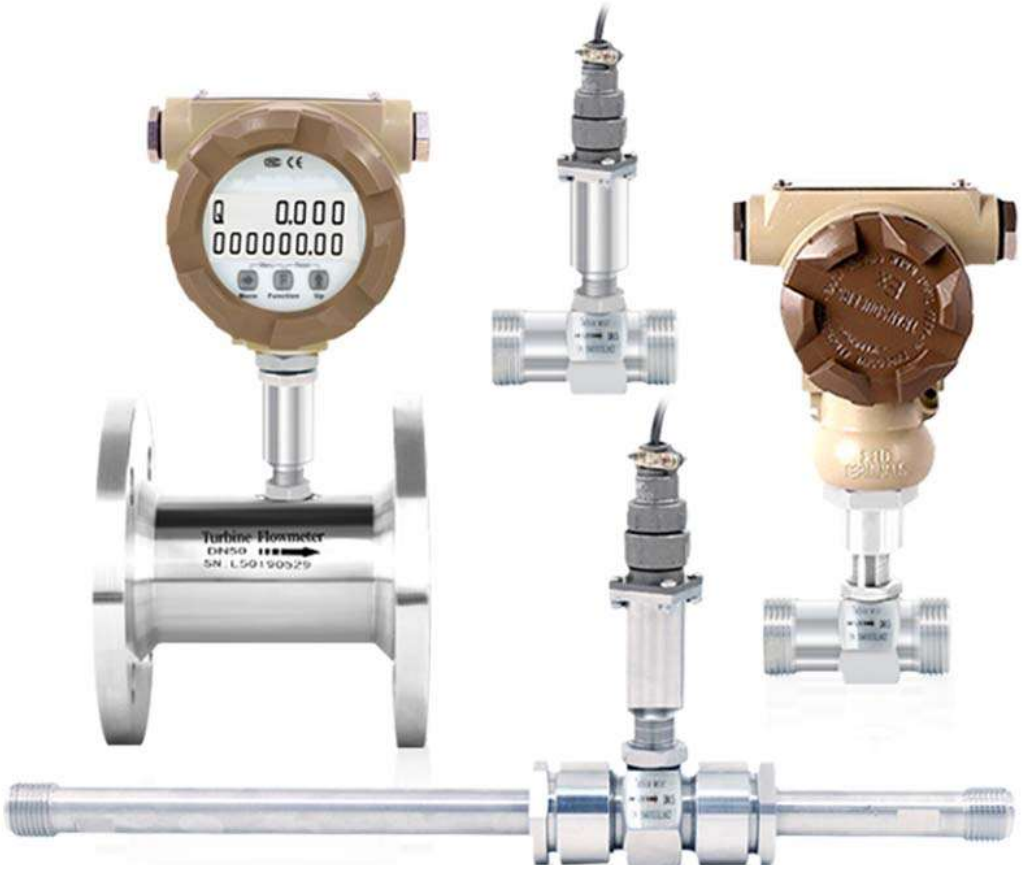
bd flow

flow, level, pressure, temperature



BD-LWGY SERIES TURBINE FLOWMETER

Contents

I. Overview

LWGY series turbine flow sensor (hereinafter referred to as the sensor) is based on the principle of torque balance and belongs to the velocity type flow meter. The sensor has a simple structure, lightweight, high accuracy, good reproducibility, responsive, easy to install and maintain the use of the characteristics, widely used in petroleum, chemical, metallurgical, water supply, paper and other industries, is the ideal instrument for flow measurement and energy saving.

The sensor is used in conjunction with the display instrument, and is suitable for measuring the liquid in closed pipes with stainless steel 1Cr18Ni9Ti, 2Cr13 and corundum Al2O3, hard alloy does not corrode, and there are no fibers, particles and other impurities. If matched with the display instrument with special functions, it can also carry out quantitative control, over quantity alarm, etc. The explosion-proof type of this product can be used in explosive environments.

The sensor is suitable for media with viscosity less than 5×10-6m2/s at working temperature. For liquids with viscosity greater than 5×10-6m2/s, the sensor should be calibrated with real liquid and then used.

If the user needs to use special forms of sensors, can negotiate the order, need explosion-proof sensors, in the order to specify.

Ⅱ. LWGY basic turbine flow sensor

2.1 Structural features and working principle

(1) Structural characteristics

The sensor is a carbide bearing thrust type, which not only ensures accuracy and improved wear resistance, but also has a simple and solid structure as well as easy disassembly and installation.

(2) Working principle

Fluid flow through the sensor shell, due to the impeller blade and the flow direction has a certain angle, the impulse of the fluid so that the blade has a rotating torque, after overcoming the friction torque and fluid resistance blade rotation, in the torque balance speed stability, in certain conditions, speed and flow speed is proportional, because the blade has magnetic conductivity, it is in the signal detector (by permanent magnet and coil composition) of the magnetic field, the rotating blade cutting The magnetic force line, periodically changing the magnetic flux of the coil, so that both ends of the coil induction out of the electrical pulse signal, this signal through the amplifier amplification and shaping, forming a certain amplitude of continuous rectangular pulse wave, can be transmitted to the display meter, showing the instantaneous flow or total amount of fluid. In 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

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

Eq.

f - pulse frequency [Hz]

k - instrumentation factor of the sensor [1/m3], given by the calibration sheet. If [1/L] is used as the unit

Q - instantaneous flow rate of the fluid (in working condition) [m3/h]

3600 - Conversion factor

The instrumentation coefficient of each sensor is filled in the calibration certificate by the manufacturer, and the k-value is set into the matching display instrument, which can display the instantaneous flow and cumulative total.

2.2 Basic parameters and technical performance

(1) Basic parameters

	LWGY	□□□□□	□	□	□	Description
Class Type	LWGY					Basic type, +5-24DCV supply.
	LWGB					4~20mA two-wire current output, remote transmission and transfer type
	LWY					Battery-powered field display type
	LWYC					Field display/4~20mA 2-wire current output
Nominal diameter		4				4mm, common turbine flow range 0.04~0.25m^3 /h
		6				6mm, common turbine flow range 0.1~0.6m^3 /h
		10				10mm, common turbine flow range 0.2~1.2m^3 /h
		15				15mm, common turbine flow range 0.6~6m^3 /h Wide range turbine for 0.4~8m^3 /h
		20				20mm, common turbine flow range 0.7-7.m^3 /h
		25				25mm, common turbine flow range 1~10m^3 /h
		32				32mm, common turbine flow range 1.5~15m^3 /h
		40				40mm, common turbine flow range 2~20m^3 /h
		50				50mm, common turbine flow range 4~40m^3 /h
		65				65mm, common turbine flow range 7~70m^3 /
		80				80mm, common turbine flow range 10~100m^3 /h
		100				100mm, common turbine flow range 20~200m^3 /h
		125				125mm, common turbine flow range 25~250m^3 /h
		150				150mm, common turbine flow range 30~300m^3 /h
		200				200mm, common turbine flow range 80~800m^3 /h
Explosion-proof						No mark, non-explosion-proof type
			B			Explosion-proof type
Accuracy grade				A		Accuracy 0.5 grade
				B		Accuracy level 1
Turbine type					A	Wide range turbine
					B	General turbine

Note: DN4-DN40 caliber sensor is threaded connection, the maximum working pressure is 6.3Mpa;

DN50-DN200 caliber sensors are flange-connected, with a maximum working pressure of 2.5Mpa;

DN4-DN10 caliber sensors with front and rear straight pipe sections and filters.

We can match the front and rear straight pipe sections for DN15 or above caliber sensors.

(2) Medium temperature: -20 ~ +120℃

(3) Ambient temperature: -20 ~ +55℃

(4) Power supply: voltage: 12V±10%, current: ≤10mA

(5) output voltage amplitude: high level ≥ 8V, low level ≤ 0.8V

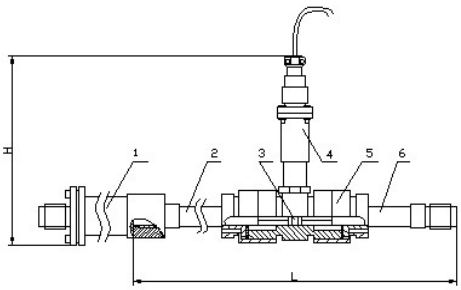
(6) Transmission distance: the distance from the sensor to the display instrument can reach 1000m

2.3 Installation, use and adjustment

(1) Installation

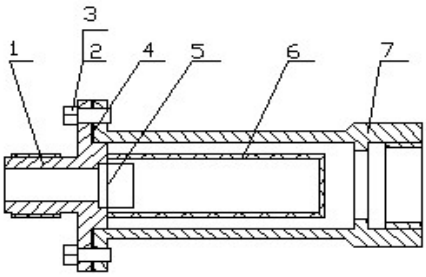
The sensor is mounted with thread or flange connection according to the specifications. The mounting method is shown in Figure 1, Figure 2 and Figure 3, and the mounting dimensions are shown in Table 2.

Whole table structure diagram.



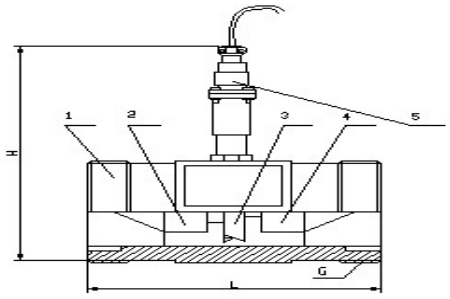
1. Filter
2. Front straight pipe section
3. Impeller
4. Preamplifier
5. Shell
6. Rear straight pipe section

Filter construction diagram.



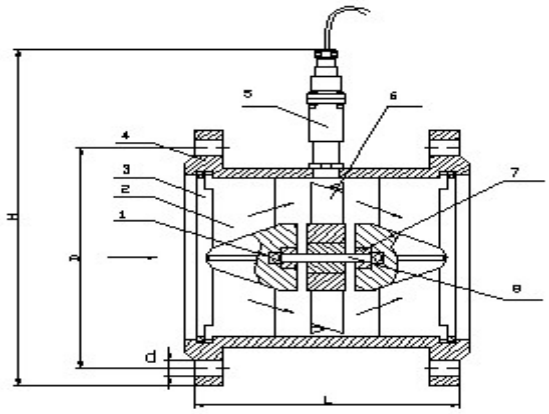
1. Pressing ring
2. Bolt 4×14
3. Washers
4. Sealing gasket
5. Steel wire 1Cr18Ni9Ti-0.8×2.5
6. Filter
7. Seat

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



1. Shell
2. Front guide parts
3. Impeller
4. Rear guide parts
5. Preamplifier

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



1. Ball bearing
2. Front guide parts
3. Rise circle
4. Shell
5. Preamplifier
6. Impeller
7. Bearing
8. Shaft

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

	Nominal diameter	L(mm)	H(mm)	G	L´(mm)	D(mm)	d(mm)	Number of holes
LWGY-4	4	275	145	G1/2	215			
LWGY-6	6	275	145	G1/2	215			
LWGY-10	10	350	165	G1/2	350			
LWGY-15	15	75	173	G1				
LWGY-20	20	85	173	G1				
LWGY-25	25	100	180	G5/4				
LWGY-32	32	140	175	G11/2				
LWGY-40	40	140	178	G2				
LWGY-50	50	150	252			Φ125	Φ18	4
LWGY-65	65	180				Φ145	Φ18	4
LWGY-80	80	200	287			Φ160	Φ18	8
LWGY-100	100	220	322			Φ190	Φ22	8
LWGY-125	125	260				Φ220	Φ26	8
LWGY-150	150	300	367			Φ250	Φ26	8
LWGY-200	200	360	415			Φ310	Φ26	12

The sensor can be installed horizontally and vertically, and the fluid direction must be upward when installed vertically. The liquid should be filled with piping and there should be no air bubbles. When installed, the liquid flow direction should be consistent with the direction of the arrow indicating the flow direction on the sensor housing. The upstream end of the sensor should be at least 20 times the length of the nominal diameter of the straight pipe section, the downstream end should be no less than 5 times the nominal diameter of the straight pipe section, the inner wall should be smooth and clean, no dents, scale and skin defects. The axis of the sensor pipe should be aligned with the axis of the adjacent pipe, the gasket used to connect the seal shall not be deep into the inner cavity of the pipe.

The sensor should be far away from 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 delivery of liquid during maintenance, it is recommended to install a bypass pipe at the installation of the sensor.

When the sensor is installed in the open air, please make the amplifier and plug waterproof. The wiring of the sensor and the display instrument is shown in Figure 4.

When the fluid contains impurities, should be installed with a filter, filter mesh according to the flow of impurities, generally 20 ~ 60 mesh. When the fluid is mixed with free gas, should be installed with a gas eliminator. The whole piping system should be well sealed.

The user should fully understand the corrosion of the measured medium and prevent the sensor from corrosion.

(2) Use and adjustment

- When using, the liquid to be measured should be kept clean and free of impurities such as fibers and particles.
- When the sensor starts to use, it should be filled with liquid slowly before opening the outlet valve, and it is strictly forbidden to subject the sensor to the impact of high-speed fluid when it is in the state of no liquid.
- The maintenance interval for the sensor is generally six months. Please be careful not to damage the parts inside the measuring chamber, especially the impeller, during maintenance and cleaning. When assembling, please pay

attention to the position of the guide and impeller.

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

● The filter should be cleaned regularly when it is used, and when it is not used, the internal liquid should be cleaned, and like the sensor, the dust cover should be added and kept in a dry place.

●Transmission cable of the sensor can be laid overhead or buried (iron pipe should be set when buried.)

Before installing the sensor, connect it to the display meter or oscilloscope, turn on the power, blow by mouth or dial the impeller by hand to make it rotate quickly to observe whether there is a display, and then install the sensor when there is a display. If there is no display, check the relevant parts to eliminate the fault.

Ⅲ. LWGB type turbine flow transmitter

LWGB type turbine flow sensor is based on the LWGY basic turbine flow sensor with 24VDC power supply and 4-20mA two-wire current transmission function, especially suitable for use with computer control system such as display instrument, industrial control machine and DCS.

Please read the second part of this manual "LWGY Basic Turbine Flow Sensor" for the flow measurement range, sensor structure size, installation method, maintenance, etc. for each caliber of this transmitter.

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

Where: Q - actual flow rate, m3/h

Q_F - flow measurement upper limit, m3/h

I - current output, mA

Transmitter power supply voltage: 24V, (12V-30V)

Supply voltage versus load resistance. $R_{LMAX} = \frac{U-12}{0.02} - 50$

Where: R_{LMAX} - maximum load resistance, Ω

U - supply voltage, V

Transmitter wiring: red line --- 24V + black (green) line --- 0V

Ⅳ. LWY type turbine flowmeter

LWY type field display turbine sensor is based on the LWGY basic type turbine flow sensor, using battery power, adding a field display function. The flowmeter is the use of advanced ultra-low-power single-chip microcomputer technology developed by the sensor and display calculation integration of new flow measurement instrument. Compared with the traditional turbine flow sensor with secondary instrumentation composed of measurement system, it has a small size, light weight, display readings intuitive, clear, high reliability, not affected by external power supply, lightning resistance, low set cost and other obvious advantages. It can be widely used in petroleum, chemical, light industry, food and other industries for liquid flow measurement. This product has superior performance and has reached the advanced level of international similar products.

This flowmeter each caliber flow measurement range, sensor structure size, installation methods, maintenance and other content please read the second part of this manual LWGY basic turbine flow sensor.

4.1 Main technical specifications

(1) Display mode.

Double-row LCD display in the following manner.

L XXX.X Four-digit instantaneous flow rate (m3/h)

XX.XXXXXXX Eight-digit cumulative flow rate (m3)

(2) The system works with low power consumption: a 3.3V10AH lithium battery can be used continuously for more than 5 years.

(3) Accumulated flow rate: automatically expand the display accuracy, and the accumulated flow rate value can be cleared.

(4) Instrument factor: Field can be placed.

(5) Power-down protection: meter coefficients and cumulative flow values are kept for ten years without loss when power is dropped.

4.2 Three point coefficient double-row LCD display set number method (authorized engineer operation only): Open the front cover of the instrument, press the key and F key at the same time, the instrument enters the state of setting the number, at this time the first digit of the upper row shows 1, which means that the instrument coefficient of the first point can be set. The last four digits of the upper row can set the output pulse frequency value of the corresponding point, and the eight digits of the lower row can set the meter coefficient value of the point.

First the highest bit blinks, press the key, the bit is added 1 to the desired value, press the shift key, the blinking bit is shifted to the right, then use the key to select the value of the bit ..... When the blinking bit is shifted to the last bit, press the key to reset the parameter. The format of the meter coefficients is XXXXXXX.XX

Press the F key after checking for errors, you can enter the next point of instrument coefficient setting, setting method, format as above.

After setting the three point coefficient continue to press the F key, the meter enters the working state, the upper row displays four digits instantaneous flow rate, the lower row displays eight digits accumulated flow rate.

In the working state, press the F key to clear the total accumulated amount.

Note: The use of three-point instrumentation coefficients for non-linear correction of flow sensors requires the user to know exactly what the corresponding instrumentation coefficients are for different flow points (frequency points) of the sensor, i.e. F1 - K1, F2 - K2, F3 --K3.

V. LWGYC type turbine flowmeter

LWGYC turbine flow sensor is based on LWY turbine flow sensor with 24VDC power supply and 4-20mA two-wire current transmission function, especially suitable for use with computer control system such as display instrument, industrial control machine and DCS.

It has both live display and remote transmission functions.

The operation method of setting the meter coefficient refers to the instructions in the "IV. LWY turbine flow sensor" setting section, with the following differences.

Operation of the three-point coefficient double-row LCD display.

Open the front cover of the meter and press the F key and the key at the same time, the meter enters the setting state.

At this time, the first number in the top row is 1, the remaining four positions are entered into the sensor frequency value at this point, and the lower row can be set into the instrumentation coefficient at this point, and the instrumentation coefficient format is XXXXXXX.XX.

First the highest bit blinks, press the key, the bit is added 1 to the desired value, press the shift key, the blinking bit is shifted to the right, then use the key to select the value of the bit ....., when the blinking bit is shifted to the last bit, press the key, the parameter can be reset.

Press the F key after checking for errors to enter the next set of coefficients, with the first one in the upper row showing 2 and the rest as above.

Press the F key after checking for errors to enter the next set of coefficients, with the first one in the upper row showing 3 and the rest as above.

If you continue to press the F key, the meter sets the fourth parameter - full flow rate. At this time, the lower row is set to 20mA corresponding to the full flow value, for example, 4mm meter corresponds to 250L/h, then it can be set to 250; if set to 50, then 50L/h automatically corresponds to 20mA.

After setting the parameters and checking for accuracy, press the F key at the same time to return to the working state. The upper row displays four digits of instantaneous flow and the lower row displays eight digits of accumulated flow.

In the working state, press the F key to clear the total accumulated amount.

The instrument has been adjusted before leaving the factory and generally does not need to be adjusted again.

If, under normal conditions of use, the output telecurrent is indeed found to be super poor at some points compared to the theoretical value, adjust the adjustable resistor on the circuit board as follows: open the front case of the instrument, take out the circuit board, and there are two adjustable resistors on the bottom layer of the circuit board, of which adjust W3 (202) can be adjusted for 4mA, and adjust W4 (502) can be adjusted for 20mA, note that when adjusting, do not Adjustment amplitude is too large. Adjusted after the original installation.

Ⅵ. Maintenance and common failures

The general faults that may arise from the sensor and the method of elimination are shown in Table III, and the maintenance cycle should not exceed six months.

If the user complies with the provisions of the manual for storage and use, the manufacturer can repair the sensor free of charge within one year from the date of delivery by the manufacturer if the sensor does not work properly due to poor manufacturing.

Serial number	Failure phenomenon	Reason	Elimination method
1	The display does not show the flow signal or the test signal	1. The power is not on and the given voltage is not correct. 2. The display is faulty.	1. Turn on the power and give the voltage as required. 2. Check and repair the display meter.
2	The meter displays the "calibration" signal but not the flow signal.	1. The sensor and the display instrument have a wrong line, or there is an open circuit, short circuit, poor contact and other faults 2. The amplifier is faulty or damaged. 3. Converter (coil) open circuit or short circuit. 4. The impeller is jammed. No fluid flow or blockage in the pipeline.	1. Check the correctness and quality of the wiring against Figure 4. 2. Repair or replace the amplifier. 3. Repair or replace the coil. 4. Cleaning of sensors and pipes. Open the valve or pump and clean the pipe.
3	The display meter is not working steadily; the measurement is not correct.	1. The actual flow rate is out of the meter's metering range or unstable. 2. The instrumentation factor K is incorrectly set. 3. Impurities such as fibers hanging inside the sensor. 4. The presence of air bubbles within the liquid. 5. Strong electromagnetic field interference next to the sensor. 6. Sensor bearings and shafts are severely worn. 7. Sensor cable shield or other grounding conductor is disconnected from the line ground or has poor contact. 8. Display meter failure.	1. Adapts the measured flow rate to the measurement range of the sensor and stabilizes the flow rate. 2. Make the coefficient K set correctly. 3. Clean the sensor. 4. Take degassing measures to eliminate air bubbles. 5. Try to stay away from the source of interference or take shielding measures. 6. Replace the "guide" or "impeller shaft". 7. Connect the wires according to the attached Figure IV. 8. Check and repair the display meter.

Ⅶ. Transportation & storage

The sensor should be packed into a strong wooden box (small-diameter meters can be used in cardboard boxes), do

not allow free movement in the box, careful and lightly placed when handling, do not allow brutal loading and unloading.

The storage location should meet the following conditions.

a. Rain and moisture-proof.

b. Not subject to mechanical vibration or shock.

c.Temperature range -20℃ ~ +55℃.

d. Relative humidity not more than 80%.

e. No corrosive gases in the environment.

Ⅷ. Unpacking notes

1. After opening the box, check whether the documents and accessories are complete according to the packing list. One instruction manual, one product certificate, one inspection certificate, one packing list.

2. Observe whether the sensor is damaged due to transportation and other phenomena, so as to properly handle.

Users are expected to keep the "Certificate of Calibration" properly and not to lose it, otherwise the instrument coefficient cannot be set!