>3</sup>], Given by the check list。 If [1 / L] as the

unit  $Q = 3.6 \times \frac{f}{k}$

Q—The instantaneous flow rate of the fluid [m<sup>3</sup>/h]

3600—Conversion factor

Coefficient of each sensor of the instrument in the calibration certificate will be completed by the

manufacturer, set into the display instrument of form a complete set of k value, can show the instantaneous flow and cumulative total.

## 2. Basic parameters and technical performance

(1) Basic parameters: Table one

**Table 1**

	LWGY□	□□□	□	□	□	Specifications
<b>Type</b>	LWGY					Basic, + 5 to 24 DCV power supply,
	LWGB					Two wire system 4 ~ 20 ma output current, far eastone - type
	LWY					Battery type display at the scene
	LWYA					The scene shows two wire / 4 ~ 20 ma current output
<b>Nominal Diameter</b>	4					4 mm, ordinary turbine flow range of 0.04 ~ 0.04 m <sup>3</sup> / h Wide-range turbine is 0.04 ~ 0.4 m <sup>3</sup> / h
	6					6 mm, ordinary turbine flow range of 0.1 ~ 0.1 m <sup>3</sup> / h Wide-range turbine is 0.06 ~ 0.6 m <sup>3</sup> / h
	10					10 mm, ordinary turbine flow range of 0.2 ~ 1.2 m <sup>3</sup> / h Wide-range turbine is 0.15 ~ 1.5 m <sup>3</sup> / h
	15					15 mm, ordinary turbine flow range 0.6 ~ 6 m <sup>3</sup> / h Wide-range turbine is 0.4 ~ 8 m <sup>3</sup> / h
	25					25 mm, ordinary turbine flow range 1 ~ 10 m <sup>3</sup> / h Wide-range turbine is 0.5 ~ 10 m <sup>3</sup> / h
	40					40 mm, ordinary turbine flow range 2 ~ 20 m <sup>3</sup> / h Wide-range turbine for 1 ~ 20 m <sup>3</sup> / h
	50					50 mm, ordinary turbine flow range 4 ~ 40 m <sup>3</sup> / h Wide-range turbine for 2 ~ 40 m <sup>3</sup> / h
	80					80 mm, ordinary turbine flow range 10 ~ 100 m <sup>3</sup> / h Wide-range turbine is 5 ~ 100 m <sup>3</sup> / h
	100					100 mm, ordinary turbine flow range from 20 to 200 m <sup>3</sup> / h Wide-range turbine is 10 ~ 200 m <sup>3</sup> / h
	150					150 mm, ordinary turbine flow range 30 ~ 300 m <sup>3</sup> / h Wide-range turbine for 15 ~ 300 m <sup>3</sup> / h
	200					200 mm, ordinary turbine flow range of 80 ~ 800 m <sup>3</sup> / h Wide-range turbine is 40 ~ 800 m <sup>3</sup> / h
<b>Explosion-proof</b>						No mark for the explosion proof type
		B				Explosion-proof type
<b>Accuracy grade</b>			A			Accuracy 0.5
			B			Accuracy 1
<b>Turbine type</b>			A			Wide-range turbine
			B			Ordinary turbine

DN 4 - DN40 sensor for the threaded connection, the maximum working pressure of 6.3 Mpa;

DN50—DN200 caliber sensors for flange connection, the maximum working pressure of 2.5 Mpa

DN15 - DN40 caliber sensors have also can make the diagnosis of connections, but when ordering.

DN15 above diameter, we can mate the front and behind of straight pipe

(2) Medium temperature: -20~+120℃.

(3) Environment temperature: -20~+55℃.

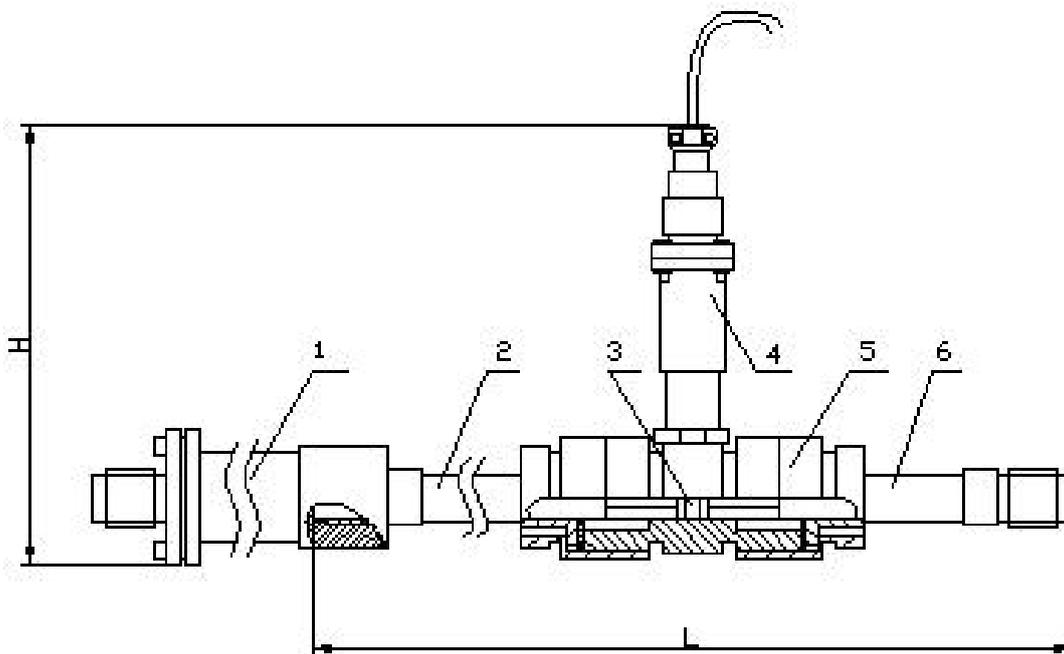
(4) Power supply: voltage: +5-24VDC, current:  $\leq 10\text{mA}$ .

(5) Transmission distance: The distance of the sensor to display instrument of up to 1000 m.

### 3. Installation, use and adjust

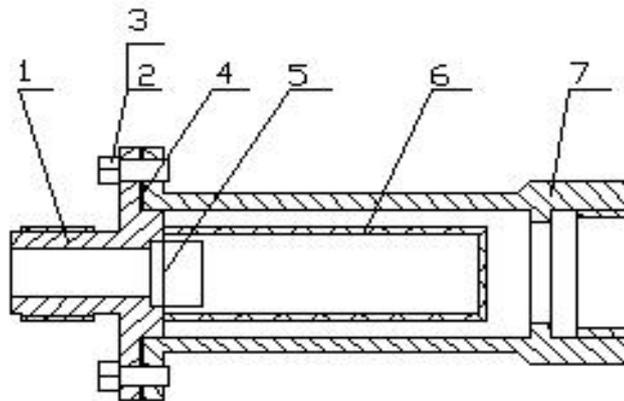
#### (1) Installation

Sensor installation method according to different specifications, using thread or flange connection, the installation method as shown in figure a, figure 2, figure 3, installation dimensions are shown in table 2.



1. Filter
2. Front of straight pipe
3. Impeller
4. Pre-amplifier
5. Shell
6. Behind of straight pipe

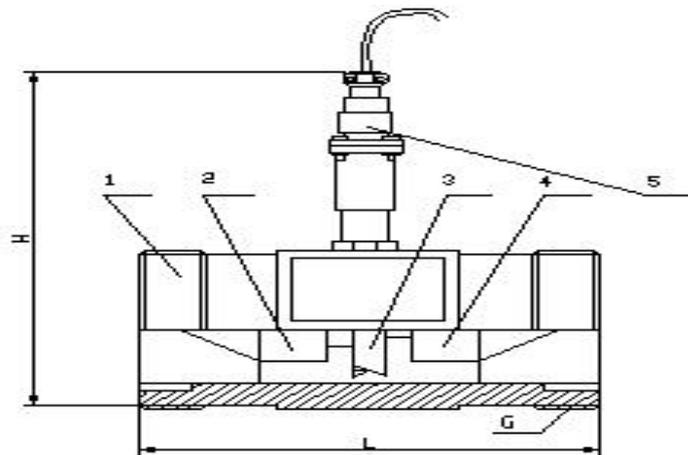
## The whole table structure



1. Clamping ring
2. Bolt 4×14
3. Washer
4. Sealing washer
5. Wire 1Cr18Ni9Ti-0.8×2.5
6. Filter screen
7. Seat

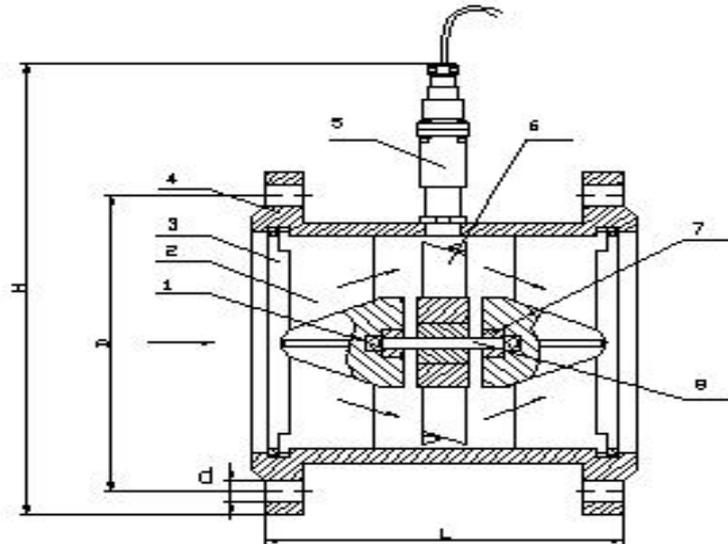
## The filter structure

Graph one LWGY, 4 ~ 10 sensor structure schematic and installation size



1. Shell
2. Front guide piece
3. Impeller
4. Behind guide piece
5. Pre-amplifier

Figure 2 LWGY - 15 ~ 40 sensor structure schematic and installation



LWGY—15~40

1. Ball bearing
2. Front guide piece
3. Ring
4. Shell
5. Pre-amplifier
6. Impeller
7. Bearing
8. Axle

Figure 3 LWGY - 50 ~ 200 sensor structure schematic and installation size

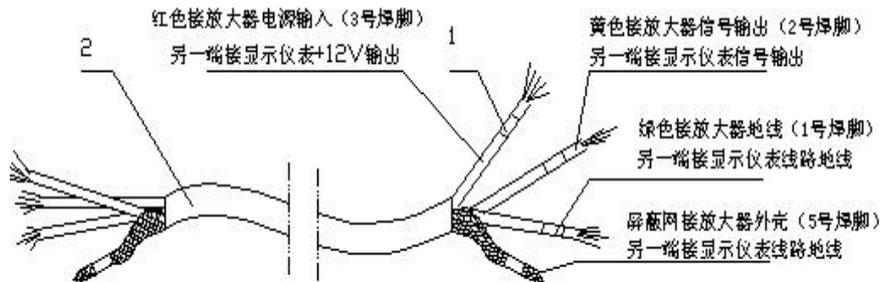


Figure 4 sensors and display instrument wiring schematic diagram

Table 2

	DN (mm)	L(mm)	H(mm)	G	L'(mm)	D(mm)	d(mm)	Hole
LWGY-4	4	275	145	G1/2	215			
LWGY-6	6	275	145	G1/2	215			
LWGY-10	10	455	165	G1/2	350			
LWGY-15	15	75	173	G1				
LWGY-25	25	100	180	G5/4				
LWGY-40	40	140	178	G2				
LWGY-50	50	150	252			Φ125	Φ18	4
LWGY-80	80	200	287			Φ160	Φ18	8
LWGY-100	100	220	322			Φ180	Φ18	8
LWGY-150	150	300	367			Φ250	Φ25	8
LWGY-200	200	360	415			Φ295	Φ23	12

Sensors can be horizontal, vertical installation, vertical installation direction of flow must be upward. Liquid should be full of pipes, can not have bubbles. When installation, the liquid flow

direction should be direction of arrow and indicating flow sensor shell. Sensors upstream side should have at least 20 times the length of the nominal diameter of straight pipe, the downstream end shall be not less than five times the nominal diameter of straight pipe section, its inner surface should be smooth and clean, no dent, fouling and defects such as peeling. The pipe axis of sensor shall be the adjacent pipe axis alignment, connecting sealing gasket may not deep into the pipe cavity.

Sensors should be far away from the external electric field, magnetic field, the effective shielding measures should be taken when necessary, to avoid the outside interference. In order to does not affect the normal liquid delivery, maintenance Suggestions in the installation of sensors, install bypass pipe.

Sensor when installation, please get amplifier and plug the waterproof processing. Sensors and display instrument connection as shown in figure 4.

When the fluid contains impurities, should be equipped with filter, filter mesh according to the flow of impurities, as a general rule, be 20 ~ 60 mesh. When mixed with the free gas in the fluid, should add the venting device. The whole pipeline system should be well sealed.

Users should fully understand the corrosion situation of measured medium, fight sensor from corrosion.

## **(2) Use and adjust**

- ◆ Measured liquid when using, should maintain clean, do not contain impurities such as fiber and particles.
- ◆ Sensors, at the beginning of the use should be to slowly filled with liquid sensor, and then open the outlet valve, Sensor is forbidden in liquid state under high velocity impact.
- ◆ The maintenance period of sensor is commonly for half a year. Maintenance when cleaning, please note that do not damage parts measuring cavity, Especially in the impeller. Please watch the orientation and the position of the impeller when assembling.
- ◆ Sensor need not should be clean inside the liquid, and on both ends of the sensor and protective cover, prevent dirt to enter, And then stored in dry place.
- ◆ With the filter should be cleaned regularly, need not when, should clean the internal liquid, like sensors, dustproof set, placed in a dry place preservation.
- ◆ Sensor cable can be raised or direct buried (buried iron pipe should be set.)
- ◆ Before sensor installation and display instrument or oscilloscope connected wires, power supply, with my mouth to blow or hand dial the impeller, make its rapid rotation observations have showed that sensor installation again when have shown. If no display, should check the relevant parts, troubleshooting.

## LWGB type turbine flow transmitter



U — Power supply, V

LWGB type turbine flow sensor is on the basis of LWGY prototype turbine flow sensor increased the 24 VDC power supply, two wire system 4-20 ma current transmitting function, especially suitable for computer, such as display, industrial control, DCS control system.

The diameter of the flow measurement range in this transmitter, sensor structure size, installation method, maintenance and so on the second part, please read this manual "LWGY prototype turbine flow sensor.

Flow calculation formula: 
$$Q = \frac{I - 4}{16} Q_F$$

: Q — Actual flow, m<sup>3</sup>/h

Q<sub>F</sub> — Limit on the flow measurement, m<sup>3</sup>/h, Table 1

I — Current output, mA

Power supply: 24V, (12V—30V)

Load resistance: 
$$R_{LMAX} = \frac{U - 12}{0.02} - 50$$

: R<sub>LMAX</sub> — Max load resistance, Ω

Sensor wire: A(+) — 24V+      B(-) — 0V

## LWY type turbine flow meter



LWY type scene shows the turbine sensor is on the basis of LWGY prototype turbine flow sensor, using battery power, strengthen the function of scene shows. The flowmeter is to adopt advanced technology of ultra-low power consumption single chip microcomputer development integration of sensor and display the new flow measurement instrument. With traditional turbine flow sensor compared with secondary instrument of measuring system, it has small volume, light weight, the display reading intuitive, clear, high reliability and is not affected by external power supply, lightning resistance, low cost, complete sets of obvious advantages. Can be widely used in petroleum, chemical industry, light industry, food industry such as liquid flow measurement. This product performance is superior, reached the international advanced level of similar products.

The diameter of the flow measurement range, the flowmeter sensor structure size, installation method, maintenance and so on the second part, please read this manual LWGY basic turbine flow sensor.

## 1. Main Technology

### (1) Display:

Double row liquid crystal display (LCD), As follow:

L XXX.X Four instantaneous flow rate (m<sup>3</sup>/h)

XX.XXXXXX Eight instantaneous flow rate (m<sup>3</sup>/h)

**(2) System working with low consumption:** One 3.0 V10AH lithium batteries can be used more than 5 years in succession.

**(3) The cumulative flow:** Automatically expand display precision, total flow rate value can be reset

**(4) Instrument coefficient:** The scene can be put into.

**(5) Power-fail protection:** Instrument coefficient, the cumulative flow values keep ten years don't lose when power supply drop.

## 2. Three coefficient method for double row liquid crystal display, load (only authorized engineer operations):

Open the front cover, press  and **F** keys, The instrument enter into the state of load, Now ranked first digital display 1, said at that time, can be set up the first instrument coefficient. Four can be set up after the corresponding points on the sensor output pulse frequency value of the instrument coefficient of discharge can be set to eight point value.

First of all, highest twinkle, press , The bit add 1 to the required value. Press the shift key , Blinking moves to the right, then use  key to select the bit value.....When flashing displacement to the last, press  key, To put this parameter afresh. Format for instrument coefficient XXXXXX.XX

Press the **F** key after check, Can be installed into the next point meter coefficient setting, method, the above format.

Continue to press **F** key after set up three coefficients, The instrument enter into the state of work, Four ranked according to instantaneous flow, discharge display eight total flow.

In working status, press the **F** key, the total amount can be reset.

Note: using three instrument coefficient of flow sensor nonlinear correction requires the user to know flow sensor and some corresponding meter coefficient (frequency) how much is respectively, namely F1, K1, F2 - K2, F3 -- K3.

## LWYA type turbine flow meter(with transmitter)

LWYA type turbine flow sensor is in LWY type turbine flow sensor on the basis of increased the 24 VDC power supply, 4-20 mA, Two wire current transmitting function, especially suitable for computer, such as display, industrial control, DCS control system.

It also has the function display and remote transmission.

Set the instrument coefficient of operating methods with reference to "four," LWY type turbine flow sensor part number, the difference are as follows:

### Three coefficient double row liquid crystal display, operation method:

Open the front cover, press  and **F** keys, The instrument enter into the state of load,

Now ranked first digital display 1, the rest of the four location into this sensor frequency values, coefficient of discharge can be put into this instrument, instrument coefficient format for XXXXXX.XX.

First of all, highest twinkle, press , The bit add 1 to the required value. Press the shift key , Blinking moves to the right, then use  key to select the bit value.....When flashing displacement to the last, press  key, To put this parameter afresh.

Press the **F** key after check, Can be installed into the next point meter coefficient setting, method, the above format. ranked first according to 2, and the rest of the same as above;

Press the **F** key after check, Can be installed into the next point meter coefficient setting, method, the above format. ranked first according to 3, and the rest of the same as above;

If continue to press the F key, instrument Settings the fourth parameter - full of traffic. The discharge flow rates in 20 ma full value,

Such as 4 mm corresponds to 250 l/h, at this point can be put into 250;If buy 50 50 l/h corresponds to 20 ma automatically. Set the parameters, after checked, went to work at the same time press the F key, display on the five instantaneous flow, discharge display eight total flow.

In the working status, press the F key at the same time, the accumulative total amount can be reset.

Instruments have been adjusted again before they leave the factory parameter, generally do not need to be adjustable.

If under normal use conditions, the output of far eastone current did find some point compared with the theoretical value super bad, is as follows to adjust the adjustable resistance of the circuit boards: open the instrument shell before, take out the circuit board, in the next layer of circuit boards have two adjustable resistance, including adjusting the V3 can adjust 4 ma, adjust the V4 can adjust 20 ma, pay attention to don't adjust the amplitude adjustment is too large. Adjust the same after installed.

## Maintenance and common fault

Sensor may produce general fault and eliminating methods are shown in table 3, the maintenance period shall not exceed half one year.

**Table 3**

No	Fault Phenomenon	Reason	Elimination method
1	Display of traffic signals and inspection are no display	1. No plug in, not given voltage. 2. Display is faulty.	1. Connect the power supply, according to the requirements for a given voltage. 2. maintenance display instrument.
2	Display instrument of "check" signal but no display of the traffic signal.	1. The sensor and display the indirect line is wrong, or open circuit, short circuit, such as poor contact failure 2. The amplifier has a fault or damage. 3. The converter (coil) open circuit or short circuit. 4. The impeller jammed. Pipeline without fluid flow or jam.	1. The comparison chart 4, check the correct wiring and connection quality. 2. Repair or replace the amplifier. 3. Repair or replace the coil. 4. Sensors and pipe cleaning. Open the valve or pump, pipeline cleaning.
3	Display instrument working instability; Measurement is not correct.	1. The actual flow is beyond the scope of instrument measurement or unstable. 2. The meter coefficient K set wrong. 3. Hang impurities such as fiber sensor inside. 4. A bubble in the liquid. 5. By the sensor has the strong electromagnetic interference. 6. The sensor bearing and shaft serious wear and tear. 7. The sensor or other grounding wire and cable shielding layer circuit ground wire broken or poor contact. 8. Display instrument malfunction.	1. Make the measured flow and sensor measurement range, and steady flow. 2. Make coefficient K is set correctly. 3. Cleaning the sensor. 4. Venting measures to eliminate air bubbles. 5. Far away from disturbance sources as far as possible or shielding measures. 6. Replace the "guide" or "impeller shaft". 7. Control chart, four line will connect well. Maintenance display instrument. 7. The sensor or other grounding wire and cable shielding layer circuit ground wire broken or poor contact. 8. Display instrument malfunction.

Users to abide by the provisions of the manual for storage and use cases, within one year from the factory delivery, sensors for producing bad that can't work normally, factory for free repair.

## Transportation and storage

Sensors should be in strong wooden cases or cartons, are not allowed in the free running in the cabinet, handle with care when handling, do not allow the rough handling.

Location shall meet the following conditions:

- A. rain moisture proof.
- B. not affected by mechanical vibration or impact.
- C. temperature range: - 20 °C ~ + 55 °C.
- D. relative humidity is not greater than 80%.
- E. no corrosive gas in the environment.

## **Attention of opening the box**

1. When unpacking the case, according to the packing list to check the file and accessories are complete.

A packing files: operation instruction

1. Observe the phenomenon such as sensor for due to transportation damage, in order to properly handle.

2. Look at the user keep "calibration certificate" do not lose, otherwise unable to set the meter factor!

## **Ordering instructions**

Users should note when ordering turbine flow sensor based on the fluid of nominal diameter, working pressure, working temperature, flow range, fluid types and environmental conditions, choose the appropriate specifications. If explosion-proof, must choose explosion-proof type sensor, and strict attention to explosive-proof grade. Need I company display instrument supporting, please refer to the corresponding specifications, choose suitable model, or the information provided by our company technical personnel according to your designs for you selection. Indicate the specifications when you need to use the transmission signal cable.

## **HongQi instrument (Jiangsu) Co.,LTD**

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