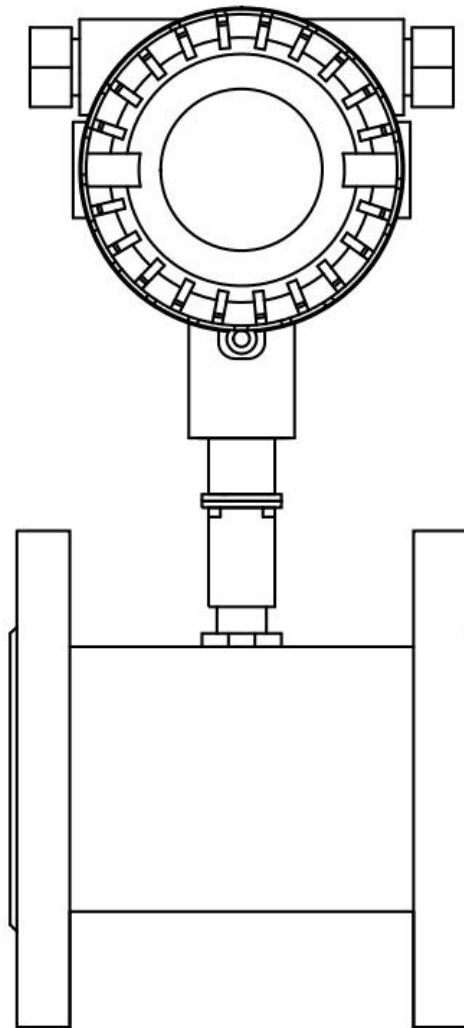


Liquid turbine flowmeter



Installation manual

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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 (Exia IICT4) can be used in the environment with explosion danger.

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

II 、 Technical index

1. Technical index

The sensor is a hard alloy bearing thrust type, which not only ensures accuracy and improved wear resistance, but also has the characteristics of simple structure, firmness and convenient disassembly and assembly.

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, 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:

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

In the formula:

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.

3. Basic parameter table

Nominal diameter (mm)	Flow range (m ³ /h)	Accuracy	Explanation
DN4	0.04-0.25m ³ /h	1.0 Level	LWGY: pulse type, 24VDC power supply; LWYB: battery-powered on-site display type; LWYC: On-site display/4~20mA two-wire current output; LWYD: RS485 communication output;
DN6	0.1-0.6m ³ /h		
DN10	0.2-1.2m ³ /h		
DN12	0.2-2m ³ /h	0.5 Level	
DN15	0.6-6m ³ /h		
DN20	0.7-7m ³ /h		
DN25	1-10m ³ /h		
DN32	1.5-15m ³ /h		
DN40	2-20m ³ /h		
DN50	4-40m ³ /h		
DN65	7-70m ³ /h		
DN80	10-100m ³ /h		
DN100	20-200m ³ /h		

DN125	25-250m ³ /h	1.0 Level	
DN150	30-300m ³ /h		
DN200	80-800m ³ /h		

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.

4. Other indicators

Medium temperature: -20~+120°C.

Environment temperature: -20~+65°C.

Service voltage: voltage: 24VDC.

battery power supply is 3.6V

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

III、Dimensions and installation

1. Dimensions

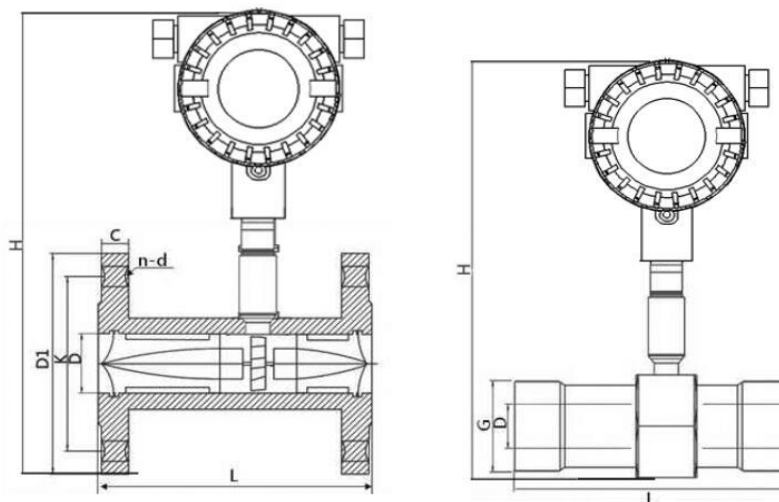


Figure 1 Schematic diagram of LWYB/C/D flowmeter structure

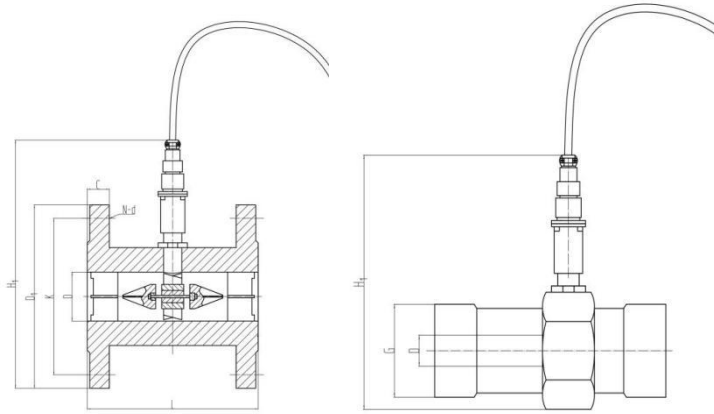


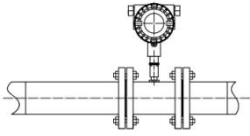
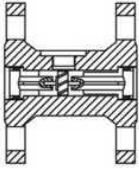
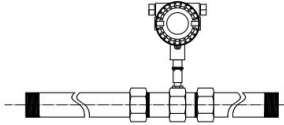
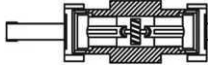
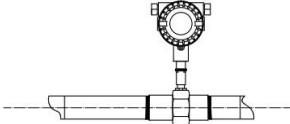
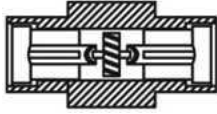
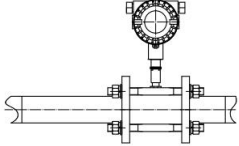

Figure 2 Schematic diagram of LWGY sensor structure

Nominal diameter (mm)	1.6MPa Flange outer diameter	Flange connection				Body Length L	Threaded connection British Standard G
		Center distance K	Aperture d	Number of holes n	Thickness C		
DN4	90	60	14	4	14	225	G1/2
DN6	90	60	14	4	14	225	G1/2
DN8	90	60	14	4	14	345	G1/2
DN10	90	60	14	4	14	345	G1/2
DN12	95	65	14	4	14	65	G3/4
DN15	95	65	14	4	14	75	G1
DN20	105	75	14	4	16	85	G1
DN25	115	85	14	4	16	100	G1 1/4
DN32	140	100	18	4	18	120	G1 1/2
DN40	150	110	18	4	18	140	G2
DN50	165	125	18	4	20	150	G2 1/2
DN65	185	145	18	4	20	175	G3
DN80	200	160	18	8	20	200	G3 1/2
DN100	220	180	18	8	22	220	G4 1/2
DN125	250	210	18	8	22	250	
DN150	285	240	22	8	24	300	
DN200	340	295	22	12	26	360	
DN250	405	355	26	12	28	400	
DN300	460	410	26	12	32	500	

Flange executive standard: HG/T 20592-20635-2009

2. Installation diagram of liquid turbine sensor

Wheel flow sensor wiring instructions:

Type	Assembly diagram	Schematic
Flange Connection type		
Thread Connection type		
		
Clamp Connection type		

3. Installation Precautions

◆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.

- ◆ 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.

- ◆ 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.

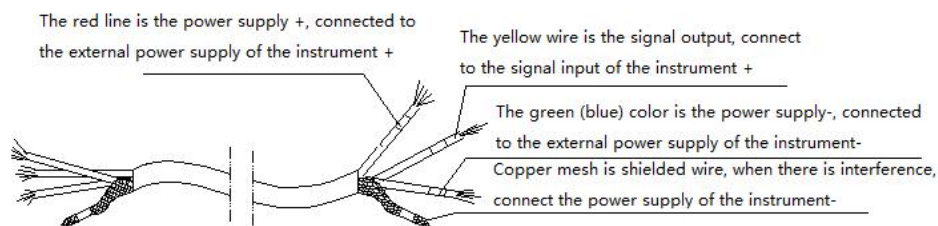
◆ When used, the filter should be cleaned regularly. When not in use, the internal liquid should be cleaned. Just like the sensor, dust jacket should be added and stored in a dry place.

◆ 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.

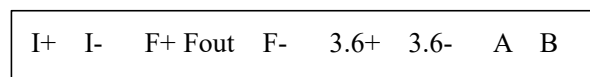
IV、Circuit and circuit interface

1. LWGY Turbine flow sensor wiring instructions: as shown



2. Wiring instructions for explosion-proof turbine flow sensor:

Open the back cover, as shown:



Frequency wiring: 24 power supply is connected to F + and F-, frequency line is connected

Fout, connect 3.6+ and 3.6- when the battery is powered,

485 wiring: 24V power is connected to F + and F-485 lines to A and B.

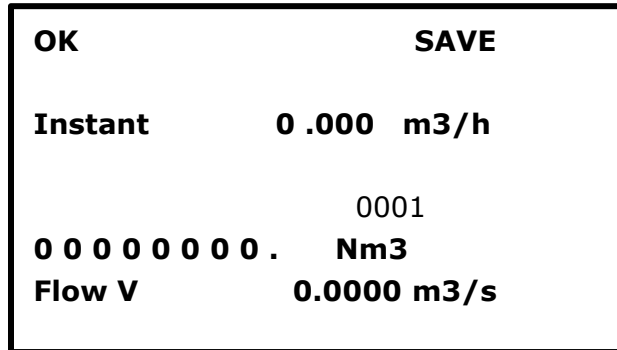
Current wiring: If the customer's field system is a two-wire system 24V + connected to I +, the current line is connected to I-.

Three-wire system, connect 24V + to I + and current line to I-, then short-circuit the current line and the GND of 24V power supply in the system.

Four-wire system, 24V + connects to I +, current line connects to I-, then short-circuit 24V GND and current GND of the system together.

V、Display and basic operation

In addition to the pulse meter, the power-on display interface of other series products is as follows:



The first line: self-test normal sign, LCD backlight is turned on, before **SAVE** shows IOOUT is current output, FOOUT is frequency output, 485OUT is 485 output.

Second line: instantaneous flow.

The third line: cumulative flow.

The fourth line: flow rate display, only after setting the caliber.

Press SHIFT to switch between work screen 2 and work screen 1.

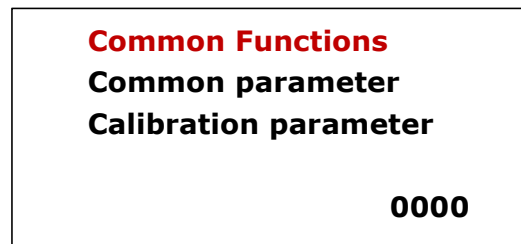


Chart 1 Menu 1

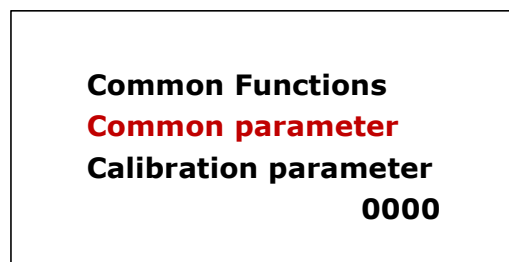


Chart 2 Menu 2

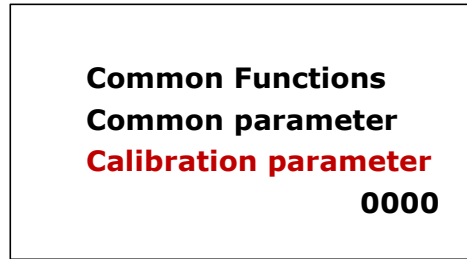


Chart 3 Menu 3

The circuit board can be found through the appearance of three buttons, their functions are:

SHIFT: a. Switch the screen. You can switch to the menu screen by pressing this on the main interface.

b. To switch menu items, press this key on the menu screen to switch between different menus.

c. Shift key. In parameter setting, you can use this key to shift.

d. Exit. In the parameter setting, if there is no displacement item, press this button to exit the menu item.

△: Digital item plus function, press this item to adjust the size of the digital item, the digital size can be displayed cyclically. For example, if the current display is 6, you can display it as 8 by pressing twice, or display it as 1 by pressing 3 more times.

SET: a. Confirm function, mainly after modifying the parameter, press this button to confirm the parameter

b. Switch the menu. In the parameter setting, press this key directly to switch to other parameters. The parameter list is displayed cyclically. When the last list is pressed, press again to return to the main menu.

The first menu is the user menu. The password is 0000 by default. It is used for basic settings. The second menu is for parameter query. The frequency value can be queried. There is also an overflow sign. When the flow is greater than 100 million, the main interface cumulative flow It is cleared. The overflow flag here counts as 1. It is cleared when the overflow flag is greater than 9. The calibration parameters are mainly used for current calibration and restoring

factory settings.

Cumulative clearing function: Long press the middle button on the main interface for more than 5 seconds to clear the cumulative flow.

Table 1 User parameter setting menu The default password of the user menu is 0000.

Submenu serial number	Menu display	meaning	Selection or value range
1	Language	Chinese and English switch	Switch between Chinese and English display
2	Algorithm	Algorithm selection (Default 0)	00: Conventional volume flow 01: Conventional mass flow
3	Unit	Flow unit selection (Default 0)	0: m ³ /h 1: l/m 2: kg/h 3: l/h 4: t/h 5: kg/m 6: m ³ /m
4	F min HZ	Lower limit for segment calibration	The default is 0. Note that the segment value here is set to frequency.
5	F min HZ	Upper limit value for segmented calibration	The default is 0, the upper limit calibration has 3 values, For example, the lower calibration limit is 0, the upper calibration limit 0 is set to 50, and the upper calibration limit 1 is set to 100. If the flow coefficient 0 is set to 3600 and the upper flow limit 1 is set to 1800, the frequency is 0-50HZ and the 3600 coefficient is used for calculation, and 50-100HZ is calculated using the 1800 coefficient.。
6	Flow Coefficient	Flow coefficient (default 3600)	Set the meter coefficient, the unit is P / m ³ , and the meter coefficient can be set to 4 corresponding segment calibrations.
7	Full Flow	Full-scale output flow (Default 1000)	When the instrument outputs a 4 ~ 20mA analog signal, this value must be set and must not be 0

8	Density	Density settings (Default 1000)	When the algorithm selection is set to mass flow, this item must be set, the unit is kg / m3
9	Lower cut	Cut-off frequency	When the lower limit cutoff 0 is set, cut off the frequency value less than this value, and when the lower limit frequency 1 and 2 are set, cut off the value between the two values.
10	password	set password	The default is 0. The user can set a four-digit password arbitrarily. When forgetting the password, enter 1111 as the universal password.
11	Backlight	Backlight switch	This item is a backlight switch, set to 0 is off, when set to 1, the backlight is turned on, the default is on, when opened, the LCD logo will appear in the upper left corner of the main interface, customers can switch according to demand.
12	Caliber	Caliber setting	The setting here is based on the actual caliber. If it is 0, the flow rate on the main interface is displayed as 0. If the flow rate is required, the corresponding caliber must be set here.

Table 2 Corresponding menu of the production verification menu table 3 The verification menu password is 4321.

Submenu serial number	Menu display	meaning	remark
1	4mA Calibration	4mA Current calibration	All calibrations must ensure that the value is 4.000 calibrations. For example, the current meter displays 3.9956, enter 3.9956 here, it is recommended not to change the settings here and 20MA, because the instrument is equipped with a 16-bit

			high-precision DA conversion chip compared to other instruments , Higher than the general multimeter accuracy, can guarantee the accuracy within 1.5 thousandths.
2	20mA Calibration	20mA Current calibration	Same as above, except that the menu must be calibrated when the value is 20.000.
3	RESET	Here is the factory calibration setting	It is forbidden to reset the parameters, which will affect the operation and measurement accuracy of the instrument

VI、 Repairs and common faults

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.

Serial number	Fault phenomenon	Cause	Elimination method
1	The display instrument has no display for flow signal and check signal.	The power supply is not connected, and the given voltage is wrong. 2.The display instrument is out of order	1. Switch on the power and set the voltage as required. 2. Maintenance of display instruments.

2	The display meter shows the check signal but not the flow signal	<ol style="list-style-type: none"> 1. The indirect line of the sensor and display instrument is wrong, or there are open circuit, short circuit, poor contact and other faults 2. The amplifier is faulty or damaged. 3. Converter (coil) open or short circuit. 4. The impeller is stuck <p>No fluid flow or blockage in the pipe.</p>	<p>Check the correctness and quality of wiring according to attached figure 4.</p> <ol style="list-style-type: none"> 2. Repair or replace the amplifier. 3. Repair or replace coils. 4. Clean sensor and piping <p>Open valve or pump and clean pipe</p>
3	The display instrument works unsteadily; Incorrect measurement.	<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.

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 : ① A copy of the operation manual ② 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.