Liquid Turbine Flow Meter

Instruction Manual

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Foreword

Thank you for purchasing our product!

This manual is an instruction manual for operating the instrument, including its functions, settings, wiring methods, and troubleshooting.

Please read this manual carefully before operation to ensure correct use of the instrument.

After reading, please keep it in an easily accessible place for future reference.

Notice

This manual's contents may be modified without notice due to functional upgrades, etc.

This manual's contents have been carefully proofread. If you find any discrepancies or errors, please contact the instrument's retailer.

In case of discrepancies between the actual product and the contents of this manual, the actual product shall prevail.

Version: LWGY-01L, First Edition, September 2025

Chapter 1 Safety Guidelines

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For each purchased product, there are applicable product documentation and manufacturer's terms of sale.

The manufacturer reserves the right to modify the contents of the document, including this disclaimer, in any way, at any time, for any reason, and without prior notice, and shall not be liable for any consequences arising from any such modifications.

1.1 Product Responsibility and Quality Assurance

The purchaser is solely responsible for determining whether the flow meter is suitable for the intended purpose and assumes full responsibility for this assessment. The manufacturer is not liable for consequences arising from the purchaser's incorrect use of the instrument. Incorrect installation and operation of the flow meter or system will void the warranty. Furthermore, the relevant "Standard Sales Terms" also apply and form the basis of the purchase contract.

To avoid injury or damage to the instrument, please carefully read the information in this document. In addition, you must comply with the relevant standards, safety regulations, and accident prevention rules of your country. If you cannot understand the contents of this document, please seek assistance from the manufacturer or instrument distributor. The manufacturer will not be liable for any property damage or personal injury caused by a misunderstanding of the information contained in this document. This document will help you establish correct operating conditions to ensure your safe and effective use of the instrument. Furthermore, key points and safety measures in this document are marked with the following icons.

The following graphic symbols are conventions to help you use this document easily.

Danger! This symbol indicates a safety warning related to electricity.

Warning! Such oaths must be heeded. Neglecting them could result in serious health hazards and potential damage to the instrument itself or related equipment and facilities.

Note! This symbol represents important information related to the operation of the instrument.

1.2 Safety Guidance for Operators

Warning! For your safety, please carefully read the following safety warnings before using the instrument. This document will help you establish operating conditions, which will ensure your safe and effective use of this instrument. Installation and use are permitted only by personnel who have received relevant training and hold the necessary certifications. Operate and maintain this instrument.

Warning! When measuring flammable media, take precautions against fire or explosion . Follow proper operating procedures when working in hazardous environments. Removing the flow meter may cause media splashing. Follow the fluid equipment manufacturer's safety operating procedures to prevent splashing.

Do not purge the flow meter with compressed air.

Pay attention to the turbine blades inside the flow meter; even small scratches or nicks can affect accuracy.

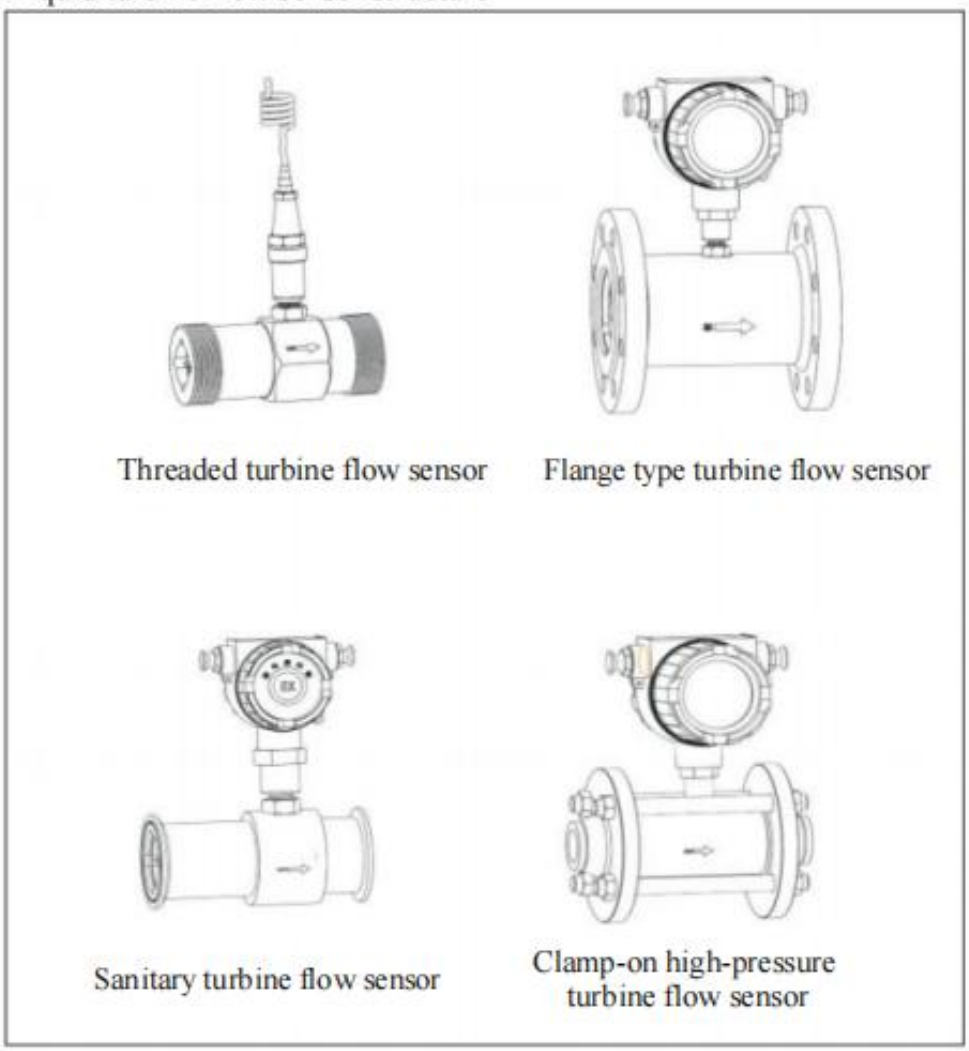
For best results, the instrument should be calibrated no more than once a year.

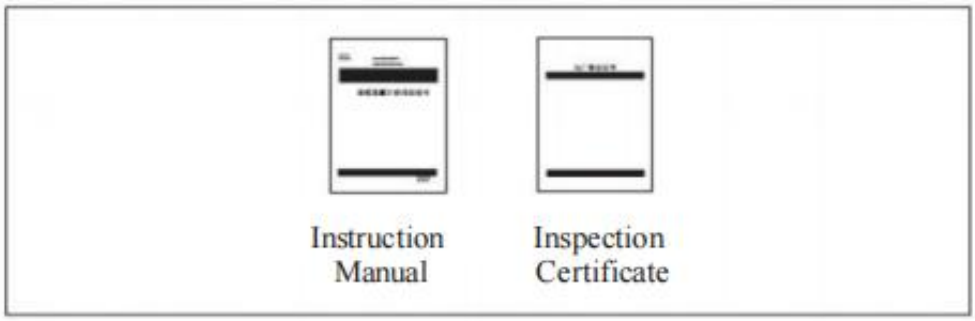
Chapter 2 Instrument Description

2.1 Delivery Scope

Please carefully inspect the packaging for damage or signs of rough handling. If any damage is found, please report it to the delivery person and the manufacturer or supplier. Please check the packing list to confirm the goods you received.

Liquid turbine flow sensor structure





2.2 Measurement Principle

When the liquid being measured flows through the sensor, the impeller rotates under the influence of the fluid, and its rotational speed is proportional to the average flow velocity in the pipe. The rotation of the impeller periodically changes the magnetic resistance value of the magnetic circuit, and the magnetic flux in the detection coil changes periodically accordingly, generating an induced electromotive force with the same frequency as the blade rotation frequency. After amplification, this electromotive force is converted and processed.

The practical flow equation for a turbine flow meter is:

$$Q_v = f/K$$

Where Q_v----is the volume flow rate,m^3/s

f----Frequency of flowmeter output signal，Hz

K----Instrument factor of flow meter，$1/m^3$

The relationship between the flow meter coefficient and flow rate (or Reynolds number) is shown in Figure 1.1. As can be seen from the figure, the meter coefficient is divided into two segments: a linear segment and a nonlinear segment. The linear segment is approximately two-thirds of its operating range, and its characteristics are related to the sensor's structural dimensions and the fluid viscosity. The nonlinear segment's characteristics are significantly affected by bearing friction and fluid viscous resistance. When the flow rate is below the sensor's lower flow limit, the meter coefficient changes rapidly with the flow rate. When the flow rate exceeds the upper flow limit, care must be taken to prevent cavitation.

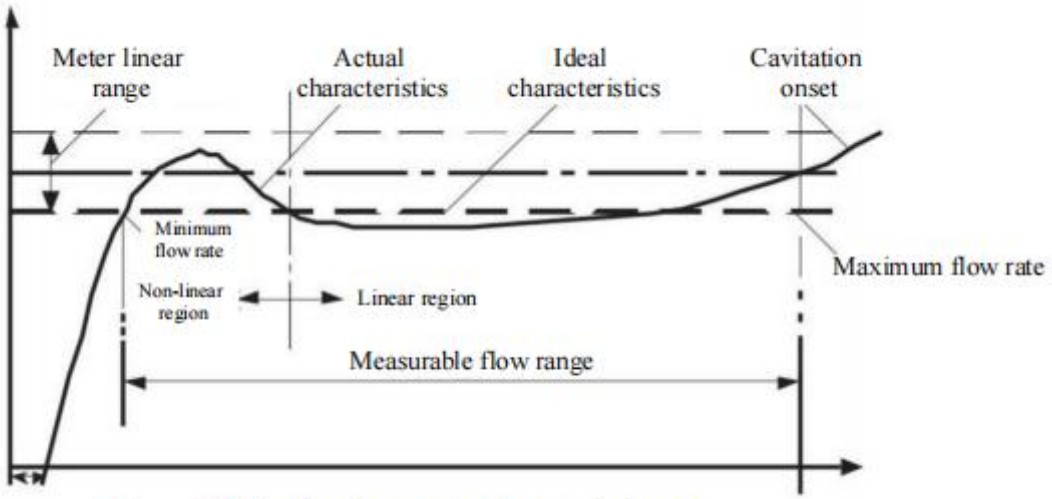


Figure 1.1 Turbine flowmeter characteristic curve

2.3 Application Scope

The turbine flow sensor (hereinafter referred to as the sensor) is based on the torque balance principle and belongs to the velocity-type flow meter category. The sensor features simple structure, lightweight, high accuracy, good repeatability, sensitive response, and convenient installation, maintenance, and use. It is widely used in industries such as petroleum, chemical, metallurgy, water supply, and papermaking. It is suitable for measuring liquids in closed pipelines that do not corrode stainless steel (1Cr18Ni9Ti, 2Cr13), corundum (Al2O3), or hard alloys, and are free of impurities such as fibers and particles.

When paired with a display instrument with special functions, it can also perform quantitative control and over-limit alarms. The explosion-proof type (ExdIICT6 Gb) of this product allows for use in environments with explosion hazards. The sensor is suitable for media with a viscosity less than 5×10^{-6} m²/s at the operating temperature. For liquids with a viscosity greater than 5×10^{-6} m²/s, the sensor must be calibrated with actual liquid before use.

Chapter 3 Installation

3.1 Installation Inspection

Warning! Please carefully inspect the packaging for damage or signs of rough handling. If any damage is found, please report it to the delivery person and the manufacturer or instrument supplier.

Note! Please check the packing list to confirm that the goods you received are complete.

Warning! Please check the instrument's nameplate and confirm that the supplied contents match your order. Check that the power supply information on the nameplate is correct. If incorrect, please contact the manufacturer or instrument distributor.

3.2 Storage

Storage!

- Store the instrument in a dry, dust-free place;
- Avoid prolonged exposure to direct sunlight;
- The instrument should be stored in its original packaging box;

3.3 Installation Prompts

Warning!

To ensure reliable installation, the following measures must be taken:

- Ensure sufficient space is left on the sides;
- Do not subject the flow meter to severe vibration;

3.4 Piping Design

The following should be considered when designing the pipeline:

(1) Installation Environment

■ The flow meter is best installed indoors. If it must be installed outdoors, measures should be taken to avoid direct sunlight and prevent rain.

■ The flow meter should avoid being installed in places with high temperatures, heat radiation from equipment, or containing corrosive gases. If it must be installed, heat insulation and ventilation measures must be in place.

(2) Avoiding Magnetic Field Interference

■ Turbine flow sensors should not be installed near motors, transformers, or other power sources that are prone to electromagnetic interference.

■ Turbine flow sensors should not be installed near frequency converters or draw power from frequency converter distribution cabinets to avoid interference.

(3) Maintenance Space

■ Sufficient installation space is required around the turbine flow meter for convenient installation, maintenance, and upkeep.

(4) Flow Meter Support

■ Turbine flow sensors should avoid installation on pipes subject to mechanical vibration. If installation is necessary, vibration damping measures must be taken. A flexible hose transition can be added, or pipe support points with anti-vibration pads can be installed 2DN upstream and downstream of the flow meter.

■ Flow meters should avoid installation on long, overhead pipes, as pipe sagging can easily cause leaks between the flow meter and the flange. If installation is necessary, pipe support points must be installed 2D upstream and downstream of the flow meter.

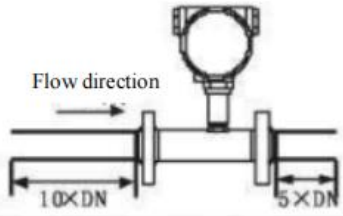
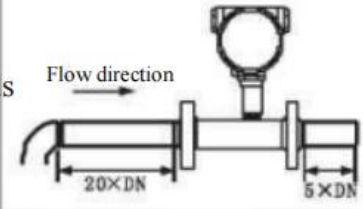
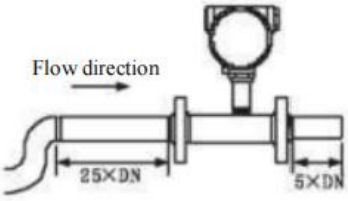
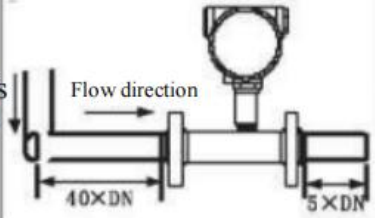
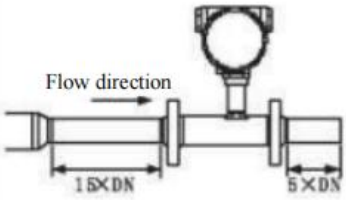
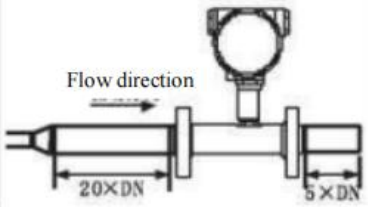
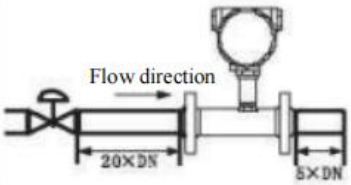
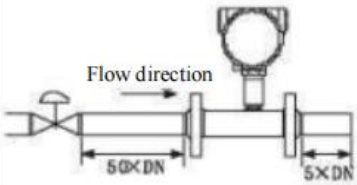
(5) Piping Requirements

■ For horizontally installed sensors, the pipeline should not have a visually perceptible tilt (generally within 5°). For vertically installed sensors, the pipeline verticality deviation should also be less than 5°.

■ The pipeline must be filled with liquid. If the measured liquid contains gas, a degassing device should be installed upstream of the sensor. The drain and degassing ports of the filter and degassing device must lead to a safe location.

(6) Straight Pipe Section Length

Turbine flow meters are sensitive to velocity distribution distortion and swirling flow within the pipe. To adequately prevent turbulence, the inlet should be equipped with the necessary straight pipe section or rectifier, depending on the type of flow obstruction upstream of the sensor. The required straight pipe section lengths for the inlet and outlet are shown in Table 4.7.

Inlet section flow choke type	Installation conditions			Installation conditions	
	Entrance section	Export section		Entrance section	Export section
General situation			Two 90-degree bends on the same plane		
Two 90-degree bends on the same plane			Two 90-degree bends on different planes		
Tube shrinkage			Expanding pipe		
Fully open valve			Half-open valve		

The dimensions shown in Table 4.7 represent the minimum required straight pipe section installation length to ensure accuracy. Doubling the straight pipe section length will improve accuracy.

Upstream: The minimum permissible straight pipe section length is at least 10 times the pipe diameter.

Downstream: The minimum permissible straight pipe section length is at least 5 times the pipe diameter.

3.5 Mechanical Installation

Instrument Operation Instructions

(1) Be careful when unpacking to avoid damaging the instrument. It is best not to unpack before transporting it to the installation site to avoid damaging the instrument.

Use mounting rings when lifting the instrument; never use a stick or rope to lift the instrument through the sensor measuring tube.

(2) Prevent the instrument from being vibrated.

Prevent the instrument from being dropped or subjected to heavy pressure, especially on the flange surface, as this may damage the sealing surface.

(3) Protect the sensor flange surface.

After unpacking the instrument, pay attention to protecting the flange. Do not place the flange on an unlined surface or other uneven surface.

(4) Avoid prolonged periods of inactivity.

After installation, avoid prolonged periods of inactivity. If the instrument will not be used for an extended period, the following measures must be taken:

A. Check the sealing of the end caps and wiring ports to ensure that moisture and water do not enter the instrument. Regularly check the above-mentioned measures and the condition of the junction box, at least once a year.

B. In situations where there is a possibility of water entering the instrument (such as after heavy rain or lightning), the instrument should be checked immediately.

3.5.1 Pipeline Installation

■ Before installing the flow meter, the pipeline should be calibrated to ensure good concentricity between the instrument's diameter and the user's pipeline. Therefore, flow meters often require grounding. Grounding the flow meter casing creates an internal space that shields against external interference, thereby improving measurement accuracy.

■ Newly installed pipelines often contain foreign objects (such as welding slag). Before installing the flow meter, these should be thoroughly cleaned to prevent damage to the lining and to prevent measurement errors caused by foreign objects passing through the measuring tube during measurement.

■ Make openings in the pipeline according to the required opening size, ensuring the opening position meets the straight pipe section requirements. Place the entire flow meter assembly, with the flange attached, into the opened pipeline.

■ Spot weld the flange to the pipeline for positioning. After spot welding, remove the flow meter; do not weld with the flow meter attached. Remove the flow meter, weld the flange as required, and clean all protruding parts inside the pipeline.

■ Install a sealing gasket with the same diameter as the pipe inside the flange groove, install the flow meter into the flange, ensuring that the flow direction indicator of the flow meter is in the same direction as the fluid, and then tighten it with bolts.

3.5.2 Installation of Pipeline Flow Meters

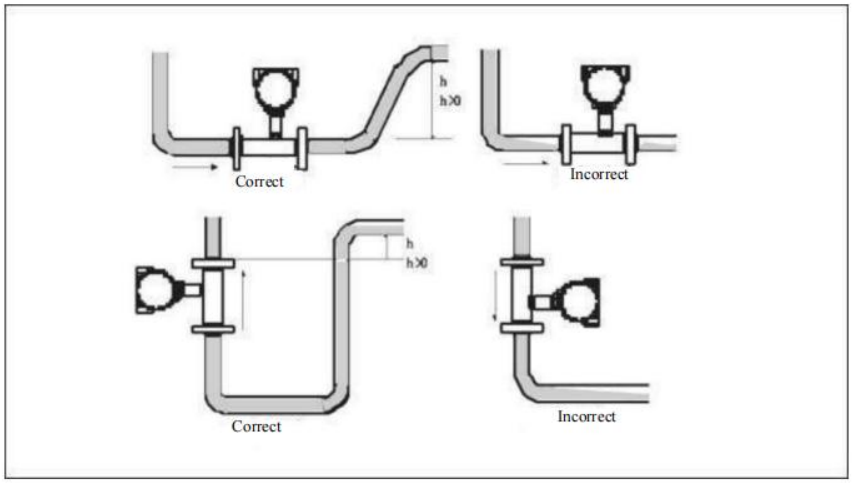
■ Installation direction: The flow direction of the fluid being measured should be consistent with the flow direction marking on the flow meter.

■ The flange gasket installed between the flanges should have good corrosion resistance and should not extend into the pipe.

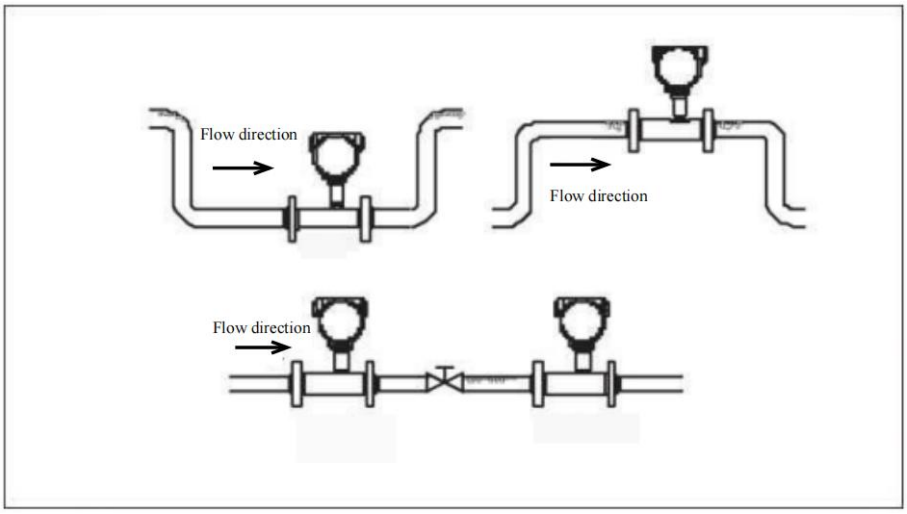
■ During field installation, use bolts to connect the flange on the sensor to the flange on the pipe. The bolts and nuts securing the instrument should be intact, undamaged, and well-lubricated. Flat washers and spring washers should be used in conjunction. If possible, use a torque wrench to tighten the bolts according to the flange size and required torque. During daily use, tighten the bolts periodically to prevent loosening.

3.5.3 Flow Meter Location

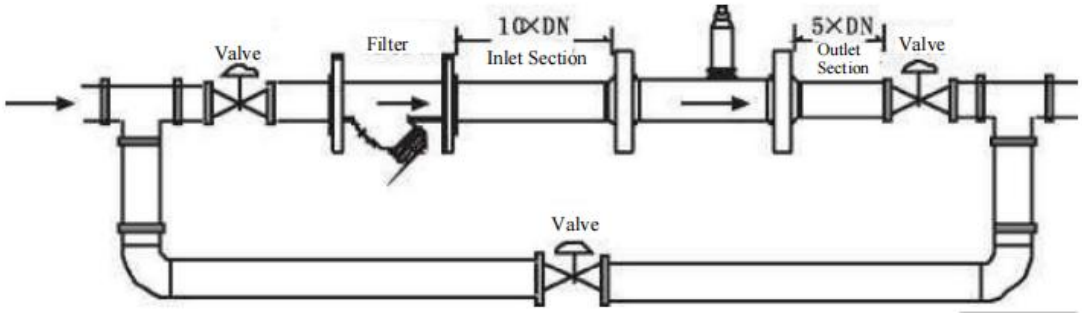
The pipe must be completely filled with liquid. It is important that the pipe remain completely filled with liquid at all times; otherwise, the flow rate display will be affected, potentially leading to measurement errors.



Avoid air bubbles. If air bubbles enter the measuring tube, the flow rate display may be affected, potentially leading to measurement errors.



3.5.4 Typical installation piping configuration for turbine flow sensors



The sensor should be installed in a location easily accessible for maintenance, free from pipeline vibration, strong electromagnetic interference, and heat radiation.

In locations where flow cannot be stopped, a bypass pipe and a reliable shut-off valve should be installed (see diagram above). During measurement, ensure the bypass pipe is leak-free.

When installing a new pipeline, initially connect a short section of pipe to the sensor location. After the pipeline cleaning is completed and the inside of the pipeline is confirmed to be clean, then formally connect the sensor. When the sensor is installed outdoors, measures should be taken to avoid direct sunlight and protect it from rain.

3.6 Installation Dimensions Diagram

Flange-connected turbine flow sensor

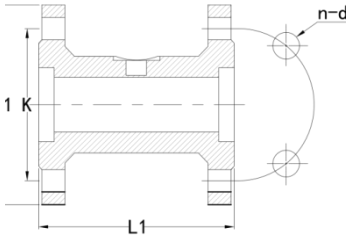


Figure 4.1
DN15 ~ DN200 Flange Connection Type
Turbine Flow Sensor Dimension Diagram

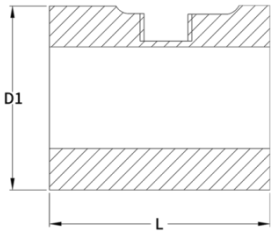


Figure 4.2
DN4~DN200 Flange Clamp Type
Turbine Flow Sensor Dimension Diagram

Threaded connection type turbine flow sensor

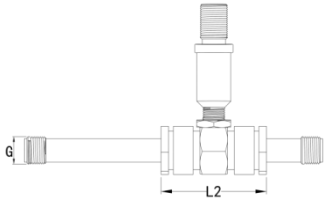


Figure 4.3
Dimensions of DN4~DN10
Threaded Connection Type
Turbine Flow Sensor (including straight pipe section)

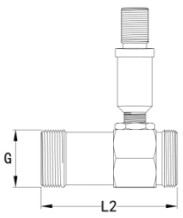


Figure 4.4
Dimensions of DN15 ~ DN5
Threaded Connection Type
Turbine Flow Sensor (excluding straight pipe section)

Turbine Flow Sensor Installation Dimensions Table

Diameter (DN)	Threaded Connection (mm)		Flange Connection (mm)					Clamp Connection (mm)		Measuring Range (m^3 / h)	
	L	G	L	D1	K	d	n	L	D	Conventional	Extend
4	225	G1/2						50	50.5	0.04~0.25	0.04~0.4
6	225	G1/2						50	50.5	0.1~0.6	0.06~0.6
10	345	G1/2						50	50.5	0.2~1.2	0.15~1.5
15	75	G1	75	95	65	14	4	100	50.5	0.6~6	0.4~8
20	85	G1	85	105	75	14	4	100	50.5	0.8~8	0.45~9
25	100	G5/4	100	115	85	14	4	100	50.5	1~10	0.5~10
32	140	G3/2	140	140	100	18	4	120	50.5	1.5~15	0.8~15
40	140	G2	140	150	110	18	4	140	64	2~20	1~20
50	150	G5/2	150	165	125	18	4	150	78	4~40	2~40
65			170	185	145	18	4	170	91	7~70	4~70
80			200	200	160	18	8	200	106	10~100	5~100
100			220	220	180	18	8	220	119	20~200	10~200
125			250	250	210	18	8			25~250	13~250
150			300	285	240	22	8			30~300	15~300
200			360	340	295	22	12			80~800	40~800

(1) The above flange-clamp type turbine flow sensor has a pressure rating of 1.6 MPa.

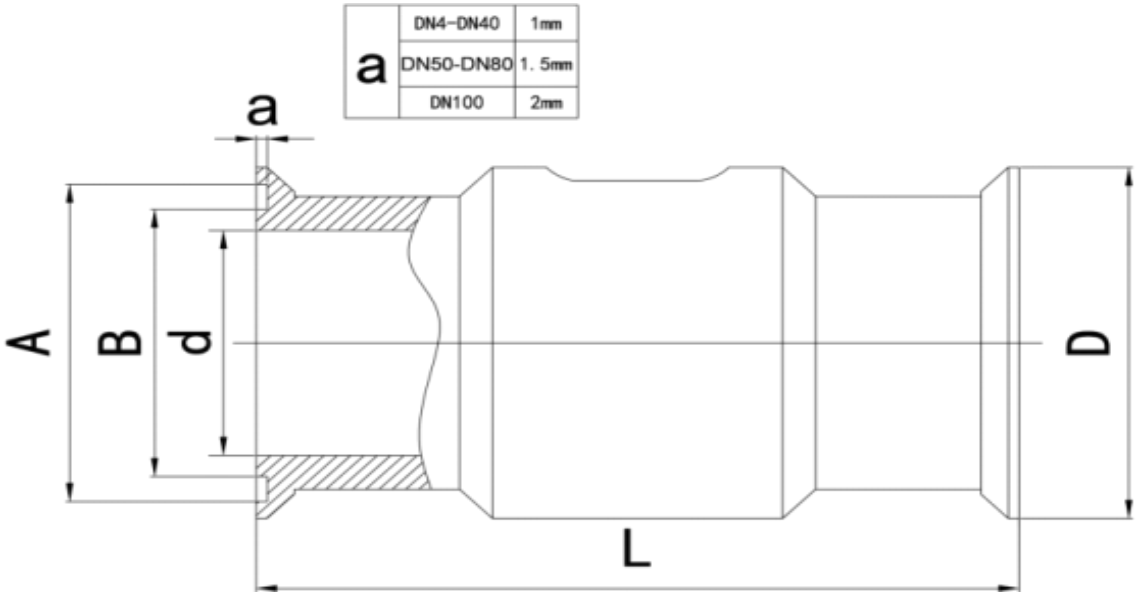
(2) Installation length L0 is the length after adding the mating mounting flange. The mounting flange is a special flange, included at the factory. The standard of the mounting flange is the enterprise standard, which is recommended.

(3) The above dimensions are for reference only during design selection. The actual dimensions are subject to confirmation at the time of delivery or ordering.

(4) The external dimensions of the high-temperature and high-pressure types are subject to confirmation at the time of delivery or ordering.

(5) The flow meter mounting flange adopts the enterprise standard. Other national or industry standards, or other national standards (American Standard, German Standard, Japanese Standard, etc.) may also be adopted according to user needs. Please specify if a special standard is required when ordering.

Sanitary turbine sensor outline dimensions



Size / Caliber	D(mm)	A(mm)	B(mm)	d(mm)	L(mm)
DN4	50.5	46	40.5	4	50
DN6				6	
DN10				10	
DN15				15	100
DN20				20	
DN25				25	
DN32				32	120
DN40	64	59	53.5	40	140
DN50	78	73.5	68	50	150
DN65	91	86	80.5	65	170
DN80	106	100.5	94	80	200
DN100	119	113	106	100	220

① ※ D refers to the inner diameter of the matching clamp.

② The standard pressure rating of the sanitary turbine sensor is 1.0 MPa.

Chapter 4 Electrical Connections

4.1 Safety Tips

Danger!

All work involving electrical connections must be performed with the power supply disconnected. Please note the power specifications on the nameplate.

Danger! Please comply with the relevant national installation procedures and standards.

Warning! Please strictly adhere to local occupational health and safety regulations. Only appropriately trained personnel are permitted to work on electrical equipment.

Notice!

Please check the instrument's nameplate and confirm that the information on the nameplate matches your order. Check that the power supply information on the nameplate is correct. If incorrect, please contact the manufacturer or the instrument seller.

4.2 Instructions for electrical cables and signal cables used in instruments

Note!

Double-shielded signal cables with effective grounding of the shielding layer can significantly reduce interference during measurement transmission.

Please note the following:

Lay the signal cable securely.

Signal cables can be laid in water or soil.

Comply with relevant standards such as EN 50 62 and IEC 60 32 2-1; the insulation material should be flame-retardant.

Signal conductors should not contain bleach or plasticizers and should remain flexible at low temperatures.

Connect the internal shielding using multi-strand shielded wire.

“RV VP” shielded cable is recommended for electrical connections. The 24 V power supply line should be connected through one side's routing hole, and the 4~20 mA signal line should be connected through the other side's routing hole.

The shielded cable connecting the flow meter should be routed away from areas with strong electromagnetic interference and must never be laid alongside high-voltage cables. The shielding wire should be as short as possible and should not be coiled to reduce distributed inductance; the maximum length should not exceed 500 meters.

4.3 Connect Electrical Cables

Danger!

Signal and power cables are only permitted to be connected when the power supply is disconnected.

Danger!

This instrument must be connected to the protective grounding terminal as specified to protect the operator from electric shock.

Danger!

For instruments used in areas with explosion hazards, it is also necessary to pay attention to the safety technical tips given in the special explosion-proof instruction manual.

WARNING!
Strictly adhere to local occupational health and safety regulations. Only appropriately trained personnel are permitted to work on electrical equipment.

Danger!

No voltage difference is permitted between the measuring sensor and its housing or converter protective ground. The measuring sensor must be fully and properly connected.

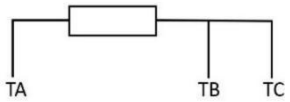
The grounding conductor should not transmit any interfering voltage.

No other electrical equipment may be connected to the grounding conductor simultaneously.

4.4 Electrical Wiring

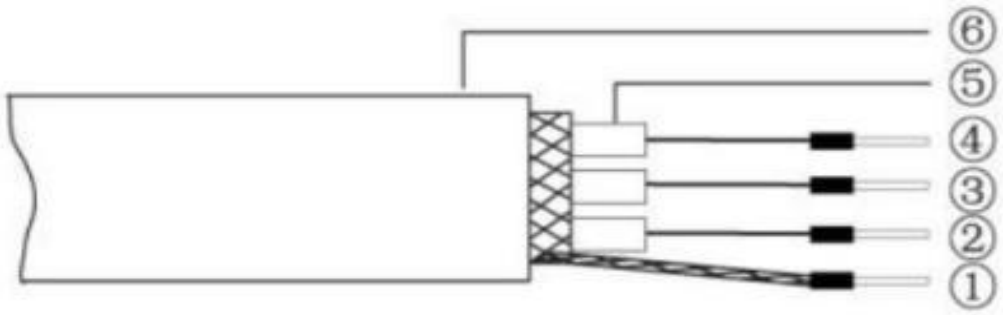
Notice!

Installation materials and tools are not included in the scope of supply. Please use installation materials and tools that comply with occupational health and safety regulations.

Terminal Blocks	Function	Remark
24V+	+24 VDC input	Two-wire wiring/Three-wire wiring
24V -	-24 VDC input	
A0+	4-20 mA + Output	
A0-	4-20 mA - Output	
F0	F0 +Output	Positive frequency output, used in conjunction with 24V -
A+	RS485+	RS485 Terminal blocks
B-	RS485-	
K+	24V+	24V alarm output, it is recommended to use a 24V DC intermediate relay.
K-	24V-	
TA	PT100 Signal Input	
TB		
TC		

4.4.1 N-type (basic pulse) terminal diagram and wiring instructions; signal cable structure.

The signal cable is a shielded cable used to transmit signals from the turbine flow meter. Bending radius > 50 mm / 2"



① Signal shielded cable - (cable shielding layer)

② Sensor power supply cable - positive (red)

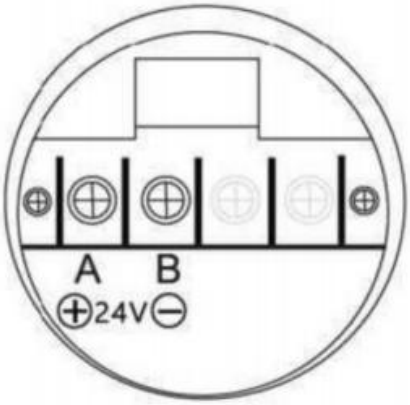
③ Sensor power supply negative, signal negative common ground - ground (blue)

④ Sensor signal cable - positive (yellow)

⑤ Copper core wire outer sheath protection layer

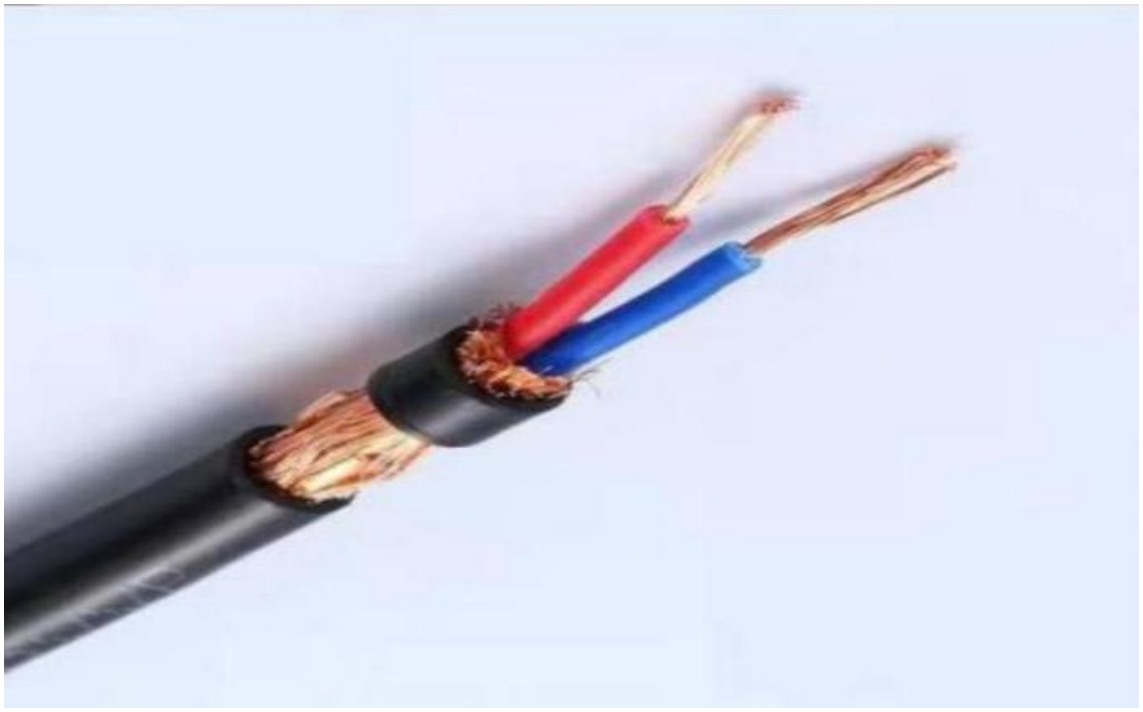
⑥ Cable sheath protection layer

4.4.2 Type A (two-wire system) Current transmission out) power strip



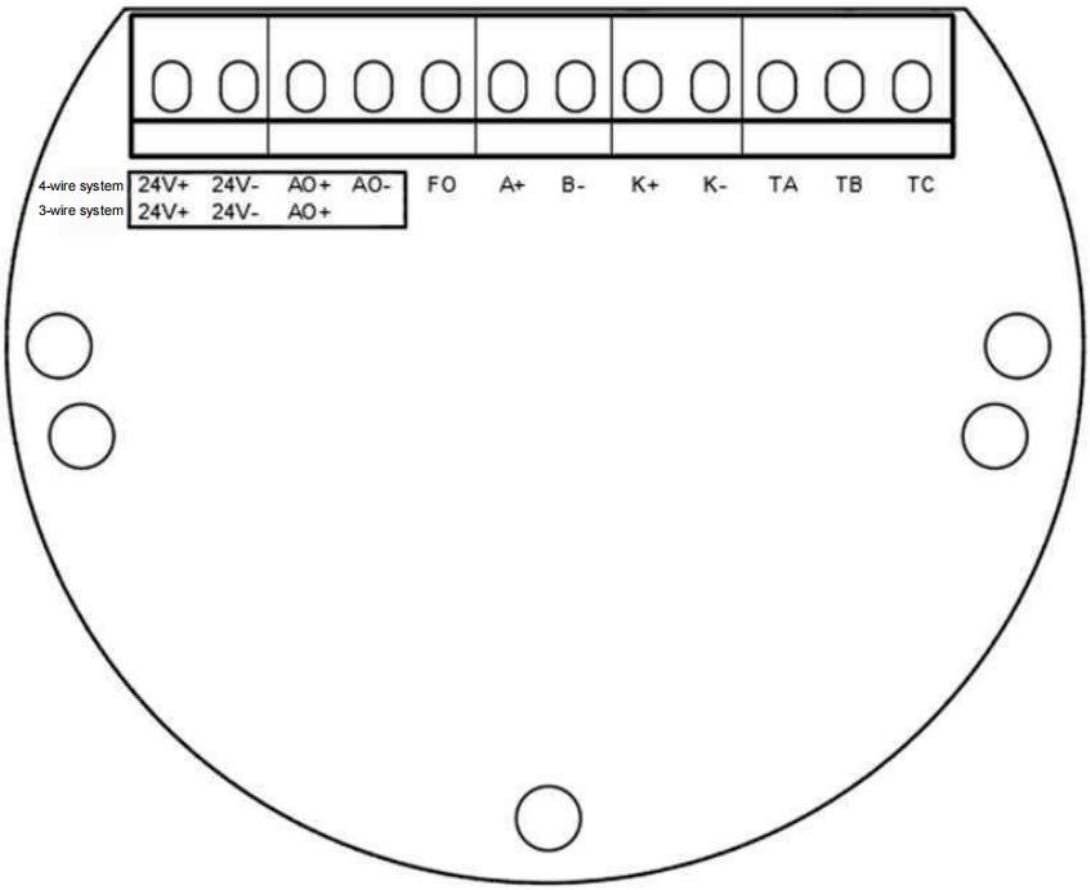
"A" is the "+" terminal of a 15-24V power supply.
"B" is the 4-20mA current output terminal.
Connect "A" to a +24V external power supply. The current output flows from "B" to the sampling resistor of a computer or display meter, passes through the sampling resistor and other loads, and then flows back to the "-" terminal of the power supply.

4.4.3 Type A1 (Two-wire current output) terminal block



Red connects to 24V Blue connects to signal + Signal -, and 0V shorted.

4.4.4 GM 2 Type (Display + Current Output) Terminal Block and Wiring Instructions



① Three-wire connection:

24V+ and 24V- are the power supply terminals (24VDC), AO+ is the 4~20mA current output terminal.

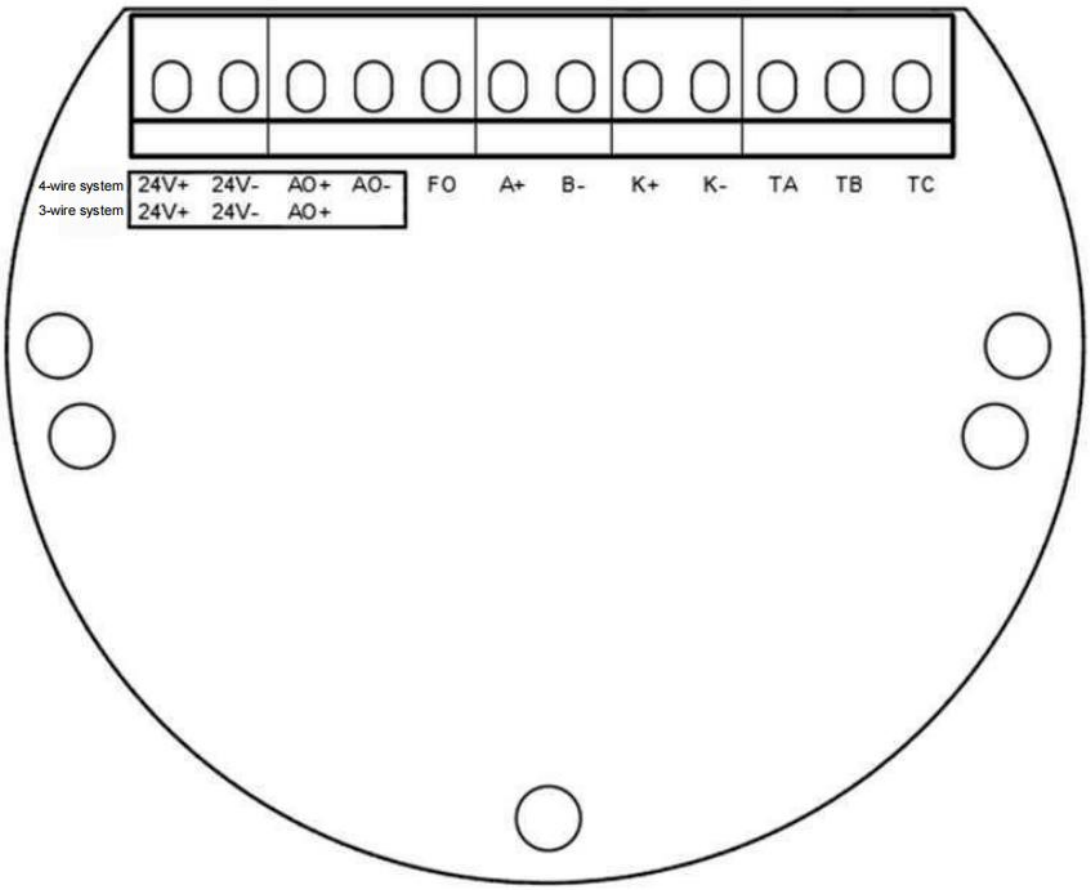
② Four-wire connection:

24V+ and 24V- are the power supply terminals (24VDC), AO+ is the 4~20mA current output, and A0- is the 4~20mA- current output.

TA, TB, and TC are external PT 100 terminals; K+ and K- are high/low alarm terminals (24VDC active switching output).

Note: The remaining terminals are unused.

4.4.5 GM3 (RS485 communication) terminal diagram and wiring instructions



Communication: A+: Positive terminal of RS 485 communication port; B-: Negative terminal of RS 485 communication port

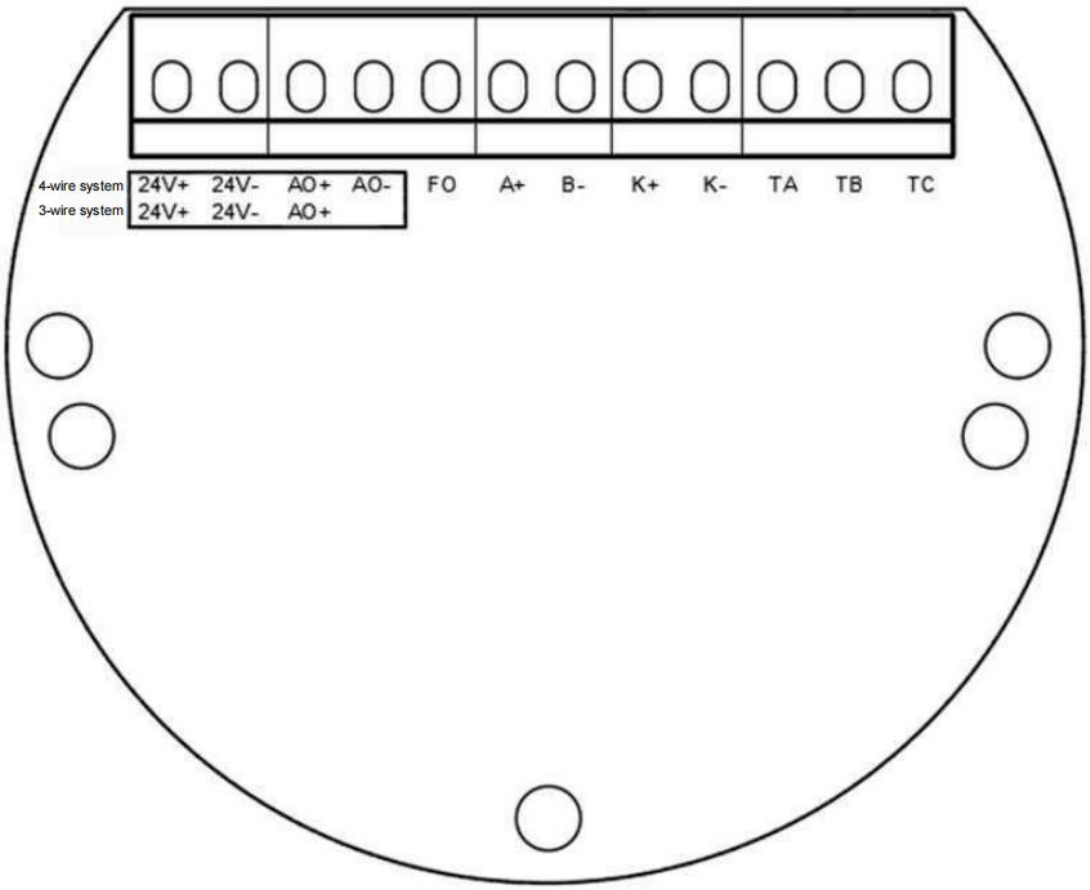
24V+, 24V- are power supply terminals (24VDC)

FO: Pulse output signal terminal

TA, TB, TC are external PT1 terminals; K+, K- are high/low alarm terminals (24VDC active switch)

Note: Other terminals are unused.

4.4.6 GM4 Type (Full Function Output) Terminal Diagram and Wiring Instructions



Communication: A+: Positive terminal of RS485 communication port, B-: Negative terminal of RS485 communication port

A+: Positive terminal of RS485 communication port, B-: Negative terminal of RS485 communication port

24V+, 24V- are power supply 24VDC, F0: Pulse output signal terminal

① Three-wire current connection:

24V+, 24V- are power supply 24VDC, A0+ is 4~20 mA current output terminal

② Four-wire current connection:

24V+, 24V- are power supply 24VDC, A0+ is 4~20 mA current +, A0- is 4~20 mA current -

TA, TB, TC are external PT 100 terminals, K+, K- are high/low alarm (24VDC active switch quantity)

4.5 Connect to power supply

WARNING

Danger!

This instrument must be connected to the protective grounding terminal as specified to protect the operator from electric shock.

PROMPTS

Note!

Included within the allowable range: 24 VDC. Please select the corresponding wiring method below according to the flow meter model and power supply type.

Chapter 5 Startup and Operation

5.1 Turn on the power

Attention!

Before turning on the power, please check that the instrument is installed correctly, including: the flow meter must be installed safely and in compliance with regulations.

The power connection should be made according to regulations.

Cover the electrical connection compartment with the protective cover and tighten the cover plate.

Please check that the electrical connection of the power supply is correct.

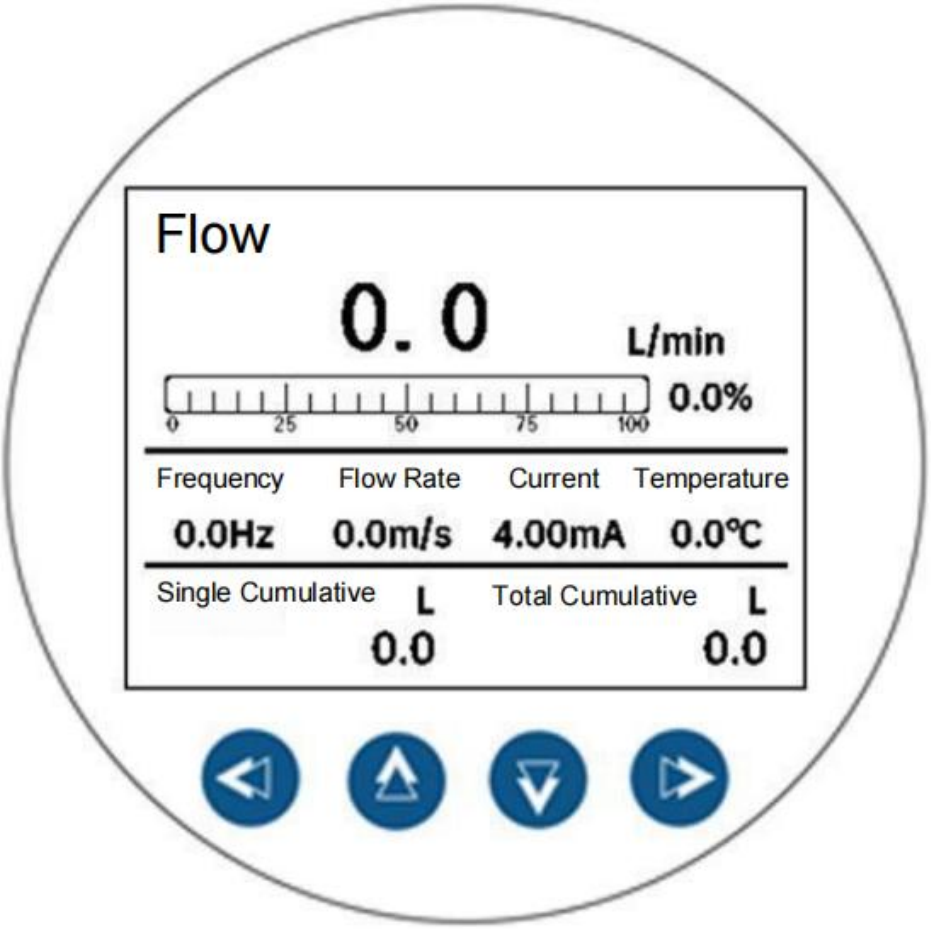
5.2 Display and Operation

The GM series instruments utilize live contact switches to achieve on-site flow measurement, display, control, and output. Through a highly integrated circuit centered on a microprocessor, it generates switching signals, standard analog current, or communication outputs, enabling continuous flow signal measurement and control. It boasts advantages such as high accuracy, stable and reliable performance, ease of operation, and simple installation.

Four-key parameter setting and debugging (7-digit instantaneous flow rate + 10-digit cumulative flow rate); 5-segment nonlinear signal correction function; Linear current output; RS485 communication interface, standard Modbus RTU protocol; Frequency pulse output: The pulse output circuit can be powered by DC, allowing the instrument to convert the mV pulse signal output from the turbine sensor into a standard TTL pulse for user debugging.

5.2.1 Display and operation buttons:

The display interface uses true-color LCD display. The observation window is shown in the "Instrument Display Window" image below:



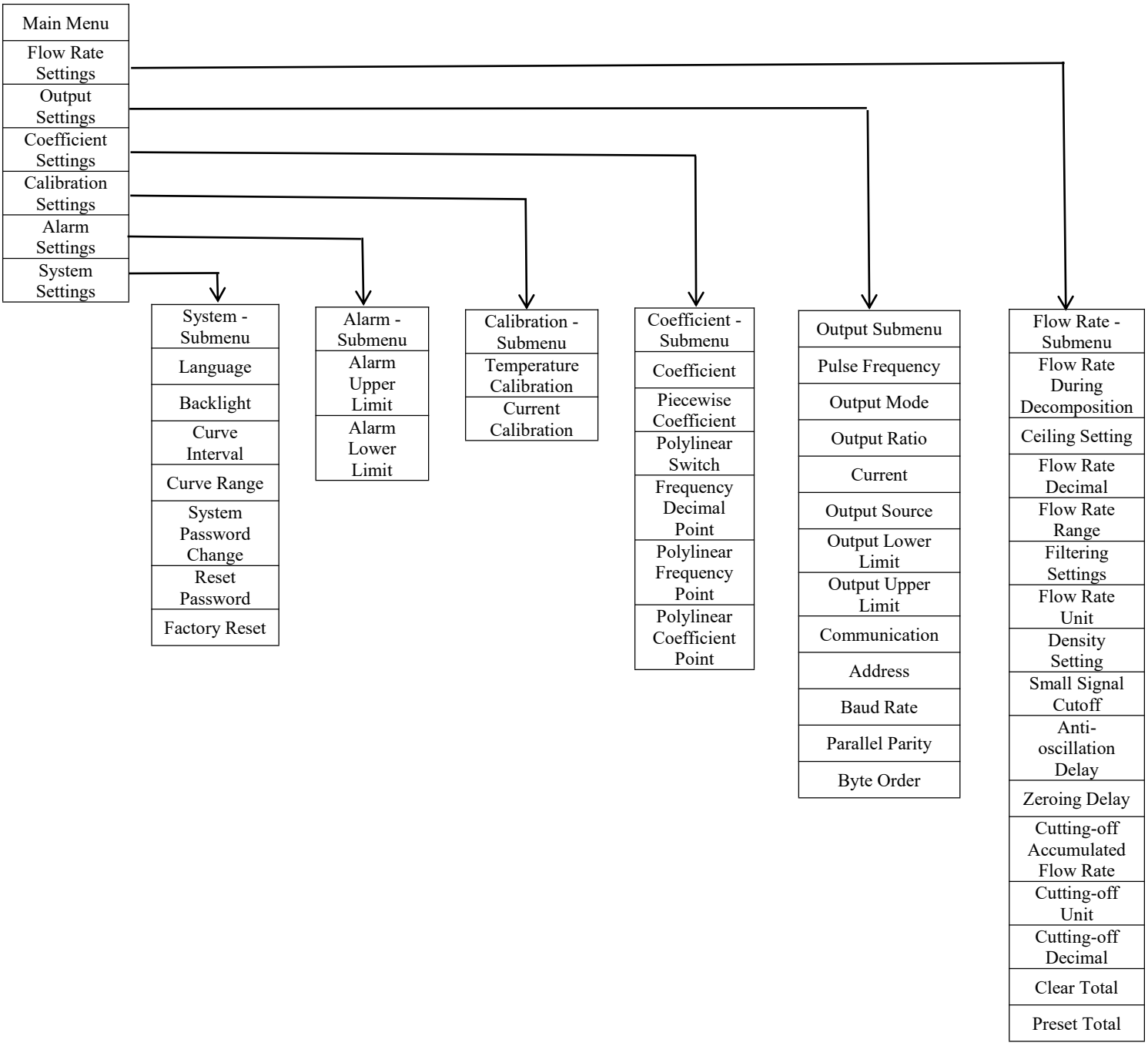
Move left, confirm parameter setting, and exit submenu;

Move up, increment key, and display toggle key;

Move down, decrement key, and display toggle key;

Move right to enter parameter settings;

5.2.2 Configuration Menu Table Parameter List



5.2.3 Flow Submenu

Instantaneous Flow Rate	
Aperture	Options: 4～300. Default value: 4
Decimal Places	Options: 0～3. Default value: 3. Description: Defines the number of decimal places for instantaneous flow rate.
Flow Range	Options: 0～9999999. Default value: 9999999. Note: The decimal point position depends on the number of decimal places in the flow rate.
Flow Unit	Options: L/S, L/min, L/h, kg/S, kg/min, kg/h, m3/S, m3/min, m3/h, T/S, T/min, T/h, IG L/S, IG L/min, IG L/h (Imperial Gallon), US G/S, US G/min, US G/h (US Gallon). Default: L/min
Filtering Time	Options: 0～30. Default value: 1
Fluorite Density	Options: 0.0～6500.0 kg/m³. Default value: 1000.0
Small Signal Cutoff	Options: 0～999 Hz. Default value: 0
Anti-Oscillation Delay	Options: 0～25. Default value: 0. Explanation: When the instrument is used in conjunction with a low-frequency flow sensor, the sensor may oscillate near the transition point due to the low frequency, resulting in higher and unstable measured values. Appropriately setting this parameter can shield against oscillation pulses during the anti-oscillation delay period.
Reset Delay	Options: 1 ～ 25. Default value: 1. Explanation: Because the lower limit of the instrument's measurement is 0.1 Hz, i.e., a pulse every 10 seconds at the minimum, when the input pulse suddenly stops, the instrument will be in a waiting state, and the instantaneous value display will not return to zero in time. By using the zero-return delay parameter, the instantaneous value display can be made to return to zero in a predetermined time after the input pulse suddenly stops.
Cumulative Traffic	
Cumulative Units	Options: L, kg, m3, T, IG L (Imperial Gallon), US G (US Gallon). Default value: L
Decimal Places	Options: 0 ～ 3. Default value: 3. Description: Defines the total number of decimal places.
Total Amount Cleared	Options: Yes, No Explanation: Total amount reset to zero
Preset Total	Options: 0～9999999.9999 Description: Clears the total amount or sets the total amount.

5.2.4 Output - Submenu

Pulse Frequency	
Output Method	Options: Equivalent, Frequency
Pulse Output Ratio	Options: 1:1, 1:10, 1:100. Default value: 1:1. Note: Valid when the output format is equivalent.
Current	
Output Source	Options: Flow rate, temperature
Lower Output Limit	Options: 0～9999999. Default value: 0. Description: The decimal point position depends on the number of decimal places in the flow rate.
Upper Output Limit	Options: 0～9999999. Default value: 999999. Explanation: The decimal point position depends on the number of decimal places in the flow rate.
Communication	
Address	Options: 1～25. Default value: 1
Baud Rate	Options: 1200, 2400, 4800, 9600, 19200. Default value: 9600
Parallel Parity	Options: No parity, odd parity, even parity. Default value: No parity.
Byte Order	Options: 1234, 3412, 2143, 4321. Default value: 1234

5.2.5 Coefficients - Submenu

Instrument Coefficient	Options: 0～999999.999. Default value: 100.000. Explanation: Q (instantaneous flow rate, L/h) = 3600 × F (frequency, Hz) ÷ k (k coefficient). After completing the actual flow detection, the final K coefficient needs to be set here. K (k coefficient) represents the number of pulses output per liter.
Segmentation Coefficients	
Broken Line Switch	Options: Off, On. Default: Off. Description: Whether to enable the polyline function.
Frequency Decimal	Options: 0～3. Default value: 1. Description: Defines the number of decimal places displayed for the frequency.
Broken Line Frequency Point	Options: 0～999 9 9. Default value: 0. Description: Original frequency, unit Hz.
Broken Line Coefficient Point	Options: 0.0000000 ～ 99.9999999. Default value: 1.0000000. Description: Linear coefficient, accurate to six decimal places.

5.2.6 Calibration - Submenu

Temperature Calibration Caution: Use with caution	Instructions: Enter the upper limit calibration, output a 400Ω resistor to the temperature channel and wait for the value to stabilize, then exit. Enter the lower limit calibration, output a 30Ω resistor to the temperature channel and wait for the value to stabilize, then exit. After completion, save the calibration test.
Current Calibration Caution: Use with caution	Instructions: Enter the upper limit calibration and lower limit calibration, and fill in the current value output by the instrument respectively. After completion, save the calibration. You can use the up and down keys to output 4mA, 12mA, and 20mA currents for testing.

5.2.7 Alarm - Submenu

Alarm Upper Limit	Options: 0 ～ 9999999. Default value: 9999999. Note: The decimal point position depends on the number of decimal places in the flow rate.
Alarm Lower Limit	Options: 0 ～ 9999999. Default value: 0. Description: The decimal point position depends on the number of decimal places in the flow rate.

5.2.8 System - Submenus

Language	Options: Chinese, English. Default: Chinese
Backlight	Options: 0~100. Default: 100
Curve Interval	Options: 1~10S. Default: 1 Description: How often the data for one point is updated in the curve viewing interface.
Curve Range	Options: 0~100. Default: 0~100 Description: Y-axis range in the curve viewing interface
System Password Change	Options: 0000~9999. Default: 0000
Reset Password	Options: 0000~9999. Default: 0000
Factory Reset	Options: Yes, No Note: Operate with caution; all data will revert to the default state after confirmation.

Chapter 6 Technical Parameters

6.1 General Technical Specifications

Measured Medium	Free of impurities, low viscosity, and non-corrosive.			
Execution Standard	Turbine flow sensor (JB/T9246 -1999)			
Verification Procedure	Turbine flow meter (JJG 1037-2008)			
Diameter and Connection Method	Flange connection	DN4-DN200		
	Threaded connection	DN4-DN80		
	clamp link	DN 4- DN100		
	High-pressure clamping	DN15-DN200		
Flange Standard	Standard	HG 20592-2009		
	Other standards	Standard customization available		
Thread Standard	Conventional threads	Imperial standard pipe threads (G threads); other specifications ordering instructions		
Accuracy and Repeatability	Accuracy	±1.0%	±0.5%	±0.2% (Special Customization)
	Repeatability	≤0.33%	≤0.17%	≤0.07%
Range Ratio	1:6;1:10;1:20			
Verification Conditions	Static mass method liquid testing device;			
	20℃; 65% RH ;			
Usage Conditions	Medium temperature: 80°C (default)℃, High temperature type 180℃ (optional)			
	Ambient temperature: -20℃~60℃	Relative humidity: 5% RH ~ 90% RH		
	Atmospheric pressure :86~106 kPa			
Output	Pulse (equivalent), 4-20mA, RS485, Hart;			
Power Supply	24 VDC ;			
Explosion-proof Rating	ExdIIC T6 Gb			
Protection Rating	IP 65; IP 68 (Waterproof Pulse Type)			

6.2 Flow Range

Instrument Diameter (mm)	Normal Flow Range (m^3 / h)	Extended Traffic Range (m^3 / h)	Upper Limit Frequency (Hz)
DN4	0.04-0.25	0.04-0.4	1200
DN6	0.1-00.6	0.06-0.6	1400
DN10	0.2-1.2	0.15-1.5	600
DN15	0.6-6	0.4-0.8	1400
DN20	0.8-8	0.45-9	800
DN25	1-10	0.5-10	600
DN32	1.5-15	0.8-15	650
DN40	2-20	1-20	450
DN50	4-40	2-40	300
DN65	7-70	4-70	240
DN80	10-100	5-100	170
DN100	20-200	10-200	240
DN125	25-250	13-250	220
DN150	30-300	15-300	185
DN200	80-800	40-800	270

6.3 Troubleshooting

Troubleshooting

Serial Number	Fault Phenomenon	Fault Analysis and Solutions
1	Medium is flowing, but no flow rate is displayed.	(1) Wiring error, check instrument wiring (2) Instrument internal parameters have been modified, set parameters correctly (3) Amplifier coil is damaged, replace amplifier (4) Impeller is stuck, check impeller and remove foreign objects (5) Medium flow rate is too slow, below the measurement lower limit, increase flow rate or replace with a different flow meter
2	There is a flow rate display when no medium flows through.	(1) There is severe vibration in the pipeline; it is recommended to add vibration damping measures. (2) Is the grounding good? Check the grounding. (3) There is electromagnetic interference on site; it is recommended to change the installation location. (4) The valve on the pipeline is not closed properly; check the valve.
3	Normal measurement, but inaccurate measurement error.	(1) There is a problem with the internal parameters. Reset them according to the factory parameters. (2) There is air or excessive viscosity in the on-site pipeline. Strictly follow the installation instructions. (3) The mechanism is worn too much. It is recommended to contact the manufacturer.
4	For flow meters with a 4-20 mA output, the displayed value on-site is inconsistent with the value displayed on the secondary instrument.	(1) The full-scale range of the flow meter and the secondary instrument is inconsistent. The full-scale parameter should be set correctly. (2) The variable output module is damaged. It is recommended to contact the manufacturer.

Chapter 7 Communication Protocol

7.1 List of Display Value Register Addresses

Register Address	Meaning	Value
0x00FE~0x00FF	Single Cumulative Quantity	32-bit floating-point data
0x0100~0x0101	Total Cumulative Quantity	
0x0102~0x0103	Instantaneous Flow Rate	
0x0104~0x0105	Frequency	
0x0106~0x0107	Flow Velocity	
0x0108~0x0109	Current	
0x010A~0x010B	Temperature	
0x010C~0x010D	Density	
0x0000	Instantaneous Flow Rate Decimal Point	Unsigned 16-bit integer; 0~3
0x0001	Instantaneous Flow Rate Unit	Unsigned 16-bit integer; see 7.2 for details;
0x0002	Cumulative Quantity Reset	Unsigned 16-bit integer; write 1 to clear single accumulator, write 2 to clear total accumulator:
0x0003~0x0004	Flow range upper limit	Unsigned 32-bit integer; follows instantaneous flow rate decimal point
0x0005~0x0006	K coefficient	Unsigned 32-bit integer: fixed 3 decimal places:
0x0007	Cumulative flow measurement unit	Unsigned 16-bit integer: see 7.2 for details;
0x0008	Pulse output ratio	Unsigned 16-bit type: 0 (1:1): 1 (1:10); 2 (1:100);
0x0009	Small signal cutoff upper limit	Unsigned 16-bit integer: 0~999
0x000A	Segmented line calculation function	Unsigned 16-bit integer; 0: Off, 1: On
0x000B	Frequency decimal point	Unsigned 16-bit integer; 0~3
0x000C	Instrument communication address	Unsigned 16-bit integer: 1~255
0x000D	Baud rate	Unsigned 16-bit integer: 0: 1200, 1: 2400, 2: 4800, 3: 9600, 4: 19200;
0x000E~0x000F	Upper limit of current output flow rate range	Unsigned 32-bit integer: 0~9999999: Decimal point is the same as the flow rate
0x0010~0x0011	Lower limit of current output flow rate range	
0x0012~0x0013	Upper limit of current output temperature range	
0x0014~0x0015	Lower limit of current output temperature range	
0x0016~0x0017	Frequency point 1	Unsigned 32-bit integer; 0~99999 No decimal point:
0x0018~0x0019	Frequency point 2	
0x001A~0x001B	Frequency point 3	
0x001C~0x001D	Frequency point 4	
0x001E~0x001F	Broken line frequency point 5	
0x0020~0x0021	Broken line coefficient point 1	Unsigned 32-bit integer; 0 0 0 0 0 0 0 0 9 9 9 9 9 9 9 9; Fixed 6 decimal places;
0x0022~0x0023	Broken line coefficient point 2	
0x0024~0x0025	Broken line coefficient point 3	
0x0026~0x0027	Broken line coefficient point 4	
0x0028~0x0029	Broken line coefficient point 5	
0x002A	Floating point order	Unsigned 16-bit integer; 0: 1 2 3 4, 1: 3 4 1 2, 2: 2 1 4 3, 3: 4 3 2 1;
0x002B	Pipe inner diameter	Unsigned 16-bit integer; 4 ~ 300;
0x002C	Language	Unsigned 16-bit integer; 0: Chinese characters, 1: English characters;
0x002D	Backlight	Unsigned 16-bit integer; 1 ~ 100;

7.2 List of Unit Register Addresses

Register Address	Meaning	Value
Instantaneous flow measurement unit	0	L/S
	1	L/ min
	2	L/h
	3	kg/S
	4	kg/min
	5	kg/h
	6	m 3 /S
	7	m 3 /min
	8	m 3 /h
	9	T/S
	10	T/ min
	11	T/h
	12	IGL /S (Imperial Gallon)
	13	IGL / min (imperial gallon)
	14	IGL /h (Imperial Gallon)
	15	USG /S (US gallon)
	16	USG / min (US gallon)
	17	USG /h (US gallon)
Cumulative flow measurement unit	0	L
	1	kg
	2	m 3
	3	T
	4	IGL (Imperial Gallon)
	5	USG (United States Gallon)

7.3 Examples of Communication Commands

Read rate (single-precision floating-point number)

01	03	01	0C	00	02	05	F4
Device Address	Function Code	Read The Starting Address		Length		CRC Check	

Response frame

01	03	04	B7	9C	41	E7	6D	B3
Device Address	Function Code	Length	Data Area				CRC Check	