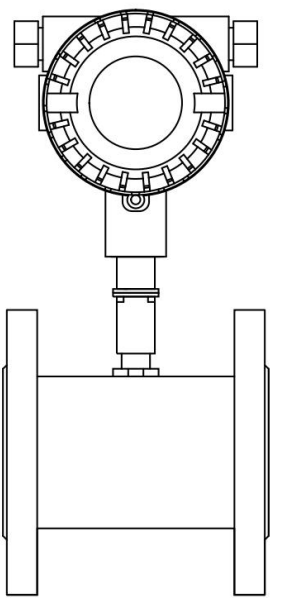
# Liquid turbine flowmeter



**Installation manual**

2021-8 B

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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 $5x10^{-6}m^2/s$ at the operating temperature. For liquids with a viscosity greater than $5x10^{-6}m^2/s$, 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、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)[m3/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 | Flow range （m3/h） | Accuracy | Explanation |
|---|---|---|---|
| DN4 | 0.04-0.25$m^3$/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 | 0.1-0.6$m^3$/h | | |
| DN10 | 0.2-1.2$m^3$/h | | |
| DN12 | 0.2-2$m^3$/h | 0.5 Level | |
| DN15 | 0.6-6$m^3$/h | | |
| DN20 | 0.7-7$m^3$/h | | |
| DN25 | 1-10$m^3$/h | | |
| DN32 | 1.5-15$m^3$/h | | |
| DN40 | 2-20$m^3$/h | | |
| DN50 | 4-40$m^3$/h | | |
| DN65 | 7-70$m^3$/h | | |
| DN80 | 10-100$m^3$/h | | |
| DN100 | 20-200$m^3$/h | | |

| | | | |
|---|---|---|---|
| DN125 | 25-250$m^3$/h | 1.0 Level | |
| DN150 | 30-300$m^3$/h | | |
| DN200 | 80-800$m^3$/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℃.

**Environment temperature**：-20～+65℃.

**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

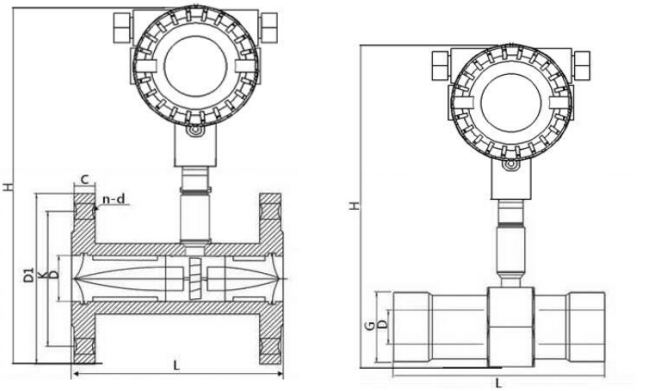



Figure 1 Schematic diagram of LWYB/C/D flowmeter structure

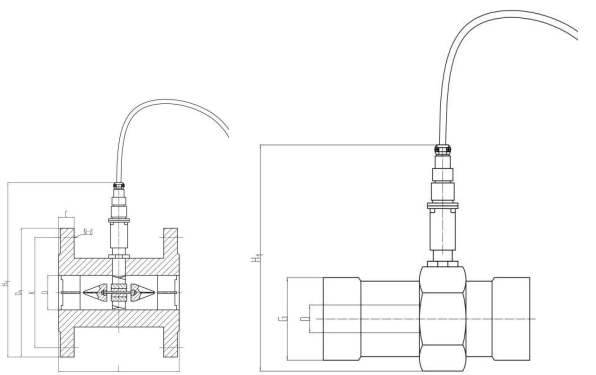


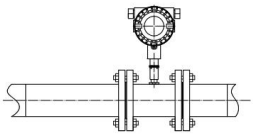
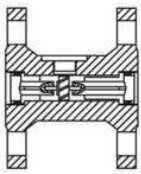
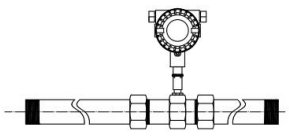
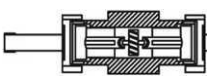
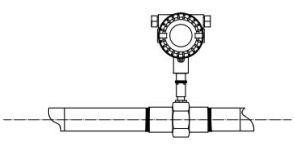
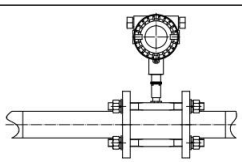
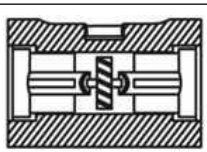
Figure 2 Schematic diagram of LWGY sensor structure

| Nominal diameter | 1.6MPa | Flange connection | | | | Body Length L | Threaded connection British Standard G |
|---|---|---|---|---|---|---|---|
| (mm) | Flange outer diameter D1 | 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. Pulse type (LWGY)

The pulse type does not have a meter head, and the signal line is directly drawn on the turbine flowmeter body. Each signal line is marked with a lead function. After distinguishing the lead function, connect it to the equipment, totalizer, PLC and other devices according to the following rules.

V+ ---- The power supply is positive (DC12-24V, 12V is recommended).

GND ---- Power negative and signal negative (common ground).

Fout ---- Pulse signal line (connected to the device signal counter interface).

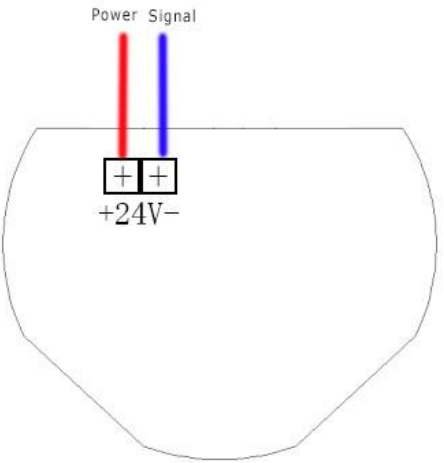
The other is a ground wire.

### 2. Battery powered type (LWYB)

The battery is powered by the built-in battery, and it is equipped with an ABB meter. When using it, you only need to keep the battery cable at the back of the meter connected.

### 3. 4-20mA type (LWYC)

The 4-20mA model is equipped with ABB meter head, and the meter wiring is a two-wire 4-20mA.



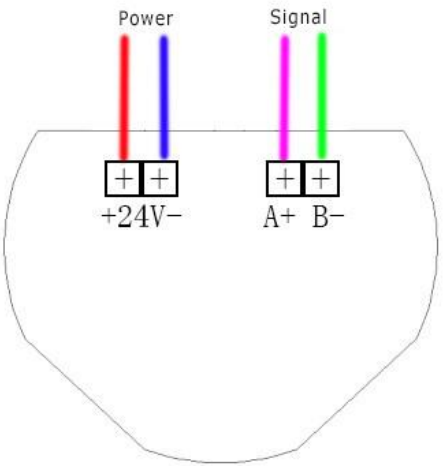

As shown in FIG:

+24V---is to connect to the power supply (DC24V).

-24V---for the negative power supply (only for power supply) or 4-20mA signal receiving end.

## 4. RS485 communication type (LWYD)

The RS485 communication type is equipped with ABB meter head, which requires the use of four interfaces for power supply and output.




As shown in FIG:

+24V---for the positive power supply (DC24V)

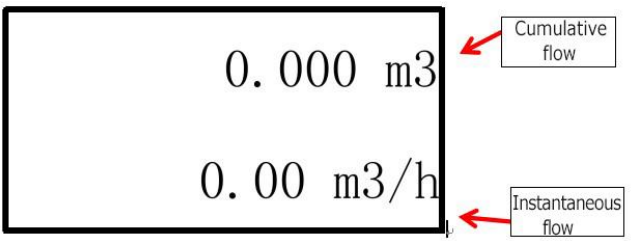
-24V---for the negative power supply (DC24V)

A+ --- Connect the positive side of the serial port

B- --- Connect the negative of the serial port

## Ⅴ、Display and basic operation

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




The instrument has two built-in buttons. Here, the left button and the right button are distinguished.

**Generally, the two buttons can be divided into four functions according to the time of pressing:**

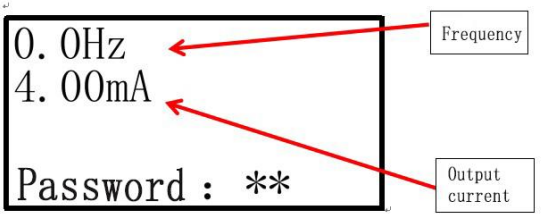
1.）Short press the left button: generally modify the value, turn the page in order

2.）Long press the left button for 3 seconds: Generally used to abandon modification or exit

3.）Short press the right button: Generally used to shift and reverse pages

4.）Long press the right button for 3 seconds: Generally used to confirm.

Press any button in the above interface to switch to the auxiliary interface, as follows




Remarks: The output current is only valid for 4-20mA type.

In the auxiliary interface, long press the right button for 3 seconds and the password will change to 00. Generally, the password will be set to 22. After the setting is completed, press the right button again for 3 seconds to confirm and enter the parameter interface.

Usually, the instrument parameters are set at the factory, so they can be used directly.

**If you need to modify some parameters, you can refer to the following table:**

| Submenu number | Menu display | significance | A selection or range of values |
|---|---|---|---|
| 1 | Q- unit | Flow unit selection | m3/h<br>m3/m<br>l/h<br>l/m<br>t/h<br>t/m<br>kg/h<br>kg/m |
| 2 | Clear Q | Zero clearing accumulative amount | To clear the zero accumulator, select YES and press the "E" key |
| 3 | Damp (2-32)[S] | 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 |
| 4 | Q Cut-Zero [0-50]% 0.000 | Set the default cut pulse input percentage | Values range from 0 to 50 |

| | | | |
|---|---|---|---|
| | | (2%) | |
| 5 | Q-20mA $m^3/h$ | Full output flow（default1000） | 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 |
| 6 | Density [kg/m3] | Density is set（default 1000.000） | When the algorithm is set to mass flow (01, 03), this must be set in kg/m3 |
| 7 | Q-Factor [P/m3] | Discharge coefficient（default 3600） | Set the instrument coefficient,unit is P/m3 |
| 8 | Q-Mode | Algorithm selection (default $Q_{vw}$ actual) | $Q_{vw}$ actual<br>$Q_{mw}$ actual |

## 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.<br>2.The display instrument is out of order | 1. Switch on the power and set the voltage as required.<br>2. Maintenance of display instruments. |
| 2 | The display meter shows the check signal but not the flow signal | 1. The indirect line of the sensor and display instrument is wrong, or there are open circuit, short circuit, poor contact and other faults<br>2. The amplifier is faulty or | Check the correctness and quality of wiring according to attached figure 4.<br>2. Repair or replace the amplifier.。<br>3. Repair or replace coils. |

| | | | |
|---|---|---|---|
| | | damaged.<br>3.Converter (coil) open or short circuit.<br>4. The impeller is stuck<br>No fluid flow or blockage in the pipe. | 4. Clean sensor and piping<br>Open valve or pump and clean pipe |
| 3 | The display instrument works unsteadily; Incorrect measurement. | 1. The actual flow exceeds the measuring range of the meter or is unstable.<br>2.Instrument coefficient K is set incorrectly.<br>3. Fiber and other impurities are hung in the sensor<br>4. There are bubbles in the liquid.<br>5.There is strong electromagnetic | 1.The measured flow is adjusted to the measuring range of the sensor, and the flow is stabilized.<br>2. Make the coefficient K set correctly<br>3. Clean the sensor.<br>4.Take measures to eliminate air bubbles.<br>5. Stay away from |

| | | | |
|---|---|---|---|
| | | interference next to the sensor.。<br>6. Sensor bearings and shafts are severely worn.<br>7. The sensor cable shield or other grounding wires are disconnected or in poor contact with the ground wire of the line.<br>8.Display instrument failure. | interference sources or take shielding measures.<br>6. Replace "guide" or "leaf wheel shaft".<br>7. Connect the wires according to attached figure<br>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 ℃ ~ + 65 ℃ 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：①A copy of the operation manual②One 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.