

Turbine Flowmeter

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Preface

- Thank you for purchasing our product.
- This manual is about the various functions of the product, wiring methods, setting methods, operating methods, troubleshooting methods, etc.
- Please read this manual carefully before operation, use this product correctly to avoid unnecessary losses due to incorrect operation.
- After you finish reading, please keep it in a place where it can be easily accessed at any time for reference during operation.

Note

- The contents of this manual are subject to change without notice due to real-time factors such as function upgrades.
- We strive to ensure the accuracy of the manual. Nevertheless, if you identify any errors or inaccuracies, please contact us.
- Unauthorized reprinting or copying of this manual is strictly prohibited.

Version

U-LWGY-SUP-EN10

Confirm the contents of the package

Please confirm the product and accessories after unpacking. Once the product is wrong, the quantity is wrong or there is a problem in appearance, please contact our company.

Product List

No.	Item	Quantity
1	Turbine Flowmeter	1
2	Manual	1
3	Certificate	1

Precautions

Users are expected to keep the “Product Qualification Certificate” in a safe place and ensure it is not misplaced.

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Chapter 1 Overview

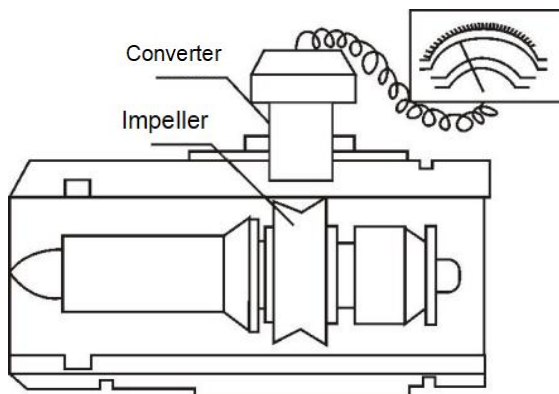
The LWGY turbine flowmeter is connected to the converter through the flow sensor, which can realize multiple functions such as pulse output, current output, and local display. The flowmeter has the characteristics of high accuracy, wide measuring range, long life, simple operation and maintenance, etc. It can be widely used in food, medicine, petrochemical, metallurgy, paper making and other industries. It is an ideal instrument for flow measurement.

The flowmeter is suitable for liquids that do not corrode stainless steel 304, 430F, corundum (Al_2O_3), cemented carbide, etc., and are free of impurities such as fibers and particles.

If the user needs a special type of flowmeter, it can be supplied by agreement.

Chapter 2 Working Principle

When the measured liquid flows through the flowmeter sensor, its internal impeller rotates with the help of liquid kinetic energy. At this time, the impeller blade causes the magnetic resistance in the detection device to change periodically. Therefore, an electric pulse signal proportional to the flow rate is induced at both ends of the detection coil, and is amplified by the preamplifier then sent to the display unit. The single chip microcomputer system in the display unit calculates according to the number of pulses measured and the meter coefficient K of the flowmeter, and displays the instantaneous flow rate and the accumulated total amount.



The relationship between the meter coefficient and instantaneous flow, frequency, pulse number, and cumulative total is:

$$K=f/Q \text{ and } K=N/V$$

In the formula:

f —flow signal frequency (Hz)

Q —instantaneous flow rate (m^3/s , or L/s)

N —pulse number

V —Total volume (m^3)

K —Meter coefficient($1/\text{m}^3$ or $1/\text{L}$)

Chapter 3 Main Technical Parameters

Table 1

Input		
Measured variables	flow	
Nominal diameter	DN4 ~ DN200	
Flow range	See Table 2	
Range ratio	DN4~DN10	1:6
	DN15~DN200	1:10
Output		
Transmitter output	Output type	(4~20)mA
	Output accuracy	0.02%
	Output load	(0~750) Ω
Pulse output	Pulse width	Automatic or 10ms
	Pulse frequency	(1~2000) Hz
	Pulse coefficient	1~20000 1/L
Communication output	RS485	Modbus protocol
Power supply		
Power supply	DC: 12V, 24V Battery power supply: 3.6V lithium battery	
Power consumption	12VDC power supply: maximum power consumption 0.15W 24VDC power supply: maximum power consumption 0.5 W Battery powered: Maximum current 0.8 mA	

Electrical interface	M20*1.5 cable gland
Performance parameters	
Accuracy	Level 0.5/1.0
Repeatability	1/3 of the accuracy grade
Response time	20ms (5s meter head without display)
Protection level	IP65 (IP67, IP68 available upon negotiation, pulse head is IP00)
Process conditions	
Medium viscosity	Less than $5 \times 10^{-6} \text{ m}^2/\text{s}$ (For liquids with a flow rate greater than $5 \times 10^{-6} \text{ m}^2/\text{s}$, the flowmeter must be calibrated with standard solution before use)
Medium temperature	Regular model: $(-20 \sim 80)^\circ\text{C}$ High temperature: $(-20 \sim 120)^\circ\text{C}$
Process pressure	See Table 2
Environmental conditions	
Operation	Temperature: $(-20 \sim 60)^\circ\text{C}$ RH: 5% to 90%
Storage	Temperature: $(5-40)^\circ\text{C}$

Table 2 Flow range

Diameter (mm)	Flow range (m^3/h)	Extended flow range (m^3/h)	Threaded connection pressure (MPa)	Flange connection pressure (MPa)	Clamp connection pressure (MPa)
4	0.04~0.24	—	6.3, 25, 32	—	
6	0.1~0.6	—			
10	0.2~1.2	—			
15	0.6~6	0.3~6	6.3, 32	—	1.6
20	0.8~8	0.4~8	6.3	—	—
25	1~10	0.5~10	6.3, 32	1.6, 2.5, 4.0	1.6
32	1.5~15	1~15	6.3	1.6, 2.5, 4.0	—
40	2~20	1~20	6.3	1.6, 2.5, 4.0	1.6
50	4~40	2~40	—	1.6, 2.5, 4.0	1.6
65	8~80	4~80		1.6, 2.5, 4.0	1.6
80	10~100	5~100		1.6, 2.5, 4.0	1.6
100	20~200	10~200		1.6, 2.5	1.6
150	30~300	15~300		1.6, 2.5	—
200	80~800	40~800		1.6	—

Chapter 4 Structure and Installation

4.1. Pulse type structure and size

The flowmeter structure is divided into thread, flange and clamp connection according to the different connection modes of the sensor part. The specific structure is shown in Figure 1 to Figure 5.

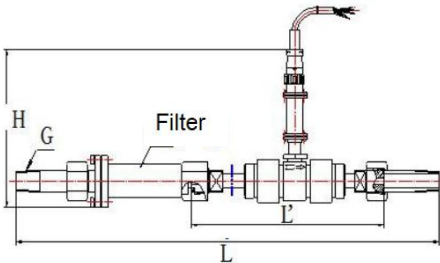


Fig.1 DN4~DN10 threaded connection flowmeter structure and installation dimensions

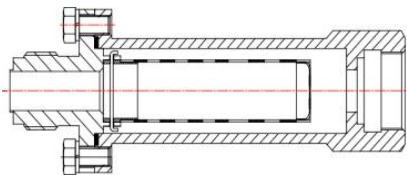


Fig.2 DN4~10 threaded connection turbine flowmeter filter

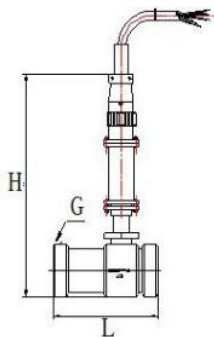


Fig.3 Threaded-connected flowmeter diagram

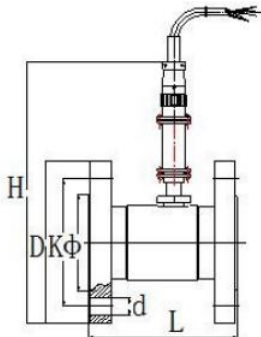


Fig.4 Flange-connected flowmeter diagram

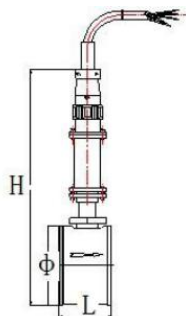


Fig.5 Clamp-connected flowmeter
diagram

Table 3 Dimensions of pulse turbine flowmeter

Diameter (mm)	Connect Type	L (mm)	H (mm)	G	L' (mm)	D (mm)	K (mm)	n -d (mm)
4	thread	4 25	140	R3/8	225			
	flange	225	168			Φ90	Φ60	4- Φ14
	clamp	225	149			Φ50.5		
6	thread	4 25	141	R3/8	225			
	flange	225	169			Φ90	Φ60	4- Φ14
	clamp	225	150			Φ50.5		
10	thread	5 45	142	R3/8	345			
	flange	345	17 3			Φ90	Φ60	4- Φ14
	clamp	345	151			Φ50.5		
15	thread	75	14 5	G1				
	flange	75	175			Φ95	Φ65	4- Φ14
	clamp	75	153			Φ50.5		
20	thread	85	149	G1				
	flange	85	183			Φ105	Φ75	4- Φ14
	clamp	85	155			Φ50.5		
25	thread	100	15 5	G1 1/4				
	flange	100	190			Φ115	Φ85	4- Φ14

Diameter (mm)	Connect Type	L (mm)	H (mm)	G	L' (mm)	D (mm)	K (mm)	n -d (mm)
	clamp	100	159			Φ50.5		
32	thread	120	162	G1 1/2				
	flange	120	206			Φ140	Φ100	4- Φ18
	clamp	120	163			Φ50.5		
40	thread	140	170	G2				
	flange	140	215			Φ150	Φ110	4- Φ18
	clamp	140	173			Φ64		
50	thread	150	184	G2 1/2				
	flange	150	227			Φ 165	Φ125	4- Φ18
	clamp	150	184			Φ77.5		
65	thread	175	201	G3				
	flange	175	245			Φ185	Φ145	8- Φ18
	clamp	175	198			Φ91		
80	thread	200	211	G3 1/2				
	flange	200	261			Φ200	Φ160	8- Φ18
	clamp	200	215			Φ106		
100	flange	220	280			Φ220	Φ180	8- Φ18
	clamp	220	230			Φ 119		
150	flange	300	337			Φ285	Φ240	8- Φ22
200	flange	360	391			Φ340	Φ295	12-Φ22

4.2. The dimension and structure of the Flowmeter with local display

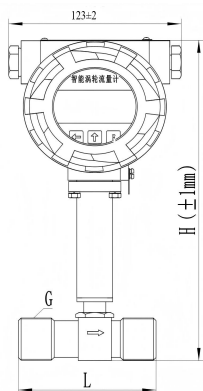


Fig.6 Threaded-connected flowmeter diagram

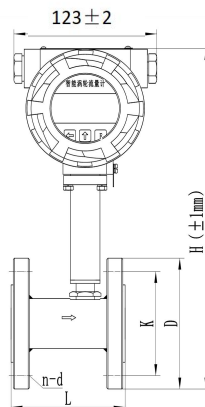


Fig.7 Flange-connected flowmeter diagram

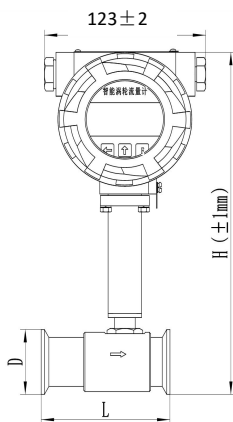


Fig.8 Clamp-connected flowmeter

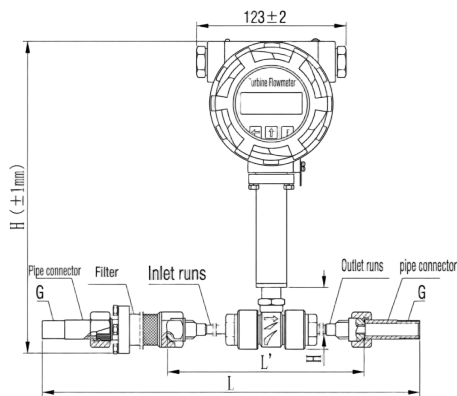


Fig.10 Diagram of DN4~DN10 threaded connection turbine flowmeter

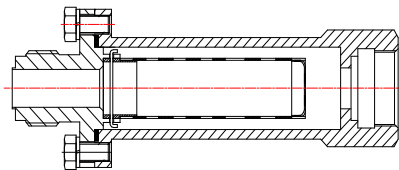


Fig.9 Diagram of DN4~ DN10 threaded connection flowmeter filter

Table 4 Dimensions of turbine flowmeter with display

Diameter (mm)	Connect Type	L (mm)	H (mm)	G	L' (mm)	D (mm)	K (mm)	n -d (mm)
4	thread	4 25	208	R3/8	225			
	flange	225	236			Φ90	Φ60	4- Φ14
	clamp	225	217			Φ50.5		
6	thread	4 25	209	R3/8	225			
	flange	225	237			Φ90	Φ60	4- Φ14
	clamp	225	218			Φ50.5		
10	thread	5 45	210	R3/8	345			
	flange	345	238			Φ90	Φ60	4- Φ14
	clamp	345	219			Φ50.5		
15	thread	75	214	G1				
	flange	75	243			Φ95	Φ65	4- Φ14
	clamp	75	221			Φ50.5		

Diameter (mm)	Connect Type	L (mm)	H (mm)	G	L' (mm)	D (mm)	K (mm)	n -d (mm)
20	thread	85	217	G1				
	flange	85	251			Φ105	Φ75	4- Φ14
	clamp	85	223			Φ50.5		
25	thread	100	222	G1 1/4				
	flange	100	258			Φ115	Φ85	4- Φ14
	clamp	100	226			Φ50.5		
32	thread	120	230	G1 1/2				
	flange	120	274			Φ140	Φ100	4- Φ18
	clamp	120	231			Φ50.5		
40	thread	140	238	G2				
	flange	140	283			Φ150	Φ110	4- Φ18
	clamp	140	241			Φ64		
50	thread	150	252	G2 1/2				
	flange	150	295			Φ 165	Φ125	4- Φ18
	clamp	150	251			Φ77.5		
65	thread	175	269	G3				
	flange	175	312			Φ185	Φ145	8- Φ18
	clamp	175	266			Φ91		
80	thread	200	279	G3 1/2				
	flange	200	329			Φ200	Φ160	8- Φ18
	clamp	200	282			Φ106		
100	flange	220	350			Φ220	Φ180	8- Φ18
	clamp	220	298			Φ 119		
150	flange	300	405			Φ285	Φ240	8- Φ22
200	flange	360	458			Φ340	Φ295	12- Φ22

4.3. Structure and size of the flowmeter without display

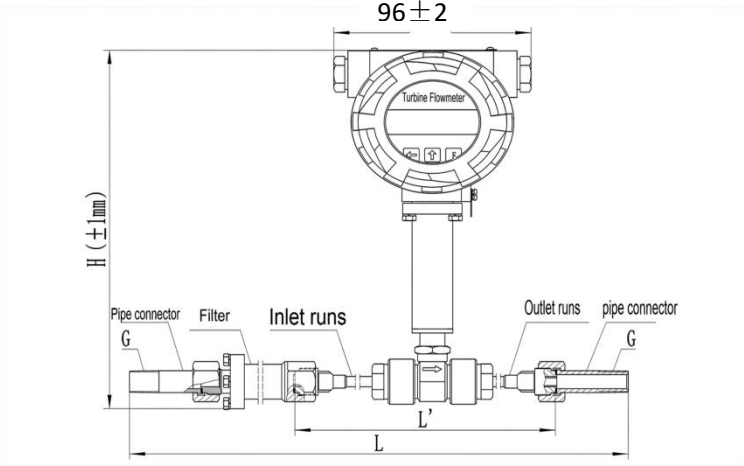


Fig. 11 Diagram of DN4~DN10 threaded connection turbine flowmeter

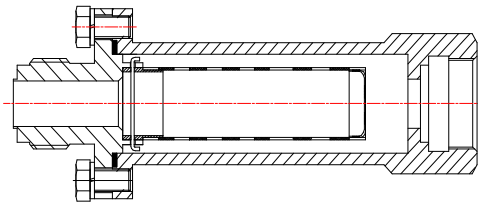


Fig. 12 Diagram of DN4~10 threaded connection turbine flowmeter filter

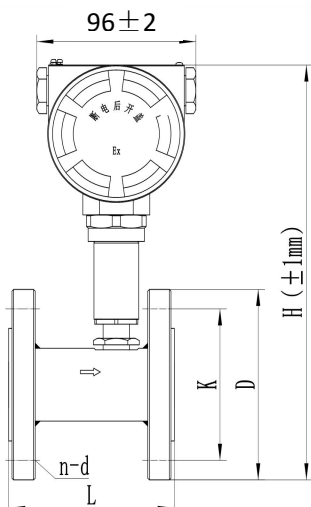


Fig. 13 Flange-connected flowmeter diagram

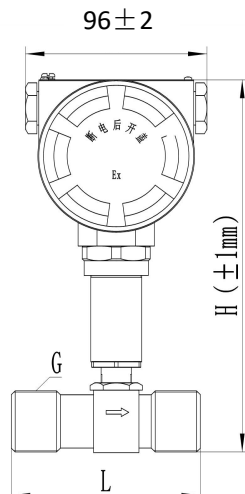


Fig. 14 Threaded-connected flowmeter diagram

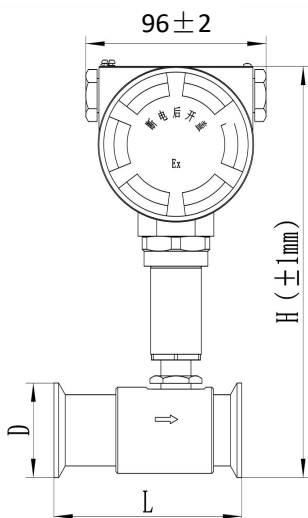


Figure 14 Diagram of clamp-connected turbine flowmeter

Table 5 Dimensions of turbine flowmeter without display

Diameter (mm)	Connect Type	L (mm)	H (mm)	G	L' (mm)	D (mm)	K (mm)	n -d (mm)
4	thread	425	203	R3/8	225			
	flange	225	231			Φ90	Φ60	4- Φ14
	clamp	225	212			Φ50.5		
6	thread	4 25	204	R3/8	225			
	flange	225	232			Φ90	Φ60	4- Φ14
	clamp	225	213			Φ50.5		
10	thread	5 45	205	R3/8	345			
	flange	345	233			Φ90	Φ60	4- Φ14
	clamp	345	21 2			Φ50.5		
15	thread	75	20 6	G1				
	flange	75	238			Φ95	Φ65	4- Φ14
	clamp	75	216			Φ50.5		
20	thread	85	21 0	G1				
	flange	85	24 4			Φ105	Φ75	4- Φ14
	clamp	85	218			Φ50.5		
25	thread	100	217	G1 1/4				
	flange	100	253			Φ115	Φ85	4- Φ14
	clamp	100	222			Φ50.5		
32	thread	120	225	G1 1/2				
	flange	120	269			Φ140	Φ100	4- Φ18
	clamp	120	2 25			Φ50.5		
40	thread	140	23 1	G2				
	flange	140	275			Φ150	Φ110	4- Φ18
	clamp	140	23 4			Φ64		
50	thread	150	244	G2 1/2				
	flange	150	290			Φ 165	Φ125	4- Φ18
	clamp	150	246			Φ77.5		
65	thread	175	264	G3				

Diameter (mm)	Connect Type	L (mm)	H (mm)	G	L' (mm)	D (mm)	K (mm)	n -d (mm)
	flange	175	3 07			Φ185	Φ145	8- Φ18
	clamp	175	2 60			Φ91		
80	thread	200	274	G3 1/2				
	flange	200	324			Φ200	Φ160	8- Φ18
	clamp	200	275			Φ106		
100	flange	220	340			Φ220	Φ180	8- Φ18
	clamp	220	293			Φ 119		
150	flange	300	398			Φ285	Φ240	8- Φ22
200	flange	360	450			Φ340	Φ295	12-Φ22

4.4. Process connection

Flange connection: GB/T9124.1-2019

Threaded connection: British G thread

Clamp connection: ISO 2852-1993

4.5. Material

Sensor and process connection: 304SS / 316LSS

Impeller: 430F stainless steel / Duplex steel 2205

Chapter 5 Installation

5.1. Installation Tips



Note!

Please inspect the packaging box for any damage or signs of rough handling. If there is any damage, report it to the delivery personnel, the manufacturer, or the instrument supplier.



Note!

Please check the packing list to make sure the items you received are complete.



Note!

Please inspect the nameplate on the instrument to confirm that the supplied items match your order. Verify that the power supply information on the nameplate is correct. If it is incorrect, contact the manufacturer or the instrument supplier.



Note!

The installation diagram is for reference only; Please refer to the actual product.

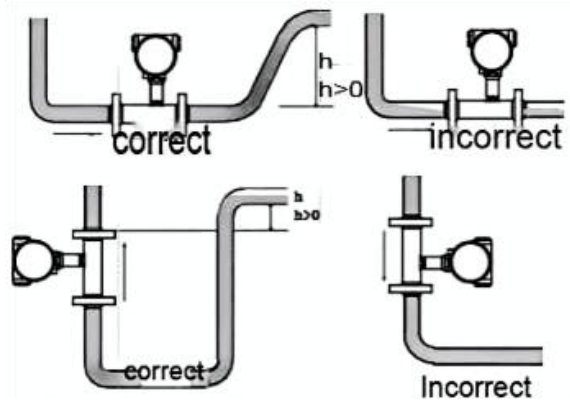
5.2. Storage

- (1) The instrument shall be stored in a dry and clean place.
- (2) Avoid exposure in direct sunlight for long.
- (3) Instrument shall be stored in the original package.

5.3. Installation Sites

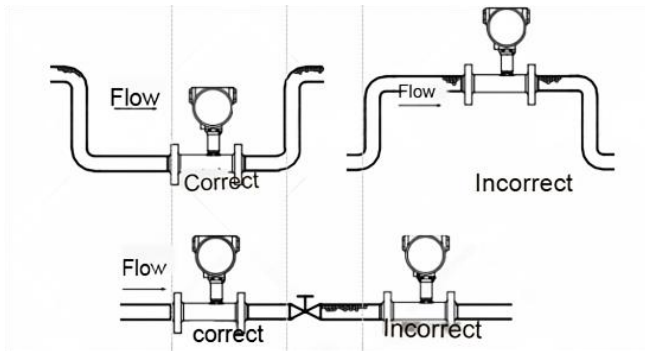
(1) Liquids shall always be filled with pipes.

Pipes shall be arranged to ensure that the electromagnetic flowmeter measuring tube is always filled with liquids.



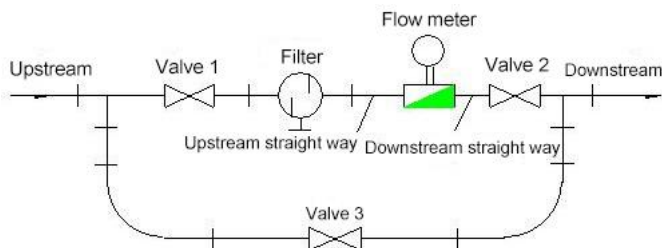
(2) No bubbles shall be observed in the pipes.

Pipes shall be designed to prevent the air bubbles in the fluids from accumulating the measurement pipe of a sensor. If a valve exists near the flowmeter, try to mount the flowmeter on the valve's upstream side for preventing a decrease of pressure inside the pipe possibly, consequently avoiding the possibility of air bubbles.



5.4. Installation Requirements

Typical installation of the turbine flowmeter.



Piping Installation Precautions

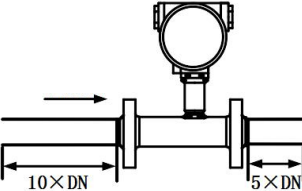
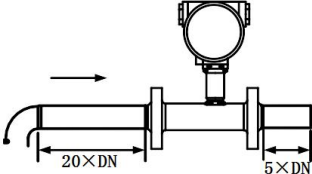
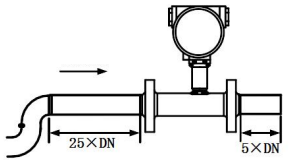
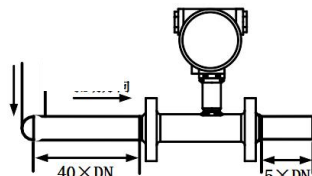
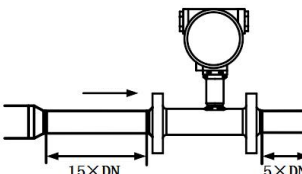
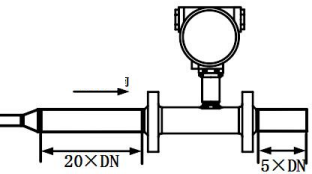
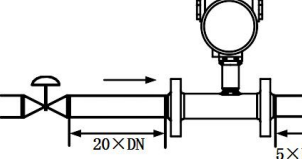
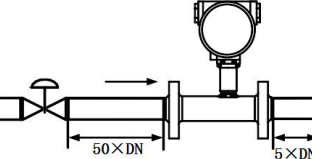
- (1) Install the sensor in a location that is easy to access for maintenance, away from pipeline vibration, strong electromagnetic interference, and heat radiation.
- (2) For horizontal installation, the pipeline should be level, with no visible tilt (generally within 5°). For vertical installation, the deviation from vertical should also be less than 5° . In systems where flow cannot be stopped, a bypass line with reliable shut-off valves should be installed (see diagram above). Ensure that the bypass is completely sealed during measurement.
- (3) When installing on newly laid pipelines, fit a short section of pipe in place of the sensor until pipeline flushing is completed and the interior is confirmed clean. Only then should the sensor be installed.
- (4) If the process fluid contains solids, install a strainer upstream of the sensor, and periodically remove accumulated sediment from the pipeline. If the liquid contains gas, fit an air eliminator upstream. Discharge outlets from the strainer and air eliminator should vent to a safe location.
- (5) When the sensor is installed outdoors, protect it from direct sunlight and rain exposure.
- (6) For explosion-proof flowmeters, never open the front or rear covers while powered in hazardous locations. After any cover is opened, ensure it is fully tightened during reassembly. Disassembly or reassembly of the instrument housing must only be carried out in a safe area.

5.5. The Length of Straight Runs

The turbine flowmeter is sensitive to distorted velocity profiles and swirl in the

pipeline. The flow entering the sensor should be fully developed turbulent flow. Therefore, depending on the type of upstream flow obstruction, an appropriate straight pipe section or flow straightener should be installed. The required straight pipe lengths for the inlet and outlet sections are shown in the table below.

Table 6 Common pipeline installation conditions

Inlet baffle type	Installation conditions		Inlet baffle type	Installation conditions	
	Inlet section	Outlet section		Inlet section	Outlet section
Standard			90 ° bend		
Two 90 ° bends on the same plane			Two 90 ° bends on different planes		
Pipe reducer			Pipe expander		
Fully open valve			Half-open valve		

5.6. Post-installation inspection

Table 7 Post-installation check

Inspection items	result
Is the instrument intact (visual inspection)?	☐
Does the flow meter comply with the technical specifications of the measuring point, such as medium temperature, process pressure, ambient temperature, nominal diameter?	☐
Have adequate protective measures been taken to protect the instrument from sun and rain?	☐
Are the set screws securely tightened using a suitable wrench?	☐

After installation, the instrument should not be left unused for long periods. If the instrument will not be used for an extended period, the following measures must be taken:

1. Check the sealing of the end cap and wiring ports to ensure that moisture and water do not penetrate the instrument.
2. Perform regular inspections. Check the conditions of the measures mentioned above at least once a year. If there is a possibility of water ingress (e.g., after heavy rainfall), the meter should be checked immediately.

Chapter 6 Flowmeter operation method

6.1. Turbine flow sensor

6.1.1. Main technical parameters

Power supply: +12V DC, +24V DC (maximum voltage +26VDC)

Output signal: pulse signal

6.1.2. Field connection method

The connection between the flowmeter and the display instrument can be selected according to the power supply of the instrument(Figure 14).

Warning: When wiring the instrument, it must be operated after power off.

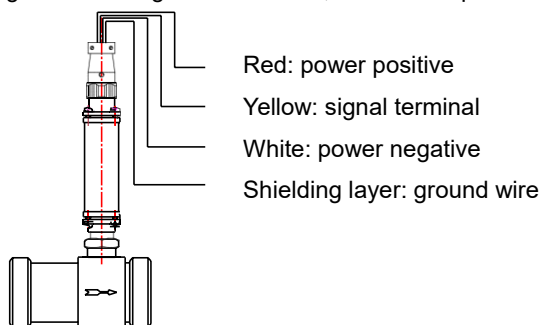


Figure 11 Wiring diagram of sensor and display instrument

6.1.3. Sensor supporting display instrument

Intelligent display instrument: It can display the cumulative quantity and instantaneous quantity, the display error is better than 0.2% FS, 8-segment broken line non-linear correction function, the alarm output can be set as the instantaneous upper and lower limit alarm or cumulative quantity preset output. Power failure record function can record the total power failure time. Number of power outages and power-on time. Output current: 4~20mA, 0~10mA; external power supply: 24V DC, 12V DC, optional RS485 communication interface. Dimensions: 160×80×125 or 80×160×125.

Display instrument: used for liquid quantitative filling or batching control, basic error 0.2%, 8-digit total and 6-digit batch display.

6.2. Turbine flowmeter with local display

6.2.1. Main technical parameters

Power supply: LWGY-1—3.6V lithium battery (19Ah built-in)

LWGY-2/3/4—+24V DC power supply

display content: instantaneous flow 6 digits, cumulative total 8 digits

Output mode: LWGY-1—pulse output (optional, need external power supply)

LWGY-2/3/4—4~20mA current output, pulse output (optional) ModBus

communication (optional), the output function cannot be used at the same time.

6.2.2. Display operation method

(1) Button function

① In the automatic measurement state, the Button function:

F key: enter the parameter setting state;

Up key: Cyclic display of turbine frequency, density, meter coefficient, unit code, instantaneous flow and Totalizer.

Left button: No function temporarily

② Key function in parameter setting state

Press the left button to display the menu items in a forward cycle;

Press the middle button to display the menu items in reverse cycle;

Press the right button to confirm and enter the parameter setting interface of the corresponding menu item, you can modify the parameters;

in the parameter setting interface:

Press the left button to shift or scroll;

press the middle button to scroll ;

Press the right button to confirm and save the corresponding parameters and exit the parameter setting interface.

(2) LCD screen

Double row segment LCD, no decimal point at the end of the upper and lower rows, use "_" instead of the decimal point.

Upper row: Q xxxxxx, 6-digit instantaneous flow, the unit is shown in Table 2;

Bottom row: xxxxxxxx, 8-digit cumulative total, the unit corresponds to the instantaneous flow.

(3) Parameter setting

Press the F key to enter the password input interface:

Enter the level 1 user password "00001111", and then press the F key to enter the user setting menu state, and the user can view and modify items 1-9.

Enter the level 2 administrator password "0000XXXX" (manufacturers used for debugging, not provided to customers), and then press the F key to enter the administrator setting menu status, and the user can view and modify items 1 to 27.

PS: The password error system returns to the running state;

In the setting state, first press the left button, and then press the middle button at the same time to return to the running state

Restore factory settings: Press the right button, enter the factory reset password "0000XXXX" (manufacturers used for debugging, not provided to customers), and then press the right button to confirm, you can restore the parameters to the factory data.

The Totalizer is cleared:

① Press the F key, enter the cumulative reset password "00005170"

(manufacturers used for debugging, not provided to customers), and then press the F key to confirm, the cumulative total can be cleared.

② Clear the reed pipe. (Optional for this function) The unit of accumulated pulse equivalent is L/P.

The bar code on the right side of the LCD simulates the instantaneous flow rate, and each bar represents 10% of the instantaneous flow rate.

Table 3 User setting menu

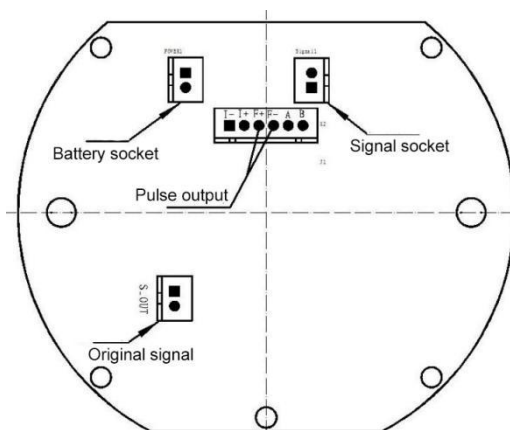
NO.	Setting parameters	Parameter symbol	Default	Description	Level
1	range	FH	100.000	Upper limit of flow	1
2	Small signal removal	FL	0.001	Lower limit of flow	1
3	Correction factor	Fn	1.000	Set to 1 when no correction is needed	1
4	unit	E	1	The units represented by 0-9 are: m3/s、 m3/h、 L/s、 L/h、 Kg/s、 Kg/h、 g/s、 g/h、 t/s、 t/h	1
5	density	dEn	1000.00	Density unit: Kg/m3	1
6	Slave address	Adr	01	00-99 (No 485 communication when battery powered)	1
7	Communication rate	bPs	1200	1200、2400、4800、9600 (No 485 communication when battery powered)	1
8	Output options	FO	0	0: No pulse output; 1: Cumulative pulse output (from artery width) 2: Accumulated pulse output (10ms pulse width) 3: Current output (invalid when powered by battery)	1
9	Cumulative pulse equivalent	Fdd	0.01	0.0001、0.001、0.01、0.1、1、2、5、10、100、1000、10000、100000 (unit: L/P)	1
10	Damping coefficient	dt	0.0000	The larger the value, the greater the damping, 0~60	1
11	Meter factor	U	100.000	Average calibration factor	2
12	Segment compensation enable	CP	0	0: No compensation 1: Compensation	2
13	Calibration frequency 1	Fr1	250.000	First frequency	2
14	Calibration frequency 1	U1	100.000	The coefficient corresponding to frequency Fr1	2
15	Calibration frequency 2	Fr2	500.000	Second frequency	2
NO.	Setting parameters	Parameter symbol	default	description	level
16	Calibration factor 2	U2	100.000	The coefficient corresponding to frequency Fr2	2
17	Calibration frequency 3	Fr3	750.000	Third frequency	2
18	Calibration factor 3	U3	100.000	The coefficient corresponding to frequency Fr3	2
19	Calibration factor 4	Fr4	1000.00	Fourth frequency	2
20	Calibration factor 4	U4	100.000	The coefficient corresponding to frequency Fr4	2

21	Calibration factor	5	Fr5	1250.00	Fifth frequency	2
22	Calibration factor	5	U5	100.000	The coefficient corresponding to frequency F5	2
23	Calibration factor	6	Fr6	1500.00	Sixth frequency	2
24	Calibration factor	6	U6	100.000	The coefficient corresponding to frequency F6	2
25	Calibration factor	7	Fr7	1750.00	Seventh frequency	2
26	Calibration factor	7	U7	100.000	The coefficient corresponding to frequency Fr7	2
27	Calibration factor	8	Fr8	2000.00	Eighth frequency	2
28	Calibration factor	8	U8	100.000	The coefficient corresponding to frequency Fr8	2

Note: Frequency points 1~8 are arranged in order from small to large. When the CP value is "0", items 13~28 are not displayed,

(4) Wiring instructions

LWGY-□□□□1 battery-powered turbine flowmeter



LWGY-□□□□2/3/4 Turbine flowmeter

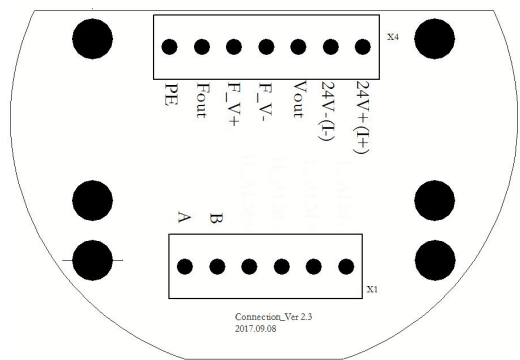
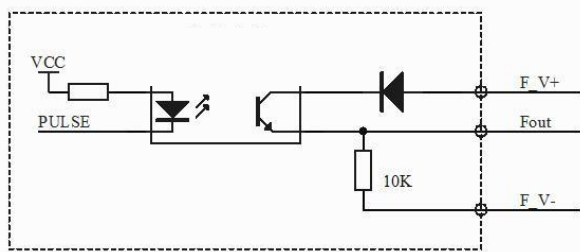


Figure 12.Schematic diagram of internal wiring

Table 4

24V+ (I+)	24V Power + (current +)
24V- (I-)	24V Power-(current -)
Vout	Voltage output+
F_V-	Pulse output power supply-
F_V+	Pulse output power supply+
Fout	Pulse output
FE	Ground
B	Modbus communication line B
A	Modbus communication line A

Pulse output wiring diagram:



When there is no sampling resistance inside the system, F_V+ is connected to the positive pole of the power supply, F_V- is connected to the negative pole of the power supply, and Fout is connected to the pulse signal;

When there is a sampling resistor inside the system, F_V+ is connected to the

positive pole of the power supply, Fout is connected to the pulse signal, and F_V- does not need to be connected.

note! The pulse signal power supply voltage range is DC5V~24V.

(5) Battery replacement

Accumulatively powered on for two years, unconditionally replace the battery. If the meter does not display or displays abnormally within the battery lifespan, and the measured battery voltage is lower than 2.8V, you should immediately cut off the power supply and replace the battery, otherwise the circuit unit in the meter will be damaged.

When replacing the battery, pay attention to the polarity of the battery to be consistent with the battery box label, and not reverse it. Each time the cover is opened and then assembled, the front and back covers of the instrument should be tightened.

6.3. Turbine flowmeter without display

6.3.1. Main technical parameters

Power supply: +24V DC

Output signal: 4~20mA current output

6.3.2. Usage

(1) The complete connection method of the flowmeter (see Figure 16).

(2) Schematic diagram of internal wiring (see Figure 17)

(3) Schematic diagram of fine adjustment of full-scale flow (see Figure 17)

Full scale fine-tuning button: press K1 and K2 at the same time, LED2 lights up to enter the adjustment mode and release the button, press K1 to increase the current, and press K2 to decrease the current. It will automatically exit the adjustment mode if there is no operation for 1 minute.

*Note: The current has been adjusted before the product is sold, please do not adjust it at will;

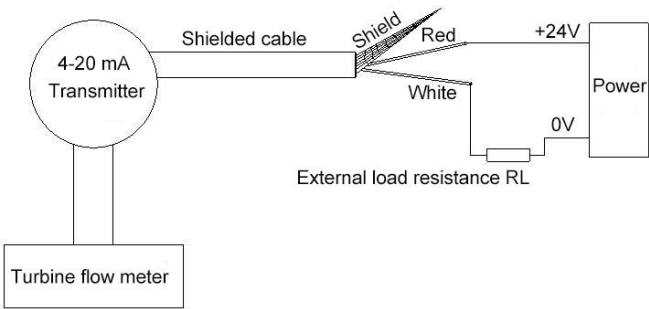
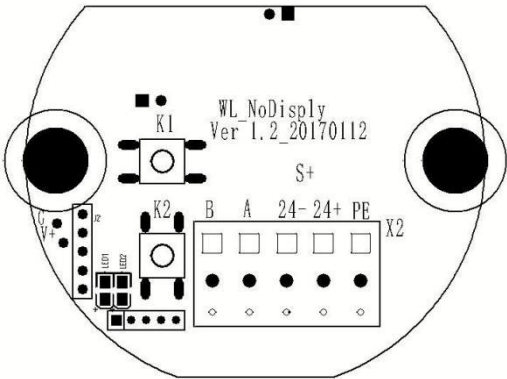


Figure 16 Schematic diagram of external wiring



PE	Ground
24+	24V power supply+
24-	24V power supply
A	485 Communication A
B	485 communication B

Figure 17 Schematic diagram of internal wiring diagram

Chapter 7 Maintenance and troubleshooting

7.1. Precautions when using

- (1) When using, keep the tested liquid clean and free of impurities such as fibers and particles.
- (2) Each time the flowmeter is used, valve 1 should be slowly opened (see Figure 11), and the pipe should be filled with liquid slowly, and then downstream valve 2 should be slowly opened. The impact of the fluid. Otherwise the sensor may be damaged!
- (3) It is recommended that the flowmeter maintenance cycle should not exceed half a year. Clean the impeller and the cavity parts of the sensor during maintenance and be careful not to damage it. Pay attention to the correct position of each part when assembling.
- (4) When the flowmeter is not in use, the liquid inside the sensor should be cleaned, and protective sleeves should be added to both ends of the sensor to prevent dust from entering, and stored in a dry place.
- (5) The configured filter should be cleaned and replaced regularly, and the internal liquid should be cleaned when not in use, with a dust cover, and stored in a dry place.
- (6) The transmission cable of the flowmeter can be laid overhead or buried (the iron pipe should be covered when buried). The cable length is 10m when the product leaves the factory.

7.2. Troubleshooting

Table 5 Common faults and solutions of flowmeters

Troubles	Possible causes	Solutions
No display on display instrument (Or no current signal)	1. The power is not connected or the fuse is blown 2. The display instrument is faulty 3. Battery failure	1. Turn on the power or replace the fuse 2. Overhaul the display instrument 3. Replace the battery
The display instrument has display on the calibration signal but no display on the flow signal (or the output current is incorrect)	1. The sensor and display instrument wiring is wrong 2. Amplifier failure 3. The converter (coil) is open or shorted 4. The impeller is stuck 5. No fluid flow or blockage in the pipeline	1. Check the correctness and quality of the wiring 2. Repair or replace the amplifier 3. Repair or replace the coil 4. Clean sensor and pipeline... 5. Open the valve or pump and clean the pipeline
Incorrect measurement or unstable display (or incorrect output current)	1. The actual flow exceeds the measuring range of the sensor 2. The meter coefficient K is set incorrectly 3. The sensor is entangled by fiber impurities 4. There are bubbles in the liquid 5. There is a strong electromagnetic field near the sensor 6. The sensor bearing and shaft are severely worn 7. The sensor cable shielding layer or other grounding wires are disconnected from the line grounding wire or have poor contact 8. Display instrument failure	1. Adjust the measured flow rate to match the measuring range of the sensor 2. Make the meter coefficient K set correctly 3. Clean the sensor parts 4. Take degassing measures to eliminate bubbles 5. Stay away from interference sources or take shielding measures 6. Replace the guide or impeller shaft 7. Check the wiring 8. Overhaul display instrument

Chapter 8 Warranty & After-sales Service

We promise to the customer that the hardware accessories provided during the supply of the instrument have no defects in material and manufacturing process. From the date of the purchase, if the user's notice of such defects is received during the warranty period, the company will unconditionally maintain or replace the defective products without charge, and all non customized products are guaranteed to be returned and replaced within 7 days.

Disclaimers:

- During the warranty period, product faults caused by the following reasons are not in the scope of Three Guarantees service
- Product faults caused by improper use by customers.
- Product faults caused by disassembling, repairing and refitting the product.

After-sales service commitment:

- We promise to deal with the customer's technical questions within 2 hours.
- For the instruments returned to the factory for maintenance, we promise to issue the test results within 3 working days and the maintenance results within 7 working days after receiving them.

Chapter 9 Communication

The communication protocol is designed for the industrial application of bus turbine flowmeter, which is version 1.0, which is mainly used for real-time data acquisition, flow measurement and flow accumulation control, and currently only supports register readout function.

9.1. Standard basis

GB/T 19582-2008 The standard is based on the industrial automation network specification targeted by the Modbus protocol.

9.2. Communication mode

The Modbus serial link is built in 485mi A, and the hardware interface adopts 485communication mode. At present, the interface supports up to 32 extension networks.

The communication mode is RTU mode, the baud rate range 1200、2400、4800、9600bps。

9.3. RTU transmission mode

- The message contains two 4-bit hexadecimal characters in each 8-bit byte, and the message needs to be transmitted in a continuous character stream.
- Format of each byte (10 bits).
 - (1) 1 start bit.
 - (2) 8 data bits, first send the least significant bits.
 - (3) 1 stop bit.
- Message frame description.

Address(1) + Function code(1)+ Data (0-252)+ CRC check(1).

- Time sequence

The idle interval of at least 3.5 character time distinguishes the message frame, which is tentatively set as a fixed time 100ms to determine the beginning of the data frame.

9.4. Function code definition

- Read register

Read the contents of the register in the instrument, including a variety of information parameters, high in the low address and low in the high address.

Big end mode:

Table 6

Name	Register address	Data type	Number of bytes
Instantaneous flow	0	float	4
Cumulative flow	4	float	4
Turbine frequency	8	float	4
Upper limit of flow (range)	12	float	4
Lower limit of flow	16	float	4
Unit	20	Char	1

Unit comparison table:

Table 7

Unit code	Unit	Unit code	Unit
0	m ³ /s	5	kg/h
1	m ³ /h	6	g/s
2	l/s	7	g/h
3	l/h	8	t/s
4	kg/s	9	t/h

9.5. Example

Table 8

40001: <0000H>	40011: <0000H>
40002: <0000H>	40012: <0000H>
40003: <4007H>	40013: <0000H>
40004: <EAD2H>	40014: <0000H>
40005: <0000H>	40015: <0000H>
40006: <0000H>	
40007: <42C8H>	
40008: <0000H>	
40009: <3A83H>	
40010: <126FH>	

- (1) 40001-40002: 00 00 00 000.000 Instantaneous flow.
- (2) 40003-40004: 40 07 EA D2 2.12371 Cumulative flow.
- (3) 40005-40006: 00 00 00 000.000 Turbine frequency.
- (4) 40007-40008: 42 C8 00 00 100 m³/s Upper limit of flow.
- (5) 40009-40010: 3A 83 12 6F 0.001 m³/s Lower limit of flow.
- (6) 40011: 00m³/s unit.