



Operation Instruction

- High quality turbine beyond normal range
- Supporting a variety of transmitters, suitable for different application requirements
- Intelligent processing, unique three - point nonlinear correction of instrument coefficient

I、Summarize

LWGY series turbine flow sensor (hereinafter referred to as sensor) is a speed-type flow meter based on the principle of torque balance. It is widely used in petroleum, chemical industry, metallurgy, water supply, papermaking and other industries. It is an ideal meter for flow measurement and energy saving.

The sensor and the display instrument are used together, suitable for measuring the liquid in the closed pipe with stainless steel 1Cr18Ni9Ti, 2Cr13 and corundum Al_2O_3 , which has no corrosive effect and no fiber, particle and other impurities. If it is matched with the display instrument with special function, it can also be used for quantitative control and over-alarm. The explosion-proof type of this product (ExmIIT6) can be used in the environment with explosion danger.

The sensor is suitable for medium with a viscosity less than $5 \times 10^{-6} \text{m}^2/\text{s}$ at the operating temperature. For liquids with a viscosity greater than $5 \times 10^{-6} \text{m}^2/\text{s}$, the sensor should be used after the actual liquid calibration.

If the user needs a special type of sensor, the order can be

negotiated. If the explosion-proof sensor is needed, it shall be explained in the order.

II、LWGY basic turbine flow sensor

1. Structural features and working principles

(1) Structural features

The sensor is the thrust type of cemented carbide bearing, which not only ensures the accuracy and improves the wear resistance, but also has the characteristics of simple structure, firm structure and convenient disassembly and assembly.

(2) Working principles

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, It can be transmitted to the display instrument to display the instantaneous flow or total amount of fluid. Within a certain flow range, the pulse frequency f is proportional to the instantaneous flow rate Q of the fluid flowing through the sensor, and the flow equation is:

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

式中：

f —Pulse Rate[Hz]

k —The instrument coefficient of the sensor [$1/m^3$] is given by the check list

Q —Instantaneous flow of fluid (working condition)[m^3/h]

3600—Second conversion coefficient

The instrument coefficient of each sensor is filled in by the manufacturer in the verification certificate, and the value of k is set in the supporting display instrument to show the instantaneous flow and cumulative total.

2. Basic parameters and technical performance

(1) Basic parameters: see Table 1

Table 1

	LWGY□	□□□	□	□	□	Explain
Type	LWGY					Basic model,+5-24DCV power supply
	LWGYA					Two-wire system current output, remote transmission
	LWGYB					Battery powered field display
	LWGYC					field display/Two-wire system current output
	LWGYD					RS485 communication output
Diameter	4					4mm,general turbine flow range 0.04~0.25 m ³ /h
	6					6mm,general turbine flow range 0.1~0.6m ³ /h
	10					10mm,general turbine flow range 0.2~1.2 m ³ /h
	12					12mm,general turbine flow range 0.2~2m ³ /h
	15					15mm,general turbine flow range 0.6~6m ³ /h
	20					20mm,general turbine flow range 0.7~7m ³ /h
	25					25mm,general turbine flow range 1~10m ³ /h
	32					32mm,general turbine flow range 1.5~15 m ³ /h

	40			40mm, general turbine flow range 2~20m ³ /h
	50			50mm, general turbine flow range 4~40m ³ /h
	65			65mm, general turbine flow range 7~70m ³ /h
	80			80mm, general turbine flow range 10~100 m ³ /h
	100			100mm, general turbine flow range 20~200 m ³ /h
	125			125mm, general turbine flow range 25~250 m ³ /h
	150			150mm, general turbine flow range 30~300 m ³ /h
	200			200mm, general turbine flow range 80~800 m ³ /h
Anti-explosion				No mark, non - explosive type
Accuracy class		B		Anti-explosion
Turbine type		A		Accuracy 0.5 grade
		B		Accuracy 1 grade
		A		Wide range turbine
		B		Ordinary turbine

The DN4 -- DN25 calibre sensor is threaded connection with a maximum working pressure of 16Mpa;

The DN32 -- DN200 calibre sensor is flanged connection with a maximum working pressure of 16Mpa;

DN4 - DN10 calibre sensors with front and rear straight sections.

DN15 and above calibre sensors can be matched with front and rear straight sections.

(2) medium temperature: -20~+120°C.

(3) environment temperature: -20~+65°C.

(4) service voltage: voltage: +6-24VDC, current: $\leq 10\text{mA}$.

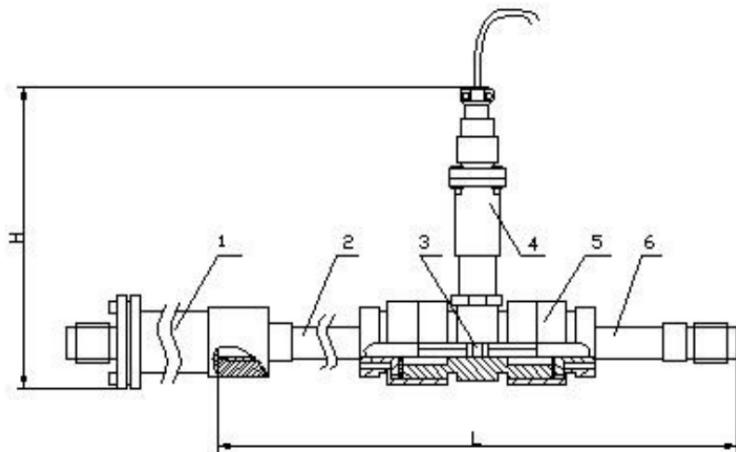
The battery power supply is 3.6V/0.3mA.485 communication current increased by 0.6mA.

(5) Transmission distance: the distance from the sensor to the display instrument can be up to 1000m.

3. Install, Use and adjust

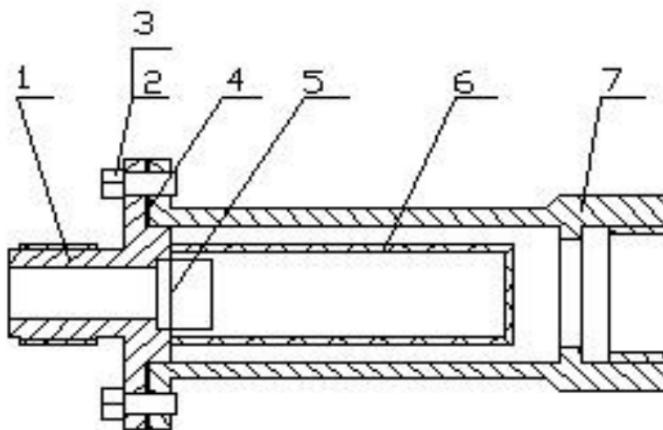
(1) Install

According to different specifications, the sensor is installed with thread or flange. See figure 1, figure 2 and figure 3 for the installation method. See table 2 for the installation size.



1.Filter 2.Front straight sections 3.Impeller 4. Pre-amplifier
5.Shell 6.Rear straight sections

Overall structure diagram

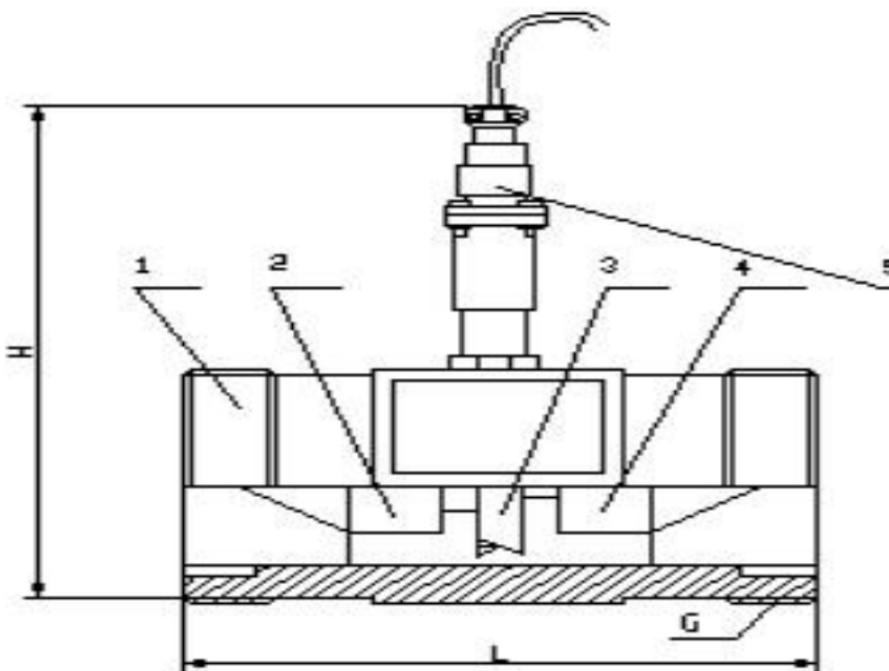


1.Compression ring 2.Bolt 4×14 3.Gasket 4.Seal washer

5.Steel wire1Cr18Ni9Ti-0.8×2.5 6.Filter net 7.Pedestal

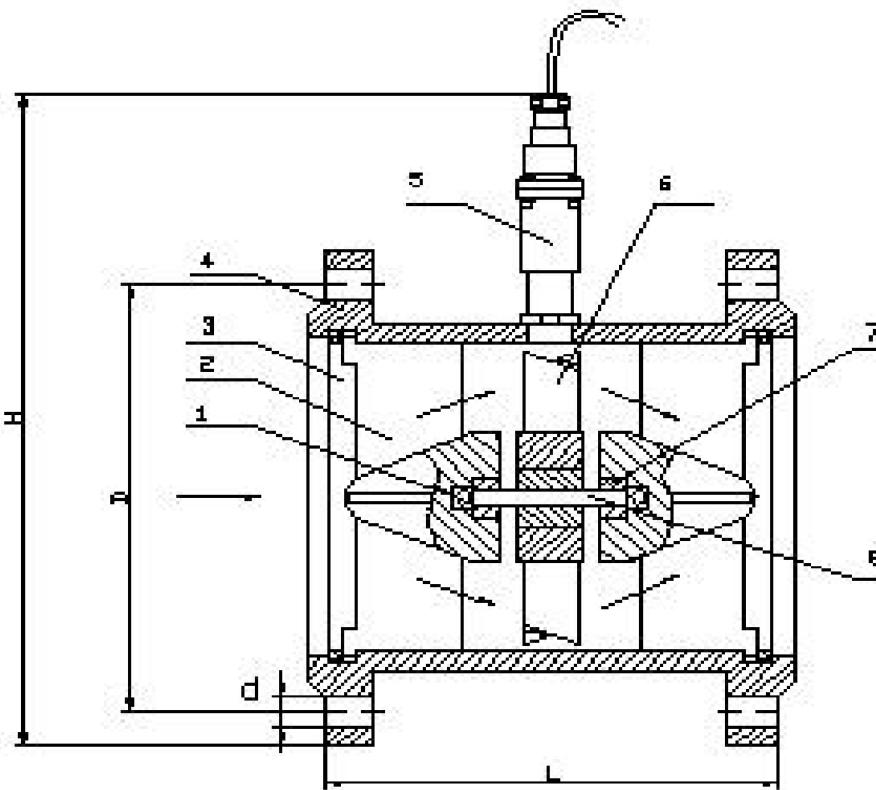
Filter structure diagram

Figure 1 LWGY—4~10 sensor structure and installation size diagram



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

Figure 2 LWGY—15~40 sensor structure and installation size diagram

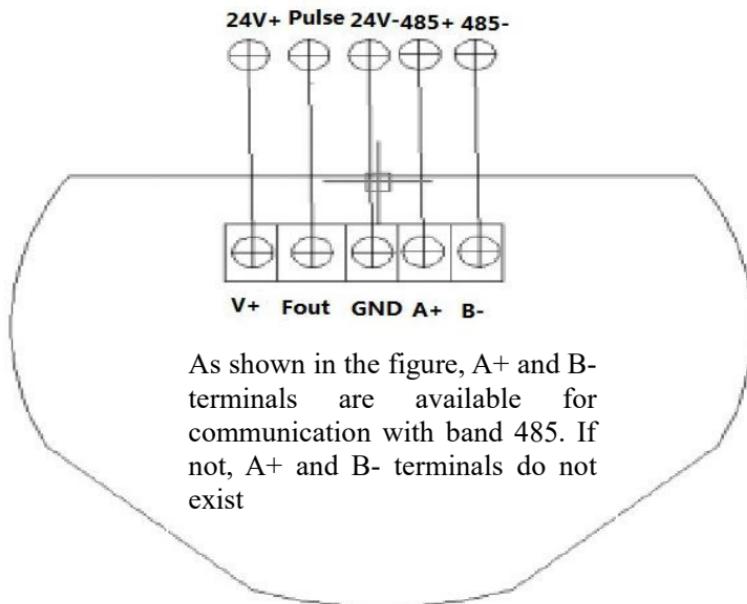


1.Ball bearing 2.Front guide 3.Packing ring 4.Shell 5.Pre-amplifier
6..Impeller 7.Bearing 8.Axis

Figure 3 LWGY—50~200 sensor structure and installation size
diagram

(2) Turbine flow sensor wiring instructions:

Open the back cover, as shown below:



As shown in the figure, A+ and B- terminals are available for communication with band 485. If not, A+ and B- terminals do not exist

(3) Sensor structure dimensions: table 2

Table 2

	Diameter (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-12	12	75	173	G1				
LWGY-15	15	75	173	G1				
LWGY-20	20	85	173	G1				
LWGY-25	25	100	173	G5/4				
LWGY-32	32	140	175	G11/2				
LWGY-40	40	140	178	G2		Φ110	Φ18	4
LWGY-50	50	150	252			Φ125	Φ18	4
LWGY-65	65	180	278			Φ145	Φ18	4
LWGY-80	80	200	287			Φ160	Φ18	8
LWGY-100	100	220	322			Φ180	Φ18	8
LWGY-125	125	250	347			Φ210	Φ18	8
LWGY-150	150	300	367			Φ250	Φ22	8
LWGY-200	200	360	415			Φ295	Φ22	12

The sensor can be installed horizontally and vertically, and the direction of the fluid must be upward when installed vertically. The liquid should be filled in the pipe without bubbles. When installed, the direction of liquid flow should be

consistent with the direction of the arrow indicating the direction of flow on the sensor housing. The upstream end of the sensor shall have at least 20 times the length of the nominal diameter of the straight pipe segment, and the downstream end shall have at least 5 times the nominal diameter of the straight pipe segment, and its inner wall shall be smooth and clean without pits, scale, peeling and other defects. The pipeline axis of the sensor shall be aligned with the axis of the adjacent pipeline, and the gasket for connecting and sealing shall not go deep into the pipeline cavity.

Sensors should be far away from the external electric and magnetic fields, and effective shielding measures should be taken when necessary to avoid external interference.

In order not to affect the normal transmission of liquid during maintenance, it is recommended to install bypass pipes at the installation of sensors.

When installing the sensor in the open, please make the amplifier and plug waterproof. The connection between the sensor and the display instrument is shown in FIG. 4.

When the fluid contains impurities, should be added to the

filter, filter mesh according to the flow of impurities, generally 20 ~ 60 mesh. When the fluid is mixed with free gas, it should be equipped with a deflator. The entire piping system should be well sealed.

Users should fully understand the corrosion of the medium under test and strictly prevent the corrosion of the sensor.

(4) Use and adjust

- ◆ When used, the tested liquid should be kept clean and free from impurities such as fiber and particles.
- ◆ When the sensor is in use, it should first fill the sensor slowly with liquid, and then open the outlet valve. It is strictly prohibited for the sensor to be impacted by high-speed fluid when there is no liquid.
- ◆ The maintenance cycle of the sensor is generally half a year. During maintenance and cleaning, please pay attention not to damage the parts in the measuring chamber, especially the impeller. Pay attention to the position relation of guide piece and impeller when assembling.
- ◆ When the sensor is not in use, the internal liquid should be

cleaned, and at both ends of the sensor with a protective sleeve to prevent grime into, and then stored in a dry place.

- ◆ When used, the filter should be cleaned regularly. When not in use, the internal liquid should be cleaned. Just like the sensor, dust jacket should be added and stored in a dry place.
- ◆ The transmission cable of the sensor can be laid overhead or buried (iron pipe should be covered when buried).
- ◆ Before installing the sensor, connect it with the display instrument or oscilloscope and connect it with power supply. Use mouth to blow or hand to pull the impeller, make it rotate quickly to observe whether there is a display, and install the sensor when there is a display. If no display, should check the relevant parts, troubleshooting.

III、LWGB turbine flow transmitter

LWGB turbine flow sensor adds 24VDC power supply and 4-20ma two-wire current transformer function on the basis of LWGY basic turbine flow sensor, Especially suitable for display instrument, industrial computer, DCS and other computer control systems.

Please refer to the second part of the manual "LWGY basic turbine flow sensor" for the flow measurement range, sensor structure size, installation method, maintenance and other contents of each calibre of this transmitter.

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

formula:

Q ——actual flow, m^3/h

Q_F ——Flow measurement upper limit value, m^3/h , see **table 1**

I ——current output, mA

The supply voltage of the transmitter: 24V, (12V—30V)

The relationship between supply voltage and load resistance:

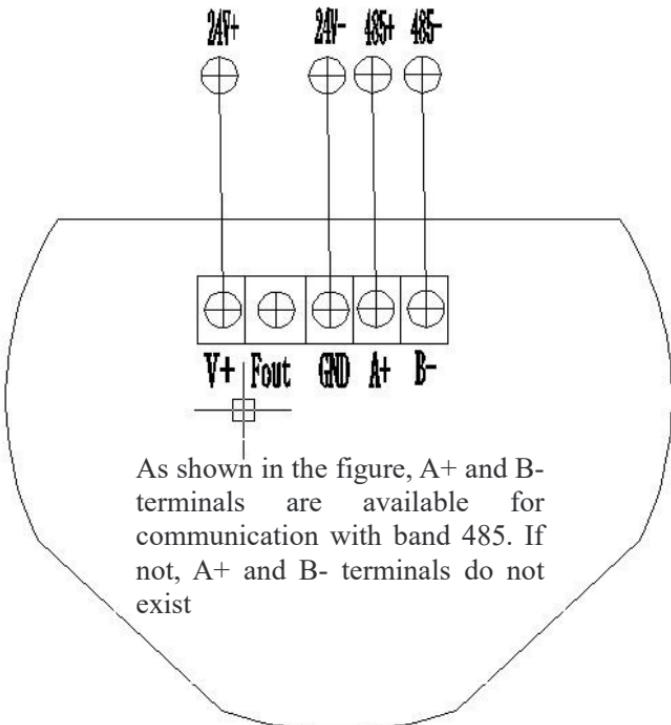
$$R_{LMAX} = \frac{U - 12}{0.02} - 100$$

Formula:

R_{LMAX} ——Maximum load resistance, Ω

U ——supply voltage, V

The wiring diagram is as follows:

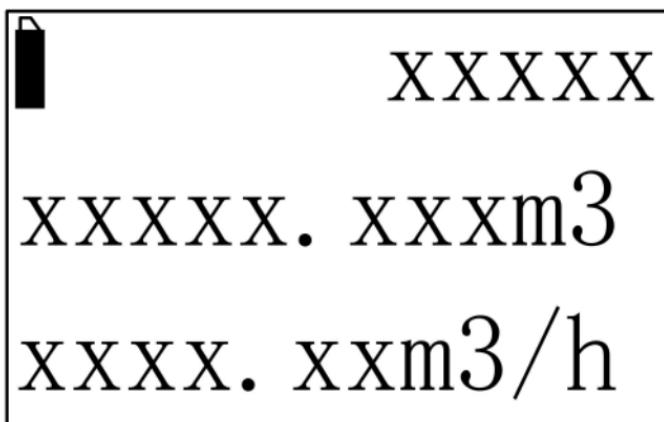


As shown in the figure, A+ and B- terminals are available for communication with band 485. If not, A+ and B- terminals do not exist

IV、LWY intelligent turbine flowmeter (LWYC current output and LWYD communication output)

(I) User menu operation

After the power is switched on, the instrument will firstly self-check and enter the main display state of screen 1 after completion.



First line : Cumulative high ; Fixed 5-bit integer number display. Display "0" when there is no 5-bit.

Second line : Cumulative low, A five-digit integer followed by three decimal places, The unit is identical to the nontime part of the instantaneous flow unit.

Third line: instantaneous flow rate; Following a 5-digit or

6-digit integer and automatically retaining 2 or 1 digits after the decimal, the flow unit is set by the menu.

The upper left corner of the LWYD three-wire system is the battery power indicator, When the meter is powered by battery, the battery power will be displayed. LWYC does not have this display.

Press the "<" button or "+" to switch between working screen 2 and working screen 1

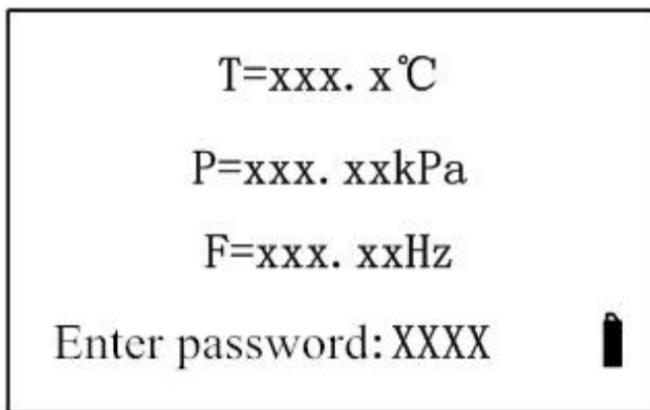


Chart 1 LWYD Working screen2 Deputy interface

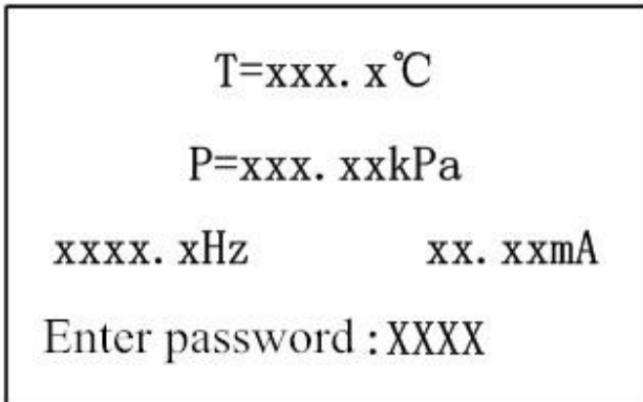


Chart 2 LWYC Working screen2 Deputy interface

First line : Temperature setting value;Used for calculation related to temperature compensation.display $T=999.9^{\circ}\text{C}$ Reserve 1 decimal place for display.

The second line:Pressure setting value;Used for calculation related to pressure compensation.display $P=99999.99\text{kPa}$, and keep the 2 decimal places.

The third line :For the LWYD meter, it is the frequency value; The left end of the LWYC meter is the frequency value, and the right end is the output current value.

The fourth line: the password to enter the set state.

Long press the "<" button (**Long press "<" for about 1.2 seconds to confirm “E” , the following is not the description**)
Enter the initial password entry state.

Long press “+” button (**Long press “+” for about 1.2 seconds to confirm “S” , the following is not the description**)

Cancel the input state, return to the second screen interface display.

Press the “+” key to change the value of the cursor in the input state. Press “<” to move the current input cursor position.

In the input state, press “E” key to submit the password. If correct, enter the menu; if not, return to the initial input state.

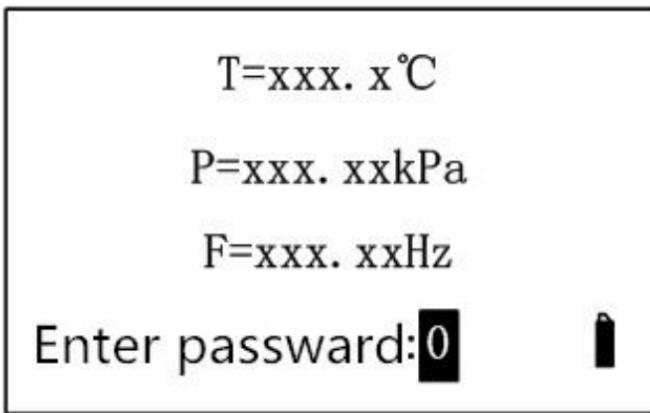


Chart3 password entered in initial state

Password: User menu password 2010

(II) User parameter setting

Press “S” button, exit the input state. Press “E” button,

make sure to save the input.

Press “+” button, Loop to change the value or symbol at the cursor;

Press “<” button, Moves the current input cursor one bit to the right.

Input up to 8 bits of data (Including symbols and decimal points) .

2、Menu action:

In menu browsing, press "+" key to scroll down; Press "<" key to turn up; Press the "E" key to enter the submenu. Press "S" key to return to the working screen 2 interface.

In the submenu, press the "S" key to exit; Press "E" key to enter the modified state. If the selection is changed in the modified state, press the "+" key to select downward. Press "<" to select up, and press "E" to confirm. If the input is modified, follow the input operation.

Matters need attention:When parameters are set, the displayed contents can be stored only after confirmation by pressing the "E" key, otherwise the setting is invalid.

Table 1 user parameter setting menu The user menu password is 2010.

Double key clear accumulator function:When simultaneously pressing the left and right buttons for about 1 second, the cumulant clears 0.

Submenu number	Menu display	significance	A selection or range of values
1	Flow unit selection	Flow unit selection (default 0)	0: m ³ /h 1: m ³ /m 2: l/h 3: l/m 4: t/h 5: t/m 6: kg/h 7: kg/m
2	algorithm selection	algorithm selection (default 0)	00: Conventional volume flow 01: Conventional mass flow 02: Volume flow of conventional gas 03: Conventional mass flow of gas
3	discharge coefficient	discharge coefficient (default 3600)	Set the instrument coefficient, unit is P/m ³

4	Full output flow	Full output flow (default100 0)	When the meter outputs 4~20mA analog signal, the value must be set and shall not be 0. The unit is the same as the flow unit
5	Density setting	Density is set (default1.0)	When the algorithm is set to mass flow (01, 03), this must be set in kg/m3
6	Temperature setting	Temperature setting (default 0.0)	Set the calculation value of temperature. This must be set when selecting 02, 03 and algorithm. In degrees Celsius
7	Absolute pressure setting	Set the absolute pressure of the gas (default 101.325)	Set the calculation value of absolute pressure of gas. This must be set when the algorithm 02, 03 and 3 are selected. The unit is kPa (A vacuum of 0.0 will result in a flow of 0)

8	Lower cut flow	Set the default cut pulse input percentage (1%)	Values range from 0 to 100
9	485 Address	Set RS485 communication serial number (default 0)	This setting is required for RS485 communication of LWYD instrument, and it cannot be the same as other devices in the same system, and the range is 0~31
10	damping time	Set output current damping time (default is 4s)	Set the current output damping time to avoid the output current fluctuating too much with the flow in a range of 2~32
11	Zero clearing accumulative amount	Zero clearing accumulative amount	To clear the zero accumulator, select YES and press the "E" key

Note: Auxiliary connection (small terminal) The double pin jumper between the main terminal and the auxiliary

terminal is the battery switch,short connection is on, unplug is off.

+3V6	3V6-	CMB	CMA
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1) The battery terminal: (Right 1,2 of the small terminals)

+3V6: Connect the "+" end of 3.6v lithium battery.

3V6- : Connect the "-" end of 3.6v lithium battery

2) Communications wiring: (Left 3,4 of the small terminals)

No 485 communication model is not suitable for this terminal

(Only LWYD flowmeter)

CMB: Connect to the "-" terminal of RS485 communication.

CMA: Connect to the "+" terminal of RS485 communication.

V、Production Validation

The production adjustment of the instrument should be carried out by professionals who have a deep understanding of the instrument under the condition of calibration equipment with corresponding accuracy. There should be at least >20mA range, accuracy better than 0.1% ammeter.

Production adjustment and some advanced Settings are carried out in the production setting state. If there is no corresponding equipment and sufficient professional knowledge, improper adjustment will lead to the instrument can not work properly. After the password is confirmed, you can enter the

production setting state, and set the corresponding instrument parameters according to different instrument models

Open the front cover of the table and select the required parameter menu according to the definition in table 2 to enter the production verification menu.

Chart 2 Production check menu table **The production menu password is 2011.**

Submenu number	Menu display	significance	remark
1	Init DATA	Initializes the Settings data to the default value, which is usually disabled	To initialize user data, select YES and press the "E" key
2	485 Baud	Set 485 baud ratede fault 4800	Only LWYD type is effectiv 00: 4800bps 01: 9600bps
3	4mA	Calibration for 4mA output current	Only LWYC type have, After the press E Enter the

			output current value as measured by the ammeter
4	12mA	Calibration for output current of 12mA	Only LWYC type have, After the press E Enter the output current value as measured by the ammeter
5	20mA	Calibration of parameters with output current of 20mA	Only LWYC type have, After the press E Enter the output current value as measured by the ammeter

VI. Maintenance and common failures

See table 3 for the general faults that may occur to the sensor and how to eliminate them. The maintenance cycle shall not exceed half a year.

Chart 3

Serial number	Fault phenomenon	Cause	Elimination method
1	The display instrument has no display for flow signal and check signal.	<p>The power supply is not connected, and the given voltage is wrong.</p> <p>2.The display instrument is out of order</p>	<p>1. Switch on the power and set the voltage as required.</p> <p>2. Maintenance of display instruments.</p>
2	The display meter shows the check signal but not the flow signal	<p>1. The indirect line of the sensor and display instrument is wrong, or there are open circuit, short circuit, poor contact and other faults</p> <p>2. The amplifier is faulty or damaged.</p> <p>3.Converter (coil) open or short circuit.</p> <p>4. The impeller is stuck</p> <p>No fluid flow or blockage in the pipe.</p>	<p>Check the correctness and quality of wiring according to attached figure 4.</p> <p>2. Repair or replace the amplifier.</p> <p>3. Repair or replace coils.</p> <p>4. Clean sensor and piping</p> <p>Open valve or pump and clean pipe</p>

3	<p>The display instrument works unsteadily; Incorrect measurement.</p>	<ol style="list-style-type: none"> 1. The actual flow exceeds the measuring range of the meter or is unstable. 2. Instrument coefficient K is set incorrectly. 3. Fiber and other impurities are hung in the sensor 4. There are bubbles in the liquid. 5. There is strong electromagnetic interference next to the sensor.。 6. Sensor bearings and shafts are severely worn. 7. The sensor cable shield or other grounding wires are disconnected or in poor contact with the ground wire of the line. 8. Display instrument failure. 	<ol style="list-style-type: none"> 1. The measured flow is adjusted to the measuring range of the sensor, and the flow is stabilized. 2. Make the coefficient K set correctly 3. Clean the sensor. 4. Take measures to eliminate air bubbles. 5. Stay away from interference sources or take shielding measures. 6. Replace "guide" or "leaf wheel shaft". 7. Connect the wires according to attached figure 8. Maintenance of display instruments.
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Under the condition that the user keeps and USES the sensor in accordance with the instructions, the manufacturer may repair the sensor free of charge within one year from the delivery date of the manufacturer if the sensor cannot work normally due to poor manufacturing.

VII、Transportation and storage

The sensor should be packed in a strong wooden case or carton. It is not allowed to move freely in the carton. Handle with care and rough handling is not allowed.

The storage place shall meet the following conditions:

- a.Protect against rain and moisture.
- b.Not subject to mechanical shock or shock.
- c.- 20 °C ~ + 65 °C temperature range.
- d.Relative humidity shall not be greater than 80%.
- e.No corrosive gas in the environment.

VIII、Notes for unpacking

1.After unpacking, check the completeness of documents and attachments according to the packing list.

Packing documents : A copy of the operation manual

One product qualification certificate

2.Observe whether the sensor is damaged due to transportation for proper handling.

3.Do not lose the "certificate of conformity", otherwise the instrument coefficient cannot be set!

IX、 Ordering instruction

When ordering turbine flow sensors, users shall pay attention to selecting appropriate specifications according to the nominal diameter, working pressure, working temperature, flow range, fluid type and environmental conditions of the fluid. When there are explosion-proof requirements, explosion-proof sensor must be selected, and strictly pay attention to the explosion-proof grade.

When you need our display instruments, please refer to the corresponding instructions, choose the appropriate model, or our technical staff according to the data you provide for your design and selection. Specify the length of the cable needed to transmit signals.