

LWGY Series Liquid Turbine Flow Meter User Manual



KAIFENG HUABANG INSTRUMENT CO.,LTD.

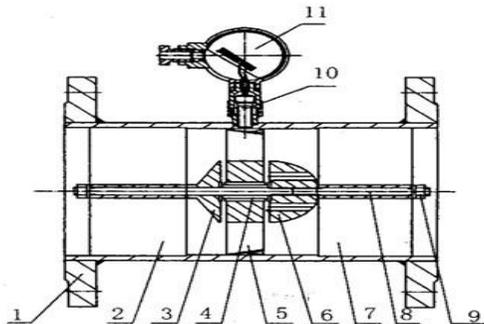
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1. Overview of liquid turbine flow meter

LWGY type liquid turbine flow meter includes liquid turbine flow sensor, liquid turbine flow transmitter. It belongs to the velocity type flow meter.

This series of instruments is suitable for measuring clean or basically clean single-phase liquids, capable of measuring volumetric flow or total volume in closed pipelines. They feature a simple structure, light weight, high accuracy, good repeatability, quick response, and ease of installation, maintenance, and use. Widely applied in industries such as oil, chemical, water supply, food, pharmaceuticals, and scientific research, they are ideal instruments for flow measurement and energy conservation.



1.housing 2. baffle 3. Vertebral body 4. bearing system 5. impeller 6. Anti cone 7. Diversion component 8. long axis 9. nut 10. signal detector 11. amplifier

Figure 1 LWGY liquid turbine flow sensor structure schematic diagram

2. Introduction of LWGY type liquid turbine flow sensor

LWGY type liquid turbine flow sensor is to convert the flow of liquid in the pipeline into an electrical pulse signal, and then processed by display instrument or computer system to complete the measurement of liquid flow in the pipeline or total metering.

1. Structural characteristics and working principle

1.1 Structural characteristics:

The sensor is mainly composed of sensing components, signal detector and amplifier (see Figure 1). Its bearing system is made of hard alloy to improve wear resistance and ensure product accuracy.

1.2 Working principle

When the fluid flows through the instrument, it pushes the impeller inside the meter to rotate, and then converts the flow rate of the fluid into an electrical pulse signal output through the magnetic coupling between the impeller and the signal detector. The amplified and shaped signal is transmitted to the display instrument, which achieves the purpose of measuring the volume flow rate or total amount of the fluid.

Within a certain flow range, the pulse frequency f is proportional to the instantaneous flow Q of the fluid flowing through the sensor, and the flow equation is:

信号频率	→	F _{in} =500.00Hz
输出电流值	→	I _{out} =12.000mA
输出频率值	→	F _{out} =500.00Hz
输入密码值	→	输入密码:00

In the formula:

F—— Pulse frequency [Hz]

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The instrument coefficient [1/m³] of the k—— sensor is given by the calibration sheet.

Q—— Instantaneous flow rate of fluid (working state) [m³/h]

3600—— second conversion factor

The instrument coefficient of each sensor is filled in the verification certificate by the manufacturer, and the k value is set into the matching display instrument to show the instantaneous flow rate and cumulative total.

2. Basic parameter performance and flow range

2.1 This sensor implements professional standards (JB/T9246-2016 turbine flow sensor)

2.2 Basic parameters, flow range and performance instructions are shown in Table 1.

Size	Conventional flow(m ³ /h)	Expand flow (m ³ /h)	Rated pressure(MPa)	Customized special pressure resistance (Mpa)
DN4	0.04—0.25	0.04—0.4	6.3	12, 16, 25
DN6	0.1—0.6	0.06—0.6	6.3	12, 16, 25
DN10	0.2—1.2	0.15—1.5	6.3	12, 16, 25
DN15	0.6—6	0.4—8	6.3,2.5(flange conn.)	4.0, 6.3, 12, 16, 25
DN20	0.8—8	0.45—9	6.3,2.5(flange conn.)	4.0, 6.3, 12, 16, 25
DN25	1—10	0.5—10	6.3,2.5(flange conn.)	4.0, 6.3, 12, 16, 25
DN32	1.5—15	0.8—15	6.3,2.5(flange conn.)	4.0, 6.3, 12, 16, 25

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DN40	2—20	1—20	6.3, 2.	4.0, 6.3, 12, 16, 25
DN50	4—40	2—40	2.5	4.0, 6.3, 12, 16, 25
DN65	7—70	4—70	2.5	4.0, 6.3, 12, 16, 25
DN80	10—100	5—100	2.5	4.0, 6.3, 12, 16, 25
DN100	20—200	10—200	2.5	4.0, 6.3, 12, 16, 25
DN125	25—250	13—250	1.6	2.5, 4.0, 6.3, 12, 16
DN150	30—300	15—300	1.6	2.5, 4.0, 6.3, 12, 16
DN200	80--800	40—800	1.6	2.5, 4.0, 6.3, 12, 16

2.3 Usage environment:

Environment temperature-20~+55°C

Relative temperature 5%~95%

Atmospheric pressure 86~106Kpa

2.4 Temperature of the measured fluid

General type-20~ + 120°C

Explosion-proof type-20~70°C

2.5 Explosion-proof mark: Ex ia IICT6 Ga

2.6 Output signal: two-wire/three-wire current output, three-wire pulse output.

The output low level IOL is approximately 3mA

The output high level IOH is approximately 13mA (square wave)

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The load resistance R (including line impedance) is in the range of 100~500

Ω (select an appropriate R value according to the requirements of the input signal of the configured display instrument or other receiving device).

2.7 Power supply

+12VDC ~ +24VDC

2.8 Transmission distance: RS485 transmission distance 1Km

3. Connection structure and size:

3.1 The structure of the threaded connection is shown in Figure 2, and the connection size is shown in Table 2

3.2 The flange connection structure is shown in Figure 3, and the connection size is shown in Table 2

The structure and size of the flange shall comply with the standard (HG/T 20593-1997)

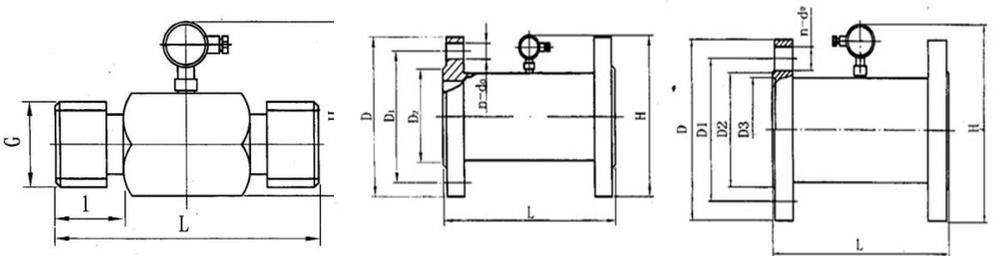


Figure 2: Threaded Connection Structure

Figure 3: Flange Connection Structure

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Instrument size table

Unit: mm

Size	flange connection						threaded connection	
	L	H	D	D ₁	D ₃	n-do	L(mm)	G
4	225	145	90	60				1/2
6	225	145	90	60				1/2
8	345	170	90	60				1/2
10	345	170	90	60				1/2
15	75	190	95	65		4-14	75	1
20	85	210	105	75		4-14	85	1
25	100	230	115	85		4-14	80	1 1/4
32	120	250	140	100		4-18	90	1 1/2
40	140	260	150	110		4-18	90	2
50	150	270	165	125		4-18	120	2 1/2
65	175	290	185	145		4-18	100	3
80	200	300	200	160		8-18	100	3 1/2
100	220	330	220	180		8-18	100	4 1/2
125	250	380	250	210		8-18		
150	300	390	285	240		8-23		
200	360	455	340	295		12-23		
250	400	510	405	355		12-26/25		
300	420	565	460	410		12-26/25		

4. Installation of liquid turbine flow meter

Under normal circumstances, the sensor should be installed horizontally, as shown in Figure 4 for normal pipeline configuration

1. inlet
2. valve
3. filter
4. gas eliminator
5. rectifier
6. turbine flow sensor
7. bypass pipe section
8. straight pipe section

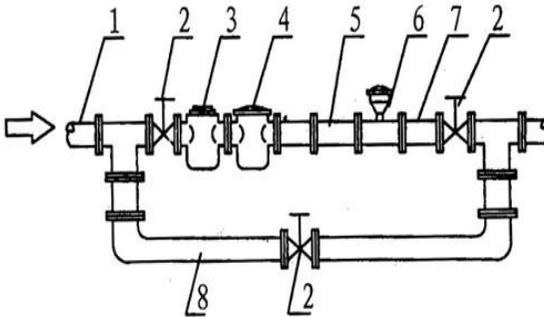


Figure 4 System configuration diagram

The functions of each part in the figure are described as follows:

Eliminator: used to eliminate free gas in the fluid, to avoid the volume occupied by free gas causing measurement error.

Filter: Filter out all kinds of impurities (such as particles, fibers, ferromagnetic substances) in the fluid to prevent them from entering the sensor and ensure that the parts inside the sensor (especially shafts and bearings) are not damaged. The mesh size of the filter is determined according to the impurities in the fluid, generally 20-60 mesh

Rectifier: When the length of the straight pipe section in front of the sensor is not less than 20 times the nominal diameter, rectifier can be installed without. Otherwise, in order to ensure the accuracy and stability of

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the sensor, rectifier must be installed to eliminate the influence of bias flow, rotating flow, vortex, etc.

Sensor installation:

The sensor should be installed horizontally, and the direction of fluid flow should align with the upward flow mark on the housing. The axis of the sensor's pipe should be aligned with the corresponding pipe axis, and the gasket used for connection sealing must not extend into the pipe cavity. Both upstream and downstream sides should have a clearance equal to that of the sensor; otherwise, a straightener should be installed on the upstream side. The flow control valve should be installed downstream of the sensor. The entire piping system should be well sealed.

In order to prevent interference signals, the transmission cable should be shielded. After wiring, the nut should be pressed to prevent the cable from falling off. The transmission cable of the sensor can be overhead or buried.

5. Precautions when using

5.1 Before installing the sensor, connect it to the display instrument or oscilloscope, turn on the power supply, blow or hand move the impeller to make it rotate quickly, observe whether there is a display, and then install it when there is a display. Check each part and troubleshoot;

5.2 When the sensor is used for the first time, the sensor should be slowly filled with liquid first, and then the outlet valve should be opened;

5.3 When the sensor is not in use, it should be cleaned inside, and the general maintenance cycle is half a year; when repairing and cleaning, do not damage the impeller components in the meter;

5.4 Corrosive effects: users should fully understand the corrosion of the measured medium and strictly prevent the sensor from being corroded;

5.5 Measurement pipeline requirements

When measuring easily vaporized liquids, the necessary back pressure should be maintained downstream of the sensor to prevent steam turbine from appearing on the downstream side of the turbine and affecting the

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measurement accuracy:

Back pressure shall comply with the following formula:

$$PH \geq 2 \cdot \Delta P_{\max} + 1.25 \cdot P_b$$

The saturated vapor of the fluid at the highest operating temperature of PH—
— is too high

ΔP_{\max} —— Pressure loss of the sensor at maximum flow

Back pressure downstream of P_b —— sensor

5.6 Measurement environment requirements:

The external magnetic field interference and mechanical vibration should be small enough to be negligible.

5.7 Flow regulation

The sensor is a precision mechanical instrument. Because the impeller rotates at a high speed, the sudden change of flow rate is easy to damage the impeller, so the valve for regulating flow should be installed downstream of the sensor, and the flow should be adjusted slowly. It is not advisable to open and close abruptly, and the occurrence of water impact should be strictly prevented.

5.8 Conversion between volumetric flow rate and mass flow rate

The sensor provides the volumetric flow rate under operating conditions. To determine the volumetric or mass flow rate under standard conditions, the density of the fluid must also be measured. Let the volumetric flow rate directly provided by the sensor be Q , the measured density of the fluid be P , the standard density of the fluid be QO , and the mass flow rate M of the fluid.

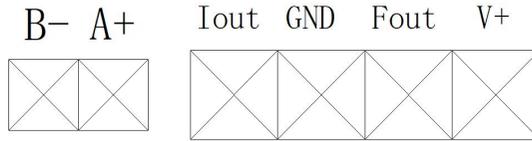
Then: $M=Q \cdot p$, $QO=Q \cdot P / PO$

5.9 Influence of liquid viscosity:

The instrument coefficient K of the sensor is sensitive to changes in fluid viscosity. Calibration at our factory uses water as the standard. When measuring fluids with a viscosity greater than $3 \text{ m Pa} \cdot \text{s}$ (under actual conditions), the flow measurement range and instrument coefficient may change. To ensure measurement accuracy, we recommend that users calibrate using the actual working state of the fluid being measured to obtain the true instrument coefficient.

3. Instrument wiring of liquid turbine flow meter

1. Three-wire turbine flow meter



A+: RS485 communication A

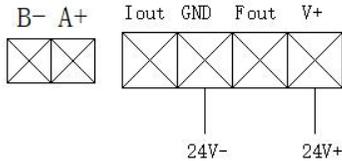
B-: RS485 communication B

V+: Power supply 24V+

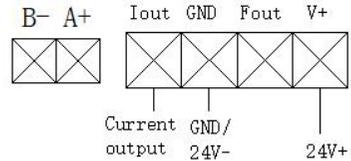
Fout: Pulse output

GND: Pulse output ground/current output ground/24V-

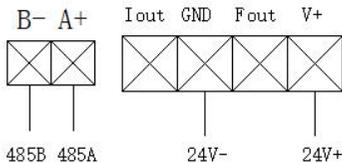
Iout: Current output



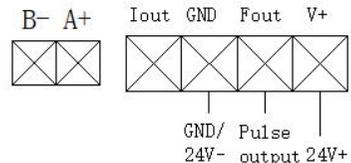
Direct power connection method



Three wire current wiring method



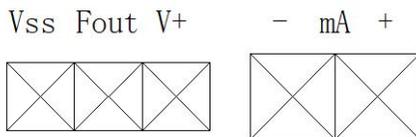
RS485 communication wiring method



Three wire pulse output Wiring method

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2. Two-line turbine flow meter



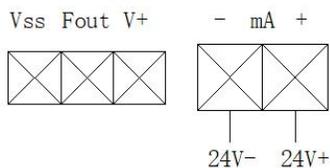
mA+: 24V+

mA-: 24V/ -current output

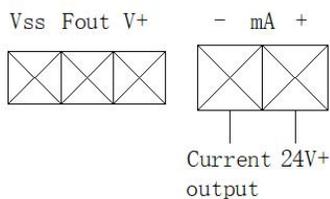
V+: 24V + pulse power supply

Fout: Pulse output

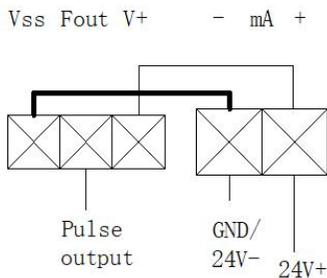
Vss: Pulse power ground



Direct power connection method



Two wire current wiring method



4. Flow meter working display interface

The working interface of the flow meter includes two interfaces, one is the main interface and the other is the auxiliary interface. As shown in the figure:

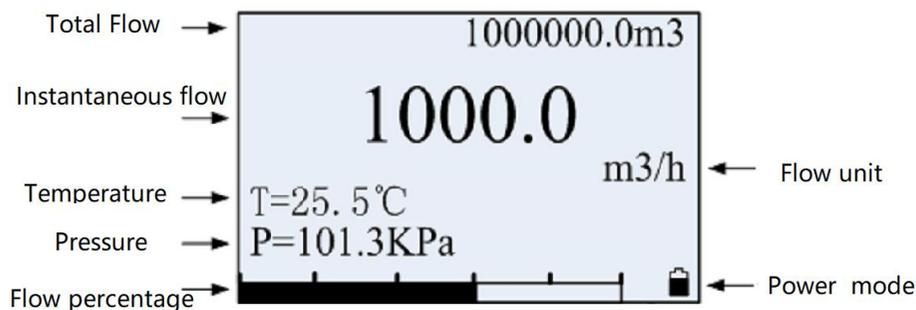


Figure 1 Main working interface

The power mode shows a "plug" pattern to indicate that the current is powered by the power supply; and a "battery" pattern to indicate that the current is powered by the battery

When T temperature and P pressure are shown as "=" after, it means that the current temperature and pressure are measured values;

When T temperature and P pressure are displayed as "≡" after, it means that the current temperature and pressure use the default setting value. Note that if there is "u" or "d" after T/P, you need to check whether the sensor is abnormal!

When the constant temperature of T is equal to "Tu≡", it indicates that the measured temperature exceeds the upper limit of 500 degrees. At this time,

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the temperature is fixed to the "default temperature" setting value in the engineer menu. When the constant temperature of T is equal to "Td≡", it indicates that the measured temperature exceeds the lower limit of 200 degrees. At this time, the temperature is fixed to the setting value of "default temperature" in the engineer menu.

When the constant symbol for P pressure is "Pd≡", it indicates that the measured pressure is lower than-101.3kPa. At this time, the fixed pressure is set to the value of "default pressure" in the engineer menu. When the constant symbol of P pressure is "Pu≡", it indicates that the measured pressure exceeds the upper limit by one times the range (the range is the difference between the upper limit value and the lower limit value of the pressure). At this time, the fixed pressure takes the set value of "default pressure" in the engineer menu.

When T temperature or P pressure is followed by "≈", it indicates that the displayed temperature or pressure is the reverse calculation value of steam.

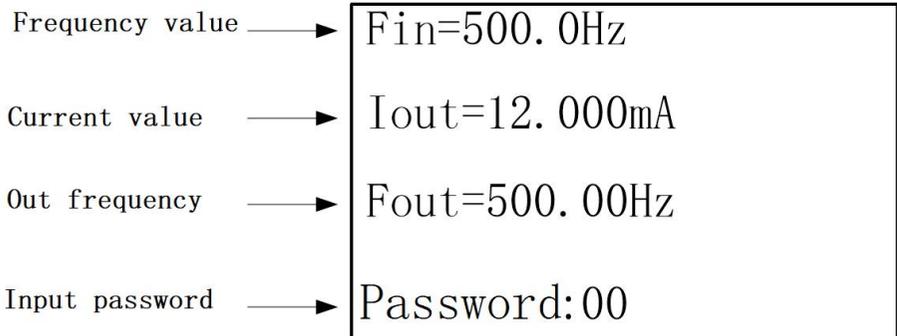


Figure 2 Auxiliary work interface

In the auxiliary interface, the signal frequency line has

different names to represent different operating states

◇ Fin-normal signal frequency

◇ FinC5--The signal belongs to 50Hz noise, and the output is cut off. At this time, the flow rate is not calculated

In the auxiliary interface, different names in the output frequency row represent different output states

◆ F_bas--Basic signal output, that is, according to the measured signal frequency output

◆ F_adj--Corrected output. For the detailed algorithm of correcting output according to multi-point K value, refer to the following chapter

◆ F_out--Frequency output, according to the measured signal, calculate the output of a certain frequency signal.

Signal frequency = (instantaneous flow rate / full flow rate) * 1000 (Hz)

◆ Pulse-Pulse output, the number of pulses calculated according to the "pulse factor" in the menu

◆ H-AL=0-High alarm not generated

◆ L-AL=0-Low alarm not generated

◆ H-AL=1--high alarm generation

◆ L-AL=1-Low alarm is generated

◆ NO-The current output is invalid

In the auxiliary interface, the value of the output current is displayed after the end of the power supply mode, and the actual output current value is displayed in the battery power supply mode; 0.0 is fixedly displayed (because there is no current output at this time)

The main interface and the auxiliary interface are switched by pressing the left key '+/S' and the right key '</E'.

Left key is + and down page, long press '+/S' to exit.

Right click < and flip the page up, long press </E> to enter and confirm.

In the auxiliary interface, long press the '</E' right key to enter password

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input mode. Users can select the required password digits by continuously pressing the '+/S' keys, and short press the '</E' key to move the cursor position. After entering two digits of the password, long press '</E' to enter the corresponding function settings menu; in password input mode, long press the '+/S' left key to return to the auxiliary interface and continue updating the displayed measurement value.

About the refresh speed of the main interface and auxiliary interface. In the engineer menu, there is an "environmental temperature" setting item. Under the power supply mode, if-10°C is selected, it will be refreshed once every 1.2 seconds; if-20°C is selected, it will be refreshed once every 8 seconds; under the battery supply mode, it will be refreshed once every 4 seconds.

5. Flow meter parameter setting menu

The flow meter menu consists of four sections: User Menu, Engineer Menu, Production Settings Menu. The Engineer Menu must include content for professional operators to set parameters. The Production Settings Menu is calibrated by the manufacturer when the flow meter leaves the factory. After leaving the factory, these parameters can only be modified under conditions with the appropriate equipment; otherwise, it may lead to measurement errors or malfunction of the flow meter!

In the menu, long press the '</ E' key to enter the parameter modification state of the selected item. If it is a numeric input type parameter, use the '+ / S' key to input numbers, and the '</ E' key to move the cursor position. After completing the input, long press the '</ E' key to confirm the input, and the transmitter will automatically update and store the settings. If the parameter is an option type, use the '+ / S' or '</ E' keys to select options up or down. After selecting the content, long press the '</ E' key to confirm, and the

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transmitter will automatically update and store the settings. Enter the password "61" to check the version number

(1) User Menu

Enter the password "22" to enter the user menu. The functions and parameters of each menu are as follows:

Table 1 User menu

NO.	Menu name	Function declaration
1	Unit selection The default is: m³/h	<p>Set the instantaneous flow unit and select it according to the type of flow algorithm</p> <p>Optional volume class: m³/h; m³/m; l/h; l/m; SG/h; SG/m</p> <p>Quality: t/h; t/m; kg/h; kg/m; lb/h; lb/m</p>
2	Algorithm selection by default: Conventional volumetric flow	<p>The flow algorithm is set, and the instrument compensates for the instantaneous flow rate according to the algorithm</p> <p>Optional items:</p> <p>Conventional volumetric flow rate (flow rate regardless of gas-liquid conditions)</p> <p>Conventional mass flow (density must be set)</p> <p>Standard gas volume flow</p> <p>Conventional gas mass flow rate (must be set to standard density)</p> <p>Steam temperature compensation for saturation</p> <p>Steam pressure compensation</p> <p>Overheated steam temperature and pressure compensation</p> <p>Specific algorithms (for user customization)</p>

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3	discharge coefficient The default value is 3600.0	The flow meter coefficient required for calculating the flow rate. The unit is P/m ³ (pulse/square)
4	fluid density The default is 1000.0	Set the density value of the fluid, in kg/m ³ (not allowed to be set to 0) (the density value used for mass algorithms is required, and is not useful for volume algorithms)
5	Full Flow The default value is 1000.0	Set the instantaneous flow corresponding to 20mA current output (not allowed to be set to 0). The unit is consistent with the unit selected in "Unit Selection"
6	Lower limit of flow removal The default value is: 0%	Set the percentage of full flow occupied by the set flow. When the measured flow is lower than this percentage, the calculated flow is 0 and the 4mA current is output.
7	Upper limit alarm flow The default value is 990.0	Set an upper limit alarm flow threshold, when the flow is higher than this value, output an alarm. The unit shall be the selected unit.
8	Lower limit alarm flow The default value is: 10.0	Set the lower limit alarm flow threshold, when the flow is lower than this value, output an alarm. The unit is selected.
9	damping period	The value is 2 to 32 seconds, which is used to display and smooth the current output. The default value is 4 seconds
10	postal address	Set the device address to 485Modbus, range 0-254 The default value is: 0

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11	Clear the cumulative amount	The accumulated quantity is cleared to 0 value, and the zeroing password is asked from the manufacturer
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(2)Engineer Menu

In the password input state, enter "33" to enter the engineer menu. The functions and parameters of each menu are as follows:

No.	Menu name	Function declaration
1	language The default is Chinese	Set the instrument language type Options: Chinese; English
2	Pulse selection The default value is: signal frequency The initial calibration should select the signal frequency, and the corrected output can be selected as the corrected frequency output	Select the output type according to the requirements, and each output is explained in detail on the main interface. Optional items: Signal frequency —— The signal frequency of the sensor (unmodified) The corrected frequency —— is the output frequency after correction by 5-point coefficients Frequency output —— Linear frequency of 0-1000Hz is output according to the flow range The equivalent pulse —— outputs the flow accumulation pulse with a selected pulse factor Upper limit alarm —— output the alarm switch signal higher than the upper limit of the alarm Lower limit alarm —— output alarm switch signal below the lower limit of alarm

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3	<p>pulse equivalency The default value is 0.01</p>	<p>It is only effective for the equivalent pulse output, which means how many cumulative flow units a pulse represents</p> <p>Options: 0.00001; 0.0001; 0.001; 0.01; 0.1; 1.0; 10.0; 100.0</p>
4	<p>485 baud rate The default is 9600, NO</p>	<p>Set the Modbus communication baud rate.</p> <p>Optional items: 4800Odd; 4800Even; 4800No; 9600Odd; 9600Even; 9600No</p>
5	<p>communication switch The default is "on"</p>	<p>Set Modbus to enable the communication function.</p> <p>Options: Off; On</p>
6	<p>Pressure shows The default value is: measurement</p>	<p>Set whether to display fluid pressure.</p> <p>Optional items: Measurement: The pressure value calculated from the measured pressure signal Default: "P≡" displays the value of the default pressure item setting in the following menu and is used for calculation Calculation: "P≈" shows the reverse calculation value of pressure when the saturated steam temperature compensation is displayed Note: The pressure item is not displayed</p>
7	<p>Default pressure The default value is 0.0KPa</p>	<p>Set the default gas pressure calculation value, unit of KPa.</p> <p>When selected as the default or when measuring pressure, this pressure is used for calculating the sensor failure (when exceeding twice the range).</p>

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		The main screen P is equal to the constant equal sign "P=" displayed after it.
8	reference pressure The default value is 101.3KPa	Set the reference end pressure value for high altitude correction when the absolute pressure is calculated by the gauge pressure sensor. The unit is KPa. The value of the absolute pressure sensor should be set to 0.0KPa
9	Temperature display The default value is: measurement	Set whether to display fluid temperature. Optional items: Measurement: The temperature value calculated from the measured platinum resistance signal is displayed Default: "T=" displays the value set in the default temperature item of the following menu and is used for calculation Calculation: "T≈" shows the reverse calculation value of temperature when saturated steam pressure compensation is performed Note: The temperature item is not displayed
10	Default temperature The default value is: 20°C	When the platinum resistance fault is set or measured (greater than 500°C), this temperature is used to calculate, and the main screen T is displayed with constant equal sign. The unit is °C.
11	Temperature measurement selection The default value is:	Select the type of resistor to measure the temperature. Options: Pt = 100; Pt=1000

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	Pt=1000	
12	Standard temperature The default value is 0.0°C	Set the calculated value of standard temperature. Options: 0°C; 20°C
12	ambient temperature The default value is: -10°C	Select the LCD refresh rate for different environments. Optional items: -10°C: When "-10°C" is selected in the normal environment, the working interface refreshes about 1.2 seconds -20°C: When the low temperature environment is set to "-20°C", the working interface refreshes about 6 seconds
13	Flow correction factor The default value of C is 1.0	The flow percentage Q_i ranges from 0 to 120%; the flow coefficient C_i ranges from 0.8 to 1.2. Flow Q0-Q4 (15,30,50,70,100%) The correction factor of the instrument is set at 5 points according to the flow increment sequence: C0-C4. C= standard flow / measured and displayed flow of this meter

Table 2 Description of engineer menu functions

Attachment: Troubleshooting

Conventional volumetric flow rate and conventional gas mass flow rate in algorithm selection:

The conventional volumetric flow rate in the algorithm refers to the non-compensated working condition flow rate displayed, which is used for liquids or uncompensated working condition gases. The standard gas volumetric flow rate is calculated according to the gas equation, and the conventional gas mass flow rate is calculated according to the standard volume multiplied by the standard density.

Flow correction factor and flow coefficient correction:

Flow Correction Factor: After calculating the flow rate according to the basic formula for a given condition, the flow is first corrected by multiplying it by the flow correction factor. The correction factor is typically set as a percentage relative to the full-scale flow at the reference point; the correction factor $C = \text{standard flow} / \text{uncorrected measured flow value}$. Linear interpolation is used between points. When not corrected, $C = 1$, and the correction value is limited to the range of 0.8-1.2. It is only effective for flow, linear frequency, and current.

Flow Coefficient Correction: This involves linearly correcting the flow meter coefficients. The correction typically starts with setting the average meter coefficient K in the user menu, then setting the calibration frequency for the meter at the reference point; input the flow coefficient corresponding to the frequency point. The coefficients between points are linearly interpolated and normalized to the average meter coefficient. When not correcting, set it to "off." It is effective for correcting frequency and flow, as well as linear frequency and current.

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Pulse output type and usage:

The signal pulses in the pulse output type track the original signal pulses and are typically used for initial calibration. The corrected frequency is the output frequency after linear correction based on the flow coefficient. The linear frequency output ranges from 0 to 1000 Hz, corresponding linearly to the instantaneous flow rate. At full flow, the output frequency is 1000 Hz. The correction factor C value is used for linear correction and compensation calculations, which are effective for frequency output. This type of output is commonly used in computer channels that measure frequency input. The pulse output is calculated based on cumulative flow, with maximum and minimum limits on the output value for each calculation cycle. An appropriate pulse equivalent must be selected to ensure that the number of pulses per cycle does not exceed the upper limit of 1000 pulses.

pulse equivalency:

The pulse equivalent is the output factor, which is the flow unit/pulse. That is, how many units of flow each pulse represents, and its value must keep the pulse output within 1000 pulses per measurement cycle.

Type status symbol for temperature pressure display:

The symbol "=" . The temperature pressure display indicates that the temperature pressure display is the measured value. The constant equal sign "≡" indicates that the temperature pressure display is the default value set.

The " ≈ " indicates that the temperature pressure display is the pressure calculated from the temperature or the temperature calculated from the pressure when the saturation steam temperature or pressure compensation algorithm is used.

Selection of ambient temperature:

Due to the slow response of LCD screens at low temperatures, making it difficult to see clearly, when the environment is below -10°C , you can choose the -20°C mode to update the screen approximately every 6 seconds, allowing data to be seen clearly at low temperatures. When the temperature is above -10°C , you can select the -10°C mode to restore normal refresh intervals within 2 seconds.

Temperature and pressure calibration during production and maintenance:

Temperature calibration should involve a standard resistor box or a corresponding calibrated resistor. After connecting the resistor to the appropriate menu, press the "E" key to confirm. If the value is correct, reconfirm and save. For modifications, press the "+" key to change the confirmation prompt to "Modify," then press "E" to save the new value. For Pt100, calibrate at 100 and 200 ohms. For Pt1000, calibrate at 1000 and 2000 ohms.

Output current calibration:

The calibration of the output current requires that the standard ammeter be connected in series with the current circuit. After pressing the "E" key on the corresponding 4/12/20mA item, there should be an approximate current output. At this time, the actual display value of the ammeter is input and confirmed to complete the calibration. Usually, three points should be calibrated at a time.

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