DDTOP
ELECTRONICS INSTRUMENT

LD

MAGNETIC FLOW METER

Operation Manual

DT- JS- 1030- 2019(B)

Preface

Thank you for choosing the products of Dandong Top Electronics Instrument (Group) Co., Ltd.

This operation manual provides you with important information on installation, connection and commissioning as well as on maintenance, troubleshooting and storage. Please read it carefully before installation and commissioning and keep it as part of the product near the meter for easy reading.

This manual can be downloaded by entering the version number at www.ddtop.com .

If the instructions are not followed, the protection provided by the meter may be destroyed.

Trademark, Copyright and Restriction Instructions

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The performance specifications of the meter are effective as of the date of publication and are subject to change without notice. Dandong Top Electronics Instrument (Group)Co.,Ltd. reserves the right to modify the products described in this manual at any time without prior notice.

Quality Assurance

Dandong Top Electronics Instrument (Group) Co.,Ltd. guarantees that all glass plate level gauge have no defects in materials and manufacturing processes within one year from the date of delivery.

During the warranty period, if the product returns with quality problems and the claim is determined by the manufacturer to be within the scope of warranty, Dandong Top Electronics Instrument (Group) Co.,Ltd. is responsible for repair or replacement of the buyer (or owner) free of charge.

Dandong Top Electronics Instrument (Group) Co.,Ltd. is not responsible for the costs caused by improper use of equipment, labor claims, direct or subsequent damage and installation and use of equipment. In addition to the special written warranty certificate for certain products of Dandong Top Electronics Instrument (Group) Co.,Ltd., Dandong Top Electronics Instrument (Group) Co.,Ltd. does not provide any express or implied warranty.

Quality

Dandong Top Electronics Instrument (Group) Co.,Ltd. has passed the ISO9001 quality system certification. The whole process of product production is strictly in accordance with the scope of the quality system, providing the strongest guarantee for product and service quality.

Contents

1. Safety Tips

It is expressly prohibited to modify or change products for safety reasons, repair or replacement only allows the use of accessories specified by the manufacturer.

1.1 Explosion May Result In Death or Serious Injury.

When installing equipment in an explosive atmosphere, be sure to follow applicable local, national, international standards, codes, and procedures. Be sure to install the equipment in Intrinsically safe or non-flammable site operating procedures.

1.2 Process Leaks Can Cause Serious Injury or Death.

Care should be taken to lift the transmitter. If the process seal is damaged, the medium may leak at the joint.

1.3 Failure to Follow Safe Installation Guidelines May Result In Death or Serious Injury.

The operations described in this manual are performed by professionally trained and qualified professionals or end-user specialized professionals to complete.

2. Product Manual

2.1 Magnetic Flow Meter measurement principle

Magnetic flow meter operating principle based on Faraday's magnetic induction law. Figure 3 in the upper and lower ends of the two magnetic coils to produce a constant or alternating magnetic field, when the conductive medium flows through the magnetic flow meter, the flow meter wall can be detected between the two electrodes on the left and right of the induced electric potential, the size of the induced electric potential and conductive medium flow rate, magnetic field of magnetic induction, conductor width (flow meter measurement tube diameter) is proportional to the size, and then through the operation you can get the media flow.

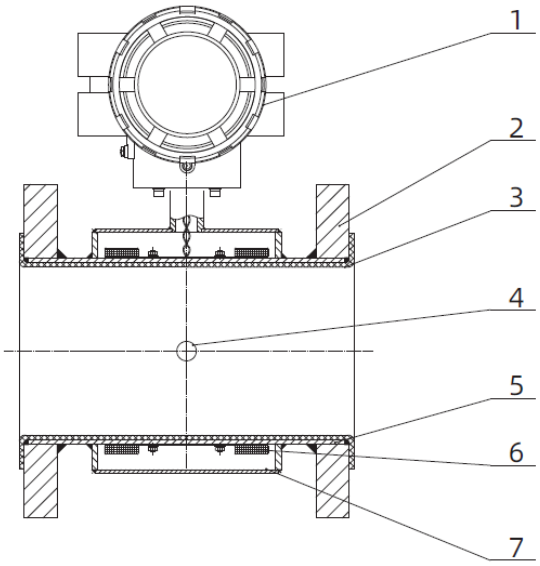
The equation for the induced electric potential is $E=K\times B\times V\times D$

Among them: E-Induced electric potential.
K - Instrument constant.
B - Magnetic susceptibility.
V- Measuring the average flow rate in the tube cross-section.
D- Measure the inner diameter of the tube.

Figure 1 Measuring principle

When measuring flow, the fluid flows through the magnetic field perpendicular to the direction of flow, and the flow of conductive fluid induces an inductive potential proportional to the average flow rate, so the flow fluid conductivity required to be measured is higher than the minimum conductivity --- 5us/cm (magnetic flow meter can theoretically measure conductivity greater than 5μs/cm conductive medium, but the actual measurement should ensure that the magnetic flow meter is used in the measured medium has a conductivity of 50 μs/cm and above (one or two orders of magnitude greater than the theoretical value, and must be based on the conductivity value obtained from online measurements). The induced voltage signal is detected by two electrodes and transmitted via cable to a converter where, after a series of analogue and digital signal processing, the cumulative and instantaneous flow rates are displayed on the converter's display.

2.2 Structure of magnetic flow meter - Figure 2



1. Converter\
2. .Flange
3. Insulation lining
4. Electrode
5. Measuring tube
6. Excitation coil
7. Housing

Figure 2 Product structure

Magnetic flow meter is mainly composed of two parts: sensor, flange, liner, motor, measuring tube, excitation coil, sensor housing and other parts; converter, including internal circuit boards and converter housing and other parts.

1. Converter:

Provide a stable excitation current for the sensor, and at the same time amplify the induced electric potential obtained through the sensor and convert it into a standard electrical signal or frequency

2. Flanges.

For connection to process piping.

3. Lining.

A complete layer of electrically insulating and corrosion resistant material on the inside of the measuring tube and on the sealing surface of the flange.

4. Electrodes.

A pair of electrodes is mounted on the wall of the measuring tube perpendicular to the magnetic line to detect the flow signal, the electrode material can be selected according to the corrosive properties of the measured medium. In addition, it is equipped with 1-2 grounding electrodes, which are used for grounding and anti-interference of flow signal measurement. 5.

5. Measuring tube.

The measuring tube flows through the medium to be measured. The measuring tube is made of non-magnetic stainless steel and flange welded together with an insulating liner.

6. Excitation coil

A set of coils are equipped at the top and bottom of the outside of the measuring tube to produce a working magnetic field.

7. Housing

It not only protects the instrument but also seals.

2.3 Instructions for use of split stent - Figure 3

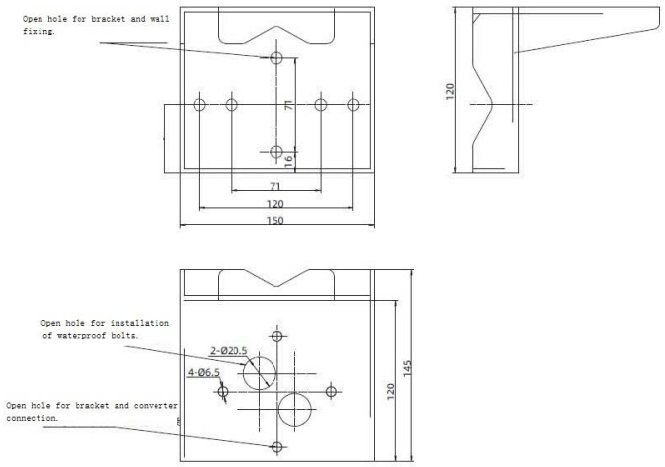
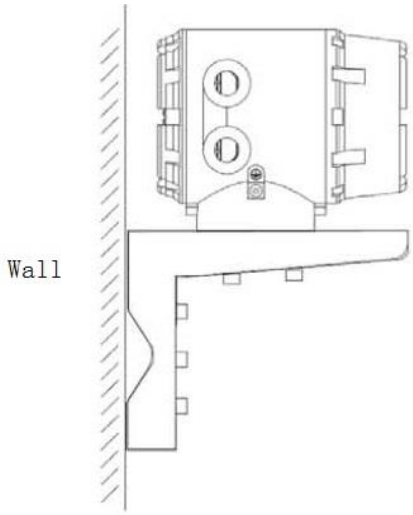


Figure 3 Separate stent



Example of use of split stent - Figure 4

Instructions for use

1. The converter and the split bracket can be fixed by hexagon socket bolts.
2. Separate brackets are attached to the wall with screws.
3. Separate brackets are mounted to the corresponding piping using clamps.

2.4 Description of the instrument

Please use qualified lifting equipment and lifting straps, and pay attention to safety. The magnetic flow meter is only suitable for measuring the instantaneous flow of conductive liquid or liquid-solid two-phase fluid, and has the function of flow accumulation. Usually, the factory parameters will be pre-set according to the requirements of the order, the user does not need to set the parameters before use, but the user needs to check whether the parameters on the nameplate have been pre-set before use, and check with the actual operating conditions.

Magnetic flow meter can theoretically measure conductivity greater than 5μs/cm conductive medium, but the actual measurement should ensure that the magnetic flow meter is used in the measured medium conductivity in 50μs/cm and above environment, the conductivity measurement of the medium must be online measurement, otherwise it will cause the deviation of the measured conductivity value of the medium.

2.5 Terminal description

Split type - Figure 5

When the Q53 converter is used as a split type, it needs to be connected to the sensor split junction box, which is wired as follows.

S SIG1, SIG2: Signal positive, Signal negative
SGND: Signal ground
S SIG1, SIG2: Signal positive, signal negative
S SIG1, SIG2: Signal positive, Signal negative
SGND: Signal ground

EXT1, EXT2:

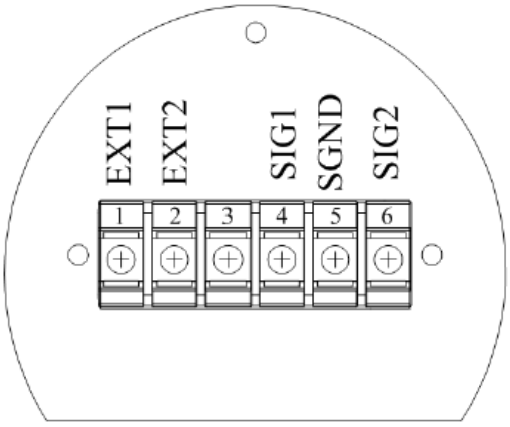


Figure 5 Separate wiring diagram

L, N: 220V AC power supply
485A, 485B: 485 serial communication interface
IOUT, ICOM: 4-20mA output interface
POUT, PCOM: Pulse/Frequency Output interface
THA, THB, THC, THD: Water supply temperature (Pt 1000)
TCA,TCB,TCC,TCD: Backwater temperature (Pt1000)
CCOM: 485 serial communication grounding
Converter instrument protection grounding

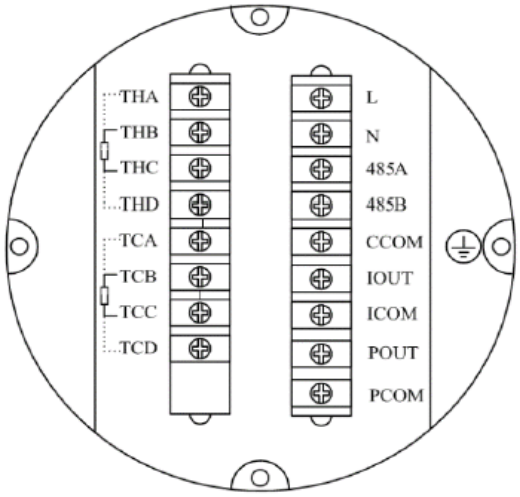


Figure 6 All-in-one wiring diagram

2.6 Nameplates

Tips!

Check the instrument nameplate and determine if the supply is the same as your order.
Check that the power supply on the nameplate is correct.

Figure 7 shows the reference to the nameplate.

电磁流量计 MAGNETIC FLOWMETER	严 禁 带 电 开 盖
型号MODEL:	脉冲输出PLUS-OUT:
附加代码SUFFIX:	内衬材料MATERIALS:
公径通称SIZE:	电极材料ELECTRODES:
准确度等级ACCURACY:	压力PRESSURES:
仪表系数FACTOR:	流体温度FLUDE TEMP:
电源SUPPLY:	环境温度AMB. TEMP:
流量范围SCALE:	防护等级PROTECTION:
电流输出I-OUT:	编号NO:
	2016-06-16

Figure 7 Product nameplate

3 Installation

3.1 Installation Tips

Tips!

Please carefully inspect the box for damage or if it has been brutally handled. If there is damage, report the damage to the delivery person and the manufacturer or instrument shipper.

Tips!

Please check the packing slip to ensure the integrity of the goods you receive.

Tips!

Check the nameplate on the instrument and verify that the supply is the same as your order. Check that the power supply information on the nameplate is correct. If it is not correct, contact the manufacturer or the instrument seller.

3.2 Storage

- Store the instrument in a dry and dust-free place.
- Please avoid exposing it to direct sunlight for a long time.
- The instrument should be stored in its original packaging.

3.3 Installation requirements

Tips!

To ensure reliable installation, the following measures are necessary.

- Leave sufficient space on the sides.
- Do not subject the magnetic flow meter to severe vibration.

3.4 Piping design

The following are considered in the design of pipelines.

1. Location

- Magnetic flow meter should be installed in a dry and ventilated place, usually should be avoided in water-prone areas.
- The magnetic flow meter should avoid the sun and rain, when installed in the open air, there should be a shelter from rain and sun protection facilities. The ambient temperature should be between -20℃ ~ +60℃.
- The magnetic flow meter should avoid installation in the place of large temperature changes and high temperature radiation by the equipment, if necessary, there must be heat insulation, ventilation measures.
- Magnetic flow meter should be avoided in the installation of corrosive gas-containing environment, must be installed, ventilation and anti-corrosion measures must be taken.
- Magnetic flow meter installation site as far as possible to avoid strong vibration, such as pipeline vibration, the magnetic flow meter should be fixed on both sides of the pipe bracket.

- The sensor part of the magnetic flow meter with IP68 (underwater 3 meters) protection level can be placed in the water; the protection level of IP65 magnetic flow meter can not be immersed in water and open air installation.

2. Avoiding magnetic interference

- Magnetic flow meter should not be installed near the motor, transformer or other power sources that are likely to cause magnetic interference. Magnetic flow meter should not be installed near the inverter or get power from the inverter distribution cabinet to avoid the introduction of interference.

3. Length of straight pipe section

- To ensure measurement accuracy of the flow meter, it is recommended that the length of the straight pipe section upstream of the sensor should be at least 5 times the pipe diameter (5D) and the length of the straight pipe section downstream should be at least 3 times the pipe diameter (3D). (See Figures 8 and 9.)

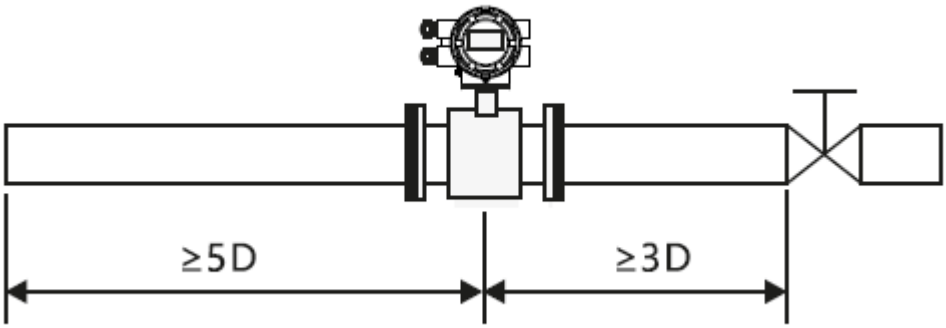


Figure 8

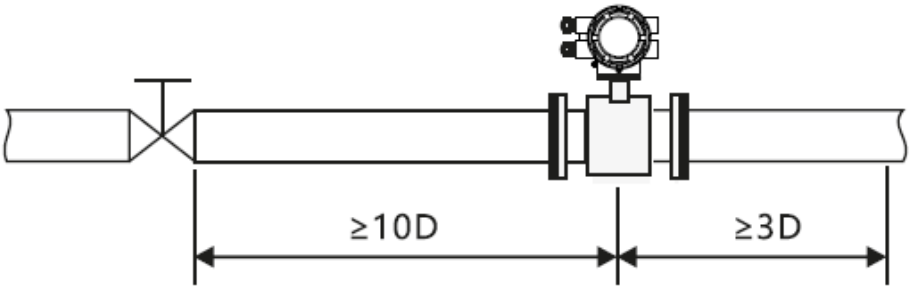


Figure 9

4. Maintenance space

- In order to install, maintain, maintain convenient, the magnetic flow meter around the need to have sufficient installation space.

5. Pipelines that do not allow flow interruptions in their processes

- The installation of the magnetic flow meter should be added to the bypass tube and cleaning port, as shown in Figure 10, this device can be withdrawn from use in the case of the flow meter, to ensure the continuous operation of the equipment system.

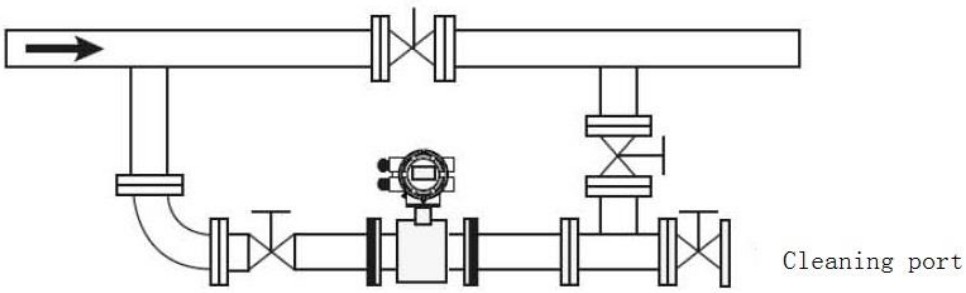


Figure 10

3.5 Sensor installation process

1. Flow

The meter can be set to automatically detect positive and negative flow directions, and the flow direction arrow on the sensor housing is the positive flow direction specified by the manufacturer. In general, the user should install the meter so that this flow direction arrow is consistent with the field process flow direction.

Figure 11 Below shows the preferred location for magnetic flow meter installation.

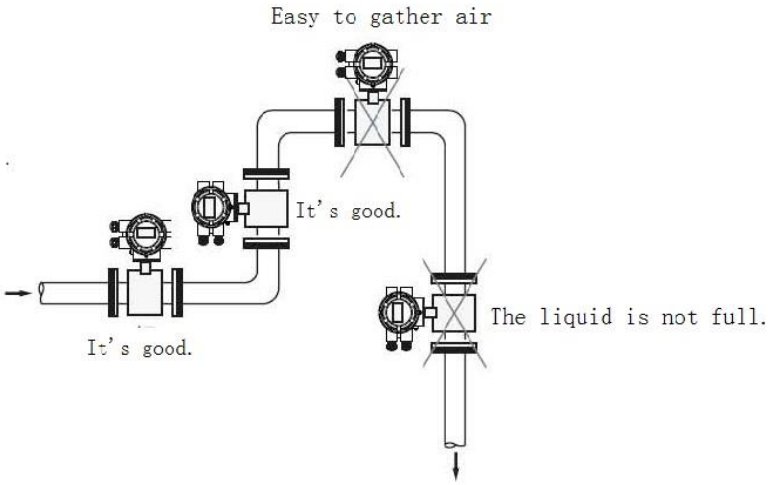
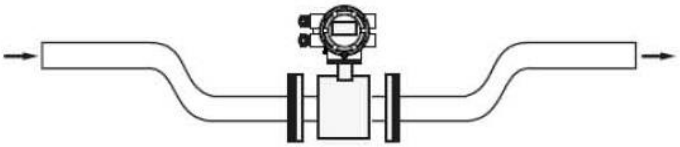


Figure 11

2. Orientation of magnetic flow meter installation and sensor electrode installation orientation

The sensor can be installed horizontally and vertically. The sensor should be installed in the horizontal electrode in a horizontal position, so that once the medium contains bubbles or precipitated substances, bubbles will not adsorb near the electrode, resulting in open converter signal side, precipitated substances will not cover the electrode, resulting in zero drift and other

phenomena.



Installation of the sensor below the pipe

Figure12

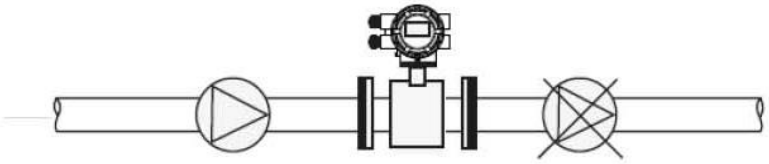
3. Body fluids should always fill the piping

Ipeline structure should ensure that the magnetic flow meter measurement tube is always full of liquid.

Liquid or slurry containing solid particles is recommended for vertical installation of magnetic flow meter, one can prevent the measured medium phase separation, the second sensor lining wear more uniform, impurities will not produce precipitation at the bottom of the measurement tube.

Must ensure that the flow direction from bottom to top, can ensure that the sensor measurement tube is always full of medium.

4. The magnetic flow meter cannot be installed on the suction side of the pump, as shown in Figure 13.



The magnetic flow meter cannot be installed on the suction side of the pump to prevent negative pressure generated by vacuum.

Figure 13

5. For long pipelines, control valves are typically installed downstream of the magnetic flow meter, as shown in Figure 14.

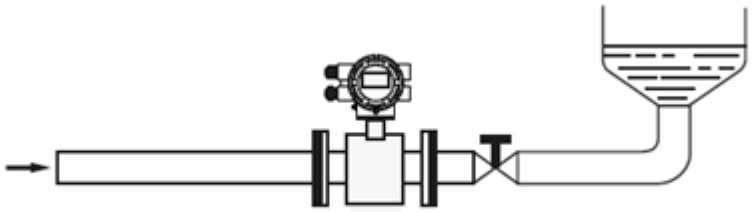


Figure 14 Installation with back pressure downstream of the sensor

6. For open discharge pipelines, the magnetic flow meter should be installed in the bottom section (lower part of the pipe) as shown in Figure 15.

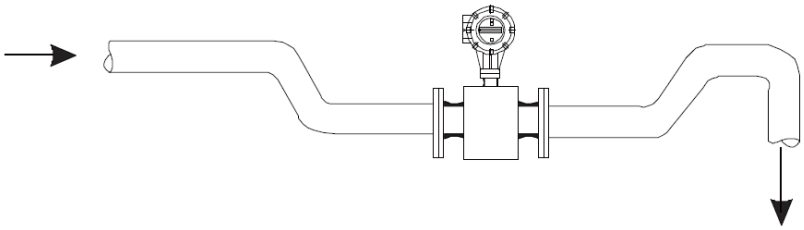


Figure 15

7. Where the pipeline drop exceeds 5 m, an air valve should be installed downstream of the magnetic flow meter, as shown in Figure 16.

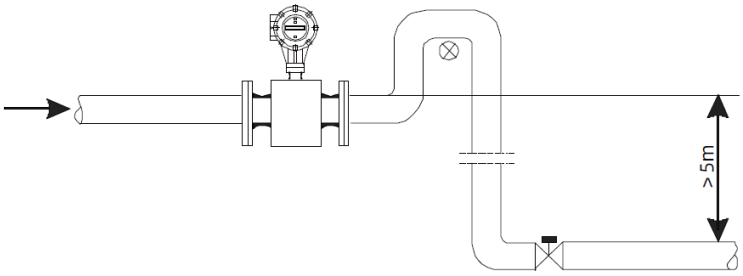


Figure 16

8. Avoid measurement errors caused by incidental gases and damage to the lining caused by vacuum.

9. The pipeline should be free of air bubbles

The piping should be designed so that no gas is separated from the liquid.

The flow meter should be installed upstream of the valve because the pressure in the pipeline will be reduced due to the valve, thus creating air bubbles.

The meter should also be installed in the lower section to reduce the effect of entrained air bubbles

in the fluid on the measurement, as shown in Figure 17.

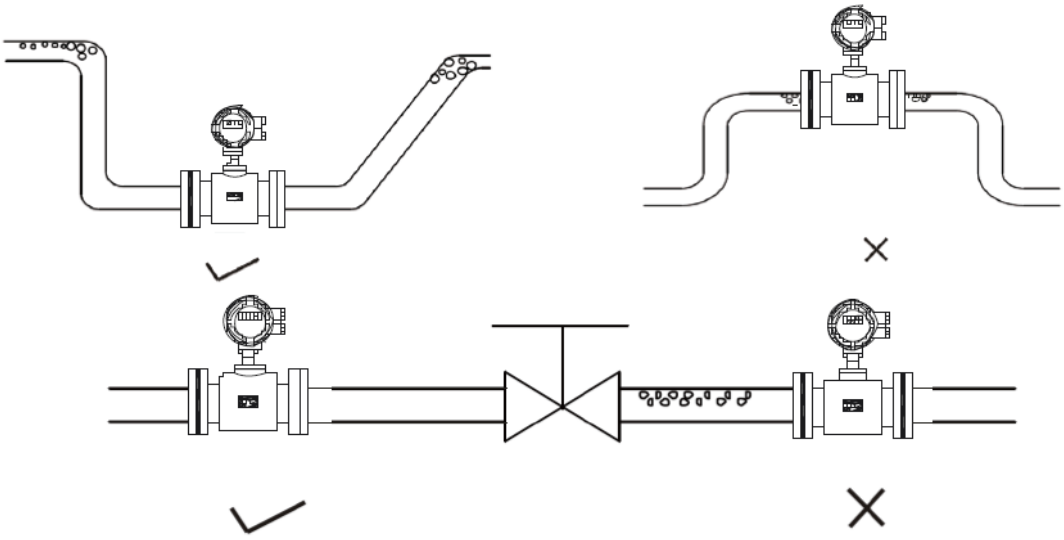


Figure 17

9. Electrical conductivity of liquids

Do not install the magnetic flow meter where the conductivity of the liquid is very uneven. Chemical injection upstream of the meter is likely to lead to uneven liquid conductivity, which can cause serious interference with the meter flow indication. In this case, it is recommended to inject the chemical downstream of the instrument; if the chemical must be injected from upstream of the instrument, it must be ensured that the upstream straight pipe section has at least 30 times the pipe diameter to ensure that the liquid is well mixed.

10. Grounding

Because the induction signal voltage of the magnetic flow meter is small, it is easy to be affected by external noise or other magnetic signals, so the magnetic flow meter needs to be grounded on many occasions, its role is to form a shielded internal space of external interference through the flow meter shell grounding, so as to improve the accuracy of measurement.

3.6 Mechanical installation

Installation of flow meter pipes

(1) Before the installation of the flow meter, the pipeline should be corrected to ensure that the diameter of the meter and the user pipe have a good coaxiality. For the sensor whose nominal diameter is less than 50mm, the height of its axis shall not exceed 1.5mm, the nominal diameter of 65-300mm shall not exceed 2mm, and the nominal diameter of 350mm and above shall not exceed 4mm.

(2) Newly installed pipes usually have foreign matter (such as welding slag). The debris should be flushed out before the flow meter is installed to prevent not only damage to the lining but also measurement errors caused by foreign objects passing through the measuring pipe during the measurement.

Note

Operating Instructions:

1. Be careful not to damage the instrument when unpacking. It is best not to unpack the instrument until it is transported to the installation site to avoid damage to the instrument. Use mounting rings when lifting the instrument, never lift the instrument with a rod or rope through the sensor measurement tube. The correct way to lift the instrument is shown in Figure 18.

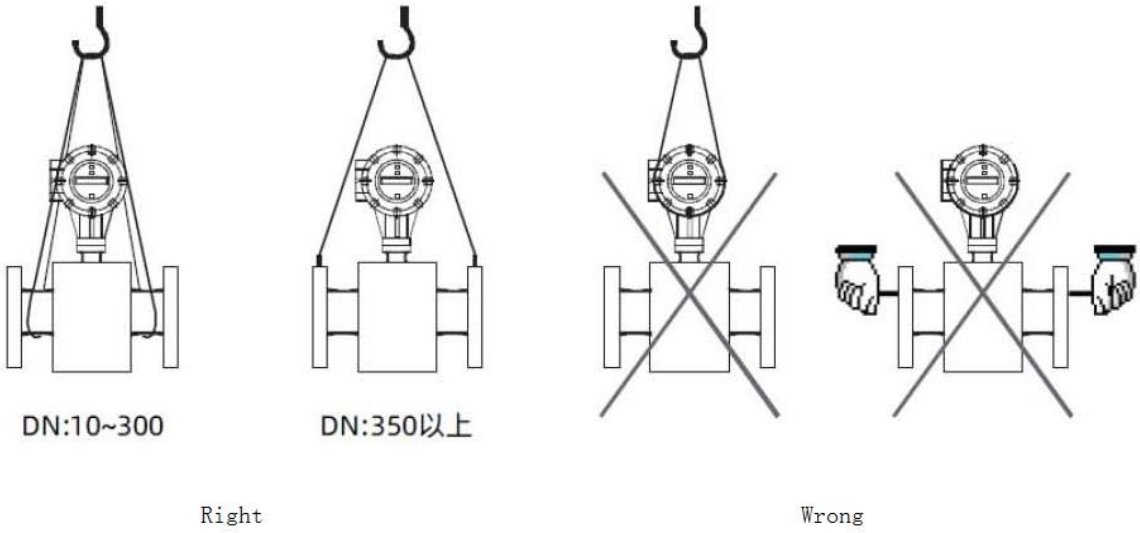


Figure 18

2. Protection of instruments from vibration.
Prevent heavy dropping and compression of the instrument, especially the surface of the flange must not be stressed (may damage the lining and prevent the instrument from working properly).

3. Flange protection
The instrument should pay attention to the protection of the flange after opening the box, do not put the flange on the ground without a liner or other uneven board.

4. Junction boxes
Do not open the junction box cover before wiring. After wiring, please pour my company's special junction box sealant into the junction box as soon as possible, and close the cover of the junction box, tighten the screws to ensure its tightness.

If the magnetic flow meter selection protection level is IP68, the instrument has been waterproof sealed at the factory.

5. Prolonged non-use
After the instrument has been installed, prolonged periods of non-use should be avoided. If the instrument is not used for an extended period of time, the following measures must be taken with respect to the instrument.

A. Check the sealing of the end caps and junction ports to ensure that moisture and water do not

enter the instrument.

B. Check regularly. Check all the measures mentioned above and the condition inside the junction box at least once a year. Check the instrument immediately when there is a possibility of water ingress into the instrument (e.g. after heavy rain, etc.).

Installation of the flow meter - see Figure 19

(1) Installation direction the flow direction of the measured fluid and the flow meter flow direction mark should be consistent.

(2) The flange gasket installed between the flanges should have good corrosion resistance, the gasket shall not be extended into the inside of the pipe.

(3) In the sensor adjacent to the pipe welding or flame cutting, should take isolation measures to prevent heat deformation of the lining.

(4) Such as installation in the well or immersed in water work, after installation and commissioning of the system, the sensor junction box must be potted with sealant. (If the magnetic flow meter selection protection level of IP68, the instrument factory has done a waterproof seal.

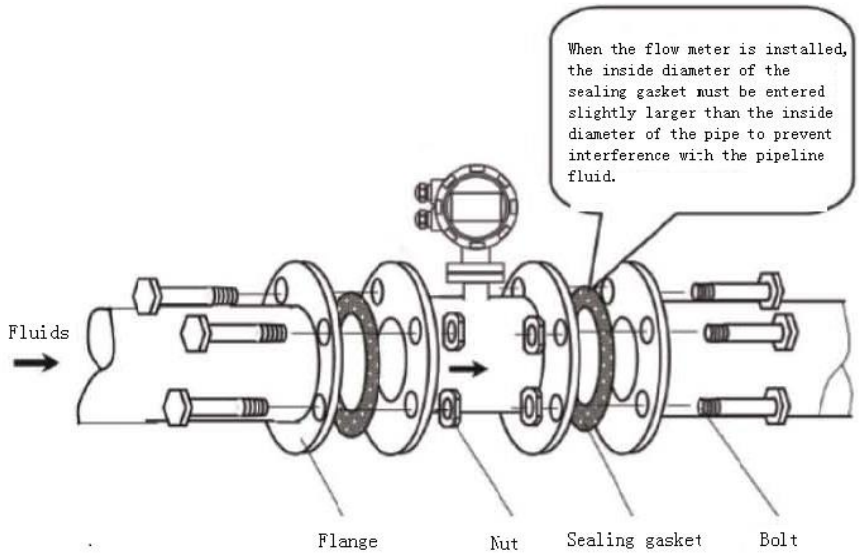


Figure 19

3.7 Sensor and converter dimensions of a pipeline magnetic flow meter, as shown in Figure 20

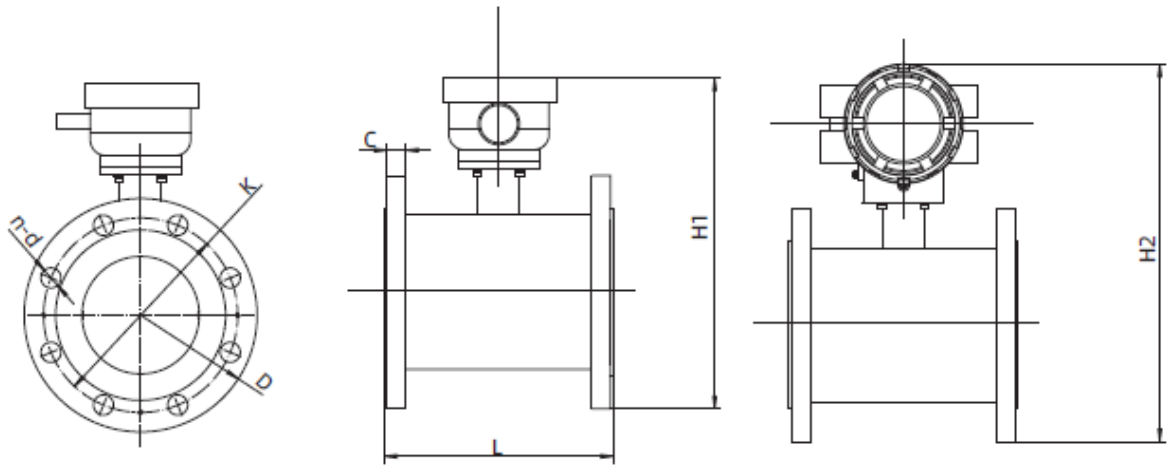


Figure 20

公称口径 nominal caliber (mm)	公称压力 Nominal pressure (MPa)	外形尺寸 External dimension（mm）			连接尺寸 Connection size（mm）				
		L	H1	H2	D	K	d	n	C
15	4.0	200	220	315	95	65	14	4	14
20		200	220	315	105	75	14	4	16
25		200	220	315	115	85	14	4	16
32		200	220	315	140	100	18	4	18
40		200	220	315	150	110	18	4	18
50		200	225	320	165	125	18	4	20
65		200	225	350	185	145	18	8	22
80		200	275	365	200	160	18	8	24
100	1.6	250	285	380	220	180	18	8	22
125		250	315	410	250	210	18	8	22
150		300	345	440	285	240	22	8	24
200	1.0	350	400	495	340	295	22	8	24
250		450	465	560	395	350	22	12	26
300		500	505	600	445	400	22	12	26
350		550	575	670	505	460	22	16	30
400		600	625	720	565	515	26	16	32
450		600	670	765	615	565	26	20	36
500		600	725	820	670	620	26	20	38
600		600	835	930	780	725	30	20	42
700	0.6	700	915	1010	860	810	26	24	40
800		800	1015	1110	975	920	30	24	44
900		900	1115	1210	1075	1020	30	24	48
1000		1000	1215	1310	1175	1120	30	28	52
1200		1200	1445	1540	1405	1340	33	32	60

Note: The size and weight of the magnetic flow meter marked here may be different from the physical product, subject to the physical.

4 Electrical connection

4.1 Safety Tips

Danger!

All work concerning the electrical connection must be carried out with the power supply disconnected. Pay attention to the power data on the nameplate!

Danger!

Please follow your country's installation regulations.

Warning!

Please strictly adhere to local occupational health and safety regulations. Allow only properly trained personnel to work on electrical equipment.

Tips!

Please check the nameplate of the instrument and make sure that the contents of the nameplate are the same as your order. Check that the power information on the nameplate is correct, if not, contact the manufacturer or instrument seller.

4.2 Connecting signal and excitation cables

Danger!

The signal cable and the excitation current cable may only be connected when the power supply is disconnected.

Danger!

The instrument must be grounded as specified to ensure safe operation.

Danger!

For instruments used in explosive atmospheres, it is also necessary to pay attention to the safety instructions given in the special explosion-proof manual.

Warning!

Strictly adhere to occupational health and safety regulations and allow only properly trained personnel to work on electrical equipment.

Wiring instructions - Figure 21

- Excitation wire: EXT1 - the positive end of the sensor excitation coil.
  EXT2 - the negative side of the sensor excitation coil.

- Signal line: SIG1 - the positive signal electrode of the sensor.
  SIG2 - the signal negative electrode of the sensor.

SGND - Signal Ground.

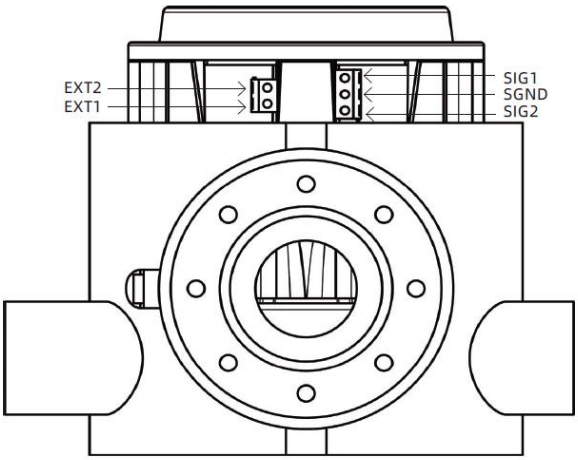


Figure 21

4.3 Measuring sensor grounding

Danger!

No potential difference is allowed between the measurement sensor and the housing or converter protection ground. Magnetic flow meter in use must be grounded separately, if the common grounding with other instruments or electrical devices, grounding leakage current in the grounding line may produce crosstalk interference on the measurement signal, will lead to magnetic flow meter can't work in serious cases.

- The measuring sensor shall be properly grounded.
- The ground wire should not transmit any disturbing voltage.
- It is not permitted to connect other electrical equipment to the ground wire at the same time.

4.4 Converter power connections

Danger!

The apparatus must be grounded as specified to protect the operator from electric shock, as shown in Figure 22.

220VAC power supply

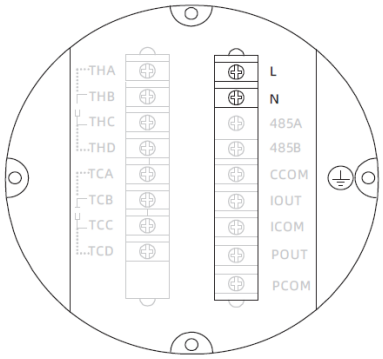


Figure 22

Tips!

Included in the allowable range: 100VAC - 240VAC, 50Hz - 60Hz

- L: Alternating current phase line.
- N: Alternating current zero line.
- Connect the ground wire to the symbol marked copper post ground screw.

24VDC power supply

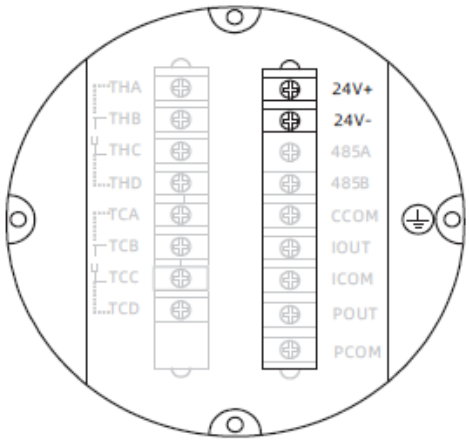


Figure 23

Tips!

Included in the allowable range: 22VDC -26VDC

- 24V+: positive 24VDC power supply.
- 24V-: 24VDC negative power supply.
- Connect the ground wire to the ground screw marked with the symbol.

4.5 Input description - Figure 24

Warning!

Only appropriately trained and authorized personnel are permitted to install, use, operate and maintain the instrument. This document will help you establish operating conditions that will ensure the safe and efficient use of your instrument.

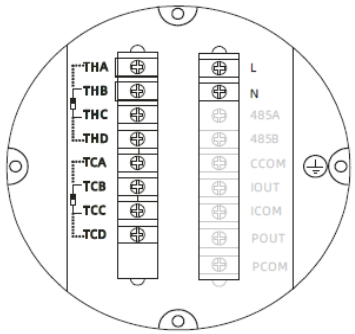


Figure 24

Supply and return water temperature input - Figure 25

- THA, THB, THC, THD: Water supply temperature sensor PT1000 input.
- TCA, TCB, TCC, TCD: return water temperature sensor PT1000 input.

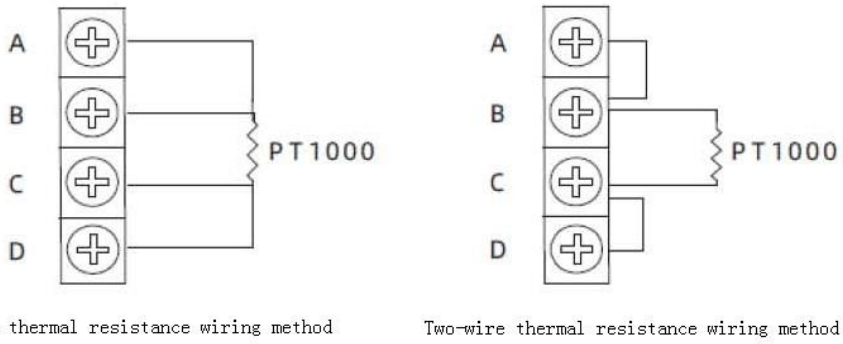


Figure 25

4.6 Output Description

Warning!

Only appropriately trained and authorized personnel are permitted to install, use, operate and maintain the instrument. This document will help you establish operating conditions that will ensure the safe and efficient use of your instrument.

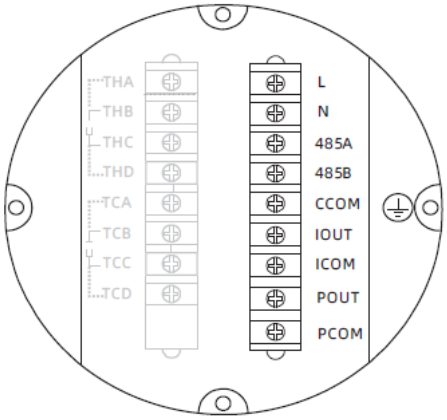


Figure 26

Current output

- IOUT, ICOM: 4-20mA output.
- Active mode: load RL ⩽ 750Ω, I ⩽ 22mA.
- The current corresponds to the flow percentile.

Communication output

- 485A, 485B: 485 serial communication output.
- CCOM: 485 serial communication ground.
- Protocol: ModBus RTU.

Pulse, frequency and alarm outputs
POUT, PCOM: pulse/frequency output terminals.
Active mode: High 24V, drive current 5mA
Output electrical isolation: optoelectronic isolation, isolation voltage > 1000VDC.

Scale.
Frequency output: 2kHz frequency (0-5kHz configurable), corresponding to the upper limit of the flow range.
Pulse output: number of flow volumes per pulse (configurable), output pulse width: 0.1ms ~ 100ms, duty cycle 1:1, Fmax <= 5000 cp/s.

- Wiring schematic - Figure 27

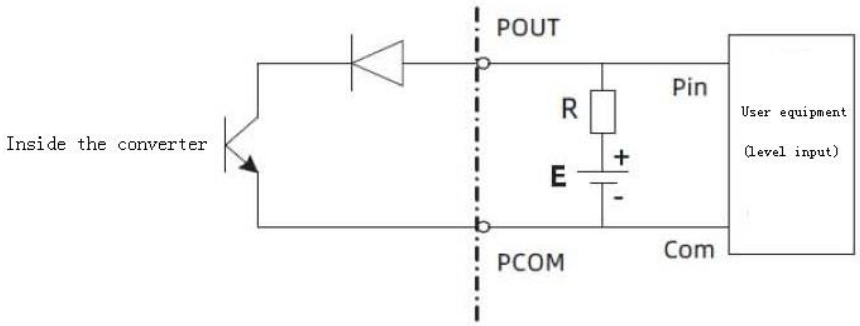


Figure 27

Supplementary note: The pulse output is an OC gate output and requires an external power supply. Usually the counters are equipped with pull-up resistors and the signal can be directly connected to the counter.

Manufacturer's recommendation: the pull-up resistor R in the diagram is recommended to use 2K, 0.5W resistors, and the other power supply E is recommended to use 24V DC.

5 Start.

5.1 Power on

Check that the equipment is installed correctly before turning on the power. Includes,

- The flow meter must be installed in a safe and compliant manner.
- Power connections shall be made as specified.
- Please check the correct electrical connection of the power supply.
- Tighten the back cover of the converter housing.

5.2 Converter activation

The measuring instruments, consisting of measuring sensors and signal converters, are supplied ready for immediate use. All operating parameters and hardware settings have been set according to your order.

As soon as the power supply is switched on, the instrument performs a self-test. Immediately afterwards, the instrument starts measuring and displays the current value.

Start-up screen - Figure 28

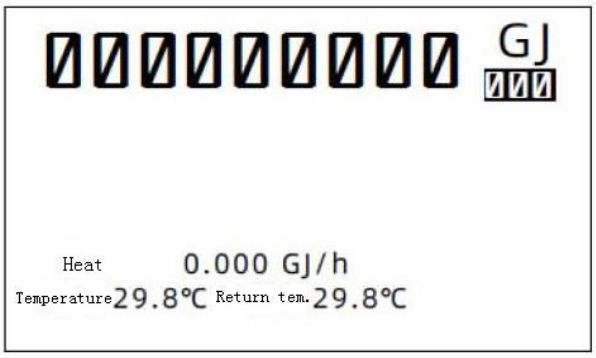


Figure 28

6 Operation

6.1 Flow display screen - Figure 29

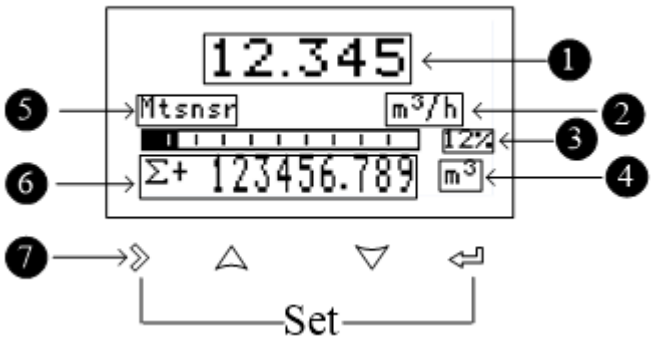


Figure 29

1. Instantaneous flow.
2. Instantaneous flow units.
3. Instantaneous flow as a percentage of flow range.
4. Cumulative flow units.
5. System alarm messages.
6. Information on cumulation, etc.
   Display information [∑+: positive accumulation, ∑-: negative accumulation, ∑: net accumulation, V: current flow rate, MT: equivalent value of current conductivity]
7. Operation keys: mechanical keys/optical keys.

Symbols	Measurement mode	Menu mode	Functional mode	Data model
>	--	Toggle menu categories	--	Data Bit Right Shift
↲	Information such as switchover accumulation	Toggle menu subcategories	Confirmation function	Confirmation data
↑ ↓	--	--	Select Function	Change data
>+↲	Enter menu mode	Exit menu	--	--

6.2 Infrared key operation instructions - Figure 30

The operation of the optical keys: Press the finger on the icon  for more than half a second and raise it to complete a button operation.

Except for the combination keys, it is forbidden to place other fingers on the other optical keys when operating the touch keys.

Figure 30

6.3 Mechanical key operation instructions

To operate the mechanical keys, open the front cover of the converter.
See the next section for details on how to operate the mechanical keys to enter the configuration.

Figure 31

6.4 Quick Setup Menu

Facilitates quick setup of important instrument parameters for factory users.

Simultaneously press » and ⏎ hold the instrument to enter the parameter setting screen.

At this point you will need to enter the following password.

Quick set password: 300000 (for modifying the quick set menu)

No.	Parameter text	Setting Method	Parameter range	Default value
1	Sensor Via Diameter	Option	3-2000	50
2	Flow range	Numbers	0-99999	35.000
3	Sensor coefficient	Numbers	0-99999	1.000
4	Zero correction	Numbers	0-99999	0.0
5	Accumulate to zero	Option	Y、N	N
6	Flow removal	Numbers	0-99%	1%
7	time constant	Numbers	0-99S	2s

6.5 Flow configuration details

No.	Parameter text	Setting	Password level	Parameter range	Default value
1 - Flow					
1-0	Flow range	Numbers	User	0-99999	35.000
	Sets the maximum upper limit value for flow rate. Used for calculating frequency, current output limit calculation; alarm and other threshold value calculation.				
1-1	Flow rate unit	Option	User	L、m^3、Kg、t	m^3/h
	The density will not be involved in the calculation by selecting a unit of volume such as L, m3, etc.. The choice of mass units such as Kg, t, etc., needs to be coupled with 1-2 density parameters.				
1-2	Fluid density	Numbers	User	0.000-99.000	1.000
	Used to calculate the mass flow rate, QM = ρVM This parameter is not displayed when the flow rate is in volume units. Density unit：g/cm^3				
1-3	Time constant	Numbers	User	0-99S	2s
	Filter damping coefficient, averaged over the time selected for the parameter as an instantaneous quantity.				
1-4	Flow removal	Numbers	User	0-10%	1%
	Indicates that the flow rate is below the set value and considered zero, 0 means no resection.				
1-5	Flow direction	Option	User	Forward, Reverse	Forward
	Used to change the direction of flow, when the positive and negative user signal wires are reversed, or when the sensor is mounted backwards.				
1-6	Measurement Method Selection	Option	User	Bidirectional, Forward, Reverse	Two-way
	Sets the direction of flow measurement, forward means only forward flow is measured, reverse means only reverse flow is measured, bi-directional means flow is measured in both directions.				
1-7	Spike inhibition allowed	Option	User	Y、N	N

<table>
<tr><td></td><td colspan="5">Indicates whether the spike suppression function is enabled or not. This function is used to filter out interfering signals in the working condition where the interference signal is large.

The 1-8 and 1-9 configuration screens are not displayed when set to N.

When the signal beating amplitude is greater than the parameters set in 1-8 and duration is less than the time set in 1-9, the system considers it to be an interfering signal and will not display and measure it.</td></tr>
<tr><td rowspan="2">1-8</td><td>Spike inhibition coefficient</td><td>Numbers</td><td>User</td><td>0.01-0.8m/s</td><td>0.8</td></tr>
<tr><td colspan="5">Amplitude of spikes (not shown when spike suppression is allowed to close the configuration)</td></tr>
<tr><td rowspan="2">1-9</td><td>Peak inhibition time</td><td>Option</td><td>User</td><td>0-3s</td><td>1</td></tr>
<tr><td colspan="5">Duration of spikes (not shown when spike suppression is allowed to close the configuration)</td></tr>
<tr><td rowspan="2">1-10</td><td>Flow correction allowed</td><td>Option</td><td>Manufacturers</td><td>Y、N</td><td>N</td></tr>
<tr><td colspan="5">Indicates whether or not non-linear flow correction is enabled.

In principle, it is used for linear adjustment for low flow rates (0.5 m/s) or less.

The feature is designed with 4 stages of correction, divided into 4 flow rate points and 4 correction factors.

The flow rate corresponding to the correction point must satisfy.

Correction point 1 ≥ Correction point 2 ≥ Correction point 3 ≥ Correction point 4 ≥ 0.

The correction calculation is based on the original sensor flow coefficient curve, so the nonlinear correction function should be turned off first and the sensor coefficients marked. Then allow the nonlinear correction function to set the correction coefficients according to the marked sensor nonlinearity and correct it in sections. If the coefficients are set appropriately, no need to recalibrate.

Wherein the original flow rate is the actual standard flow rate, the corrected flow rate said the corrected flow rate, the correction formula is as follows.

In the interval between correction point 1 > original flow velocity ≥ correction point 2.

Corrected flow rate = correction factor 1 x original flow rate.

In the interval between correction point 2 > original flow velocity ≥ correction point 3.

Corrected flow rate = correction factor 2 x original flow rate.

In the interval between correction point 3 > original flow velocity ≥ correction point 4.

Corrected flow rate = correction factor 3 x original flow rate.

In the correction point 4 > original flow rate ≥ 0.

Corrected flow rate = correction factor 4 x original flow rate.

Note: When setting correction points, the following relationship should be maintained.

Correction point 1 > Correction point 2 > Correction point 3 > Correction point 4 > 0

The median value of the correction factor is 1.0000, with a factor greater than 1 correcting the flow rate higher and a factor less than 1 correcting the flow rate lower.</td></tr>
<tr><td rowspan="2">1-11</td><td>Flow correction point 1</td><td>Numbers</td><td>Manufacturers</td><td>0.0-99.999</td><td>0</td></tr>
<tr><td colspan="5">Flow correction point 1, this parameter is not displayed when the flow function is off.</td></tr>
<tr><td rowspan="2">1-12</td><td>Flow correction factor 1</td><td>Numbers</td><td>Manufacturers</td><td>0.0-99.999</td><td>1.000</td></tr>
<tr><td colspan="5">Flow trim factor 1, which is not displayed when the flow function is off.</td></tr>
</table>

1-13	Flow correction point 2	Numbers	Manufacturers	0.0-99.999	0
	Flow correction point 2, this parameter is not displayed when the flow function is off.				
1-14	Flow correction factor 2	Numbers	Manufacturers	0.0-99.999	1.000
	Flow trim factor 2, which is not displayed when the flow function is off.				
1-15	Flow correction point 3	Numbers	Manufacturers	0.0-99.999	0
	Flow correction point 3, this parameter is not displayed when the flow function is off.				
1-16	Flow correction factor 3	Numbers	Manufacturers	0.0-99.999	1.000
	Flow trim factor 3, which is not displayed when the flow function is off				
1-17	Flow correction point 4	Numbers	Manufacturers	0.0-99.999	0
	Flow correction point 4, this parameter is not displayed when the flow function is off.				
1-18	Flow correction factor 4	Numbers	Manufacturers	0.0-99.999	1.000
	Flow trim factor 4, which is not displayed when the flow function is off.				

2-Current output					
No.	Type	Option	Password level	Parameter range	Default value
2-0	Reverse output allowed	Option	User	Y, N	N
	4-20mA output required for flow rate reversal, pulse/frequency; cannot be turned off for flow rate reversal				
2-1	Adjustment K	Numbers	User	0-99999	1
	For adjusting the current output value, I = Kx + B				
2-2	Adjustment B	Numbers	User	0-99999	0
	For adjusting the current output value, I = Kx + B				
2-3	Output Current	Display	User	4.00-20.00	--
	Displays the current milliamp value of the output current				
3-pulse/frequency/alarm output					
3-0	Pulse output type	Option	User	Frequency, Pulse	frequency
	Selectable frequency/pulse equivalent/				
3-1	No output transistor state	Option	User	High/Low	High level
	Selects the output level when there is no frequency output, no pulse equivalent output, and no alarm output				
3-2	Frequency output limit	Numbers	User	0-5000	2000
	Set the frequency value corresponding to the upper limit of the instantaneous flow rate; when frequency output is selected, this parameter is displayed				
3-3	Pulse equivalent (L/P)	Option	User	0.001-999.999	1
	Sets the cumulative amount represented by each pulse; this parameter is displayed when Equivalent Output is selected				
4 - Cumulative					
4-1	Accumulate to zero	Option	Manufacturers	Y、N	N
	Cumulative total removals				
4-2	Positive cumulative integer	Numbers	Manufacturers	0-999999999	0
	Set the positive total integer part				
4-3	Positive cumulative decimal	Numbers	Manufacturers	0.0-0.999	0
	Set the decimal part of the positive total				
4-4	Inverse cumulative integer	Numbers	Manufacturers	0-999999999	0
	Set the inverse total integer part				
4-5	Inverted cumulative decimal	Numbers	Manufacturers	0.0-0.999	0

	Set the reverse total decimal part

5-Alarm contact 1					
No.	Type	Option	Password level	Parameter range	Default value
5-1	Allow alarm 1 output.	Option	User	Y/N	N
	Contact 1 is allowed to output the total switch, and when set to N, the following parameters are not displayed.				
5-3	Allow alarm 1 empty pipe status	Option	User	Y/N	N
	Allow empty pipe alarm output switch, the system detects an empty pipe, contact 1 will automatically output an alarm signal. When the alarm output configuration is allowed to be N, this parameter is not displayed.				
5-4	Allow alarm 1 limit overrun	Option	User	Y/N	N
	The allowable flow limit alarm output switch will automatically output an alarm signal to contact 1 when the instantaneous volume is greater than the set value of the flow limit. The specific setting is described in 7-0. This parameter is not displayed when the allowable alarm output configuration is N.				
5-5	Allow alarm 1 lower limit override	Option	User	Y/N	N
	The allowable lower flow limit alarm output switch will automatically output an alarm signal when the instantaneous volume is less than the lower flow limit setting value, contact 1. The specific setting is described in 7-1. This parameter is not displayed when the allowable alarm output configuration is N.				
6-Alarm contact 2					
No.	Type	Option	Password level	Parameter range	Default value
6-1	Allow alarm 1 output.	Option	User	Y/N	N
	Contact 1 is allowed to output the total switch, and when set to N, the following parameters are not displayed.				
6-3	Allow alarm 1 empty pipe status	Option	User	Y/N	N
	Allow the empty tube alarm output switch, the system detects an empty tube, contact 1 will automatically output an alarm signal. This parameter is not displayed when the allowable alarm output configuration is N.				
6-4	Allow alarm 1 limit overrun	Option	User	Y/N	N
	The allowable flow limit alarm output switch will automatically output an alarm signal to contact 1 when the instantaneous volume is greater than the set value of the flow limit. The specific setting is described in 7-0. This parameter is not displayed when the allowable alarm output configuration is N.				
6-5	Allow alarm 1 lower limit override	Option	User	Y/N	N
	The allowable lower flow limit alarm output switch will automatically output an alarm signal when the instantaneous volume is less than the lower flow limit setting value, contact 1. The specific setting is described in 7-1. This parameter is not displayed when the allowable alarm output configuration is N.				

7-Alarm settings					
No.	Type	Option	Password level	Parameter range	Default value
7-0	Upper limit for alarms	Numbers	User	0-999.9%	100%
	Set the alarm value of the upper limit alarm, percentile of the range.				
7-1	Lower alarm limit	Numbers	User	0-999.9%	0%
	Set the alarm value of the lower alarm limit, percentile of the range.				
7-2	Alarm return differential	Numbers	User	0-99.9%	1%
	Used to eliminate disturbances on alarm				
	Upper limit alarm conditions: instantaneous quantity less than upper limit alarm value - return difference				
	Lower limit alarm condition: instantaneous quantity greater than lower limit alarm value + return difference				
7-3	Display alarm permission	Option	User	Y/N	N
	Allows alarm messages to be displayed on the main screen.				
8-System					
8-0	Language	Option	User	Chinese/English	Chinese
	Language for configuration display				
8-1	Display accuracy	Numbers	User	0-4	2
	The number of decimal places in the instantaneous quantity				
8-2	Contrast	Numbers	User	0-100%	50%
	LCD Contrast				
8-3	Instrument Address	Numbers	User	1-247	8
	Instrument address based on RS485 Modbus RTU communication protocol				
8-4	Communication baud rate	Option	User	1200、2400、4800、	9600
	Baud rate for physical layer serial communication				
8-5	Calibration method	Option	User	None / Odd / Even	N/A
	Physical Layer Serial Communication Checksum				
8-6	Byte order	Option	User	2-1 4-3、3-4 1-2、4-3	2-1 4-3
	Byte exchange sequence for physical layer serial communication				
8-6	User password	Numbers	User		0
	User-level passwords for viewing and modifying user-level parameter configurations.				
	This parameter is not displayed when entering with the manufacturer's password.				
	Factory initial password：200000				

9 - ATC parameters					
9-0	ATC detection threshold	Numbers	Manufacturers	0-100%	40%
	Validity of ATC Alarm Judgment				
9-1	Equivalent value of measured conductivity	Display	Manufacturers		
	Displays the equivalent value of the measured conductivity of the fluid. General natural water: in full pipe equivalent value <200, in empty pipe >1200 (actual and fluid conductivity and the length of the measurement line has a relationship, when the wiring distance of 20m is recommended to use double shielded line, otherwise it will affect the empty pipe detection function)				
9-2	ATC testing permits	Option	Manufacturers	Y, N	Y
	Set whether to turn on ATC detection function				
9-3	Upper limit for ATC	Numbers	Manufacturers	0-9999	1200
	The equivalent value of the measured conductivity when the tube is empty, and the default value can be used directly for general natural water. The special fluid needs to observe the 9-1 value of the empty tube and write 9-3				
9-4	Lower limit for ATC	Numbers	Manufacturers	0-9999	174
	The equivalent value of the measured conductivity when the pipe is full, generally natural water can directly use the default value. Special fluids need to observe the value of 9-1 when the empty pipe, write 9-4				
9-5	Empty pipe detection backlash	Numbers	Manufacturers	0-9999	30
	For the return difference judged by the empty pipe detection, the default value can be directly used within 20 meters of the signal line.				

10-Sensors					
10-0	Sensor code	Numbers/symbols	Manufacturers	16 digits	
	For identification of sensors				
10-1	Sensor Tag No.	Numbers	Manufacturers	6 digits	000000
	Product Manufacturer Number				
10-2	Nominal diameter	Option	Manufacturers	3-2000	50
	Size of the sensor				
10-3	Zero-point adjustment	Option	Manufacturers	-9.99-9.99mv	0.00mv
	The code value of the sensor in the case of a static full tube (average value within 30 seconds) Generally, when the sensor has good symmetry and good wiring (with good shielding), the code value is within ±0.1, and no adjustment is required.				
10-4	Sensor coefficient	Numbers	Manufacturers	0-99999	
	The sensor manufacturer calibrates the coefficient of this flow meter to the actual water volume. Detailed sensor coefficient calibration section.				
10-5	Calibration factor	Numbers	Manufacturers		
	Factory normalized calibration factor for converter manufacturers				
10-6	Zero correction	Numbers	Manufacturers	0-99.999	
	For correction of sensor nonlinearity at low flow rates (up to 0.3 m/s). Detail Sensor Coefficient Calibration Section.				
10-7	Excitation mode selection	Option	Manufacturers	3.125Hz、	6.25Hz
	Selection of excitation frequency Mode 1: 3.125Hz Mode 2: 6.25Hz				
10-9	Gain option	Option	Manufacturers	1/3/9	3
	Gain option: Change the gain of the instrument to change the range of the measured flow rate. Options for gain size: 1, 3, 9				

6.6 Operating instructions

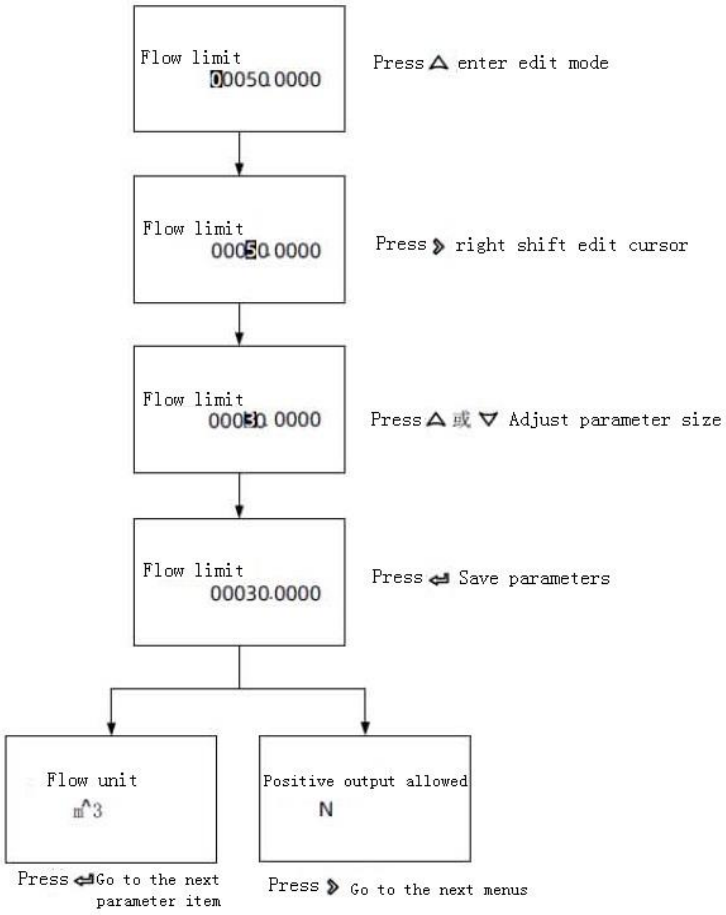
Selection and adjustment of parameters

Simultaneously press ⟫ and ⏎ hold the instrument to enter the parameter setting screen.

At this point you will need to enter the following password.
Initial user password: 200000 (to modify user-level parameters)
Initial factory password: 100000 (to modify factory-level parameters)
Initial manufacturer's password: 300000 (quick parameter setting)
Heat Configuration Password: 316000 (for modifying heat-related configurations)
After entering the configuration parameters, the parameters can be modified by the following

operations.

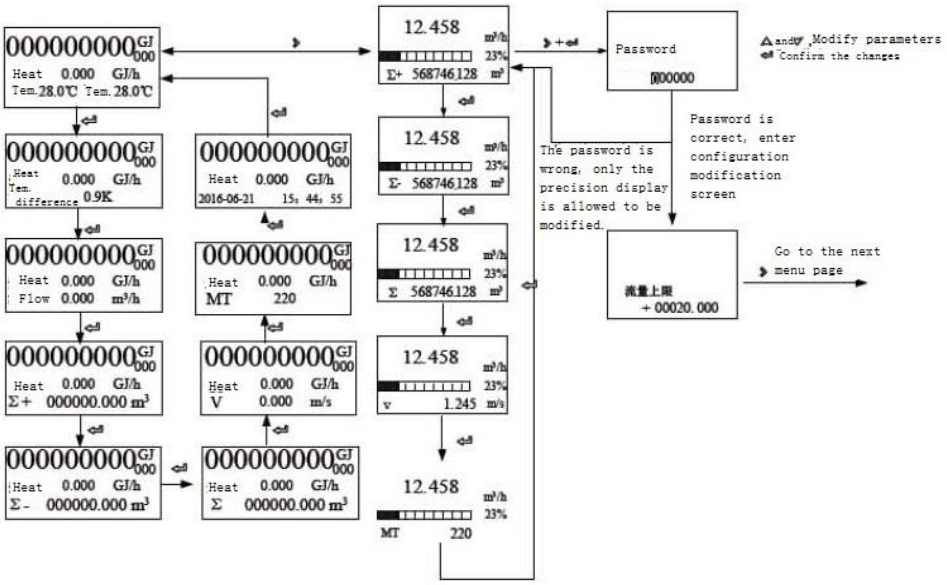
The user can use the ⏩ key to switch between menu pages, use the ⏎ key to switch between parameter items in the menu page, and store the adjusted value of the previous parameter item at the same time, use the ⏫ 和 ⏬ keys to adjust the parameter value. For example, to adjust the "upper limit of flow rate", use the key.



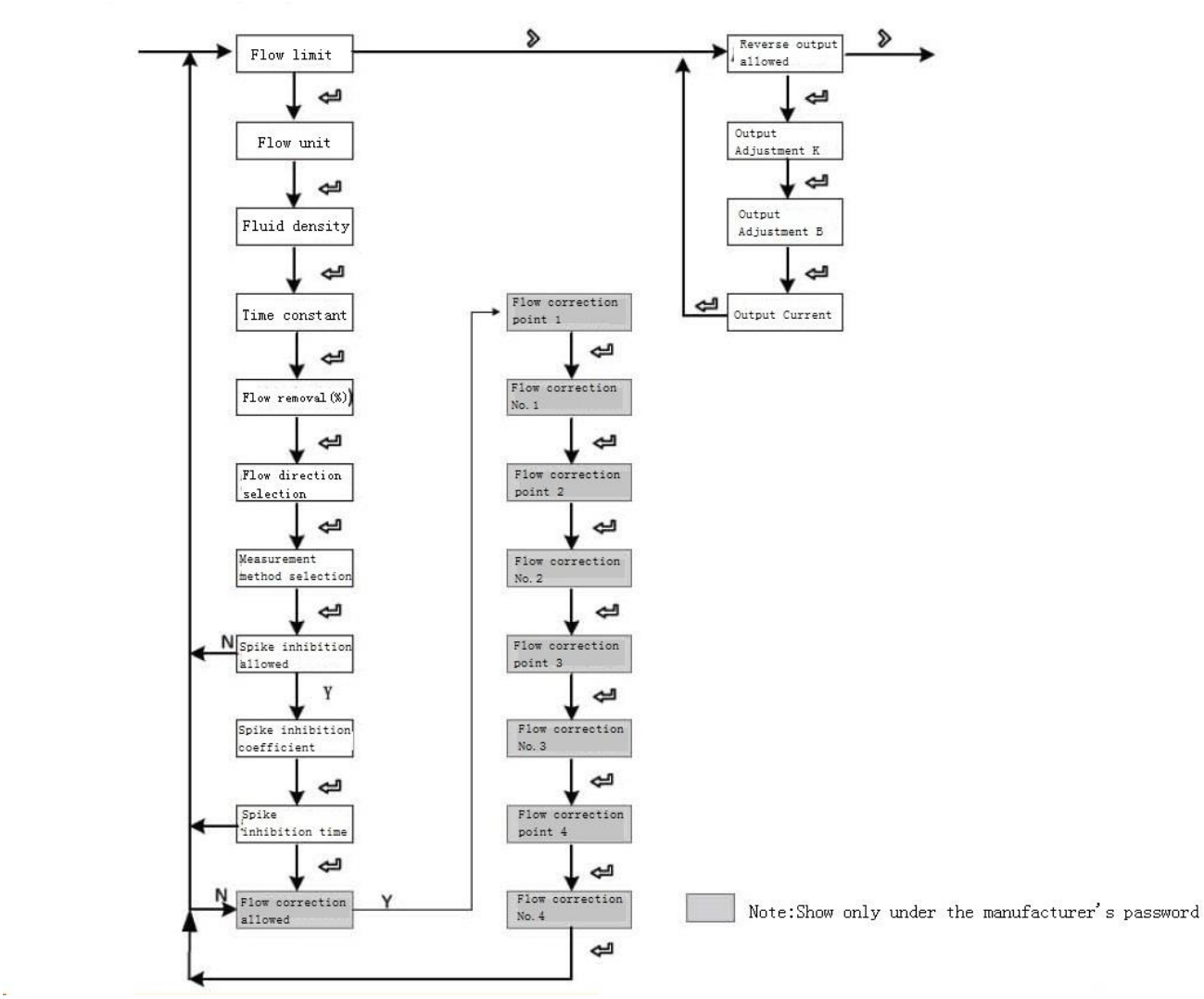
Flow rate screen and heat screen switching

⏎ Key: Temperature difference, flow rate, "∑+":forward accumulation, "∑-":reverse accumulation, "Σ":net accumulation," "V":current flow rate, "MT":conductivity equivalent value, "2016-06-21 15:44:55":current time, cyclic display.

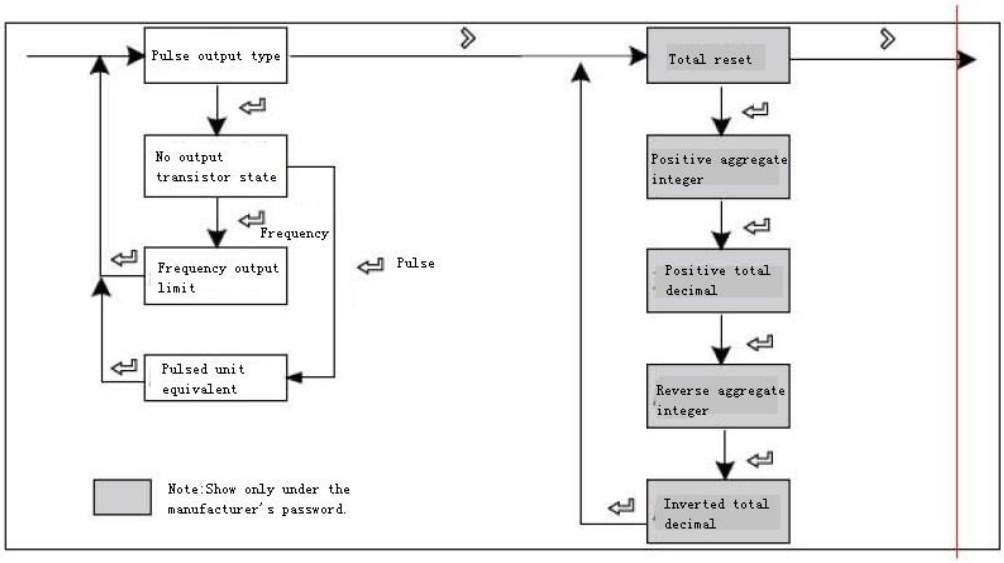
⏩ Key: The flow screen and the heat screen switch between each other.



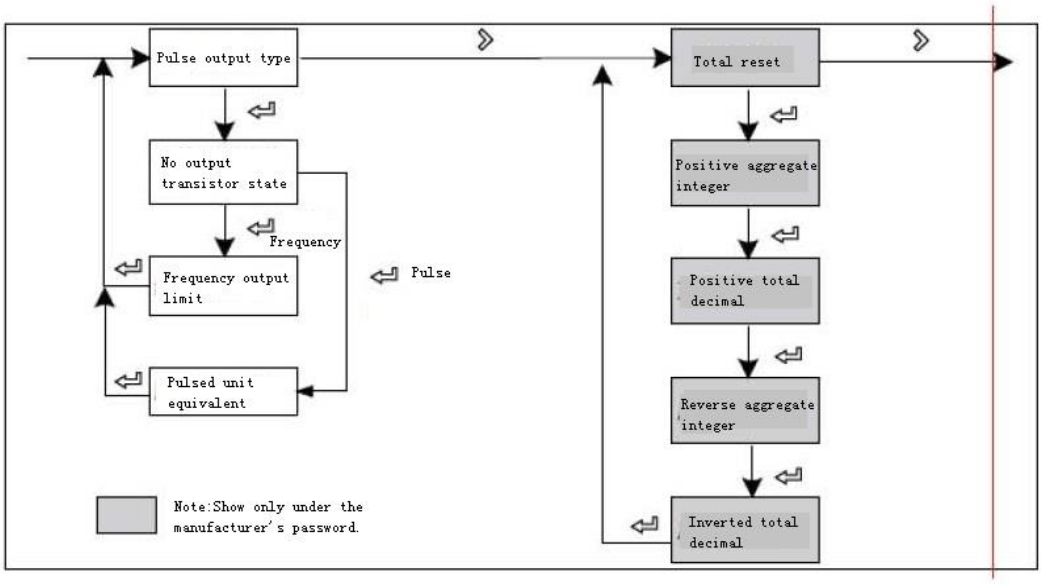
Flow settings and analog output menu



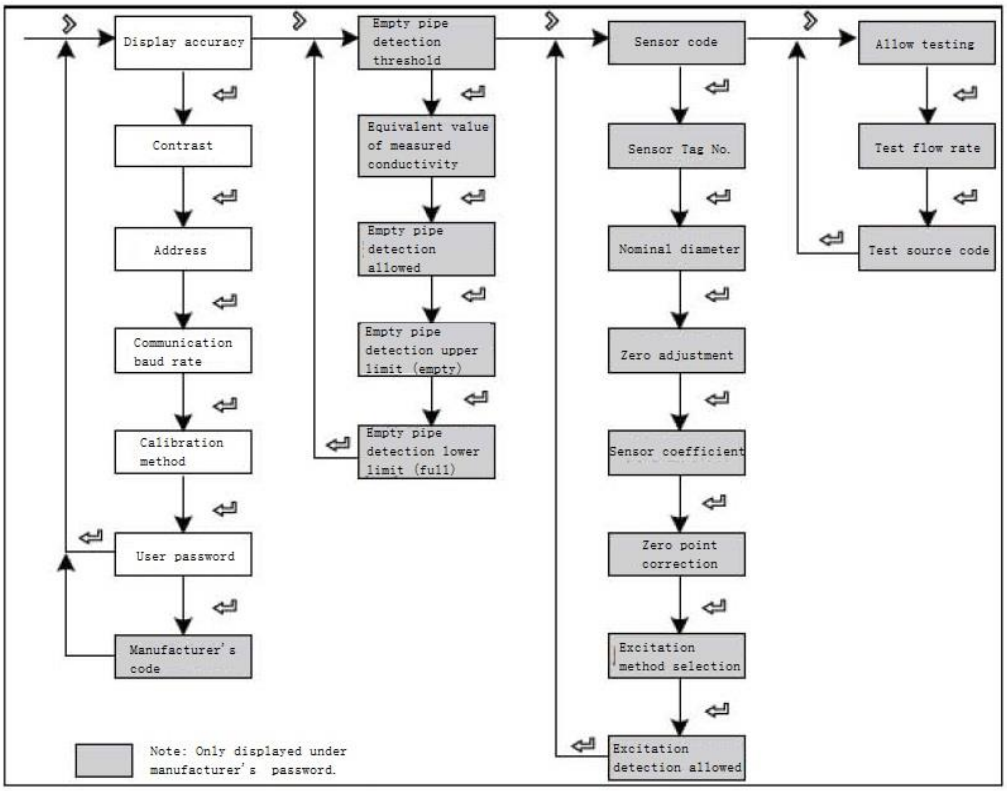
Pulse output and total amount setting menu



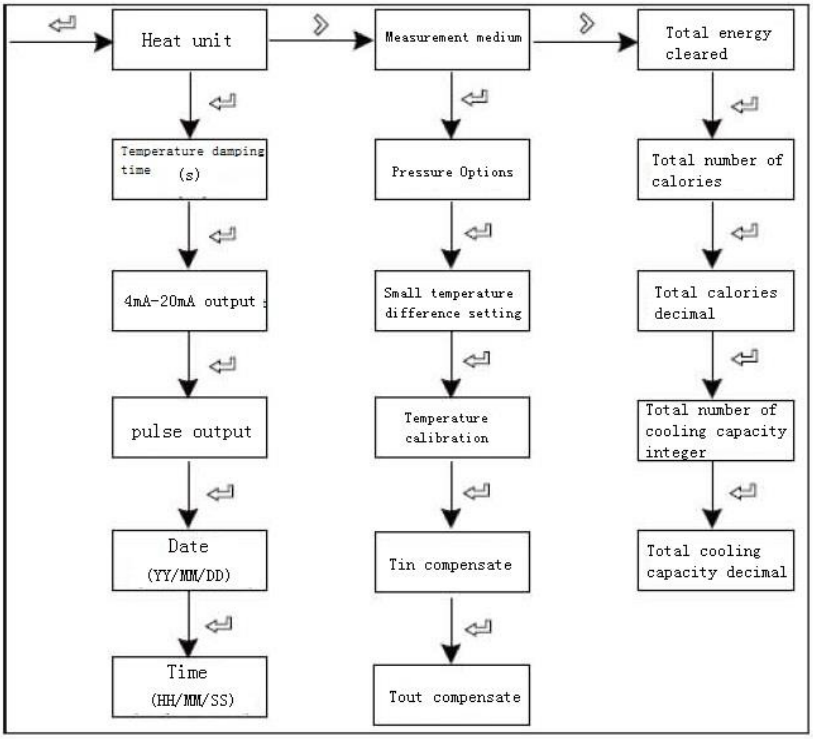
Alarm Setup Menu



System Function, ATC Function, Sensor Function, Test Function Setting Menu.



Heat function menu



7 Functions

7.1 System information-figure 32

The flow meter itself has a self-diagnostic function, in addition to the power supply and circuit board hardware failure, for the general application of the fault can correctly give the corresponding alarm information.

Display position in the measurement screen

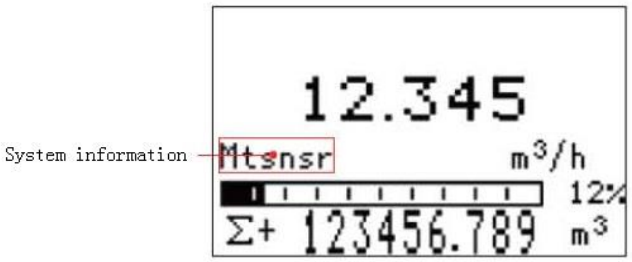


Figure 32

System information sheet

Display	Contents of the alarm
MtSnsr	Sensor tubes
Hi	The current instantaneous exceeds the set flow limit
Lo	The current instant is below the set lower flow limit.
Pls	The pulse output frequency exceeds the set upper frequency limit.
AD_Hi	The sensor signal is greater than the upper limit of the system AD sampling
Rng	Current instantaneous traffic exceeds the user-set traffic limit
Rng_Hi	The range set by the user exceeds the system AD sampling limit.
Pls_Hi	The user set range is out of the upper limit of the pulse output.

7.2 Pulse/Frequency/Current Outputs

Pulse-equivalent output

It is mainly used for sensor manufacturer coefficient calibration and user metering. Set in group 3 configuration parameters.

The pulse equivalent corresponds to the cumulative volume, indicating the corresponding number of volumes per pulse.

Example: Parameter set to 0.1L/p

The current instantaneous volume is 3.6m3/h.

Number of pulses per second: 3.6 x 1000/3600/0.1 = 10

Note: When the parameter is set to 0.4L/p

The current instantaneous volume is 3.6m3/h

The number of pulses output per second is: 3.6×1000/3600/0.4 = 2.5

In the above case, the fractional part of 2.5 pulses will automatically accumulate to the next second output without data loss.

When the flow in the pipeline is large, the pulse equivalent should not be too small, otherwise it will cause the pulse output to exceed the upper limit. At this time, the system alarm information of Pls will appear on the main screen. The user needs to reset the pulse equivalent parameters. Similarly, when the flow in the pipeline is small, the selected pulse equivalent should not be too large, otherwise it will cause the instrument to output a pulse for a long time, causing errors in the measurement.

Pulse equivalent output is different from frequency output, pulse output can accumulate enough pulse equivalent to output one pulse, so the pulse output is uneven. When measuring the pulse output, you should use a counter instead of a frequency counter.

Frequency output

It is mainly used for factory coefficient calibration and user metering. Set in group 3 configuration parameters.

The frequency corresponds to the instantaneous volume and the upper frequency limit corresponds to the maximum flow rate.

Note: The maximum frequency setting is 5000Hz.

Current Output

Mainly used for variable transmission output to other intelligent instruments, such as: digital meters, recorders, PLC, DCS and so on.

The output current type is: 4-20mA.

The current value corresponds to the instantaneous quantity of flow, 20mA corresponds to the upper limit of range, and 4mA corresponds to the lower limit of range.

Conversion relationship.

$$I_{实时} = \frac{Q_{实时}}{Q_{max}} 16.00 + 4.00$$

Note: Q represents instantaneous flow in real time.

QMAX represents the current meter range.

I represents real-time current value in real time.

7.3 Serial communication

This instrument provides standard RS485 serial communication interface, adopts international MODBUS-RTU communication protocol, supports 04 read input register command.

Register address

Communication data and register addresses are listed in the following table.

Parameters	Type	Addresses	Description
Instantaneous flow rate	float	100	

Instantaneous velocity of flow	float	102	
Percentage of flow	float	104	50 for 50%
conductivity	float	106	
Positive flow cumulative integer	ulong	108	
Cumulative decimal of positive flow	ulong	110	The decimal part is magnified 1000 times, and 123 represents 0.123.
Reverse flow cumulative integer	ulong	112	
Reverse Flow Cumulative Decimal	ulong	114	The decimal part is magnified 1000 times, and 123 represents 0.123.
Incoming temperature	float	122	
Go out of temperature	float	124	
Cumulative heat integer	ulong	126	
Cumulative caloric fraction	ulong	128	The decimal part is magnified 1000 times, and 123 represents 0.123.
Cumulative cooling integer	ulong	130	
Cumulative coolant decimal	ulong	132	The decimal part is magnified 1000 times, and 123 represents 0.123.
Unit of heat	ushort	134	0x00: kW 0x01: MW 0x02: kJ/h 0x03: MJ/h 0x04: GJ/h
Cumulative heat unit	ushort	135	0x00: kWh 0x01: MWh 0x02: kJ 0x03: MJ 0x04: GJ

Note: For float/ulong/long type data, communication is transmitted in byte order 2-1-4-3; for push type data, it is transmitted in 2-1.

Communications configuration
Address: 1-247.
Default address: 8
Baud rates: 1200, 2400, 4800, 9600, 192 默认波特率：9600。00, 38400, 57600.
Default baud rate: 9600.
Checks: unchecked, odd-checked, even-checked.
The default is no checksum.
Alignment in the communication frame for 32-bit data (long shaping or floating point).
Example: Long Plastic 16909060 (01020304H): 03 04 01 02
Floating point 4.00 (40800000H): 00 00 40 80

Example of reading real-time floating-point number communication:
Real-time floating-point number reading
Send message: 08 04 00 63 00 02 81 4C
Return to message: 08 04 04 22 6E 41 3F 79 61 (instantaneous flow rate: 11.95)
Positive flow accumulation reading
Send message: 08 04 00 6B 00 04 80 8C
Return to message: 08 04 08 00 6C 00 00 00 7B 00 00 00 D6 8E (Cumulative whole number: 108,

Cumulative decimal: 0.123, Cumulative: 108.123)

8. Technical parameters

8. 1 Technical parameters

Measurement system

Measuring Principle	Faraday's theorem of electromagnetic induction	
Function	Real-time measurement of instantaneous flow, flow rate, mass flow (when density is constant) and flow accumulation.	
Modular structure	The measurement system consists of a measuring sensor, a signal converter and a pair of PT1000 temperature sensors.	
转换器		
一体型	Protection class IP65	
分体型	Protection class IP65	
测量传感器		
Calibre	DN15-DN450	
Flange	Comply with GB/T 9119-2000 standard carbon steel (optional stainless steel flanges), other standard flanges can be customized.	
Rated Pressure Rating (High pressure can be customized)	DN6 - DN50, PN<4.0MPa	
	DN65 - DN150, PN<1.6MPa	
	DN200 – DN600, PN<1.0MPa	
	DN700 – DN2000, PN<0.6MPa	
Lining material	Polychloroprene Rubber(CR), Perfluoroethylenethelene F46(FEP), Perfluoroethylenethelene F46(FEP) plus stencil, PFA plastic(PFA), PTFE, PVDF	
Electrodes	Stainless Steel 316L, Hastelloy (HB and HC), Titanium, Tantalum, Platinum	
Protection class	IP68	IP65
Medium	-25 – 180℃	-10 – 80℃
Embeddability	Less than 5m (split sensor with IP68 protection only)	
Immersion depth	Less than 3m (split sensor with IP68 protection only)	
Sensor Cables	For split use only, 10m of cable is standard; other cables are recommended for customization up to a maximum of 20m.	

Communications

Serial port communication	RS-485
Output	Current (4-20mA), pulse, frequency, status switching quantity
Function	Air tube identification, electrode contamination

Display User Interface

Graphic display	Monochrome LCD with white backlight; Size: 128*64 pixels
Display function	2 measured value screens (measurement, status, etc.)
Language	Chinese language
Unit	The units can be selected via the configuration menu, see "6.3 Configuration details", section "1-1 flow units" and "4-0 accumulation units".
Operating unit	4 mechanical keys or 4 optical keys

Measurement accuracy

Maximum measurement error of flow rate	±0.3% of measured value (flow rate 1m/s); ±2mm/s (flow rate <1m/s)
Repeatable	0.15 per cent
Temperature sensor measurement range	-20℃~120℃
Max. measuring error of temperature	±0.1°C (within the measuring range of the temperature sensor)

Operating environment

Temperature	
Ambient temperature	Integral Flow Meter -10℃ – 55℃,
Storage temperature	-40℃ – 65℃
Conductivity	
Water	Minimum 20μS/cm (actual measurable conductivity should be greater than 50μS/cm)
Other	Minimum 5μS/cm (actual measurable conductivity should be greater than 50μS/cm)

Materials

Sensor housing	Carbon steel
Converter	Standard die-cast aluminum

Electrical connection

Power supply voltage	220 VAC, 50Hz
Power consumption	Maximum 15VA
Signal Cable	For split type only
Shielded cable	Signal section, lead wire: 0.5mm^2 Cu /AWG20

Output

Current output		
Function	Measurement of volume and mass (with constant density)	
Set up	Scope	4-20mA
	Range limit	20mA
	lower limit of range	4mA
Internal voltage	24VDC	

Load	⩽750Ω	
Pulse and frequency output		
Function	Can be set as pulse output or frequency output	
Pulse output	Basic	Output pulse width：0.1ms ~100ms
	Set up	0.001L – 1m^3
Frequency	Range limit	F_{max} ⩽ 5000H_z
	Set up	0-5000H_z
Active	Active frequency/pulse output voltage U internal ⩽ 24VDC	
	Active frequency/pulse output current I ⩽ 4.52mA	
Passive	U external ⩽ 36VDC	
Status output		
Function	Can be used as an alarm status output	
Passive	U external ⩽ 36VDC	
Active	Active output voltage U internal ⩽ 24VDC	
	Active output current I⩽ 4.52mA	

8.2 Flow meter

	$Q_{100\%}$ 单位 (Unit) m^3/h			
V[m/s]	0.3	1	3	7
DN[mm]	最小流量 Minimum Flow Rate	常用流量 Common Flow Rate		最大流量 Maximum Flow Rate
10	0.08	0.28	0.85	1.96
20	0.34	1.13	3.39	7.91
25	0.53	1.77	5.30	12.39
32	0.87	2.90	8.69	20.27
40	1.36	4.52	13.57	31.67
50	2.12	7.07	21.21	49.48
65	3.58	11.95	35.84	83.62
80	5.43	18.10	54.29	126.67
100	8.48	28.27	84.82	197.92
125	13.25	44.18	132.54	309.25
150	19.09	63.62	190.85	445.32
200	33.93	113.10	339.30	791.70
250	53.01	176.71	530.13	1236.97
300	76.34	254.47	763.41	1781.29
350	103.91	346.36	1039.08	2424.52
400	135.72	452.39	1357.17	3166.73
500	212.06	706.86	2120.58	4948.02
600	305.37	1017.90	3053.70	7125.30
700	415.62	1385.40	4156.20	9697.80
800	542.88	1809.60	5428.80	12667.20
900	687.06	2290.20	6870.60	16031.40
1000	848.22	2827.40	8482.20	19791.80

Conversion formula: Flow rate Q = Flow rate V x π x (DN/2)2, in m/s and m3/h.

8.3 Accuracy

- Reference conditions - Figure 33
- Medium: water
- Temperature: 20°C

- Pressure：0.1MPa
- X [m/s]: Flow rate
- Y [%]: Deviation from the actual measured value

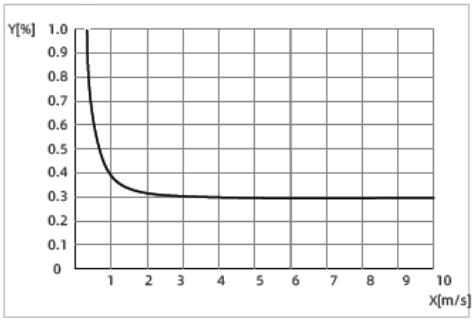


Figure 33

9 Disassembly

9.1 Warning

Before disassembly, be aware of hazardous process conditions, e.g., pressure in the vessel, high temperatures, corrosive or toxic media.
Refer to the installation procedures in 6.3 and the instructions in section 7.2 Electrical Wiring for dismantling of the completed components in reverse order of operation.

9.2 Waste removal

Please follow the existing guidelines for waste disposal in your region.

10 Product Certifications

产品认证			
认证		证书编号	认证范围/描述
功能安全完整性等级 SIL3			SIL 2 @ HFT=0; SIL 3 @ HFT=1, Route 2_H
CE 认证	CE	E8A160896863001	Rated Voltage : 10-240VAC,50-60Hz Rated Power: <=15W Prontection Class: I
防爆合格证	Ex NEPSI	GYB19.2641X	Ex ia/ d e IIC T4 Ga/Gb
计量器具型式批准证书	PA	12F211-21	

Product Certification			
Certification		Certificate No.	Scope of certification/description
Functional safety integrity level SIL3			SIL 2 @ HFT=0; SIL 3 @ HFT=1, Route 2_H
CE certification		E8A160896863001	Rated Voltage : 10-240VAC,50-60Hz Rated Power: <=15W Prontection Class: I
Explosion Proof Certificate		GYB19.2641X	Ex ia/ d e IIC T4 Ga/Gb
Type approval certificate of measuring instruments		12F211-21	