Product principle and application

The turbine flow sensor consists of a rotor and a pulse detector installed externally. When liquid flows into the turbine, it causes the rotor to rotate. The specific inner diameter makes the rotor speed directly proportional to the flow rate. The pulse detector converts the detected rotation of the rotor blades into a pulse signal proportional to the flow rate. It has a strong anti-impurity ability. When the tangential impeller rotates, it can release suspended impurities in the fluid at any time, preventing them from entangling on the blades of the tangential impeller. The turbine flowmeter is an industrial-grade product that is compact in structure, modular, easy to install, highly accurate, has good repeatability and is very applicable. Industrial-grade rotary flowmeters can be widely applied in water treatment, beverage, chemical, pharmaceutical, oil and other industries for purposes such as measurement, batching and control.

LED Display unit

LCD Display unit

Internal thread type

External thread type

Chuck type

Flange type

Internal thread type

External thread type

Cassette type

Flange type

Technical parameters

Verification conditions	Verification device	Standard meter method liquid flow verification device, static mass method liquid flow verification device	
	Environmental conditions	Ambient temperature	20℃
		Relative humidity	65%
Conditions of use	Medium temperature	T1 (General Type, Standard configuration	-20℃～80℃
		T2 (High-temperature Type, Customized)	-20℃～120℃
		T3 (High-temperature Type, Customized)	-20℃～150℃
	Ambient temperature	-20℃～60℃	
	Relative humidity	5%～90%	
	Atmospheric pressure	86Kpa～106Kpa	

Measurement range

Instrument diameter (mm)	Conventional flow range (m^3/h)	Expand the flow range (m^3/h)	Starting flow (m^3/h)	Maximum pressure loss*1 (KPa)
10	0.2～1.2	0.15～1.5	0.07	50
15	0.6～3.6	0.5～5	0.35	35
20	0.8～8	0.45～9	0.3	35
25	1～10	0.5～10	0.4	35
32	1.5～15	0.8～15	0.6	35
40	2～20	1～20	0.6	35
50	4～40	2～40	1	35
65	7～70	5～70	4	25
80	10～100	7～100	5	25
100	20～200	10～200	8	25
125	25～250	13～250	10	25
150	30～300	15～300	12	25
200	80～800	40～800	20	25
Accuracy class *2	Grade 0.5	Grade 1.0		

Usage features

The medium under test	No impurities, low viscosity, and no strongly corrosive liquid		
Enforce standards	Turbine flow sensor (JB/ T 9246-1999)		
Verification Regulation	Turbine flowmeter (JJG1037-2008)		
Instrument diameter and. Connection method	Flange connection type		DN15 - DN200
	Threaded connection type		DN4 - DN50
	Clamping connection type		DN4 - DN200
	Snap-on connection type		DN4 - DN80
Flange standard *1	Conventional standard		GB / T9113 - 2000
	Other standards	International Management flan	For example: German standard DIN, American Standard A N S I, Japanese standard JIS
		Domestic management of Flanders	For example: standards of the Ministry of Chemical Industry, standards of the Ministry of Machinery
Thread specification *2	Conventional specification		British standard pipe thread (external thread)
			(Refer to the standard GB/ T7307-2001
			Internal threads, spherical threads, N P T threads, etc

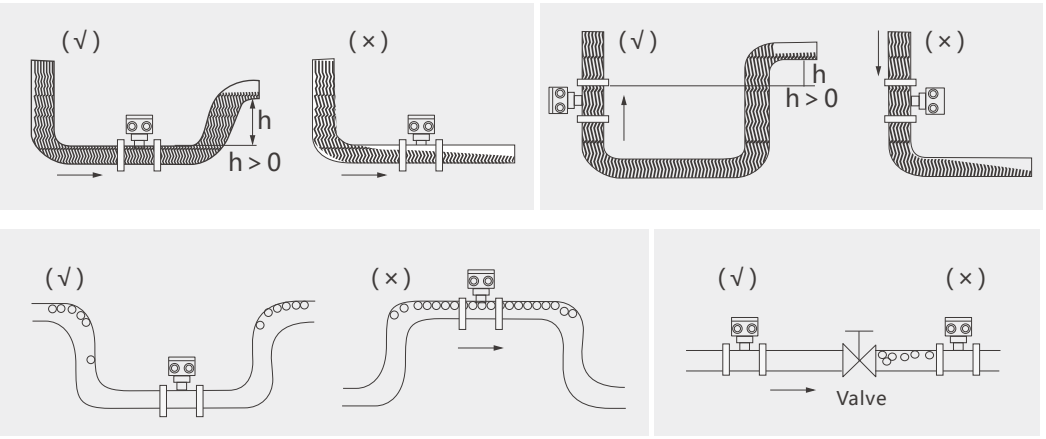
Model	Pulse Output type	Explosion-proof pulse Output type	4-20mA Output type	Intelligent display type		
Power supply	DC24V		DC24V	DC24V	3.6V Lithium battery	AC220V
Power consumption	< 1W		< 0.5W	< 2W	< 700uA	< 22VA
Protection grade	-	IP65				
Explosion-proof grade	-	ExdIICT6 Gb				
Electrical interface	-	M20 * 1.5 internal thread (NPT thread needs to be customized				

Material description

Type	Table body		Impeller		Front and rear guidance		Flange or clamp/chuck	
	Conventional	Customized	Conventional	Customized	Conventional	Customized	Conventional	Customized
Threaded connection	304	316	2 Cr 13	Duplex steel	304	316	-	-
Flange connection							304	316
Clamping connection							Carbon steel	304 / 316
Clamp connection							304	-

Installation Precautions

The upstream and downstream of the flowmeter must have sufficiently long straight pipe sections: the front straight pipe section is 10 times the diameter, and the rear straight pipe section is 5 times the diameter.



【 Installation Precautions 】

- Before installing the flowmeter on the new pipeline, please blow and clean it to prevent foreign objects in the pipeline from damaging the flowmeter.

When welding flanges, do not weld with the flowmeter on. After the flange is welded, the welding slag and burrs inside the pipeline must be cleaned.

When installing a flowmeter, pay attention to the direction and keep the arrow on the flowmeter's flow direction indicator consistent with the flow direction of the medium.

When installed outdoors, waterproof treatment should be done well. If the wiring position is higher than the case position,

Before the signal line enters the case, it should first bend downward and then upward into the case to prevent rainwater from seeping into the case along the cable.

Avoid installation in high-temperature (above 50℃) and low-temperature (below -20 ℃) environments. Youdaoplaceholder0 - Avoid installing in places with strong electromagnetic interference (such as high-power frequency converters, motors, etc.). When wiring, strong current and weak current should be separated.

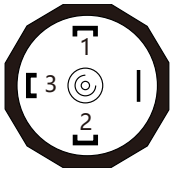
Avoid installing on pipelines subject to mechanical vibration. If installation is necessary, vibration reduction measures must be taken. For example, add a hose transition or shock-absorbing pads. Youdaoplaceholder0 - Avoid installing on overhead long pipelines where the previous pipeline sagging could cause seal leakage between the flowmeter and the flange; If installation is necessary,

Pipe support points should be set up near the upstream and downstream of the flowmeter.

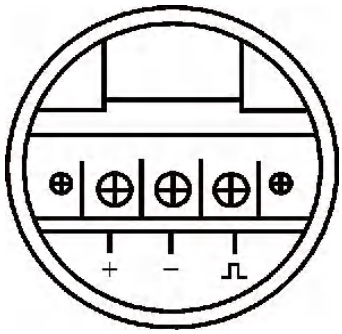
Electrical connection

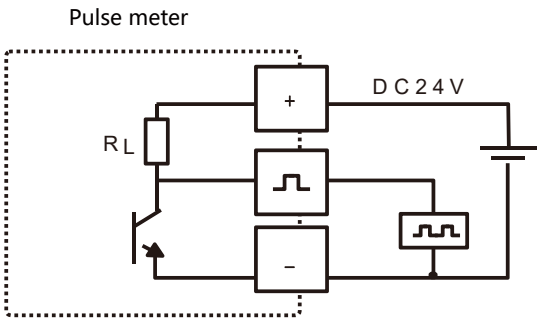
By setting the correct instrument coefficient through the PLC or integrator, you can find the instrument coefficient on the nameplate.
The instantaneous flow rate is calculated by the following formula
Q v = f/K*3600
In the formula:
Q v represents volumetric flow rate, with the unit of m³/h.
f is the frequency collected by the flowmeter, with the unit of Hz.
K is the instrument coefficient of the flowmeter, with the unit of L/m³
4 ~ 20mA current output type
You can find the variable feed limit value, that is, the maximum flow rate Qmax, on the nameplate or verification certificate.
The relationship between the instantaneous flow rate and the output current is as follows: Q = (I- 4) /1 6 * Qmax;
In the formula,
Q represents the instantaneous flow rate value; I is the output value of the current; Qmax represents the maximum flow rate.

Hirschmann plug

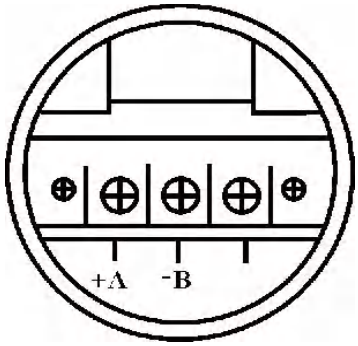
Hirschmann plug	DIN 175301-803 A		
		Two-wire system(4...20mA)	Three-wire system (pulse)
	U +	1	1
	U -	2	2
	S +	-	3

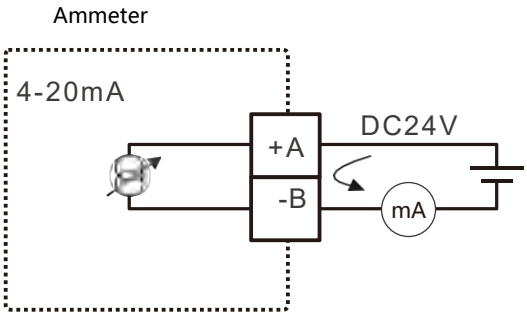
Stopwatch





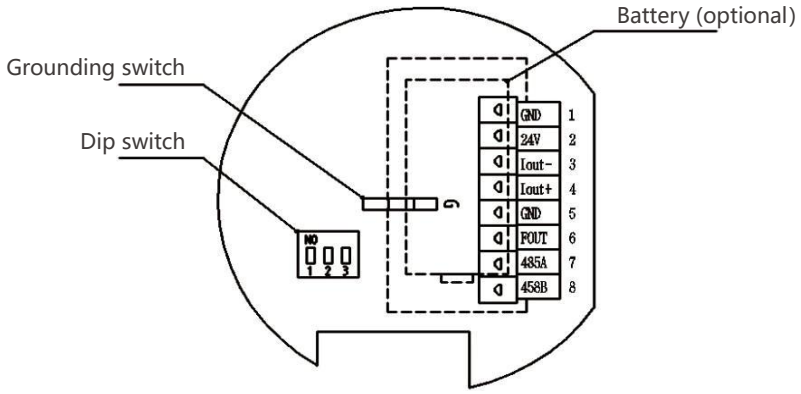
Pulse type: High-level amplitude >22V, low-level amplitude <0.8V, load capacity >1100Ω, pulse





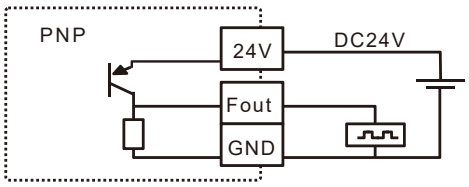
Current type: The current load resistance is less than 500Ω.

Smart meter

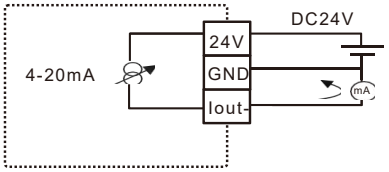


Terminal number	Terminal identification		Remarks
1	GND	Negative terminal of 24V external power supply	
2	2 4 V	Positive terminal of 24V external power supply	
3	Iout-	Current output terminal	Two/three-wire 4-20mA output and three-wire 0-20mA function
4	Iout+	Current output terminal	
5	G N D	2. Negative terminal of 4 V external power supply	
		Pulse output terminal	
6	FOUT		Pulse or equivalent pulse output It is related to the status of the dip switch
7	485A	RS485 communication terminal A	
8	485B	RS485 communication B-end	

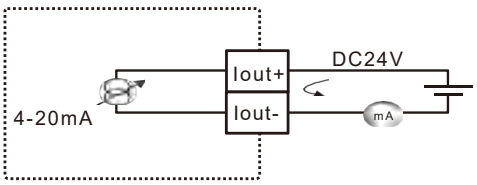
Pulse connection method
High-level amplitude >22V, low-level amplitude <0.8V, load energy >1100 Ω, pulse frequency ≤ 3000Hz



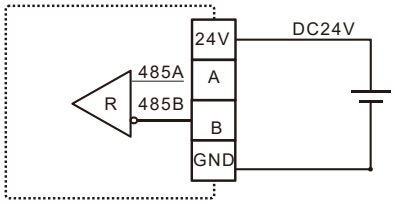
Three-wire current connection method: The current load resistance is less than 500Ω



Two-wire current connection method

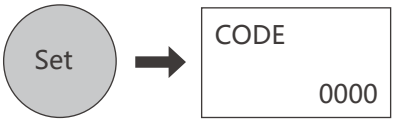


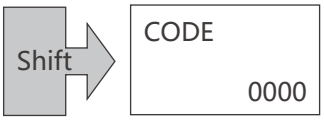
RS485 communication connection method
The protocol format is MODBUS-RTU protocol



Setup Instructions

Key instructions	Function Description
Settings	Enter the menu After setting the parameters, press the setting key to save the parameters and automatically scroll down the menu
Shift	Switch the screen display parameters Parameter modification shift key
Confirm	Save the modified values of the parameters Scroll down the menu in a loop
Upward	Increase the number
Downward	Reduce the number





First-level menu (Menu password: 0002)

L01	The decimal point position of the instantaneous flow rate is 0 to 4. 0 ~ 4 order for 0.0000, 00.000, 000.00, 000.0, 0000. This item may not be set.
L02	The decimal point position of the flow coefficient is 0 to 4. The sequence of 0 to 4 corresponds to 0.0000 and 00.000. 000.00, 000.0, 0000. I don't care about that.
L03	Sensor flow coefficient, unit: 1/ liter;
L04	The density value of the medium, unit: t/m ³, default is 1.000 This item can be used as a traffic correction factor.
L05	Instantaneous flow measurement unit: 0～3。 0：l/m；1：m3/min；2：m3/h； 3：l/h。
L06	Filtering time setting (s) : 1 to 20, with the default setting being 1;
L07	The small signal excision value ranges from 0 to 9999, with the default being 0. Signal excision is not enabled. A small flow rate value can be removed according to the actual situation.
L08	Line correction function selection: 0: OFF; 1: ON, default is OFF Do not enable the broken line correction function. Non-manufacturer personnel are not allowed to modify this parameter.
L09	20mA range setting; (This item is not available for dry battery power supply.)

Secondary menu (default password: 2222)

L11	Permission for resetting external magnetic steel. ON: Allow; OFF: Not allowed.
L12	Press the "Down" key to reset the permission. ON: Allow; OFF: Not allowed.

Three-level menu (super password fixed at 6210) :

BA0	4-20mA zero point adjustment There is no such thing as battery power supply, so it doesn't matter.
BAI	4-20mA full-scale adjustment; There is no such thing as battery power supply, so it doesn't matter.
L13	First-level menu password modification (0002);
L14	Secondary menu password modification (2222);
L15	Reset the integer part of the cumulative flow to zero.
L16	The decimal part of the accumulated flow is reset to zero.
L17	Frequency gain (0-7

Instrument coefficient compensation, that is, multi-point line correction of the instrument coefficient K (see P 9), a total of 8 points (Fi, Ki) can be set.
(i=1,2... 8
(1) Fi is the original frequency, directly proportional to the flow rate, with the unit being Hz.
Ki is the compensation coefficient at the corrected frequency point, dimensionless, and related to the instrument coefficient K (P9 parameter)

The system is as follows:

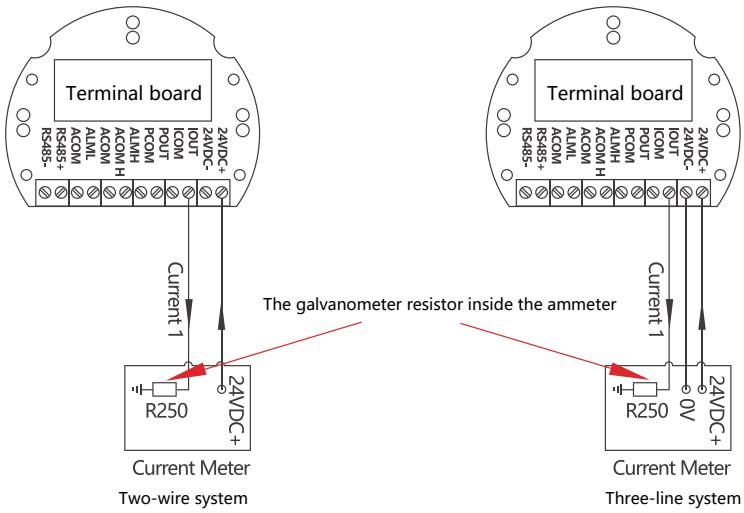
$$K_i = \frac{K_{ic}}{K} \qquad Q_c = \frac{F_c}{K_1 * K}$$

If F c < F 1
Among them, Kic is the actual coefficient at the Fi frequency point, which is generally obtained through real current calibration.

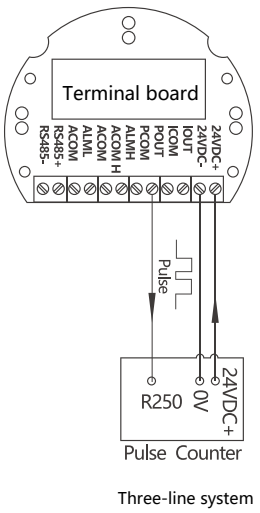
Fault phenomenon	Fault analysis	Solution
There is flow passing through, and the instantaneous flow of the instrument is zero	1. Wiring error.	Check the wiring of the instrument.
	2. The internal parameters of the instrument were modified.	Test the parameters of the instrument according to the verification certificate.
	3. The signal acquisition coil is damaged, affecting the signal transmission. Even if there is flow passing through, the signal cannot be transmitted to the converter.	Slide the signal acquisition coil with a magnetic screwdriver.
	4. The impeller is stuck.	Check the impeller.
When there is no flow passing through the instrument, the instrument will display the instantaneous flow	There is severe vibration in the pipeline.	It is suggested to add vibration reduction measures.
	2. Whether the instrument is properly grounded.	Check the grounding.
	3. There is magnetic field interference on site, such as frequency converters, motors, solenoid valves, etc. (50HZ power frequency interference on site.) To a certain extent, it may affect the use of the instrument. The calculation of power frequency interference is Q= 3600f/ k (f =50HZ,k= the coefficient of the instrument).	Through calculation, it can be determined whether there is power frequency interference in the instrument, and it is recommended to change the installation position
	4. The pipeline stop valve of the instrument was not fully closed.	Check the valve.
The instrument is measuring normally, but the measured value is inaccurate	There is a problem with the internal parameters of the instrument	Test the parameters of the instrument according to the verification certificate.
	2. The on-site pipelines do not meet the requirements, containing gas or having excessively high viscosity.	Operate strictly in accordance with the installation instructions and precautions in the manual.
	3. Regarding the issue with the instrument movement, when removing the instrument, the impeller should be blown and run quickly.	If damaged, it is recommended to contact the manufacturer.

Electrical connection of explosion-proof joint

Wiring diagram for 4-20mA current output



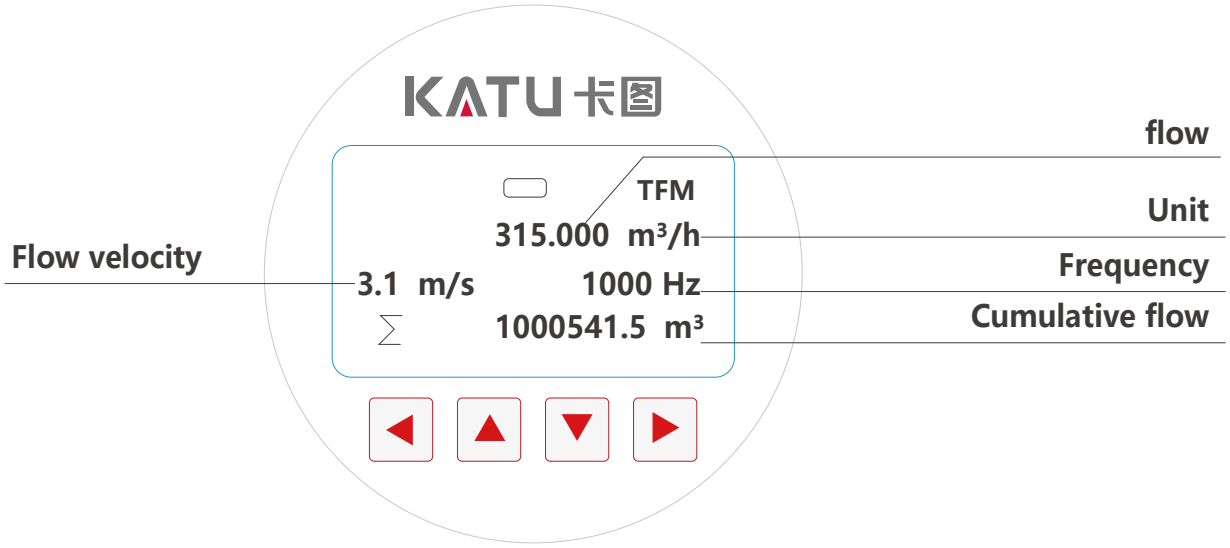
Pulse output wiring diagram



Definition of terminal blocks

Silk-screen printing of terminal blocks	Function	Remarks
24V+	DC 18-36V+	Power supply: 24V+
24-	DC 18~36v-	Power supply: 24V-
IOUT	4~20Ma+	The load current is less than or equal to -500 ohms
ICOM	4~20mA-	
POUT	Frequency & Pulse output +	
PCOM	Frequency & pulse output common terminal	
ALM H	High alarm	It is recommended to use a 24VDC intermediate relay with a load current of no more than 30mA
ACOM	High alarm public terminal	
ALM L	Low alarm	
ACOM	Low alarm public end -	
RS+	RS485+	RS485 terminal block
RS-	RS485-	

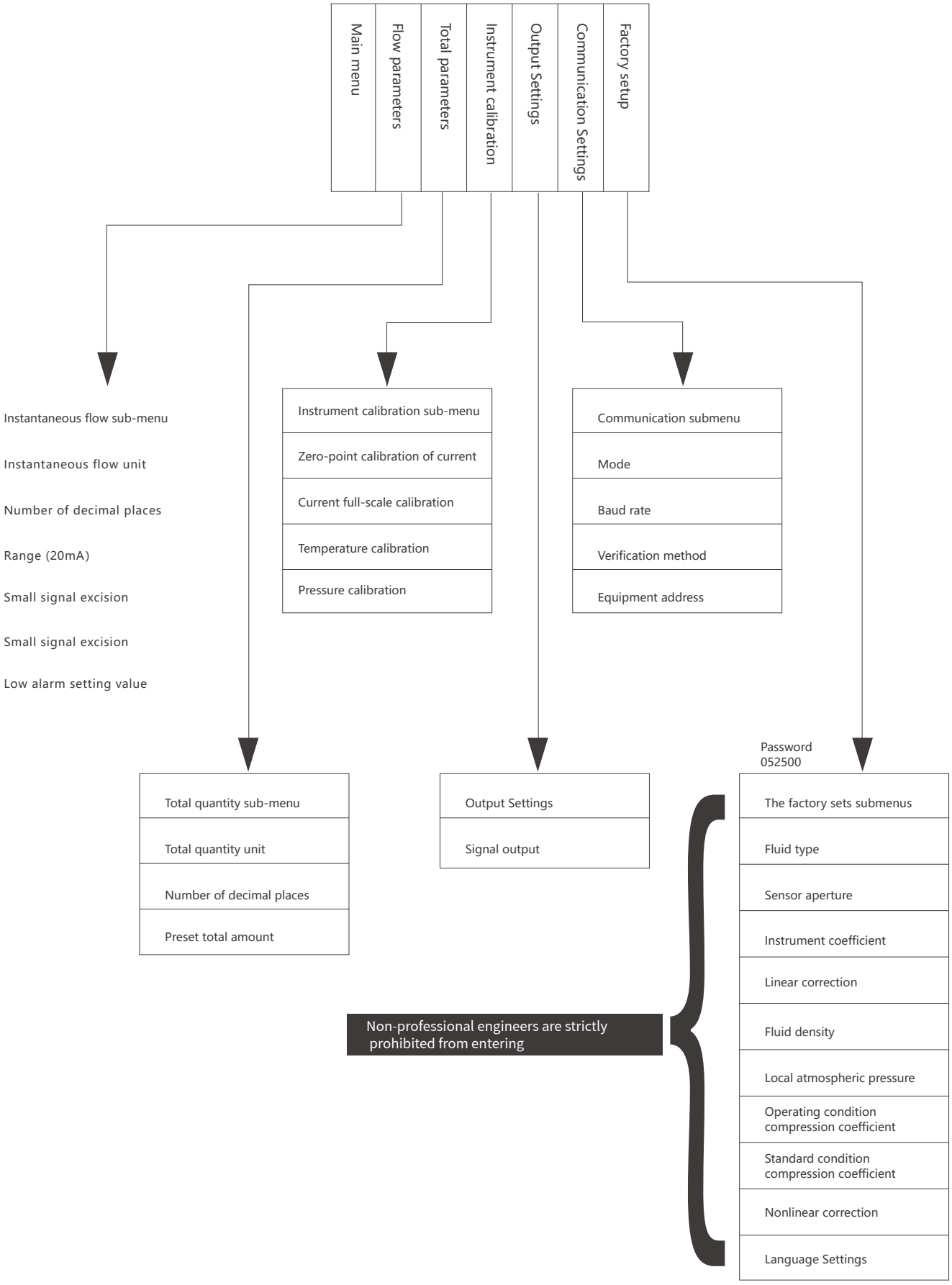
Panel schematic diagram



Left shift, parameter setting confirmation key and exit subdirectory key;	The factory is equipped with a fast key, a down key, and a number decrement key.
Up shift, number decrement keys;	Move right and enter the parameter Settings.

Adjustment method

Converter menu structure



Instantaneous flow parameter setting

Flow unit	Options: L/sL/mL/h m after m/s m after/m after the Nm/h after USG USG/m/s/h USG/hKg/sKg mKg/ht/st/mt/h
	Default value: m³/h
	Define the unit of instantaneous flow rate
	L(liters),h(hours),t(tons),s(seconds),m(minutes)
The number of decimal places of the flow rate	Option: 0123, default value: 1 defines the decimal places of the instantaneous flow rate
Range	Floating-point number: 99999999.00-0.00 m³/h, default value: 100.0 m³/h
	When the instantaneous flow rate reaches the range, the converter outputs 20mA. Changing this parameter will affect the current output, high alarm and low alarm, etc.
	Note: When you modify this set value (range), please pay attention to the unit of this parameter (range). You can modify the unit of this parameter (range) as needed.
Small signal excision	Floating-point number: 9.90-0.00%, default value: 0.0%. This set value is a percentage of the range
High alarm	Floating-point number: 99.00-1.00%, default value: 90.0%
	This setting value is a percentage of the range. For example, if this value is set to 10, it is equal to 10% of the range. If the absolute value of the instantaneous flow rate is greater than (range ×10%), the converter outputs a high alarm signal and the high alarm contact closes.
Low alarm	Floating-point number: 99.00 to 0.00%, default value: 0.0%
	This setting value is a percentage of the range. For example, if this value is set to 10, it is equal to 10% of the range. If the absolute value of the instantaneous flow rate is less than (range ×10%), the converter outputs a low alarm signal and the low alarm contact closes.
Damping time	Floating-point number: 30.0 to 0.1, default value: 1

Total quantity setting: Define the relevant parameters of the total quantity.

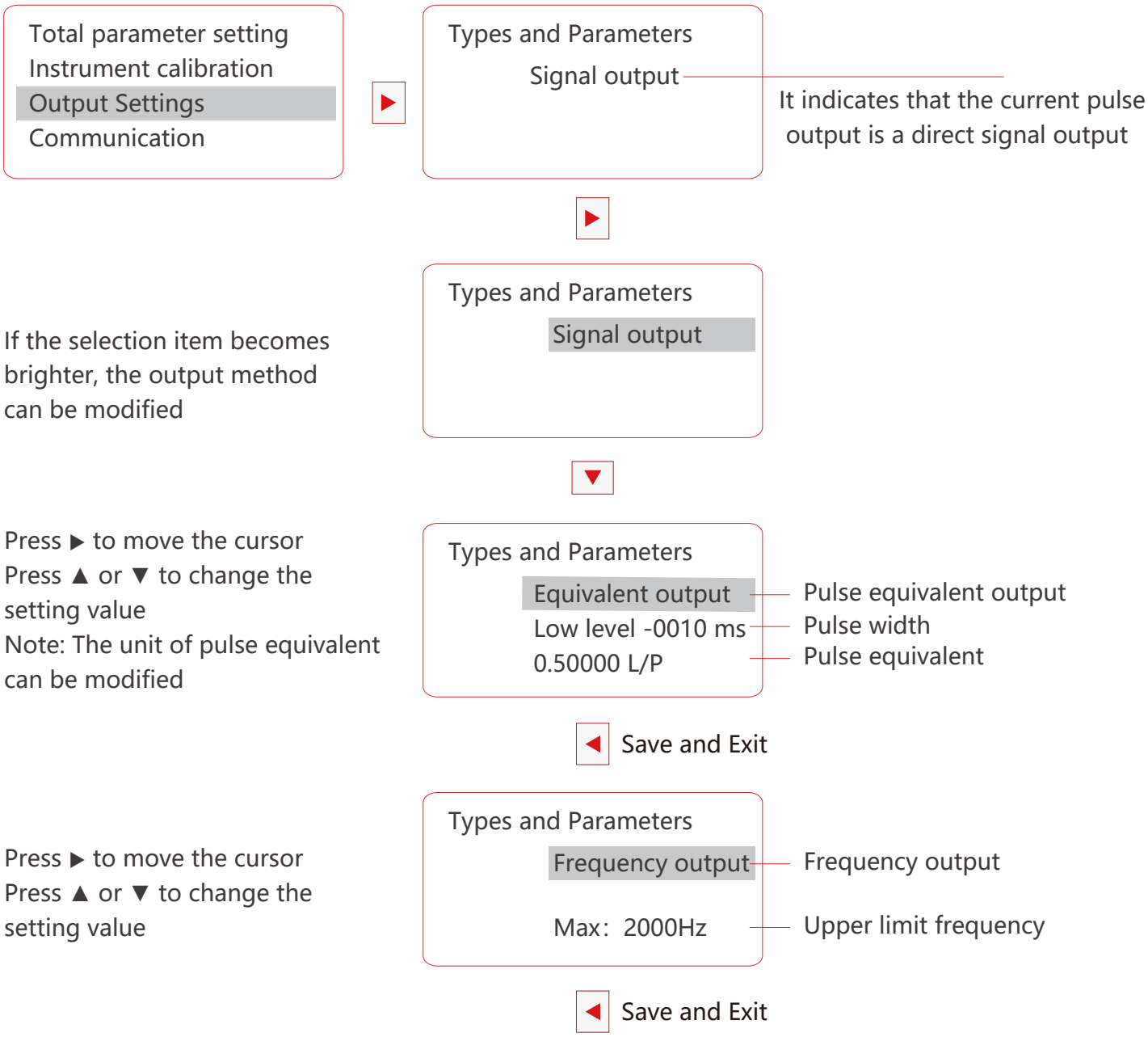
Total quantity unit	Options: L(liter)m³ nm ³ USG Kg t(ton), default value: m³ defines the total unit
The total amount is several decimal places	Option: 0123, default value: 1 define the decimal places of the total amount
Preset total amount	Option: 99999999.00-0.00 m3/h, default value: 0.0 m3/h. Clear the total amount or set the total amount value

Instrument calibration: Calibrate the current output and the temperature and pressure measurement circuits.

Zero-point calibration of current	Floating-point number: 5.0-3.0, default value: 0.0 After entering this sub-menu, use a multimeter to measure the current output value. If the current value is not equal to 4.0mA, input the true value measured by the multimeter, and the converter will automatically complete the calibration of the 4mA current output. Standard value. Note: If the current output deviation is too large, multiple corrections are required to recheck the requirements. The maximum input value for each correction is 5.0
Current full-scale calibration	Floating-point number: 21.0-19.0, default value: 0.0 After entering this sub-menu, use a multimeter to measure the current output value. If the current value is not equal to 20.0mA, input the true value measured by the multimeter, and the converter will automatically complete the 20mA current output calibration. Note: If the deviation of the current output is too large, multiple corrections are required to recheck the requirements, each time The maximum corrected input value is 21.0

Output Settings: Set the parameters for three output modes: equivalent output, frequency output, and signal output

Frequency upper limit	Floating-point number: 5000.0-100.0 Hz, default value: 2000.0 Output frequency (Hz)= Instantaneous flow rate (m^3/h)÷ range (m^3/h)× upper frequency limit (Hz) For instance, if the instantaneous flow rate is 100m^3/h, the range is 200m^3/h, and the upper limit of the frequency is set to 2000HZ, then the output frequency corresponding to the instantaneous flow rate of 100m^3/h at this time is 1000 Hz
Pulse equivalent	Floating-point number: 9999.0-0.0, default value: 0.0 The unit of pulse equivalent is: L(liters)/ pulse. Users can change the unit of pulse equivalent as needed to: USG/P,Kg/P,t/P,Nm^3/P,m^3/P
Pulse width h(ms)	Floating-point number: 1000.0 to 0.0ns, default value: 0.0 When the pulse width is set to "0", the duty cycle of the pulse is 1:1
Signal output	Original signal output Note 1. It is merely a distinction between frequency output and equivalent output 2. Nonlinear correction also has an effect on the output of the original signal 3. It is related to the instrument coefficient K F(HZ)=3600/(Q*K) Q: Instantaneous flow rate (m^3/h); K: Instrument coefficient


Total parameter setting
Instrument calibration
Output Settings
Communication
Types and Parameters
Signal output
It indicates that the current pulse output is a direct signal output
Types and Parameters
Signal output
If the selection item becomes brighter, the output method can be modified
Types and Parameters
Equivalent output
Low level -0010 ms
0.50000 L/P
Pulse equivalent output
Pulse width
Pulse equivalent
Press ▶ to move the cursor
Press ▲ or ▼ to change the setting value
Note: The unit of pulse equivalent can be modified
Save and Exit
Types and Parameters
Frequency output
Max: 2000Hz
Frequency output
Upper limit frequency
Press ▶ to move the cursor
Press ▲ or ▼ to change the setting value
Save and Exit

Mode	Option: M odbus - R TU M odbus - ASCII Default value: M odbus-R TU
Baud rate	Option : 1 2 0 0 2 4 0 0 4 8 0 0 9 6 0 0 1 9 2 0 0 3 8 4 0 0 Default value: 19200 Note: Please set the Baut rate not to be lower than 96 0 0
Verification method	Options: No verification, even verification, odd verification Default value: Odd parity
Equipment address	Number value: 2, 4, 7 to 1, missing value: 1

How to set parameters

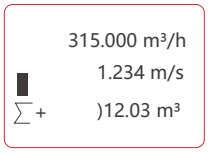


Figure 1 Instantaneous flow display interface

Press ▶ To enter the menu Settings, as shown in Figure 2:

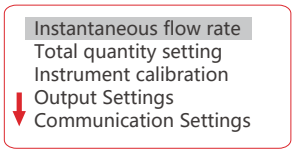


Figure 2

In the interface shown in Figure 2, pressing ▼ or ▲ allows you to select different sub-menus. Press ◀ to return to the flow display interface, as shown in figure 1; Press ▼ or ▲ to select the sub-menu, and press ▶ to enter the sub-menu to set the parameters. For example: We need to set the "Instantaneous flow Parameter". When the sub-menu of the instantaneous flow parameter lights up, pressing ▶ will display as shown in Figure 3 below:

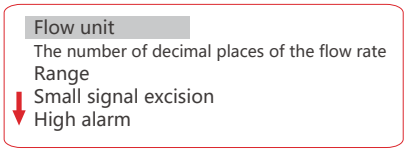


Figure 3

Press ▼ or ▲ to select the parameters you modify. The selected parameters will be highlighted. If you need to return to the menu shown in Figure 2, press ◀; If you need to enter the next-level menu, press ▶ to set the parameters, as shown in Figure 4:

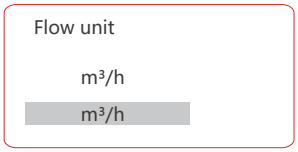


Figure 4

In this case, press ▼ or ▲ to modify the parameters. For example, as shown in Figure 4, if you need to change the instantaneous flow unit "m³/h" to "m³/m", pressing ▲ will change the instantaneous flow unit to "m³/m", as shown in Figure 5

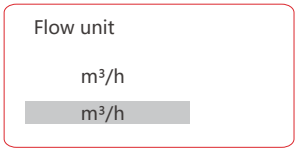


Figure 5

After modifying the parameters, if you need to save the Settings, press ◀ and the system will save them automatically.
As shown in Figure 6

In this case, press ◀, save the setting value and push out (as shown in figure 3).

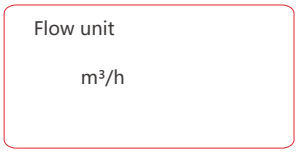


Figure 6

RS485 communication address table

Variable name	Register starting address	Register length	Instruction code	Data types
Instantaneous flow rate	0x01	0x02	0x04	Floating-point number
Instantaneous flow unit	0x03	0x01	0x04	Integer type
Total amount	0x04	0x04	0x04	Double precision
Total quantity unit	0x08	0x01	0x04	Integer type
Temperature	0x09	0x02	0×04	Floating-point number
Pressure	0x0b	0×02	0x04	Floating-point number
Total amount (m ³)	0x0d	0x02	0x030x04	Floating-point number
Instantaneous flow rate	0x14	0x02	0×04	Floating-point number
Total amount	0x16	0x02	0x04	Floating-point number
Temperature	0x18	0x02	0x04	Floating-point number
Pressure	0x1a	0x02	0x04	Floating-point number
Instantaneous flow rate	0x1e	0x02	0x04	float inverse
Total amount	0x20	0x02	0x04	float inverse
Temperature	0×22	0x02	0x04	float inverse
Pressure	0×24	0x02	0x04	float inverse

Unit definition

	Unit	Code	Unit	Code
Instantaneous flow rate	Nm³/h	0x00	usg/h	0×09
	Nm³/m	0×01	usg/m	0x0a
	Nm³/s	0×02	usg/s	0x0b
	m³/h	0×03	kg/h	0×0c
	m³/m	0×04	kg/m	0x0d
	m³/s	0×05	kg/s	0x0e
	L/h	0x06	t/h	0x0f
	L/m³	0x07	t/m	0x10
	L/s	0x08	t/s	0x11
Total amount	Nm3	0x00		
	m³	0×01		
	L	0x02		
	usg	0×03		
	kg	0×04		
Temperature	t	0×05		