Target Flow Meter Manual

HONGQI INSTRUMENT(JIANGSU) CO.,LTD.

The target flow meter was applied to industrial flow measurement in the 1960s. It is mainly used to solve the flow measurement of high viscosity and low Reynolds number fluids. It has experienced two development stages of pneumatic and electric meters. The intelligent target flow meter is based on the measurement principle of the strain gauge type flow meter, adopted a new form of differential sensor. Adopting the new differential sensor is the key core of the new product to achieve high precision and high stability. It has completely changed the original strain gauge target flow meter with large temperature drift, poor anti-overload (shock) capability, static sealing point, etc. All kinds of defects not only play the original technical advantages of the target flow meter, but also have the measurement accuracy comparable to the volumetric flow meter. In addition to its unique anti-interference and anti-impurity performance, it can replace the conventional flow meter. The measured flow metering problem has good adaptability especially in the case of small flow rate, high viscosity, easy condensation and easy plugging, high temperature, low temperature, strong corrosion, strong vibration and so on. It has been widely used in flow measurement in various fields such as metallurgy, petroleum, chemical, energy, food, and environmental protection.

I. Principle and Characteristics

1.Structure

The intelligent target flow meter mainly consists of a measuring tube (housing), a new type of sensor (including a choke element), an integrated display and an output part. According to different media and working conditions, it is necessary to select the appropriate sensor. Therefore, the user provides accurate measurement objects and parameters, and the appropriate sensor that the manufacturer chooses is the key to ensure the accuracy of measurement.

2. Working principle

When the medium flows in the measuring tube, the pressure difference caused by its own kinetic energy passes through the choke (target flow meter), and has a force on the choke, the force is proportional to the square of the medium flow rate. The mathematical formula is expressed as follows:

$$F=C_dA\rho\cdot V^2/2$$

F——Force acting on the spoiler (kg)
$\mathbf{C_d}$——Object resistance coefficient
A——The axial projection area of the flow block to the measuring tube (mm^2)
ρ——Medium density under working conditions (kg/m^3)
V——The average flow rate of the medium in the measuring tube (m/s)

The force F received by the spoiler (target) is transmitted to the sensor via a rigidly connected transmission member (rod), and the sensor generates a voltage

Signal output: **V=KF**

V——voltage (mV) of the sensor output, K—proportional constant,

F——force acting on the flow block (target) (kg)

After the voltage signal is preamplified, AD converted, and computerized, the corresponding instantaneous flow rate and cumulative total amount can be obtained.

3. Product features

- The whole instrument structure is solid and has no moving parts, and the plug-in structure is easy to disassemble;
- A variety of anti-corrosion and high temperature resistant materials (such as Hastelloy, titanium, etc.) can be selected;
- The sensor is not in contact with the measured medium, there is no wear of the parts, and can be used safely and reliably;
- There are a variety of installation methods to choose from, such as the choice of online plug-in type, the installation cost is low;
- With integrated temperature, pressure compensation, direct output quality or standard;
- Optional small signal cutoff, nonlinear correction, filter time selection;
- Can accurately measure the flow of gas and liquid under various conditions of normal temperature, high temperature 350 degree and low temperature -100 degree condition;
- High sensitivity, able to measure ultra-small flow, it can measure low flow rate of 0.8m / s, wide measuring range, up to 1:30;
- Accurate measurement, the accuracy can reach 0.2%;
- Good repeatability, generally 0.05% to 0.08%, fast measurement;
- The pressure loss is small, only about 1/2 ΔP of the standard orifice plate;
- Anti-interference, anti-impurity ability; strong anti-vibration, pulsating flow can be measured within a certain range.
- The flow block can be changed according to the actual need, to change the flow block (target piece);
- Low-power battery on-site display, can directly read the indication value online, the display can read both instantaneous and cumulative flow;
- A variety of output forms, can pass a variety of parameters;
- Measured bidirectional flow, cumulatively measured in positive and negative directions;
- It can measure the heat of the liquid and display the heat enthalpy value;

II. Technical parameters and content

1. Main technical parameter list

Measured medium liquid	gas, steam		
Nominal diameter	Flange type 15～500mm	Clamped type 15～500mm	Insert type 65～5000mm
Nominal pressure	0.6～42MPa	0.6～42MPa	0.6～42MPa

Medium temperature	-100 ° C ~ +200 ° C
Accuracy	±1.5%
Range	1:10 (liquid, gas)
Compensation form temperature compensation	pressure compensation
Repeatability	0.1% to 0.25%
Power supply external power supply	24VDC
Output form Field display	4~20mA, two-wire system; RS485/RS232
Measuring tube material carbon steel	stainless steel; can also be negotiated according to user requirements
Explosion-proof mark	Explosion-proof type (ExdIICT4)
Protection level	IP65; IP67
Flange Specifications	Flow meter connection flange specifications are subject to GB/T series standards, and can also be specially processed according to user requirements.

2. Typical application

Gases: gas, air, hydrogen, natural gas, nitrogen, liquefied petroleum gas, hydrogen peroxide, flue gas, methane, butane, chlorine, etc.

Liquids: heavy oil, paraffin, asphalt, sulfuric acid, edible oil, residual oil, acetone, diesel, mine water, detergent, soy sauce, gasoline, silicone oil, syrup, solvent, perfume, sea water, aviation kerosene, soap and ketone water, glucose, Vegetable oleic acid, brine, paste, ink, coolant, glycol, mineral oil, liquid sugar, hydrochloric acid, automotive paint, resin, butter, vegetable oil, liquid oxygen, shampoo, toothpaste, gel, fuel, milk , bleach, conditioner, soda, additives, cleaning agents, alkaline, ammonia, marine oil, chemical reagents, kerosene, glycerin, dyes, water, nitric acid, high boiling organic solutions, lard, alcohol, oil, ethylene, poly Propylene, a stupid, etc.

Steam: superheated steam, saturated steam.

III. The flow meter measurement range selection (larger flow range can be customized)

1.Standard water flow measurement range table

Nominal caliber DN(mm)	Flow meter measurement range(m3 /h)	Target ratio range	Maximum pressure drop（kpa）
15	0.1～3	0.8～0.5	75.53
20	0.17～5	0.8～0.5	55.12
25	0.3～9	0.8～0.4	34.45
32	0.5～14	0.8～0.3	24.12
40	1.0～24	0.8～0.3	17.23
50	1.5～40	0.8～0.3	6.89
65	2.5～60	0.7～0.35	5.51
80	3.5～90	0.7～0.35	4.31
100	5～140	0.7～0.3	2.76
125	6～200	0.7～0.3	2.07
150	10～300	0.6～0.25	1.38
200	18～560	0.6～0.25	0.89
250	25～800	0.5～0.25	0.56
300	40～1200	0.5～0.2	0.35
350	50～1500	0.5～0.2	0.01
400	65～2000	0.5～0.2	0.07
450	90～2600	0.4～0.2	0.06
500	110～3300	0.4～0.2	0.05
550	140～4100	0.35～0.2	0.04
600	170～5000	0.3～0.15	0.03
700	230～6800	0.3～0.15	0.011
800	300～9000	0.3～0.15	0.0083
900	370～11000	0.3～0.15	0.0062
1000	470～14000	0.2～0.1	0.0055
1100	560～16000	0.2～0.1	0.0041
1200	670～20000	0.2～0.1	0.0034
1300	780～23000	0.2～0.1	0.0028
1400	900～27000	0.2～0.1	0.0018
1500	1050～31000	0.2～0.1	0.0016

1600	1200～32500	0.2～0.1	0.0014
1700	1350～36500	0.2～0.1	0.0012
1800	1510～40800	0.2～0.1	0.0011
1900	1680～45500	0.2～0.1	0.0010
2000	1850～50000	0.2～0.1	0.0009
2100	1980～55800	0.2～0.1	0.0008

Note: Actual pressure drop = (actual flow / full scale flow) × full scale maximum pressure drop.

2.Selection calculation

The selection of the intelligent target flow meter needs to be calculated to convert the actual flow into an equivalent standard flow, and then select the appropriate diameter and model according to the selection table. Calculated as follows:

Liquid medium: q0=q1(ρ/ρ0)^1/2

Gas medium: Q0=Q1(ρ/ρN) ^1/2

Q0——standard water flow (m3/h) Q0——standard dry air flow (Nm3/h)

Q1——actual liquid medium full-scale flow (m3/h)

Q1——The actual gas medium standard state full-scale flow rate (m3/h)

ρ0——the density of standard state water

ρN - standard dry air density

ρ - actual media density

Standard conditions are:

Standard state pressure: Po=101.325kPa (absolute) Standard state temperature: t0=20°C Standard state air density: ρ air = 1.293kg/m3 Standard state water density: ρ water =999.8kg/m3

3. Saturated water vapor flow measurement range under working condition pressure

Nominal Diameter DN (mm)	measurement range（pressure） t/h									
	0.1Mpa	0.2Mpa	0.3Mpa	0.4 Mpa	0.5Mpa	0.6 Mpa	0.8Mpa	1.0Mpa	1.5Mpa	2.0Mpa
15	0.002 ~0.02	0.003~ 0.03	0.005~ 0.05	0.007~ 0.07	0.008~ 0.08	0.009~ 0.09	0.012~ 0.12	0.015~ 0.15	0.023~ 0.23	0.03~0 .3

20	0.003~0.03	0.006~0.06	0.009~0.09	0.012~0.12	0.015~0.15	0.017~0.17	0.022~0.22	0.028~0.28	0.04~0.4	0.055~0.55
25	0.005~0.05	0.009~0.09	0.014~0.14	0.019~0.19	0.02~0.2	0.027~0.27	0.035~0.35	0.044~0.44	0.065~0.65	0.085~0.85
32	0.008~0.08	0.016~0.16	0.023~0.23	0.032~0.32	0.036~0.36	0.044~0.44	0.056~0.56	0.072~0.72	0.1~1.0	0.14~1.4
40	0.012~0.12	0.025~0.25	0.036~0.36	0.045~0.45	0.058~0.58	0.069~0.69	0.09~0.9	0.11~1.1	0.16~1.6	0.22~2.2
50	0.02~0.2	0.038~0.38	0.057~0.57	0.075~0.75	0.09~0.9	0.1~1.0	0.14~1.4	0.17~1.7	0.26~2.6	0.34~3.4
65	0.035~0.35	0.065~0.65	0.1~1.0	0.13~1.3	0.15~1.5	0.18~1.8	0.24~2.4	0.29~2.9	0.44~4.4	0.58~5.8
80	0.05~0.5	0.1~1.0	0.15~1.5	0.18~1.8	0.23~2.3	0.27~2.7	0.36~3.6	0.45~4.5	0.66~6.6	0.88~8.8
100	0.08~0.8	0.15~1.5	0.23~2.3	0.28~2.8	0.36~3.6	0.42~4.2	0.56~5.6	0.7~7.0	1.0~10	1.3~13
125	0.12~1.2	0.24~2.4	0.35~3.5	0.48~4.8	0.56~5.6	0.68~6.8	0.89~8.9	1.1~11	1.6~16	2.1~21
150	0.18~1.8	0.35~3.5	0.5~5.0	0.7~7.0	0.82~8.2	0.96~9.6	1.2~12	1.5~15	2.3~23	3.1~31
200	0.32~3.2	0.6~6.0	0.9~9.0	1.2~12	1.4~14	1.7~17	2.2~22	2.8~28	4.1~41	5.5~55
250	0.5~5.0	1.0~10	1.4~14	1.9~19	2.2~22	2.7~27	3.5~35	4.4~44	6.5~65	8.6~86
300	0.7~7.0	1.4~14	2. ~20	2.5~25	3.3~33	3.9~39	5~50	6.2~62	9.2~92	12~120
350	1.0~10	1.9~19	2.8~28	3.5~35	4.4~44	5.2~52	7~70	8.5~85	12~120	16-160
400	1.3~1	2.5~25	3.6~36	4.7~47	5.8~58	6.8~68	9~90	11~110	16~16	22~22

	3								0	0
450	1.6~16	3.1~31	4.6~46	6.0~60	7.4~74	8.6~86	11~110	14~140	21~210	27~270
500	2.0~20	3.8~38	5.6~56	7.0~70	9.1~91	10~100	14~140	17~170	26~260	34~340

4.Standard dry air flow measurement range table

Nominal Diameter DN (mm)	Measurement range（pressure） Nm^3 /h								
	0.01MPa	0.1MPa	0.2MPa	0.3MPa	0.4MPa	0.6MPa	0.8MPa	1.0MPa	2.0MPa
15	2 ~20	4~40	6~60	8~80	10~100	14~140	18~180	22~220	42~420
20	3~30	6~60	9~90	12~120	15~150	21~210	27~270	33~330	63~630
25	5~50	1~100	15~150	20~200	25~250	35~350	45~450	55~550	105~1050
32	8~80	16~160	24~240	32~320	40~400	56~560	72~720	88~880	168~1680
40	13~130	26~260	39~390	42~420	65~650	91~910	117~1170	143~1430	273~2730
50	20~200	40~400	60~600	80~800	100~1000	140~1400	180~1800	220~2200	420~4200
65	35~350	70~700	105~1050	140~1400	175~1750	245~2450	315~3150	385~3850	735~7350
80	50~500	100~1000	150~1500	200~2000	250~2500	350~3500	450~4500	550~5500	1050~10500
100	80~800	160~1600	240~2400	320~3200	400~4000	560~5600	720~7200	880~8800	1680~16800

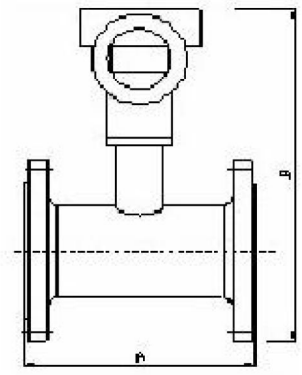
125	130~1300	260~2600	390~3900	420~4200	650~6500	910~9100	1170~11700	1430~14300	2730~27300
150	180~1800	360~3600	540~5400	720~7200	900~9000	1260~12600	1620~16200	1980~19800	3780~37800
200	300~3000	600~6000	900~9000	1200~12000	1500~15000	2100~21000	2700~27000	3300~33000	6300~63000
250	500~5000	1000~10000	1500~15000	2000~20000	2500~25000	3500~35000	4500~45000	5500~55000	10500~105000
300	750~7500	1500~15000	2250~22500	3000~30000	3750~37500	5250~52500	6750~67500	8250~82500	15750~157500
350	1000~10000	2000~20000	3000~30000	4000~40000	5000~50000	7000~70000	9000~90000	11000~110000	21000~210000
400	1300~13000	2600~26000	3900~39000	4200~42000	6500~65000	9100~91000	11700~117000	14300~143000	27300~273000
450	1700~17000	3400~34000	5100~51000	6800~68000	8500~85000	11900~119000	15300~15300000	18700~187000	35700~357000
500	2000~20000	4000~40000	6000~60000	8000~80000	10000~100000	14000~14000000	18000~180000	22000~220000	42000~420000
550	2500~2500	5000~50000	7500~75000	10000~100000	12500~125000	17500~175000	22500~225000	27500~275000	52500~525000
600	3000~30000	6000~60000	9000~90000	12000~120000	15000~150000	21000~210000	25000~250000	33000~330000	63000~630000
700	4000~40000	8000~80000	12000~120000	16000~160000	20000~200000	28000~280000	36000~360000	44000~440000	84000~840000
800	5000~50	10000	15000	20000	25000	35000~3	45000~4	55000~5	105000~

	000	~1000 00	~1500 00	~2000 00	~2500 00	50000	50000	50000	1050000
900	6500~65 000	13000 ~1300 00	19500 ~1950 00	26000 ~2600 00	32500 ~3250 00	45500~4 55000	58500~5 85000	71500~7 15000	136500~ 1365000
1000	8000~80 000	16000 ~1600 00	24000 ~2400 00	32000 ~3200 00	40000 ~4000 00	56000~5 60000	72000~7 20000	88000~8 80000	168000~ 1680000

Note: The dry air in the table is 20 ° C, and the standard dry air flow rate is 0.101 MPa absolute pressure.

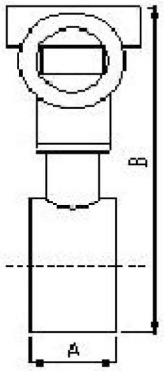
IV. The flow meter shape and installation size

1. Flanged pipe type



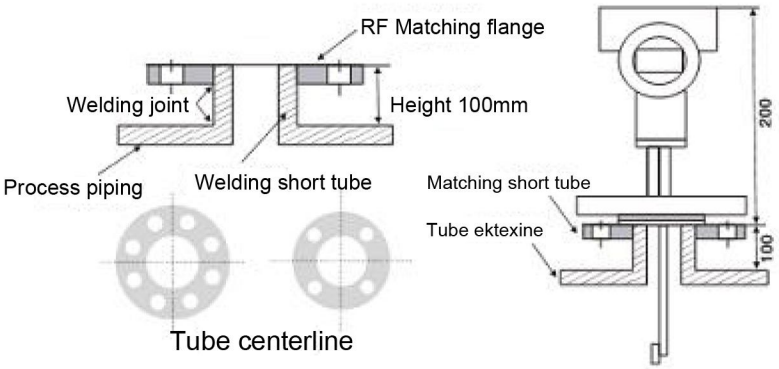
Nominal diameter DN(mm)	Width A	Height B	Nominal diameter DN(mm)	Width A	Height B
15	150	345	125	200	455
20	150	350	150	200	480
25	150	355	200	200	530
32	150	362	250	200	580
40	150	370	300	200	630
50	150	380	350	200	680
65	200	395	400	200	730
80	200	410	450	200	780
100	200	430	500	200	830

2. Clamping



Nominal diameter DN(mm)	Width	Height	Nominal diameter DN(mm)	Width	Height
	A	B		A	B
15	66	270	125	66	380
20	66	275	150	66	405
25	66	280	200	66	455
32	66	287	250	66	505
40	66	295	300	66	555
50	66	305	350	66	605
65	66	310	400	66	655
80	66	335	450	66	705
100	66	355	500	66	755

3.Plug-in



(5) Insert flow meter short tube process and installation

4. Flow meter flange connection

A. Flange specifications: nominal pressure 0.6MPa ~ 42.0MPa;

B. The flange size mainly adopts the national standard GB/T series, and can adopt the chemical industry standard HG series.

The mechanical industry standard JB/T series can also be negotiated to provide flanges according to customer requirements.

V. Instrument output and connection

1. Instrument output form

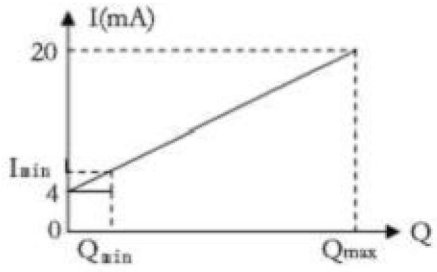
A. current output: 4 ~ 20mA; power: 15-36VDC, two-wire system;

B. pulse output: 0 ~ 1000Hz; internal resistance 1000 Ω; power supply: 15-36VDC; 10mA;

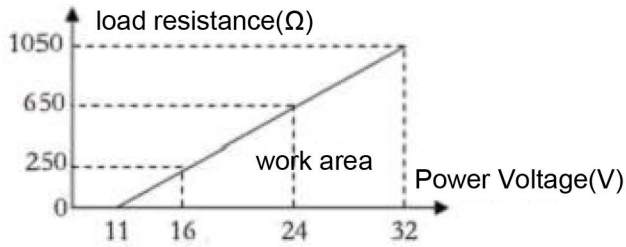
C. RS232/RS485 interface; power supply: 15-36VDC; 10mA;

D. HART; power supply: 15-36VDC, two-wire system;

2. Current output characteristics



4~20mA current output characteristic



Note: maximum load resistance(Ω)=50*(Power Voltage-11)

4~20mA current output load characteristics

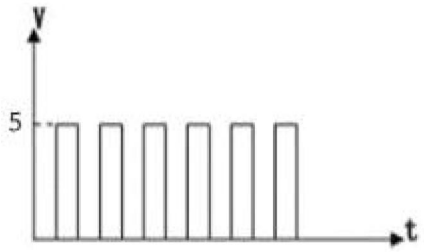
In the above figure, *I*min is the current output value corresponding to the minimum display flow of the flow meter. The output value is:

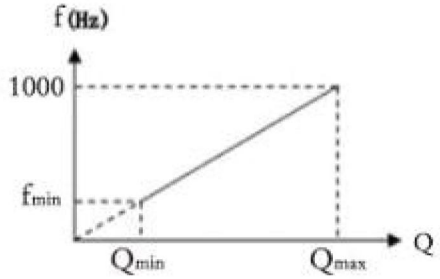
$$I_D = \frac{\text{Full-span output-Zero position output}}{\text{Maximum rated flow}} \bullet$$

$$= \frac{20-4}{Q_{max}} \bullet Q_D + 4$$

For the same reason: the output-output current and corresponding flow value in the full-scale output range can be calculated.

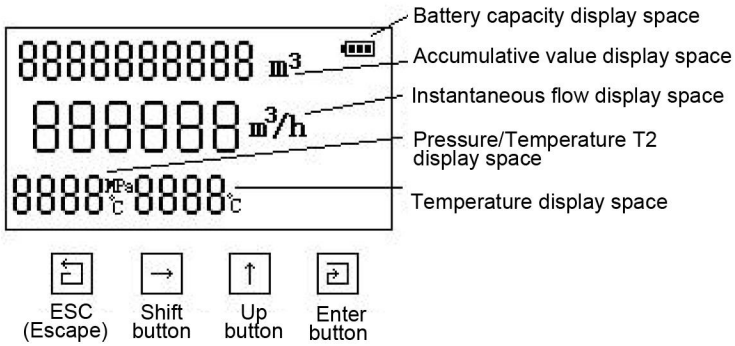
3. 0 ~ 1000HZ pulse output characteristics





Instructions

key, display function description



Key function in measurement state:

Confirmation key: Enter the parameter setting status.

key function in menu state:

Up key: the number at the cursor is increased by 1 or the menu number is increased by 1 (the number that can be modified is increased by 1);

Shift key: The cursor moves to the right, which means that the number is incremented by one (the modifiable number is shifted to the right by 1 bit);

Confirmation key: Enter the submenu, modify and exit the submenu.

Exit key: Returns to the measurement status.

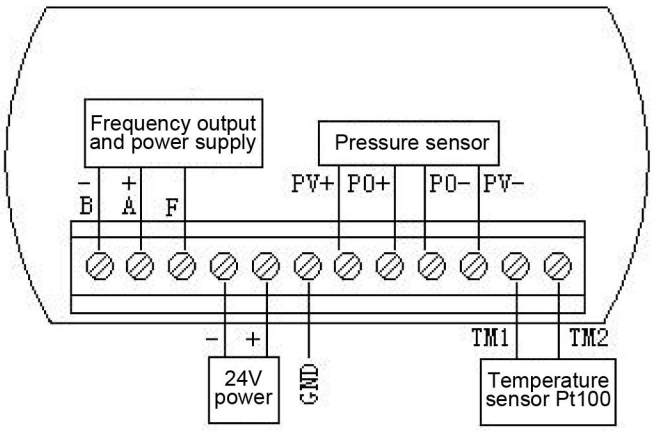
Note：(1) When using the “Up” key, the value at the cursor is 0~9 cyclically changed;

(2) When using the "Shift Key", the cursor moves from the leftmost end to the rightmost end and then moves from the left end to the loop;

(3) In the parameter setting state, there is no key operation within 1 minute, and the meter automatically returns to the measurement state.

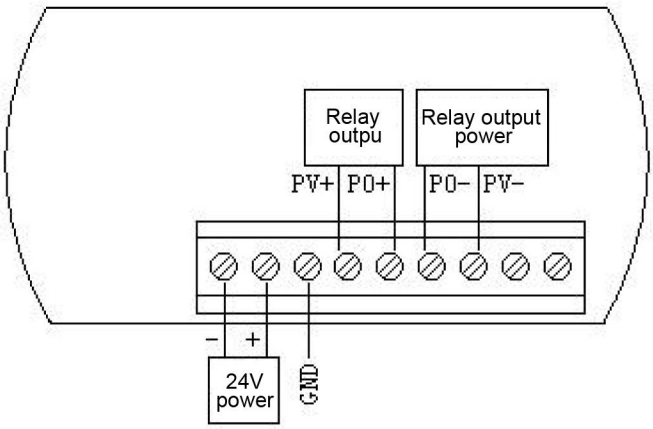
Wiring terminal connection diagram:

1. Current board, HART communication board terminal connection diagram:



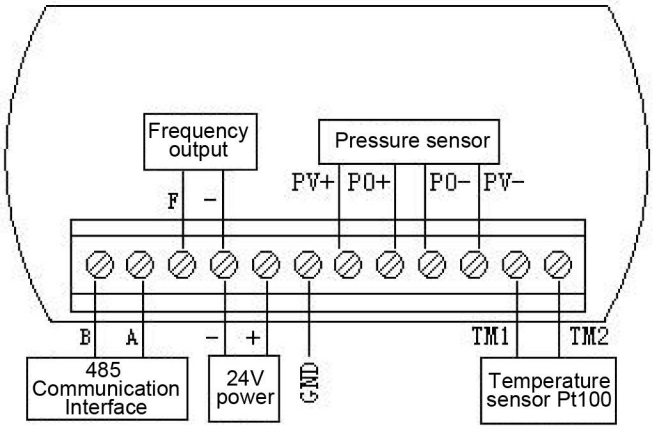
Note: The frequency output power supply and the power supply are two independent power supplies. The frequency output power supply is a 12V or 24V DC power supply.

2. Current (with return alarm) board terminal connection diagram:



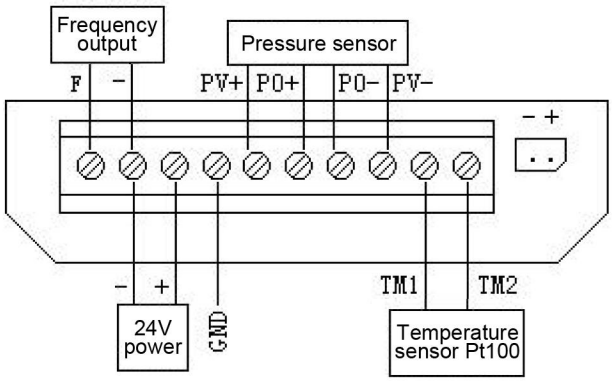
Note: The relay power supply and power supply are two independent power supplies. The relay output power is 12V or 24V DC power.

3. MODBUS 485 communication board terminal connection diagram:



Note: When frequency output or pulse output is required, enter the menu F2-01 to open the frequency output or pulse output. The frequency output ground wire is shared with 24V ground. When no output is required, enter the F2-01 menu to turn off the frequency output or pulse output.

4. Battery power supply board terminal connection diagram:



The battery power supply board can work in two situations, with external 24V power

supply and battery power supply: the external power supply is only used at the coefficient standard, and the battery power supply is in normal working condition, and the two power supply modes cannot be shared.

a. When the external 24V power supply is connected, the battery power must be disconnected and the 24V power supply must be well connected. After power-on, enter the menu F2-01 to open the frequency output or pulse output, and pull out the frequency output wiring F on the terminal block. The frequency output ground wire is connected to 24V negative. **When the calibration is finished, enter the F2-01 menu, turn off the frequency output or the pulse output.**

b. When the battery is powered, the 24V power supply must be disconnected and the battery power supply must be well connected. The frequency output must be off.

Instruction of menu:

Step 1: Enter the menu and enter your password

Confirm key, enter the menu, display as shown on the left
First, you need to enter the password. The current digital flashing position indicates that the current cursor indicates the digital position that can be modified (the first digit on the left). At this time, the number will increase by pressing the up key.

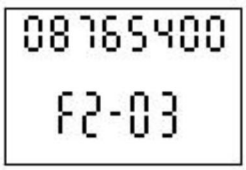
Press the up key once to modify the number plus 1 (the first digit on the left) as shown on the left.
Press the up key continuously to increase the number to the one you need.

For example: press the up key 6 times in succession, enter the number 6, the first digit is entered, and then press the right shift key, the cursor moves to the right (the number that can be modified is shifted to the right), as shown on the left.
The current flashing position indicates that the current cursor points to the position (the second digit on the left). At this time, the second digit is modified

according to the above method; press the up key continuously to enter the second digit of the password;
The following input methods are similar. If you need to re-enter the password, the shift key can realize the right shift of the cursor, and then shift to the first digit on the left to re-modify. If the password is correct, press the enter key to enter the corresponding parameter setting menu. (The first level password 0000 enters the F1 menu, the second level password 1234 enters the F2 menu, and the third level password 6666 enters the F3 menu).

Step 2: Modify the parameters (operating flow zero)

Enter the second level password (**default password 1234**) according to the operation in step 1. Press the enter key to enter the parameter setting state as shown on the left, F2-01 indicates menu 2-1, the specific menu directory is in the menu list, press the up key to enter the menu. Select, for example, the MODBUS communication board, turn to the F2-03 menu for the flow zero point, and then press the enter key to enter the menu modification state, as shown below:



After entering the menu, the original zero sample value is displayed. Pressing the up key will display the current state sample value. If you press the exit key, the zero point modification will not be performed. If the OK key is pressed, the current state is saved as the flow zero state.

Current menu description

Level one password: Enter 0000

F1-01 **Measurement type:** 0--Liquid, 1--Gas

F1-02 **Temperature and pressure compensation type:** Select different compensation types for different measurement media settings
Liquid: no compensation
Gas: temperature compensation or no compensation, temperature compensation or pressure compensation

F1-03 **Flow unit:** Set the unit of instantaneous flow, accumulated flow and user range (m3/min, m3/h, L/h, Nm3/h, Nm3/min, t/h, kg/h,), when the unit After the modification, the accumulated flow will be cleared, and the user's range unit will also change, so you need to reset the range after modifying the unit.
Liquid optional units: M3/H, M3/MIN, L/H, T/H, KG/H
Gas optional units: NM3/H, NM3/MIN, M3/H, M3/MIN, L/H, T/H, KG/H

F1-04 **Media Density:** Set the media density of the fluid, to calculate mass flow. (KG/M3)

F1-05 **Small signal cutoff:** The percentage of the set flow rate is used as excision lower limit. The small signal below the set value will be cut off, and the percentage in the range of 0.001~99.999 can be set.

F1-06 **Damping setting:** Set the execution speed of the program. 0.000~65.000s When the setting value is greater than 65, the default is the maximum value of 65s.

F1-07 **Range upper limit:** Set the upper limit of the user range, and set the range from 0.1 to 999999.9. This menu is not allowed to be set to 0, and will continue to hold the original value when 0 is entered. The range unit is the current set flow unit.

F1-08 **Pressure/temperature display switch:** T-OPEN is the temperature display on, T-CLOSE is the temperature display off, and the corresponding switches on the pressure display are P-OPEN, P-CLOSE. Only set the pressure/temperature value to display, it does not affect the normal measurement and calculation.

Level two password: Enter 1234

F2-01 **4mA little adjustment:** adjust the current output to 4mA; connect the ammeter to the power supply circuit. After entering this menu, observe whether the ammeter reading value is 4mA. If it is equal to 4mA, do not adjust; if not, input the ammeter reading, and then enter again after confirming. Check if the ammeter reading is 4 mA. If not, enter the ammeter reading again and repeat the above steps until it is adjusted to 4 mA.

F2-02 **20mA little adjustment:** Adjust the current output to 20mA. Same as above.

F2-03 **Frequency output switch:** 0 is off, 1 is the frequency output is on, 2 is the pulse output is on.

Set to 0 when no frequency output is required. When set to 1, the frequency output is turned on, and the output is 0-1000HZ, corresponding to the zero point and range of the range. When set to 2, the output pulse, one pulse represents the cumulative flow value of the corresponding unit.

F2-04 **Temperature vs. flow sensor compensation coefficient:** Set the compensation coefficient of temperature to the sensor.

F2-05 **Flow Zero:** Set the current state to flow 0. After entering the menu, display the original flow zero sample value. Press the up key to replace the original flow zero sample value with the current sample value on the screen, and then press the enter key. The zero setting is completed. (See calibration step 3)

F2-06 **Pressure zero point:** set the fluid pressure value when the pressure sensor is under air pressure is 0 MPa, the operation method is the same as the flow zero point operation method.

F2-07 **Temperature zero point:** set the fluid temperature when the resistance of the pt-100 temperature sensor is 100 Ω.

Degree 0 degrees Celsius. The operation method is the same as the flow zero point operation method.

F2-08 **Pressure correction:** If the current display pressure does not match the actual

pressure, enter the actual pressure value of the current fluid and press the OK key to correct the pressure. (Unit KPa).

F2-09 **Temperature correction:** If the current display temperature does not match the actual temperature, enter the true temperature of the current fluid. Press the OK key to correct the temperature. (Only valid when the temperature is positive, negative temperature is invalid)

F2-10 **Flow coefficient:** set the flow coefficient of the meter k k=10000XQ mark / Q test

F2-11 **Pulse Equivalent:** Set the pulse equivalent at the pulse output, the cumulative flow value represented by one pulse.

(0.1 means that the cumulative flow rate increases per 0.1, output one pulse, 1 means that the cumulative flow rate increases per 1,output one pulse, and 10 means the cumulative flow rate increases per 10,output one pulse)

Level 3 password: Enter 6666

F3-01 **Cumulative clear:** Enter the set value 33 to clear the accumulated amount.

F3-02 **Erase:** Delete formatted record, flow zero, and temperature compensation data. Enter the menu display 00000000, enter 11111111 to confirm the above data can be cleared, otherwise if you enter other values, no operation will be performed, clearing is invalid.

F3-03 **Flow Formatting: Do this if the meter is not linear. Before starting, set F2-10 to 10000, the unit is M3/H, fill 1000KG/M3 when density water, and fill 1 in air. 2KG /M3, other according to the initial state, record the standard flow value, the meter displays the flow value P, calculate the flow coefficient C of each point,**
C=10000XQ mark/P Then fill in P1, C1, P2, C2 from small to large. . .

Enter the display flow value P and the corresponding flow coefficient C that need to be formatted. When the C value of a set of data is input, the number of arrays will be automatically increased by 1. **If the number is greater than 1 group, this function will work. The maximum number of data cannot exceed 9 groups.** The flow value P must be input **in order from small to large** when inputting. If you want to erase the array, just enter 0 in C of any array, and press the up key to observe the number of arrays will automatically change to 1.

Remarks: If the flow coefficient is normal, if the linearity is not good, then use the F3-03 menu. This menu input should be the set of flow rate values P and the corresponding flow coefficient C. Do not use this menu if it is linear at the time of calibration. When this menu data is greater than 1 group, the flow coefficient will be obtained from this array. When this menu array is less than or equal to 1 group, the flow coefficient will be obtained from the fill value of menu F2-09.

F3-04 **Data Backup:** Enter the set value 33 to back up the current settings. Backup

before leaving the factory.

F3-05 **Data Recovery:** Enter the set value 33 and overwrite the current setting parameters with the parameters that were last backed up.
enter the menu to display the original zero sampling value, and manually input to modify. When the displayed flow is larger than the actual flow, it will increase on the basis of the original value. When the displayed flow is smaller than the actual flow, the original value is reduced. (Each increase or decrease 200~400), press “Confirm” to save after inputting, and then press “Exit” to return to the main interface to observe the flow value. If it cannot be adjusted at one time, repeat the operation. (This menu has zero sample value, and can't be modified once the meter enters the working state)

Level 4 password: Enter 8888

F4-01 **No. 2 flow coefficient:** set the flow coefficient k' of the meter. **(Factory coefficient, has been calibrated at the factory, do not move)**

F4-02 **Accumulated flow preset:** Enter the menu to display the current accumulated flow value, manually input the value to be preset, and press “Enter” to save.

Current (with backflow alarm) menu description

Level one password: Enter 0000

F1-01 **Measurement type:** 0--Liquid, 1--Gas

F1-02 **Temperature and pressure compensation type:** Select different compensation types for different measurement media settings
Liquid: no compensation
Gas: temperature compensation or no compensation, temperature compensation or pressure compensation

F1-03 **Flow unit:** Set the unit of instantaneous flow, accumulated flow and user range (m3/min, m3/h, L/h, Nm3/h, Nm3/min, t/h, kg/h,), when the unit is modification, the accumulated flow will be cleared, and the user's range unit will also change, so you need to reset the range after modifying the unit.
Liquid optional units: M3/H, M3/MIN, L/H, T/H, KG/H
Gas optional units: NM3/H, NM3/MIN, M3/H, M3/MIN, L/H, T/H, KG/H

F1-04 **Media Density:** Set the media density of the fluid ,to calculate mass flow. (KG/M3)

F1-05 **Small signal cutoff:** The percentage of the set flow rate is used as excision lower limit. The small signal below the set value will be cut off, and the percentage in the range of 0.001~99.999 can be set.

F1-06 **Damping setting:** Set the execution speed of the program. 0.000~65.000s

When the setting value is greater than 65, the default is the maximum value of 65s.

F1-07 **Range upper limit:** Set the upper limit of the user range, and set the range from 0.1 to 999999.9. This menu is not allowed to be set to 0, and will continue to hold the original value when 0 is entered. The range unit is the current set flow unit.

F1-08 **Pressure/temperature display switch:** T-OPEN is the temperature display on, T-CLOSE is the temperature display off, and the corresponding switches on the pressure display are P-OPEN, P-CLOSE. Only set the pressure/temperature value to display, it does not affect the normal measurement and calculation.

Level two password: Enter 1234

F2-01 **4mA little adjustment:** adjust the current output to 4mA; connect the ammeter to the power supply circuit. After entering this menu, observe whether the ammeter reading value is 4mA. If it is equal to 4mA, do not adjust; if not, input the ammeter reading, and then enter again after confirming. Check if the ammeter reading is 4 mA. If not, enter the ammeter reading again and repeat the above steps until it is adjusted to 4 mA.

F2-02 **20mA little adjustment:** Adjust the current output to 20mA. Same as above.

F2-03 **Return alarm switch:** 0 is off, the relay output is off, and 1 is the frequency output is on.

F2-04 **Temperature vs. flow sensor compensation coefficient:** Set the compensation coefficient of temperature to the sensor.

F2-05 **Flow Zero:** Set the current state to flow 0. After entering the menu, display the original flow zero sample value. Press the up key to replace the original flow zero sample value with the current sample value on the screen, and then press the enter key. The zero setting is completed. (See calibration step 3)

F2-06 **Pressure zero point:** set the fluid pressure value when the pressure sensor is under air pressure is 0 MPa, the operation method is the same as the flow zero point operation method.

F2-07 **Temperature zero point:** set the fluid temperature when the resistance of the pt-100 temperature sensor is 100 Ω. Fluid 0 degrees Celsius. The operation method is the same as the flow zero point operation method.

F2-08 **Pressure correction:** If the current display pressure does not match the actual pressure, enter the actual pressure value of the current fluid and press the OK key to correct the pressure. (Unit KPa).

F2-09 **Temperature correction:** If the current display temperature does not match the actual temperature, enter the true temperature of the current fluid. Press the OK key to correct the temperature. (Only valid when the temperature is positive, negative temperature is invalid)

F2-10 **Flow coefficient:** set the flow coefficient of the meter k k=10000XQ mark / Q test

F2-11 **Return alarm upper limit (sample value):** Set the upper limit of the return alarm. When the reflow is greater than this set value, an alarm signal is generated.

Level 3 password: Enter 6666

F3-01 **Cumulative clear:** Enter the set value 33 to clear the accumulated amount.

F3-02 **Erase:** Delete formatted record, flow zero, and temperature compensation data. Enter the menu display 00000000, enter 11111111 to confirm the above data can be cleared, otherwise if you enter other values, no operation will be performed, clearing is invalid.

F3-03 **Flow Formatting: Do this if the meter is not linear. Before starting, set F2-10 to 10000, the unit is M3/H, fill 1000KG/M3 when density water, and fill 1 in air. 2KG /M3, other according to the initial state, record the standard flow value, the meter displays the flow value P, calculate the flow coefficient C of each point,**
C=10000XQ mark/P Then fill in P1, C1, P2, C2 from small to large. . .
Enter the display flow value P and the corresponding flow coefficient C that need to be formatted. When the C value of a set of data is input, the number of arrays will be automatically increased by 1. **If the number is greater than 1 group, this function will work. The maximum number of data cannot exceed 9 groups.** The flow value P must be input **in order from small to large** when inputting. If you want to erase the array, just enter 0 in C of any array, and press the up key to observe the number of arrays will automatically change to 1.

Remarks: If the flow coefficient is normal, if the linearity is not good, then use the F3-03 menu. This menu input should be the set of flow rate values P and the corresponding flow coefficient C. Do not use this menu if it is linear at the time of calibration. When this menu data is greater than 1 group, the flow coefficient will be obtained from this array. When this menu array is less than or equal to 1 group, the flow coefficient will be obtained from the fill value of menu F2-09.

F3-04 **Data Backup:** Enter the set value 33 to back up the current settings. Backup before leaving the factory.

F3-05 **Data Recovery:** Enter the set value 33 and overwrite the current setting parameters with the parameters that were last backed up.

F3-06 **Manual zero calibration of flow zero:** enter the menu to display the original zero sampling value, and manually input to modify. When the displayed flow is larger than the actual flow, it will increase on the basis of the original value. When the displayed flow is smaller than the actual flow, the original value is reduced. (Each increase or decrease 200~400), press “Confirm” to save after inputting, and then press “Exit” to return to the main interface to observe the flow value. If it cannot be adjusted at one time, repeat the operation. (This menu has zero

sample value, and can't be modified once the meter enters the working state)

Level 4 password: Enter 8888

F4-01 **No. 2 flow coefficient:** set the flow coefficient k' of the meter. **(Factory coefficient, has been calibrated at the factory, do not move)**

F4-02 **Accumulated flow preset:** Enter the menu to display the current accumulated flow value, manually input the value to be preset, and press “Enter” to save.

MODBUS menu description communication

Level one password: Enter 0000

F1-01 **Measurement type:** 0--Liquid, 1--Gas

F1-02 **Temperature and pressure compensation type:** Select different compensation types for different measurement media settings
Liquid: no compensation
Gas: temperature compensation or no compensation, temperature compensation or pressure compensation

F1-03 **Flow unit:** Set the unit of instantaneous flow, accumulated flow and user range (m3/min, m3/h, L/h, Nm3/h, Nm3/min, t/h, kg/h), when the unit is modified, the accumulated flow will be cleared, and the user's range unit will also change, so you need to reset the range after modifying the unit.
Liquid optional units: M3/H, M3/MIN, L/H, T/H, KG/H
Gas optional units: NM3/H, NM3/MIN, M3/H, M3/MIN, L/H, T/H, KG/H

F1-04 **Media Density:** Set the media density of the fluid, to calculate mass flow. (KG/M3)

F1-05 **Small signal cutoff:** The percentage of the set flow rate is used as excision lower limit. The small signal below the set value will be cut off, and the percentage in the range of 0.001~99.999 can be set.

F1-06 **Damping setting:** Set the execution speed of the program. 0.000~65.000s When the setting value is greater than 65, the default is the maximum value of 65s.

F1-07 **Range upper limit:** Set the upper limit of the user range, and set the range from 0.1 to 999999.9. This menu is not allowed to be set to 0, and will continue to hold the original value when 0 is entered. The range unit is the current set flow unit.

F1-08 **Pressure/temperature display switch:** T-OPEN is the temperature display on, T-CLOSE is the temperature display off, and the corresponding switches on the pressure display are P-OPEN, P-CLOSE. Only set the pressure/temperature value to display, it does not affect the normal measurement and calculation.

Level two password: Enter 1234

F2-01 **Frequency output switch:** 0 is off, 1 is the frequency output is on, 2 is the pulse

output is on.

Set to 0 when no frequency output is required. When set to 1, the frequency output is turned on, and the output is 0-1000HZ, corresponding to the zero point and range of the range. When set to 2, the output pulse, one pulse represents the cumulative flow value of the corresponding unit.

F2-02 **Temperature vs. Flow Sensor Compensation Coefficient:** Set the compensation coefficient of temperature to the sensor.

F2-03 **Flow zero point:** Set the current state to flow rate 0. After entering the menu, display the original flow zero sample value. Press the up key to replace the original flow zero sample value with the current sample value on the screen, and then press the enter key. The zero setting is completed. (See calibration step 3)

F2-04 **Pressure zero point:** Set the fluid pressure value when the pressure sensor is under air pressure is 0 MPa, the operation method is the same as the flow zero point operation method.

F2-05 **Temperature Zero:** Set the fluid temperature when the resistance of the pt-100 temperature sensor is 100 Ω. Fluid 0 degrees Celsius. The operation method is the same as the flow zero point operation method.

F2-06 **Pressure correction:** If the current display pressure does not match the actual pressure, enter the actual pressure value of the current fluid and press the OK key to correct the pressure. (Unit KPa).

F2-07 **Temperature correction:** If the current display temperature does not match the actual temperature, enter the true temperature of the current fluid.Press the OK key to correct the temperature. (Only valid when the temperature is positive, negative temperature is invalid)

F2-08 **Flow coefficient:** set the flow coefficient of the instrument k k = 10000 × Q mark / Q test.

F2-09 **Pulse Equivalent:** Set the pulse equivalent at the pulse output, the cumulative flow value represented by one pulse.

(0.1 means that the cumulative flow rate increases per 0.1, output 1 pulse, 1 means that the cumulative flow rate increase per 1, output 1 pulse, and 10 means the cumulative flow rate increases per 10, output 1 pulse.)

F2-10 **Device Address:** The device address is the communication address. This menu can modify the communication address. The input range is 0~255. If it is out of this range, the setting will be invalid and the original value will be maintained.

Level 3 password: Enter 6666

F3-01 **Cumulative clear:** Enter the set value 33 to clear the accumulated amount.

F3-02 **Erase:** Delete formatted record, flow zero, and temperature compensation data. Enter the menu display 00000000, enter 11111111 to confirm the above data can be cleared, otherwise if you enter other values, no operation will be performed, clearing is invalid.

F3-03 **Flow Formatting: Do this if the meter is not linear. Before starting, set**

F2-10 to 10000, the unit is M3/H, fill 1000KG/M3 when density water, and fill 1 in air. 2KG /M3, other according to the initial state, record the standard flow value, the meter displays the flow value P, calculate the flow coefficient C of each point,
C=10000XQ mark/P Then fill in P1, C1, P2, C2 from small to large. . .
Enter the flow value P and the corresponding flow coefficient C that need to be formatted. When the C value of a set of data is input, the number of arrays will be automatically increased by 1. **If the number is greater than 1 group, this function will work.** The maximum number of data cannot exceed 9 groups. The flow value P must be input in **order from small to large** when inputting. If you want to erase the array, just enter 0 in C of any array, and press the up key to observe the number of arrays will automatically change to 1.

Remarks: If the flow coefficient is normal, if the linearity is not good, then use the F3-03 menu. This menu input should be the set of flow rate values P and the corresponding flow coefficient C. Do not use this menu if it is linear at the time of calibration. When this menu data is greater than 1 group, the flow coefficient will be obtained from this array. When this menu array is less than or equal to 1 group, the flow coefficient will be obtained from the fill value of menu F2-08.

F3-04 **Data Backup:** Enter the set value 33 to back up the current settings.

F3-05 **Data Recovery:** Enter the set value 33 and overwrite the current setting parameters with the parameters that were last backed up.

F3-06 **Manual zero calibration of flow zero:** enter the menu to display the original zero sampling value, and manually input to modify. When the displayed flow is larger than the actual flow, it will increase on the basis of the original value. When the displayed flow is smaller than the actual flow, the original value is reduced. (Each increase or decrease 200~400), press “Confirm” to save after inputting, and then press “Exit” to return to the main interface to observe the flow value. If it cannot be adjusted at one time, repeat the operation. **(This menu has zero sample value, and can't be modified once the meter enters the working state)**

Level 4 password: Enter 8888

F4-01 **No. 2 flow coefficient:** set the flow coefficient k' of the meter. **(Factory coefficient, has been calibrated at the factory, do not move)**

F4-02 **Accumulated flow preset:** Enter the menu to display the current accumulated flow value, manually input the value to be preset, and press “Enter” to save.

Battery powered menu description

Level one password: Enter 0000

F1-01 **Measurement type:** 0--Liquid, 1--Gas

F1-02 **Temperature and pressure compensation type:** Select different compensation
types for different measurement media settings
Liquid: no compensation
Gas: temperature compensation or no compensation, temperature compensation or pressure compensation

F1-03 **Flow unit:** Set the unit of instantaneous flow, accumulated flow and user range (m3/min, m3/h, L/h, Nm3/h, Nm3/min, t/h, kg/h,), when the unit is modified, the accumulated flow will be cleared, and the user's range unit will also change, so you need to reset the range after modifying the unit.
Liquid optional units: M3/H, M3/MIN, L/H, T/H, KG/H
Gas optional units: NM3/H, NM3/MIN, M3/H, M3/MIN, L/H, T/H, KG/H

F1-04 **Media Density:** Set the media density of the fluid, to calculate mass flow. (KG/M3)

F1-05 **Small signal cutoff:** The percentage of the set flow rate is used as excision lower limit. The small signal below the set value will be cut off, and the percentage in the range of 0.001~99.999 can be set.

F1-06 **Damping setting:** Set the execution speed of the program. 0.000~65.000s When the setting value is greater than 65, the default is the maximum value of 65s.

F1-07 **Range upper limit:** Set the upper limit of the user range, and set the range from 0.1 to 999999.9. This menu is not allowed to be set to 0, and will continue to hold the original value when 0 is entered. The range unit is the current set flow unit.

F1-08 **Pressure/temperature display switch:** T-OPEN is the temperature display on, T-CLOSE is the temperature display off, and the corresponding switches on the pressure display are P-OPEN, P-CLOSE. Only set the pressure/temperature value to display, it does not affect the normal measurement and calculation.

Level two password: Enter 1234

F2-01 **Frequency output switch:** 0 is off, 1 is the frequency output is on, 2 is the pulse output is on.
The frequency output must be turned on under external 24V power supply, and the frequency output or pulse output cannot be turned on when the battery is powered. Set to 0 when no frequency output is required. When set to 1, the frequency output is turned on, and the output is 0-1000HZ, corresponding to the zero point and range of the range. When set to 2, the output pulse, one pulse represents the cumulative flow value of the corresponding unit.

F2-02 **Temperature vs. Flow Sensor Compensation Coefficient:** Set the

compensation coefficient of temperature to the sensor.

F2-03 **Flow zero point:** Set the current state to flow rate 0. After entering the menu, display the original flow zero sample value. Press the up key to replace the original flow zero sample value with the current sample value on the screen, and then press the enter key. The zero setting is completed. (See calibration step 3)

F2-04 **Pressure zero point:** set the fluid pressure value when the pressure sensor is under air pressure is 0 MPa, the operation method is the same as the flow zero point operation method.

F2-05 **Temperature Zero:** Set the fluid temperature when the resistance of the pt-100 temperature sensor is 100 Ω. Fluid 0 degrees Celsius. The operation method is the same as the flow zero point operation method.

F2-06 **Pressure correction:** If the current display pressure does not match the actual pressure, enter the actual pressure value of the current fluid and press the OK key to correct the pressure. (Unit KPa).

F2-07 **Temperature correction:** If the current display temperature does not match the actual temperature, enter the true temperature of the current fluid. Press the OK key to correct the temperature. (Only valid when the temperature is positive, negative temperature is invalid)

F2-08 **Flow coefficient:** set the flow coefficient of the instrument k k = 10000 × Q mark / Q test.

F2-09 **Pulse Equivalent:** Set the equivalent of the pulse output, the cumulative amount represented by one pulse.
(0.1 means that one pulse represents 0.1 cumulative flow, and 1 means one pulse represents 1 cumulative flow, 10 means a pulse represents 10 cumulative flows)

Level 3 password: Enter 6666

F3-01 **Cumulative clear:** Enter the set value 33 to clear the accumulated amount.

F3-02 **Erase:** Delete formatted record, flow zero, and temperature compensation data.Enter the menu display 00000000, enter 11111111 to confirm the above data can be cleared, otherwise if you enter other values, no operation will be performed, clearing is invalid.

F3-03 **Flow Formatting: Do this if the meter is not linear. Before starting, set F2-10 to 10000, the unit is M3/H, fill 1000KG/M3 when density water, and fill 1 in air. 2KG /M3, other according to the initial state, record the standard flow value, the meter displays the flow value P, calculate the flow coefficient C of each point, C=10000XQ mark/P Then fill in P1, C1, P2, C2 from small to large. . .**
Enter the flow value P and the corresponding flow coefficient C that need to be formatted. When the C value of a set of data is input, the number of arrays will be automatically increased by 1. **If the number is greater than 1 group, this**

function will work. The maximum number of data cannot exceed 9 groups. The flow value P must be input in **order from small to large** when inputting. If you want to erase the array, just enter 0 in C of any array, and press the up key to observe the number of arrays will automatically change to 1.

Remarks: If the flow coefficient is normal, if the linearity is not good, then use the F3-03 menu. This menu input should be the set of flow rate values P and the corresponding flow coefficient C. Do not use this menu if it is linear at the time of calibration. When this menu data is greater than 1 group, the flow coefficient will be obtained from this array. When this menu array is less than or equal to 1 group, the flow coefficient will be obtained from the fill value of menu F2-09.

F3-04 **Data Backup:** Enter the set value 33 to back up the current settings.

F3-05 **Data Recovery:** Enter the set value 33 and overwrite the current setting parameters with the parameters that were last backed up.

F3-06 **Manual zero calibration of flow zero:** Enter the menu to display the original zero sampling value, and manually input to modify. When the displayed flow is larger than the actual flow, it will increase on the basis of the original value. When the displayed flow is smaller than the actual flow, the original value is reduced. (Each increase or decrease 200~400), press “Confirm” to save after inputting, and then press “Exit” to return to the main interface to observe the flow value. If it cannot be adjusted at one time, repeat the operation. (This menu has zero sample value, and can't be modified once the meter enters the working state)

Level 4 password: Enter 8888

F4-01 **No. 2 flow coefficient:** Set the flow coefficient k' of the meter. (Factory coefficient, calibrated at the factory already, do not change)

F4-02 **Accumulated flow preset:** Enter the menu to display the current accumulated flow value, manually input the value to be preset, and press “Enter” to save.

Instrument initial calibration steps:

1. Media temperature calibration (marked)
2. Medium pressure calibration
3. Flow zero adjustment
4. Flow coefficient calibration

1. Medium temperature calibration

Including temperature zero calibration and temperature calibration

Step 1: Temperature zero calibration

Temperature zero adjustment: Connect 100Ω resistor to the temperature sensor signal input terminal. After stabilization, enter the temperature zero menu; or connect the Pt100 temperature sensor to the medium temperature signal input terminal, and then keep the temperature at 0 degrees Celsius. After entering the temperature zero menu, the temperature zero calibration is completed.

Step 2: Temperature calibration

Connect the 250 Ω resistor to the temperature sensor signal input terminal. After stabilization, input 408.50 degrees Celsius and enter the temperature calibration menu. Or connect the Pt100 temperature sensor to the medium temperature signal input terminal. After stabilization, enter the temperature calibration menu and enter the current actual. Temperature, complete temperature adjustment.

2. Medium pressure calibration

Including pressure zero calibration and pressure calibration

Step 1: Pressure zero adjustment

After turning off the steam source, enter the pressure zero calibration menu. After entering the menu, press “Up”, then press “OK”. After the operation is finished, exit the menu and check if the pressure returns to zero. Complete the zero calibration.

Step 2: Pressure calibration

After turning on the steam source and full pressure (pressure sensor full scale) to be stabilized, enter the pressure calibration menu, input the full scale value, and press “OK” to complete the calibration.

3. Flow zero adjustment

If the flow is offset at zero, the flow zero adjustment must be made.

Keep pipe flow at zero for zero adjustment. After stabilization, (greater than 10 seconds) enter the menu and press "Up", then press "Enter". If you do not press "Exit", exit the menu after the operation to check whether the flow returns to zero.

4. Flow coefficient calibration

The ratio of the actual flow value (standard table) to the displayed flow value is multiplied by the current meter factor to obtain the new meter factor.

Current menu list:

No.	Menu item	Setting method	Parameter range	Default value
F0-00	Password	Input	0~9999	0000
F1-01	Measurement Type	Selection	0~1 0--liquid, 1--gas	0

F1-02	Temperature and pressure compensation type	Selection	TP—temperature and pressure compensation, T—temperature compensation NO—no compensation, P—pressure compensation	
F1-03	Flow unit setting	Selection	m3/h , L/h , N m3/h , t/h, m3/min N m3/min , kg/h	m3/h
F1-04	Media Density	Setting	0.001~9999.999	01000.000 KG/M3
F1-05	Small signal cutoff	Setting	0.001~99.999 (percent)	0.000%
F1-06	Damping setting	Setting	0.000~65.000s	0.000s
F1-07	Range Upper Limit	Setting	0.1 ~ 999999.9	450.0
F1-08	Temperature, pressure Display switch	Select	P-OPEN, P-CLOSE T-OPEN, T-CLOSE	P-OPEN

F0-00	Level two password	Input	0~9999	1234
F2-01	4mA fine adjustment	Setting		4.000
F2-02	20mA fine adjustment	Setting		20.000
F2-03	Frequency output switch	Select		0
F2-04	Temperature to flow sensor compensation coefficient	Input	0~99.999	00.000
F2-05	Flow Zero	Setting	Sample Value	
F2-06	Pressure Zero	Setting	Sample Value	
F2-07	Temperature zero	Setting	Sample value	
F2-08	Pressure correction	Setting	0000.001~99999.999kpa	Current pressure value
F2-09	Temperature Correction	Setting	00000.01~999999.99 °C (negative temperature is invalid)	Current Media Temperature Value
F2-10	Flow coefficient	Setting	0000000~9999999	0010000
F2-11	Pulse equivalent	Selection		0.1

F0-00	Level 3 Password	Input	0~9999	6666
F3-01	Cumulative clear	Setting	00~99	33
F3-02	Erase	Setting	11111111	00000000
F3-03	Traffic Formatting	Setting	P1----- Formatted first point flow value C1----- Format the flow coefficient corresponding to the first point flow value P2...	
F3-04	Data Backup	Setting	00~99	33
F3-05	Data Recovery	Settings	00~99	33
F3-06	Flow zero manual	Set	00000000~16777215	Sample value

correction

F0-00	Level 4 Password	Input	0~9999	8888
F4-01	No. 2 flow coefficient	Setting	0000.000~9999.999	1.000
F4-02	Cumulative preset	Setting	0000000.000~99999990999	0.000

Current (with backflow alarm) menu list:

No.	Menu item	Setting method	Parameter range	Default value
F0-00	Password	Input	0~9999	0000
F1-01	Measurement Type	Selection	0~1 0--liquid, 1--gas	0
F1-02	Temperature and pressure compensation type	Selection	TP—temperature and pressure compensation, T—temperature compensation NO—no compensation, P—pressure compensation	
F1-03	Flow unit setting	Select	m3/h , L/h , N m3/h , t/h, m3/min N m3/min, kg/h	m3/h
F1-04	Media Density	Setting	0.001~9999.999	01000.000 KG/M3
F1-05	Small signal cutoff	Setting	0.001~99.999 (percent)	0.000%
F1-06	Damping setting	Setting	0.000~65.000s	0.000s
F1-07	Range Upper Limit	Setting	0.1 ~ 999999.9	450.0
F1-08	Temperature, pressure Display switch	Select	P-OPEN, P-CLOSE T-OPEN, T-CLOSE	P-OPEN
F0-00	Level two password	Input	0~9999	1234
F2-01	4mA fine adjustment	Setting		4.000
F2-02	20mA fine adjustment	Setting		20.000
F2-03	Return Alarm Switch	Select		1
F2-04	Temperature to flow sensor compensation coefficient	Input	0~99.999	00.000
F2-05	Flow Zero	Setting	Sample Value	
F2-06	Pressure Zero	Setting	Sample Value	
F2-07	Temperature zero	Setting	Sample value	
F2-08	Pressure correction	Setting	0000.001~99999.999 kpa	Current pressure value
F2-09	Temperature Correction	Setting	00000.01~999999.99 °C	Current Media Temperature

				Value
			(negative temperature is invalid)	
F2-10	Flow coefficient	Setting	0000000~9999999	0010000
F2-11	Return alarm upper limit	Setting	000000~999999	050000
F0-00	Level 3 Password	Input	0~9999	6666
F3-01	Cumulative clear	Setting	00~99	33
F3-02	Erase	Setting	11111111	00000000
F3-03	Traffic Formatting	Setting	P1----- Formatted first point flow value C1----- Format the flow coefficient corresponding to the first point flow value P2...	
F3-04	Data Backup	Setting	00~99	33
F3-05	Data Recovery	Setting	00~99	33
F3-06	Flow zero manual correction	Setting	00000000~16777215	Sample value
F0-00	Level 4 Password	Input	0~9999	8888
F4-01	No. 2 flow coefficient	Setting	0000.000~9999.999	1.000
F4-02	Cumulative preset	Setting	0000000.000~99999990999	0.000

MODBUS communication menu list:

No.	Menu item	Setting method	Parameter range	Default value
F0-00	Password	Input	0~9999	0000
F1-01	Measurement Type	Selection	0~1 0--liquid, 1--gas	0
F1-02	Temperature and pressure compensation type	Selection	TP—temperature and pressure compensation, T—temperature compensation NO—no compensation, P—pressure compensation	
F1-03	Flow unit setting	Selection	m3/h , L/h , N m3/h , t/h, m3/min N m3/min , kg/h	m3/h
F1-04	Media Density	Setting	0.001~9999.999	1000.000 KG/M3
F1-05	Small signal cutoff	Setting	0.001~99.999 (percent)	0.000%
F1-06	Damping setting	Setting	0.000~65.000s	0.000s
F1-07	Range Upper Limit	Setting	0.1 ~ 999999.9	450.0
F1-08	Temperature pressure Display switch	Selecting	P-OPEN, P-CLOSE T-OPEN, T-CLOSE	P-OPEN

F0-00	Level two password	Input	0~9999	1234
F2-01	Frequency output switch	Select		0
F2-02	Temperature to flow sensor compensation coefficient	Input	0~99.999	00.000
F2-03	Flow Zero	Setting	Sample Value	
F2-04	Pressure Zero	Setting	Sample Value	
F2-05	Temperature Zero	Setting	Sample Value	
F2-06	Pressure Correction	Setting	0000.001~99999.999kpa	Current Pressure Value
F2-07	Temperature correction	Setting	00000.01~999999.99 °C (negative temperature is invalid)	Current media temperature value
F2-08	Flow coefficient	Setting	0000000~9999999	0010000
F2-09	Pulse equivalent	Selection		0.1
F2-10	Device Address	Setting	0~255	1

F0-00	Level 3 Password	Input	0~9999	6666
F3-01	Cumulative clear	Setting	00~99	33
F3-02	Erase	Setting	11111111	00000000
F3-03	Traffic Formatting	Setting	P1----- Formatted first point flow value C1----- Format the flow coefficient corresponding to the first point flow value P2...	
F3-04	Data Backup	Setting	00~99	33
F3-05	Data Recovery	Setting	00~99	33
F3-06	Flow zero manual correction	Setting	00000000~16777215	Sample value

F0-00	Level 4 Password	Input	0~9999	8888
F4-01	No. 2 flow coefficient	Setting	0000.000~9999.999	1.000
F4-02	Cumulative preset	Setting	0000000.000~99999990999	0.000

Battery powered menu list:

No.	Menu item	Setting method	Parameter range	Default value
F0-00	Password	Input	0~9999	0000
F1-01	Measurement Type	Selection	0~1 0--liquid, 1--gas	0

F1-02	Temperature and pressure compensation type	Selection	TP—temperature and pressure compensation, T—temperature compensation NO—no compensation, P—pressure compensation	
F1-03	Flow unit setting	Selection	m3/h , L/h , N m3/h , t/h, m3/min N m3/min , kg/h	m3/h
F1-04	Media Density	Setting	0.001~9999.999	001.200 KG/M3
F1-05	Small signal cutoff	Setting	0.001~99.999 (percent)	0.000%
F1-06	Damping setting	Setting	0.000~65.000s	0.000s
F1-07	Range Upper Limit	Setting	0.1 ~ 999999.9	450.0
F1-08	Temperature Pressure Display switch	Select	P-OPEN, P-CLOSE T-OPEN, T-CLOSE	P-OPEN

F0-00	Level two password	Input	0~9999	1234
F2-01	Frequency output switch	Select		0
F2-02	Temperature to flow sensor compensation coefficient	Input	0~99.999	00.000
F2-03	Flow Zero	Setting	Sample Value	
F2-04	Pressure Zero	Setting	Sample Value	
F2-05	Temperature Zero	Setting	Sample Value	
F2-06	Pressure Correction	Setting	0000.001~99999.999kpa	Current Pressure Value
F2-07	Temperature correction	Setting	00000.01~999999.99 °C (negative temperature is invalid)	Current media temperature value
F2-08	Flow coefficient	Setting	0000000~9999999	0010000
F2-09	Pulse equivalent	Selection		0.1

F0-00	Level 3 Password	Input	0~9999	6666
F3-01	Cumulative clear	Setting	00~99	33
F3-02	Erase	Setting	11111111	00000000
F3-03	Traffic Formatting	Setting	P1----- Formatted first point flow value C1----- Format the flow coefficient corresponding to the first point flow value P2...	
F3-04	Data Backup	Setting	00~99	33
F3-05	Data Recovery	Setting	00~99	33
F3-06	Flow zero manual correction	Setting	00000000~16777215	Sample value

F0-00	Level 4	Password	Input	0~9999	8888
F4-01	No. 2 flow coefficient		Setting	0000.000~9999.999	1.000
F4-02	Cumulative preset		Setting	0000000.000~99999990999	0.000

Flow Formatting Instructions

Operation steps: Do this if the instrument linearity is not good. Set F2-10 to 10000, the unit is M3/H, 1000KG/M3 for density water, and 1.KK/M3 for air. According to the initial state, the standard flow value is recorded, the meter displays the flow value P, and the flow coefficient C of each point is calculated.

C=10000XQ mark/P Then fill in P1, C1, P2, C2 from small to large. . .

Enter the flow format F3-03 menu to display P1

P1 format 1st point flow value symbol

Press the ENTER key to enter the 1st point flow value input menu.

P1 0000.000 m3/h

After inputting the flow value of the first point and pressing the confirmation key, the flow value is stored. Press the up key again to display C1

C1 formats the first point corresponding flow coefficient value

Press the ENTER key to enter the first point corresponding flow coefficient value input menu.

C1 000000

Enter the corresponding flow coefficient for the first point and press the ENTER key. The coefficient is stored.

The first point corresponds to the flow coefficient stored and press the up key to automatically display the second point symbol.

Press the up key to add the value function, and the following display appears in sequence:

a. P1 format 1st point flow value symbol
b. C1 formats the first point corresponding flow coefficient value
c. P2 format 2nd point flow value symbol
d. C2 format the second point corresponding flow coefficient value
.....

Note: When the coefficient input of any point is 0, the data of all points in the flow format will be cleared to 0. At this point the meter uses the factor filled in at F2-10. If there are two or more sets of values in the flow format, the meter uses the data in the format, and the coefficients in F2-10 will not be used.

Traffic formatting can only be done at a maximum of 9 points.

The flow formatted data should be measured when the parameters are in the following state: the unit is m3/h, the coefficient is 10000, the water standard timing density should be input 1000.000 kg/m3, and the gas standard timing density should be input 1.2 kg/m3. The flow data displayed by the measured meter and the calculated coefficient are entered into the flow formatted menu.

5. Reset the flow meter

The flow meter has been cleared by the factory, and the flow meter may have a zero drift due to the inevitable violent collision and installation error during transportation. In order to ensure the accuracy of the flow meter, after the flow meter is installed in place and it is confirmed that there is no medium passing condition, observe that the flow meter has a zero drift, it needs to be cleared. The operation procedure is:

- Close the valve at the rear of the flow meter;
- Slowly open the front end valve of the flow meter to fill the flow meter with the measured medium;
- Turn on the flow meter for about 5 minutes at maximum flow rate;
- The maximum flow rate of the meter scale shall prevail;
- Close the front and rear valves of the flow meter and confirm that the measured medium flow in the pipeline is zero, that is, the measured medium is stationary;
- Perform the clear operation according to the flow zero operation mode indicated earlier;
- Install the flow meter without temperature drop compensation of the sensor in the high-temperature flow meter in place and run for a certain period of time, that is, after the temperature of the transition piece of the flow meter rises to the equilibrium point (no longer warming up), close the front and rear valves of the flow meter and confirm Cleared under the premise that the flow rate of the medium in the flow meter is zero.
- If the flow meter with pressure compensation still shows pressure when it is not under pressure, it needs to be cleared as the flow clears.
- For the flow meter with temperature zero compensation of the sensor in the high-temperature flow meter, if there is no zero drift after the installation is in place, it does not need to be cleared. If the zero drift occurs due to the installation, it needs to be cleared. However, it must be cleared at normal temperature, that is, it must not be cleared at high temperature.

6. Clear operation mode:

After the flow meter is installed in place, it is necessary to clear the error caused by the difference between the installation and the calibration, and the zeroing process can be performed.

a. The flow meter is cleared:

① Flow zero point: set the current state to flow 0. After entering the flow zero menu, the original flow zero sample value is displayed. Press the up key to replace the original flow zero sample value with the current sample value on the screen, and then press the

enter key. The zero setting is completed. (See calibration step 3)

② Pressure zero point: Set the fluid pressure value when the pressure sensor is under air pressure is 0 MPa, and the operation method is the same as the flow zero point operation method. For flow meters without pressure compensation, no pressure zero is required to clear, and the flow is cleared and exits.

b. Reset the total accumulated traffic:
※F3-01 Cumulative clear: Enter the set value 33 to clear the accumulated amount.

c. Flow meter coefficient correction:
(Q mark / Q test) * original coefficient = new coefficient
The basic parameter settings in the flow meter must be determined according to different requirements of the user.

d. Flow error correction:
After the flow meter is used for a period of time, certain errors will inevitably occur. Recalibration can be performed as follows:
① Record the standard value and the current value of the flow meter separately, both cumulative flow and instantaneous flow.

② Substituting the recorded standard values and the current value of the flow meter into the following formulas:
C new = C old · Q standard / Q current

Among them, C new---flow meter is to input the new outflow coefficient.
C old --- flow meter original outflow coefficient Q standard --- standard device calibration value.
Q current---the value of the flow meter calibration

For example: the original coefficient C of the flow meter is (C) is 15000, the standard value obtained in the calibration is 251Kg, and the current value of the flow meter is 223Kg, and the above data is found in the previous formula:
C new = C old · Q standard / Q current =15000·251/223 =16883

③ Input flow meter the new outflow coefficient C new = 16883.

VI. Installation of the flow meter

It should be installed in horizontal pipelines as much as possible.

a. Normal temperature type, low temperature type, high temperature type flow meter according to different working conditions, horizontal, vertical or inverted installation (subject to the factory check list)

b. When the working temperature of the medium is above +300 degrees, the user should take heat insulation measures to prevent the heat radiation from damaging the meter head (the working temperature of the meter is -30 to +70 degrees), and the working temperature is below -100 degrees. The medium should also take anti-freezing measures

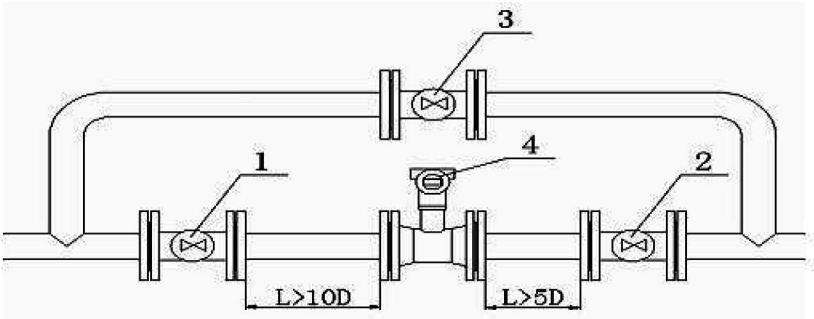
c. In order to ensure accurate metering of the flow meter, it is required to set the former and latter straight pipe sections

d. In order to ensure the flow meter not to affect the system during inspection and replacement, the bypass valve (3) and the shut-off valve (1, 2) should be set as far as possible

e. Vertical installation due to process requirements, the flow of the measured medium can be from bottom to top, or from top to bottom, but should be explained to the supplier when ordering

f. The flow meter diameter and the connected pipe diameter are as same as possible to reduce flow interference and cause measurement error

g. The flow meter housing must be reliably grounded. If there is no grounding condition, it should be explained to the manufacturer.



'1' is former valve,'2' is latter valve, '3' is Bypass valve, '4' is flow meter, L ≥10D is the length of former straight tube, L ≥5D is the length of latter straight tube,'D' is Tube nominal diameter.

VII. The remote transmission circuit of flow meter on line

In addition to the direct reading of the indication value, the flow meter has the functions of current output, frequency output, pulse equivalent output and voltage output for remote transmission according to different types of flow meters. It also has HART, RS232-RS485 MODBUS digital communication function. The wiring clamp of the output connection is located at the back of the meter head, and the rear cover of the instrument head is opened. For more details, see the terminal diagram of each function board.

Notes: It is not allowed to install valves, elbows, etc. directly on the front and rear ends of the flow meter measuring tube to greatly change the fluid flow state; if it is

necessary to install valves, elbows, etc. on the pipe before and after the flow meter, the length of the forward and backward straight pipe should be ensured.

Explosion-proof flow meters must be used in hazardous areas. SBL-type intelligent target flow meters are inspected by the National Explosion-proof Electrical Products Quality Supervision and Inspection Center (CQST) and comply with GB3836.1-2000 "Electrical Equipment for Explosive Gas Environments Part 1: General Requirements". , GB3836.2-2000 "Electrical equipment for explosive gas atmospheres Part 2: Explosion-proof type "d"" and GB3836.4-2000 "Electrical equipment for explosive gas atmospheres Part 4: Intrinsically safe type "i""
The requirements of the standard are: ExdIICT4 and ExiaIICT4.

VIII. The environmental conditions that the flow meters work normally

A. Atmospheric pressure: 86 ~ l06kPa;
B. Ambient temperature: -20 ° C ~ +60 ° C (8 ° F ~ l40 ° F);
C. Relative humidity of the surrounding environment: ≤95% RH (+25°C);
D. Explosion-proof flow meter can be applied to hazardous areas in Zone 1 and Zone 2 containing explosive gas mixtures of Groups II to II, IIC and IIC;
E. Intrinsically safe flow meter can be applied to hazardous areas in Zone 0, Zone 1 and Zone 2 containing explosive gas mixtures of Groups II to II, IIC and TC to Group T1.

IX. Flow meter verification

1. Real-flow verification
2. Dry-type verification, that is, using the weight-counting method.
In the dry method check, first calculate the force F acting on the spoiler (target) according to the following formula.

$$Q_n = K \cdot D_i (1/\beta - \beta) \sqrt{F \cdot \rho / \rho_0}$$

$$Q_m = K \cdot D_i (1/\beta - \beta) \sqrt{F \cdot \rho}$$

$$Q = K \cdot D_i (1/\beta - \beta) \sqrt{F / \rho}$$

$$\beta = d / D_i$$

式中：Q_m—— Mass instantaneous flow(kg/h)

Q_n—— Standard state volume instantaneous flow(Nm^3/h)

Q—— Volume instantaneous flow(m^3/h)

K——Flow coefficient

Di—— Flowmeter inner diameter(mm)

F——The force of the spoiler(target) affected by medium(kg)

ρ —— Working condition density of the measured medium(kg/m^3)

ρ_0—— Density of medium under standard conditions(kg/m^3)

β—— Target diameter ratio

d——Spoiler (target) diameter

The coefficient K in the above formula is provided by the manufacturer, and the user can use the formula to sequentially calculate the relationship between the instantaneous flow rate Q in the flow range of the instrument and the force F acting on the choke member, thereby calibrating the meter.

X. Flow meter common faults and treatment methods:

① When the flow rate of the measured medium in the pipeline is zero, the instantaneous flow rate value indicated by the flow meter is not zero. The reasons for this phenomenon are:

A. The horizontality of the flow meters before and after installation is inconsistent, so that the axial and horizontal components of the target and the target are tilted to cause transient existence.

B. The flow meter runs for a long time, and the internal stress release of the sensor produces a slight change.

C. During the installation or operation, severe overload causes zero drift.
The above three methods can be referred to the steps and methods of the flow meter clearing in this specification.

D. The flow meter sensor is damp or insufficiently insulated.
Treatment method: Use a hair dryer to dry the sensor or return to the factory for repair.

E. The target piece, the target rod and the measuring instrument are caught by the debris.
Treatment method: close the front and rear valves of the flow meter, use the tool to loosen the connecting bolt between the flow meter transition part and the measuring tube, and gently shake the transition parts or take out, clean the debris and reset it as it is.

F. The high temperature flow meter without flow sensor temperature zero compensation is not cleared at its maximum operating temperature.
Treatment method: The flow meter can be cleared under the condition of its maximum working temperature and ensuring that the flow rate of the test medium is zero.

② The value of co-occurrence increases abnormally during the flow meter process. The main causes of this phenomenon are:

A. Filamentous and banded debris are attached to the target and the target.
Treatment method: Refer to the method of handling debris.

B. Under high crucible conditions, the target sheet and the target rod produce severe crusting, so that the projected area of the target plate along the measuring tube is increased, that is, the annular flow area between the target piece and the measuring tube is reduced, and thus the same Under the flow rate, the force of the sensor increases, which eventually leads to an abnormal increase in the flow rate.
Treatment method: Remove the transition piece and use tools to remove the dirt on the target and target rods and the inner wall of the measuring tube.

C. The flow meter sensor is damp due to external factors, the insulation strength is reduced, and the output signal is superimposed to cause the indication value to increase.
Treatment method: Dry the sensor wiring part, tighten the instrument casing to ensure the

sealing performance. If it still cannot be solved, it can be sent back to the production plant for treatment.

③The measurement error is large, and there are many reasons for this phenomenon. The main reasons are as follows:

A. The relative concentricity of the flow meter and the connecting pipe is greatly misaligned during installation, and the sealing gasket is not concentric, thereby forming a throttling resistor, which greatly affects the flow state of the measured medium.
Solution: Adjust the installation status.

B. The straight pipe section of the flow meter is too short, and the components such as elbows and valves that greatly interfere with the flow state of the measured medium are directly installed in front of the flow meter.
Solution: Install according to the requirements of the manual or perform on-the-spot real-time calibration of the flow meter.

C. Bypass pipe leak
Solution: Check and replace the bypass line.

D. The band is wrapped around the target piece to increase the force of the target piece.
Solution: Refer to the previous method of handling debris.

E. Flow meter board related components are damaged
Solution: return to factory for repair

④The flow meter has no indication or no anti-signal. There are three main reasons:

A. Power supply contact is not good or reversed
Solution: For the flow meter with its own battery, check if the battery is stable, the contacts are good, and the battery is powered. For external power supply, check whether the connection between the connecting wires is intact, whether the wires are conducting, whether the positive and negative poles are reversed, and whether the external power supply is normal.

B. Flow meter power circuit is damaged
Solution: return to factory for repair.

C. Display damage
Solution: return to the factory for replacement.

⑤The value displayed during the operation of the flow meter has been zero. The main reasons for this phenomenon are:

A. The force component (target piece) falls off, causing the sensor to be non-inductive.
Solution: assemble the target piece of the same specification.

B. Flow meter sensor no voltage output signal
Solution: The sensor is damaged and needs to be returned to the factory for repair.

C.The flow meter sensor is stuck to the transitional component.
Solution: remove the transition parts for cleaning or return to factory for repair

D. The measured medium flow is too small, below the flow meter's minimum scale flow.
Solution: Return to the factory to replace the force component.

⑥There is no display of instantaneous flow. The main reasons for this phenomenon are:
A. The sensor is damaged due to excessive force applied to the instrument during transportation or installation.
Solution: replace the sensor or return to the factory for repair

B. Damage to the sensor caused by overload flow impact during operation of the instrument
Solution: replace the sensor or return to the factory for repair

C. The instrument is not removed when the pipeline is purged, causing sensor overload damage.
Solution: replace the sensor or return to the factory for repair

D. The sensor connector is loose, and the contact is poor, causing the line to be blocked.
Solution: Replace the sensor connector or return to the factory for repair

XI. Special tips

①Replace the battery
A.Flow meter with battery, when the battery power display window on the upper right of the display shows insufficient power, you should replace the battery immediately. Replace the battery should be the same technology battery. (Can consult or purchase from the factory)

B.The meter will automatically save data for internal parameters and accumulated flow.

C.When the ambient temperature is below -20 °C, the liquid crystal display of the flow meter will freeze, that is, it will not be displayed, but it will not affect the internal

measurement. Once the temperature exceeds -18 °C, the liquid crystal will return to the display state, thus in the severe cold area. The flow meter should be insulated.

②Environmental requirements

Although the flow meter has a considerable degree of protection, in order to maximize its service life and reliability, it is recommended to provide appropriate rain and anti-collision measures for the flow meter installed outdoors.

Attachment 1

MODBUS communication protocol address correspondence table

Address	Name	Read/ Write	Remarks
02H	Flow value high digit*	R	
04H	Flow value low digit*	R	
06H			/
08H	Percentage high digit*	R	
0AH	Percentage low digit*	R	
0CH~10H			/
12H	pressure unit	R	
14H	pressure high digit*	R	
16H	pressure low digit*	R	
18H	PV unit	W/R	M3/H--13H，M3/MIN--83H，kg/H--4BH，T/H--57H，L/H--8AH， NM3/H--8EH， NM3/MIN--8FH
1AH	Cumulative value high digit*	W/R	Send date 0, Accumulation will be cleared
1CH	Cumulative value two digits*	W/R	
1EH	Cumulative value three digits*	W/R	
20H	Cumulative value four digits*	W/R	
22H	Range upper limit high digit*	W/R	
24H	Range upper limit low digit*	W/R	
26H	Range lower limit high digit*	W/R	
28H	Ranger lower limit low digit*	W/R	

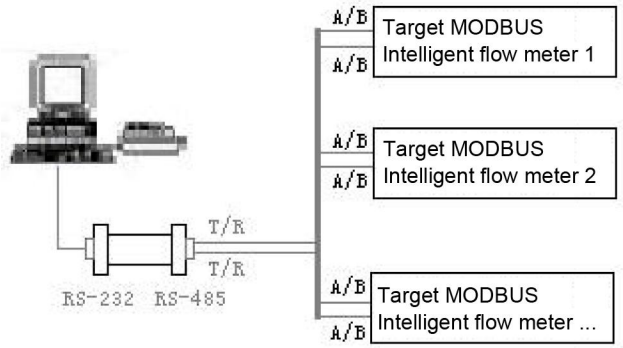
2AH	damping value*	W/R	Less than or equal to 65 seconds
2CH	Write protection mark	W/R	
2EH	**compensation type**	W/R	No compensation--0H, Temperature compensation--01H, Pressure compensation--10H, Temperature and pressure compensation--11H
30H	K coefficient high digit*	W/R	
32H	K coefficient low digit*	W/R	
3AH	Small signal resection high digit*	W/R	
36H	Small signal resection high digit*	W/R	
38H	Process temperature high digit*	R	
3AH	Process temperature low digit*	R	
3CH	Fluid density unit	R	KG/M3--5CH
3EH	Fluid density high digit*	W/R	
40H	Fluid density low digit*	W/R	
42H	Measurement type	W/R	Liquid--01，Gas--02
44H	output method	W/R	No output--0，Frequency output--01H，Pulse output--02H
46H	Pulse equivalent	W/R	Accumulate per 0.1, output pulse 0 Accumulate per 1, output pulse 1 Accumulate per 10, output pulse 2

Address	Name	Write/Read	Remarks
48H	Flow zero sample value high digit	W/R	‘R’ function reads the current flow zero point sample value, and ‘W’ function sends data 0 for the flow zero point operation, and other data is invalid.
4AH	Flow zero sample value low digit	W/R	
4CH	Pressure zero sample value high digit	W/R	‘R’ function reads the current pressure zero sample value, ‘W’ function, performs pressure zero operation when the data is 0, and corrects the current pressure to this data when the data is not 0.
4EH	Pressure zero sample value low digit	W/R	
50H	Temperature zero sample value high digit	W/R	‘R’ function reads the current temperature zero point sample value, ‘W’ function,

52H	Temperature zero sample value low digit	W/R	performs temperature zero point operation when the data is 0, and corrects the current temperature to this data when the data is not 0.
54H			/
56H	Data Recovery	W	Data 01 is valid, other data is invalid
58H	data backup	W	Data 01 is valid, other data is invalid
5AH~5EH			/
60H	Sensor serial number high digit	W/R	
62H	Sensor serial number low digit	W/R	
64H	Final assembly number high digit	W/R	
66H	Final assembly number low digit	W/R	
68H	Device No. High digit	W/R	
6AH	Device No. low digit	W/R	
6CH	Device address	W/R	0~255 （The default is 0, which can be set before leaving the factory according to user requirements.）
6EH~74H			/
76H	Date Year	W/R	
78H	Date Month	W/R	
7AH	Date Day	W/R	
7CH	Station number	W/R	
、、	Station number	W/R	
、、	Station number	W/R	
82H	Station number	W/R	
84H	MESSAGE	W/R	
、、	MESSAGE	W/R	
、、	MESSAGE	W/R	
9AH	MESSAGE	W/R	

Remarks: For items with * after the name, the data is expanded by 1000 times. For example, the flow rate of 123.456 M3/H data is 123456 during the transmission.
Communication settings: baud rate 9600, even parity, 8 data bits, 1 stop bit (can be changed according to customer requirements).
RS-232═RS-485 MODEL (converter model): UT-201, CONVERTER
This instrument is not equipped with this interface and needs to be purchased by the user.

Communication interface connection diagram:



Example: There are two MODBUS flow meters connected to the same bus. To achieve communication with the host computer, the parameters are as follows:

Item	Device address	Instantaneous flow
The first one	01	888.695m^3/h
The second one	02	1.234m^3/h

Packet format (hexadecimal) when the host computer queries the first table

Device address	Function code	Variable beginning address high digit	Variable beginning address low digit	Numbers of variables high digit	Numbers of variables low digit	CRC Check code low digit	CRC Check code high digit
01H	03H	00H	02H	00H	02H	0XXH	0XXH

The above table is a query packet for reading the instantaneous flow data of two words of the No. 01 meter, and the addresses of the data are 02H and 04H, respectively.
Note: The number of readable variables cannot exceed 20.
Packet format when the instrument 1 replies (hexadecimal)

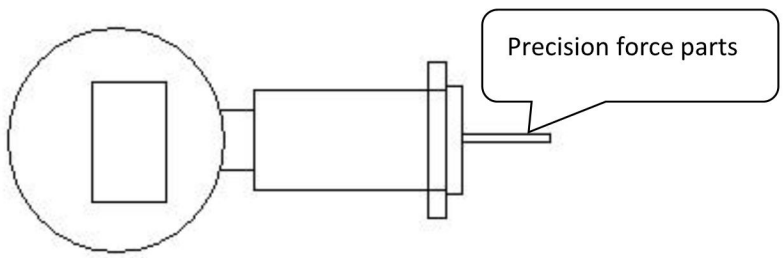
Device address	Function code	Total digits of variables	High digit of the high flow value	Low digit of the high flow value	High digit of the low flow value	Low digit of the low flow value	CRC Check code low digit	CRC Check code high digit
01H	03H	04H	00H	0DH	08FH	077H	0YYH	0YYH

Process the reply data as follows:
(Flow value high word data × 010000H + flow value low word data) /1000 = actual flow value
0000DH × 010000H + 08F77H = 0D8F77H 0D8F77H (hexadecimal) = 888695 (decimal)
Instantaneous flow value = 888695/1000 = 888.695m3 / h
The data reading method of the No. 02 meter is similar to that of the No. 01 meter.

Special Note:

Install the high temperature meter in a horizontal pipe and tilt it down 45 degrees to avoid hot air blowing the electronic meter.

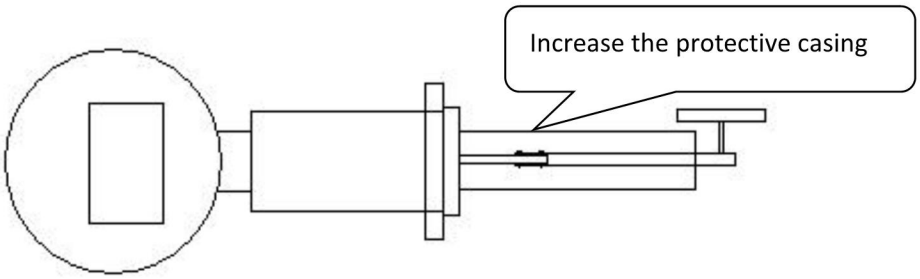
The instrument sensor is a precision component, and the lower connecting rod (precise force component) of the instrument is directly connected to the sensor, and should be protected during installation, adjustment and transportation, so as to avoid collision, extrusion or artificial application of the connecting rod to the maximum range of the sensor. The force causes permanent damage to the sensor. In particular, plug-in instruments must be protected or fixed by the connecting rods of the target and the sensor.



In the above picture, the force-carrying parts cannot collide, squeeze or artificially apply excessive force and protect them.

Several protection methods are listed below. It is recommended that users protect them according to this method. Otherwise, the economic loss caused by problems such as sensor damage or inaccurate measurement will be borne by the user.

1. Install protective sleeve

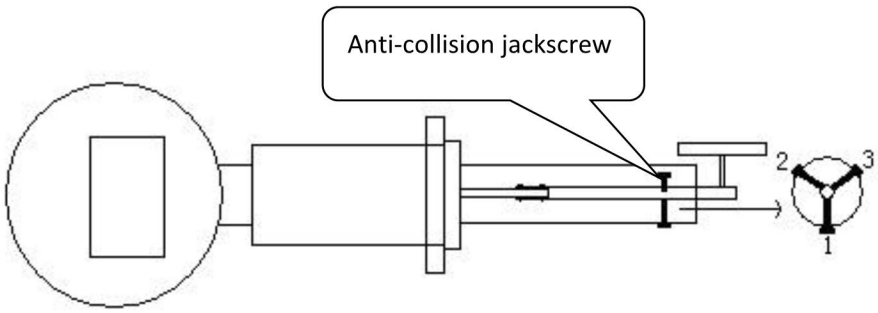


The protective sleeve is installed to avoid damage to the sensor caused by collision and extrusion of the target during transportation. The most important thing is to ensure that the target does not bear the force exerted by the fluid during the measurement to ensure the application of the fluid to be tested. The force is applied to the target, and the only way to ensure the accuracy of the measurement.

Note: The protective sleeve must extend behind the target to ensure that the target is not subject to flow.

2. Installation method of anti-collision jackscrew and its important role

Installation method of plug-in instrument anti-collision jackscrew



Adding the jackscrew in three directions on the protective sleeve avoids the collision of the target rod in all directions during transportation and the damage caused by over-range during the measurement state.

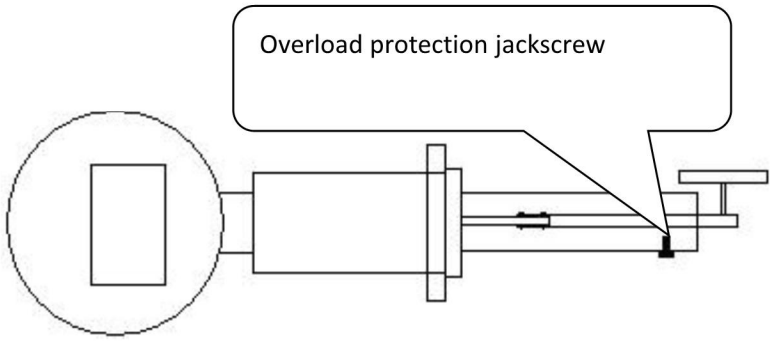
①Protection during transportation

The jackscrew of the three directions must be tightly pressed to ensure that the stressed parts during transportation are not damaged by external forces such as collision and extrusion, but the following premise must be achieved when tightening the jackscrew:

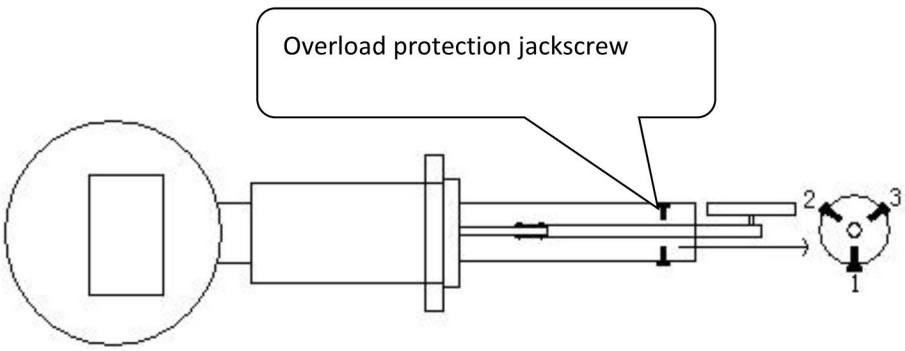
a. The jackscrew 1 must be placed in the vertical opposite direction of the target's force;

b. Before the jackscrew is tightened, the meter must be raised (vertically downward) to ensure that the stressed parts are not subjected to forces in other directions except gravity.
c. Power on the meter, and simultaneously tighten the jackscrew in three directions to the target at the zero point of the meter to ensure that the jackscrew only plays a role in preventing and protecting the target rod, and does not exert any force on the target rod, that is, tightening The instrument is still at zero after the jackscrew.

② **In the measurement state, anti-overload protection**
a. Overload protection for one-way flow meters



Before the instrument is installed, remove the 2 and 3 jackscrews, leaving only 1 wire. For the length and fixing method of the 1 wire, see the description of the position and fixing method of the anti-overload jackscrew.
b. Anti-overload protection for bidirectional flow meters

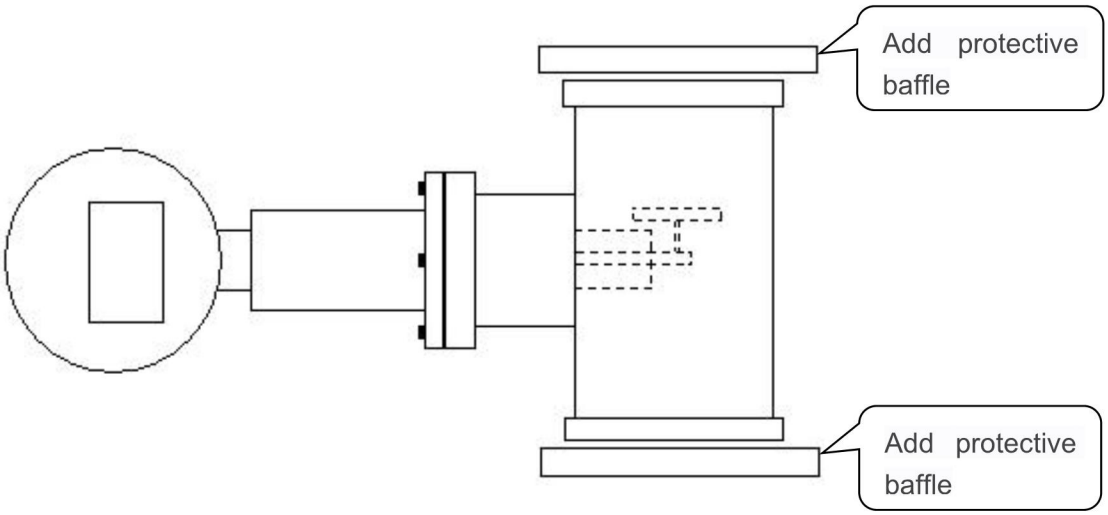


Before the instrument is installed, loose the 1, 2, and 3 jackscrews, respectively, and return to the corresponding positions, and then fix them. 1 For the application length and fixing method of the jackscrew, please refer to the description of **'position and fixing method of anti-overload jackscrew'**. 2, 3 jackscrew operation method is basically similar to the method of 1 jackscrew, only 2, 3 jackscrew should be operated at the same time when determining the length of the jackscrew, to ensure that the position and length

of the two jackscrews must be symmetrical with each other.

Pipeline instrument installation method

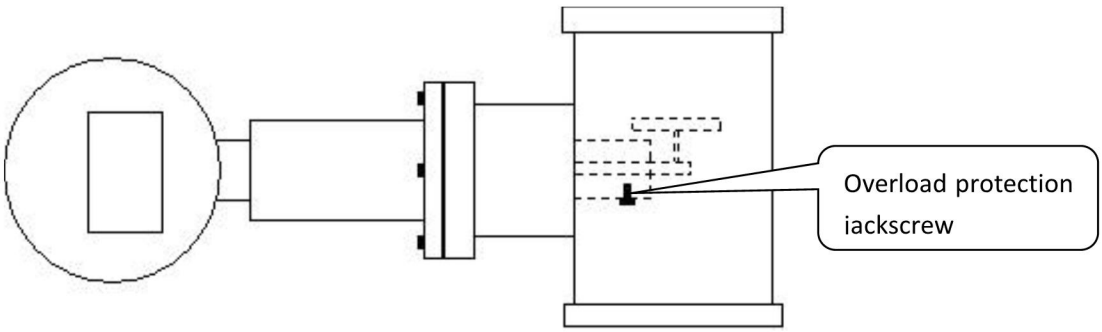
A. Protection during transportation



During the transportation process, two baffles are added at both ends of the pipe to prevent other objects from entering the pipe and hitting the target or the target to cause damage to the sensor.

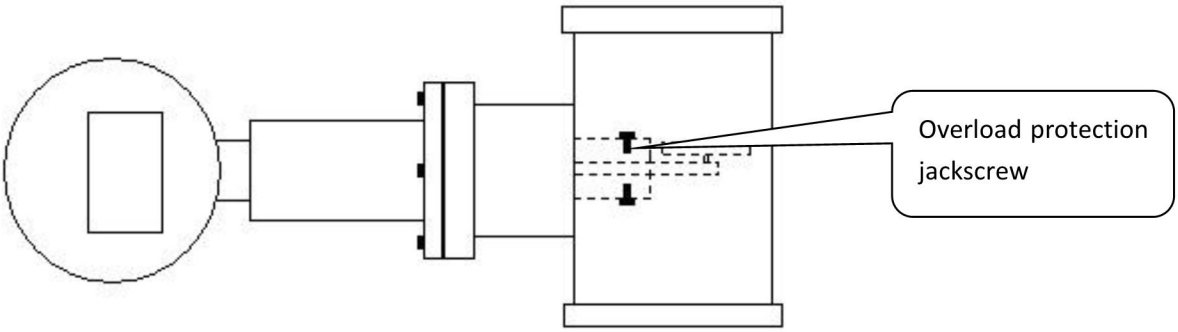
B. In the measurement state, anti-overload protection

a. Overload protection for one-way flow meters



Before the instrument is installed, install the anti-overload jackscrew on the protective sleeve in the vertical and reverse direction of the target force. For the application length and fixing method of the jackscrew, please refer to the description of the **'position and fixing method of the anti-overload jackscrew'**.

b. Anti-overload protection for bidirectional flow meters



Before the instrument is installed, the anti-overload jackscrew is installed on the protective sleeve of the two-way two-piece target in the vertical direction and the opposite direction. The application length and fixing method of the jackscrew are related to the "position and fixing method of the anti-overload jackscrew". Description. The two jackscrews are identical in operation except the opposite direction.

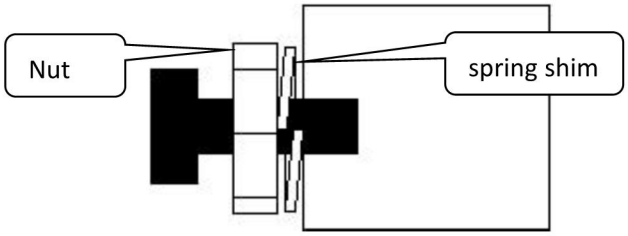
3. Application length and fixing method of anti-overload jackscrew

In the actual flow pipeline, the instantaneous flow rate of the pipeline is too large for various reasons (**for example, when the pipeline valve is opened too fast**), causing permanent damage to the sensor over-range. Therefore, the anti-overload jackscrew is added to the sleeve in the opposite direction of the target force. When the target sheet is subjected to the maximum range force, the target rod will be pushed onto the jackscrew to prevent the sensor from being overloaded and causing damage. The steps for determining the length of the jackscrew are as follows:

①When the instrument protection sleeve and the anti-overload jackscrew are ready and installed, and the parameters of the instrument have been set, the instrument will stand up (keep the target perpendicular to the ground) and enter the menu to set the flow zero point.

②When the LCD screen is in the measurement state, apply force to the target piece, and press the “Exit” key until the LCD display value display area reaches 3000000, and the jackscrew is topped.

③After the jackscrew is topped, apply force to the target piece until the target rod hits the jackscrew. Press the “Exit” key to observe the LCD display value. The value cannot exceed 3000000, and then fix the jackscrew. The fixing method of the jackscrew is as follows:



The above measures are to protect and prevent the transportation and use of the instrument. In particular, the plug-in instrument should pay more attention to the protection measures of the above items.
When installing the instrument, it is recommended that the user only install on the horizontal pipe, not on the vertical pipe, because the weight of the target and the target in the vertical pipe will be applied to the sensor, which may cause direct damage to the sensor and narrow the available range. Zero point instability, pipe vibration impact and so on.
If the instrument is damaged due to failure to take any protective measures, artificial or human negligence in the above process, it is not a quality problem of the instrument, and the loss caused by the user is borne by the user.

Instrument selection: DSB--□□□□□□□□□
DSB product code: smart target flow meter
1-----Caliber
2-----Instrument type, A-pipe flange, B-clip type, C-plug-in D-online installation
3-----media type, Y-liquid, Q-gas, Z-vapor
4-----media temperature, C-normal temperature (-20-80 degrees), G-high temperature (-20---350 degrees)

5------Nominal pressure,
6------Shell material, Z-cast steel, N-stainless steel
7------Compensation content, T-temperature compensation, P-pressure compensation, W-temperature and pressure compensation, N-no compensation
8------Output mode, I—4—20MA, F-frequency output, R-485 communication, H-HART communication
9------Explosion-proof form, X-intrinsic safety type, Y-explosion-proof type