Electromagnetic Heat Meter

MAG-11 Series

Instruction Manual

Please read this manual carefully and use the product correctly on the basis of full understanding.

CONTENTS

1. Preface

In order to ensure the normal use of the instrument, please read this manual carefully and fully understand how to use the instrument before operation.

About this user manual

● The instructions must be provided to the end user.

● Please read this manual carefully before use.

● The contents of this manual can be changed without prior notice.

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● 2Flow AB makes no guarantee in any form for this manual, including but not limited to the sale of this manual and its use for other special purposes.

● The company makes every effort to ensure the correctness of the contents of the instructions. If there are any errors or omissions, please inform 2Flow AB.

● Besides the contents mentioned in the statement, 2Flow AB will not bear any other responsibilities for this product.

● If the change of product specification, structure or operating parts does not affect the operation and performance, the user manual will not be revised accordingly.

1.1 Safety tips

●The installation and wiring of flow sensor and temperature sensor must be completed by professional technicians;

● all wiring terminals and connecting wires of the instrument must be plugged in and out after power failure;

● when measuring high-temperature fluid, the sensor housing will become very hot to prevent personnel from scalding.

The provisions of this manual must be observed at all stages of product operation and maintenance, especially the contents with the following marks.

⚠ A warning indicates a danger that may result in injury or death.

⚠ Attention indicates that there is a danger, which may cause partial or overall damage to the instrument.

⃠ It is forbidden to indicate that the instrument will not work normally or be damaged.

It is important to draw the attention of operators to avoid instrument damage.

Notes indicate information that must be known about the operation and characteristics of the instrument.

1.2 Disclaimers

The following situations do not belong to product liability:

(1) Damage caused by customers' negligence or lack of maintenance of products.

(2) Problems or damage caused by violation of relevant regulations during operation, operation and storage.

(3) Problems or damage caused by natural disasters and other external factors.

(4) Problems or damage caused by repair or modification by personnel not authorized by the company.

(5) If the customer or a third party is injured when using the product, and these injuries are caused by unpredictable defects of the product, the company will not bear any Responsibility, nor will it be responsible for indirect injuries.

2. Acceptance, storage and transportation

2.1 Unpacking inspection

When unpacking the product, please check the following contents in time:

(1) Appearance

This instrument has been carefully checked before leaving the factory. If damage is caused during transportation (please pay special attention to the lining and shell), please contact our company.

(2) Nameplate

Check whether the product conforms to the ordering requirements according to the nameplate contents, see the instructions in 4.5. **Fel! Hittar inte referenskälla.**

(3) Attachment

Check whether the accessories in the packing box are complete according to the packing list.

2.2 Storage

If the instrument needs to be stored for a long time after delivery, please pay attention to the following points:

● the instrument must be stored in the original packaging box.

● the storage place must be dry, vibration free and the ambient temperature suitable.

2.3 Carry

Handle all parts carefully to prevent damage. Please use the original packing box to transport the instrument to the installation place.

important

● the damaged lining will cause the flow sensor to be scrapped.

● if the cable is not selected reasonably (see the instructions in 7.1) and the cable sealing plug or instrument cover is not tightened, the product may be scrapped due to water ingress or moisture on the instrument shell. 0

3. Product overview

3.1summary

MAG-11 electromagnetic heat meter (hereinafter referred to as "heat meter") is a product integrating the measurement of air conditioning water flow, heat and temperature difference, which is suitable for cold / hot water air conditioning billing system.

The converter, electromagnetic flow sensor and supply / return water temperature sensor form a heat meter. The converter can be installed independently or assembled on the electromagnetic flow sensor.

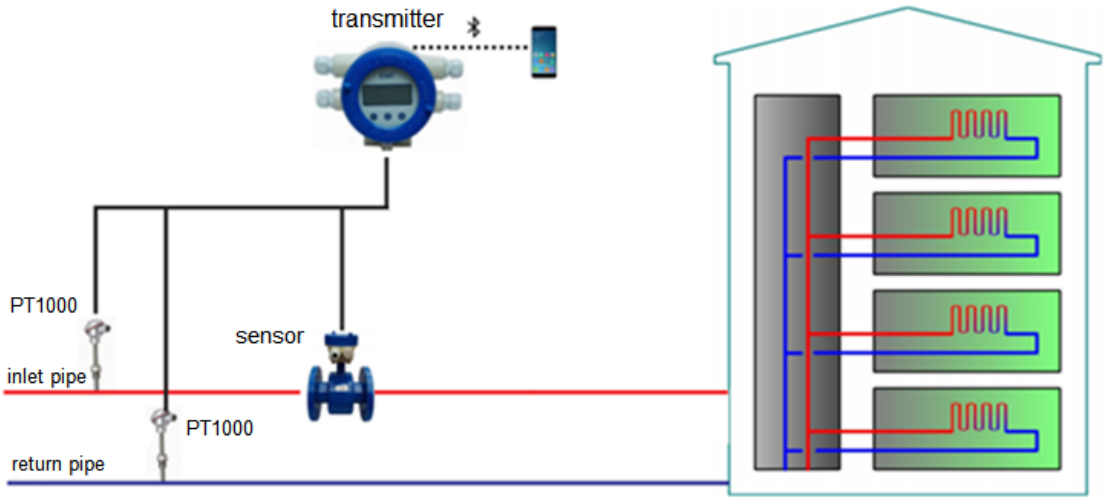


Figure 3 - 1 system diagram31

Users can operate by pressing keys and remote control by Bluetooth（Set the heat meter to different working modes for heat metering by using the mobile phone with Bluetooth chip and corresponding APP) or the upper computer (modbus\ bacnet protocol).

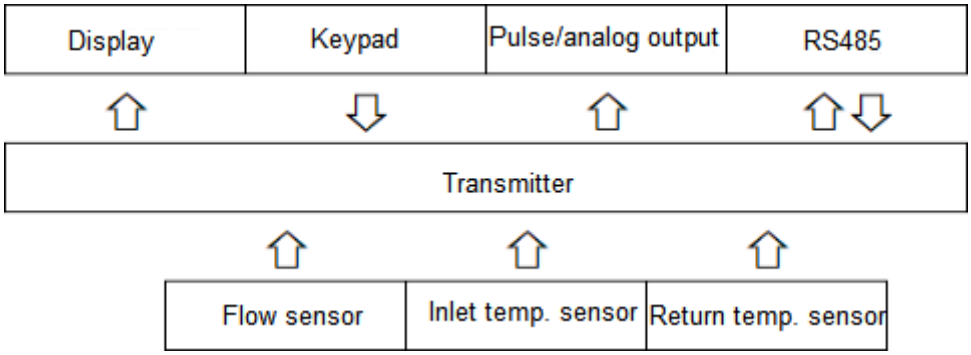


Figure 3 - 2 system function block diagram32

3.2 Product features

Unimpeded detection: the pipeline is unobstructed, will not block the flow, will not cause pressure loss, save the power consumption of the water pump, and does not need a filter.

High precision measurement: high precision A/D conversion circuit is adopted, and the flow measurement error can be within ± 0.5% of the actual flow.

Screen display: dot matrix LCD is used, and the panel information is complete. Under different panels, positive and negative flow, cold and heat, alarm information, temperature sensor status and other contents can be displayed, and a variety of parameter settings can be carried out. The screen supports 90 °, 180 °, 270 °.

Safety protection: the standard protection grades of sensors and calculators are IP65, IP67 and IP68.

Applicable to a variety of fluids: different linings can be used to measure the flow and temperature of a variety of fluids with different temperatures, physical and chemical properties, such as central air-conditioning water, primary and secondary network hot water in heat exchange stations, industrial refrigerant, etc.

Power off holding parameters: EEPROM is used to store configuration parameters and cumulative data, which can be memorized in case of power failure.

Remote communication: support MODBUS or BACNET communication protocol based on RS485 or MOSBUS communication protocol based on Bluetooth communication.

Automatic switching of cold and heat: it has heat mode, cooling capacity mode and automatic switching mode of cold and heat, and the display and accumulation of cooling capacity and heat can be switched automatically.

Good lightning protection function and anti-static interference: the surge protection of power line meets class A at 2KV; Electrostatic interference meets class a requirements when contacting 6kV and gap 8Kv.

Complete reporting functions: support 1200 hours of time reports, 365 days of daily reports, 36 months of monthly reports, 15 years of annual reports, 100 power on and power off records and 100 error report records.

3.3 Working principle of heat metering

This heat meter includes the functions of temperature, temperature difference and power measurement. Generally, the measuring medium is water. When the medium is water, the pipe pressure needs to be set, and when using other media, the medium density and enthalpy need to be set.

The setting parameter positions are as follows:

Media: detail - > power set - > medium

Pressure option: power->pressure opt

Media density: detail - > power set - > density (g/cm³)

Enthalpy: detail - > power set->heat C

The specific calculation method is as follows:

When the medium is water:

Power calculation p=q×ρTS×（HTs-HTr）

Q is the measured flow;

ρTS is the medium density at the water supply end, which is obtained by looking up the table according to the water supply temperature ts and pressure options;

HTS is the enthalpy value of the medium at the water supply end, which is obtained by looking up the table according to the water supply temperature ts;

HTR is the enthalpy of the medium at the return water end, which is obtained by looking up the table according to the return water temperature tr.

When the media is other:

Power calculation p=q×ρ×ΔT×H

Q is the measured flow;

P is the set medium density;

H is the set enthalpy of medium;

ΔT=|Ts-Tr|.

The power measurement mode is divided into heating mode (heat), cooling mode (cold) and automatic judgment mode (auto), which are calculated according to the rules in the following table:

Table 3 - 1 Calculation rules of heat and cooling capacity31

Power option settings	Flow	Temp.	Power measure mode	Abnormal conditions
Heating	Forward	Ts>Tr	Heating	
	Reverse			Not calculate heat
Cooling	Forward	Ts<Tr		
	Reverse			Not calculate heat
Auto.	Forward	Ts>Tr	Heating	Not calculate heat when Ts<30℃
		Ts<Tr	Cooling	Not calculate cooling when Ts>18℃
	reverse	Ts>Tr	Cooling	Not calculate cooling when Tr>18℃
		Ts<Tr	Heating	Not calculate heat when Tr<30℃

4. Technical parameter

4.1 Basic parameters

(1) Measuring medium: central air conditioning water, primary and secondary network hot water of heat exchange station, industrial refrigerant, etc.

(2) Measurable flow rate range: 0 ~ 12m / S

(3) The accuracy of flow measurement is level 0.5

4.2 Converter

4.2.1 Input / output signal parameters

4.2.1.1 Current output interface

Through parameter setting, it can be set to

4 ~ 20 mA corresponding instantaneous flow output (load resistance ≤ 500 Ω)

4 ~ 20 mA corresponding power output (load resistance ≤ 500 Ω)

4.2.1.2 Pulse output interface

The pulse output is a passive pulse.

Transistor contact capacity: 30VDC, 200mA

Output frequency: 0.0001 ~ 5000Hz.

Scaled pulses can be output through the setting of pulse equivalent.

Pulse width: 50% duty cycle or fixed value (≤ 200ms).

4.2.1.3 RS485 output

Through parameter setting, it can be set to

For Modbus protocol, see 9.5rs485 communication function (MODBUS-RTU) for details**Fel! Hittar inte referenskälla.Fel! Hittar inte referenskälla.**

For BACnet protocol, see 9.6rs485 communication function (BACnet ms/tp) for details**Fel! Hittar inte referenskälla.Fel! Hittar inte referenskälla.**

4.2.1.4 Bluetooth communication

Support Bluetooth 4.0 communication of Android 6.0 and above systems,and use MODBUS-RTU protocol.

4.2.1.5 Temperature interface

Pt-1000 input.

Default two-wire system, optional four wire system.

Measuring range: When the medium is water, the range is (0 ~ 130) ℃

When the medium is other, the range is (-30 ~ 175) ℃

Temperature difference range: (3 ~ 70) K.

4.2.2 Display

(1) 128 x 64 full dot matrix LCD display

(2) Language English

(3) Display units: "instantaneous flow", "cumulative flow", "power", "cumulative heat"

4.2.3 Power supply DC 18 ~ 36V

AC 100 ~ 240V, 48 ~ 62Hz

4.2.4 Ambient temperature -10 ℃ ~ +60 ℃ (when AC power supply)

-10 ℃ ~ +50 ℃ (DC power supply)

4.2.5 Protection grade IP65

4.2.6 Cable access hole m20x15 internal thread

4.2.7 Terminal plug-in connector (wiring diameter 0.3 ~ 1.5mm2)

4.2.8 The shell is made of cast aluminum alloy, and the surface is coated with pure polyester plastic powder.

4.3 Sensor

Threaded sensor

4.3.1.1 Normal diameter

DN10 ~ 40

4.3.1.2 Appearance dimension

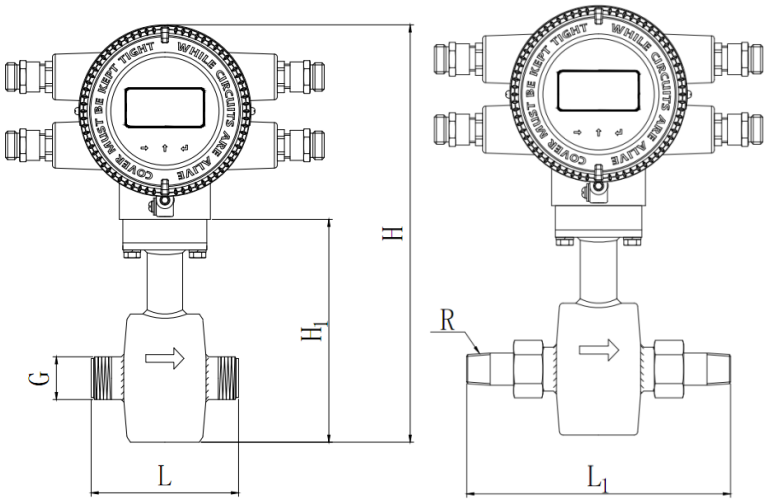


Figure 4 - 3 Schematic diagram of external dimensions of threaded calorimeter41

Table 4 - 5 dimension table of threaded sensor41

Normal diameter	Measuring tube length L	Total length L1	G	R	H1	H
DN10	100	194	G 3/4	R 1/2	147	284
DN15	100	194			147	284
DN20	100	208	G 1	R 3/4	147	284
DN25	100	226	G 1 1/4	R 1	147	284
DN32	100	227	G 1 1/2	R 1 1/4	152	289
DN40	100	227	G 2	R 1 1/2	162	299

4.3.1.3 Electrode material

Stainless steel 316L.

4.3.1.4 Lining material

PU, FEP.

4.3.1.5 Medium temperature

It is related to the temperature resistance of lining materials. See Appendix B lining material performance table. **Fel! Hittar inte referenskälla.**

4.3.1.6 Withstand voltage level

1.6MPa.

4.3.2 Degree of protection

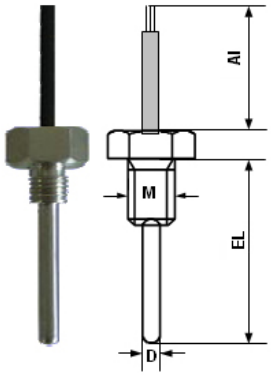
IP65,IP67,IP68

4.3.3 Junction box

Cable access hole M20 x 1.5 female

The shell is made of cast aluminum alloy, and the surface is coated with pure polyester plastic powder.

4.4 Temperature sensor



EI= insertion depth, AI= cable length, M= mounting accessories, D= sheath outer diameter

Product standard DIN EN 60751 (according to IEC 751)
Sensor PT1000
Measurement accuracy Two-wire system ± 0.15 ℃
Four wire system ± 0.1 ℃
Measuring range: 0 ~ 105 ℃
Humidity condition <95% relative humidity (non condensing)
Withstand voltage grade PN25
Protection grade IP67
Sheath material 316L stainless steel
Outer diameter of sheath: 5 ~ 12 mm
The insertion depth is 50mm for DN15 ~ DN50
The connection mode is two-wire or four wire system for optional
Cable length 3m, 5m, 10m for optional (customized)

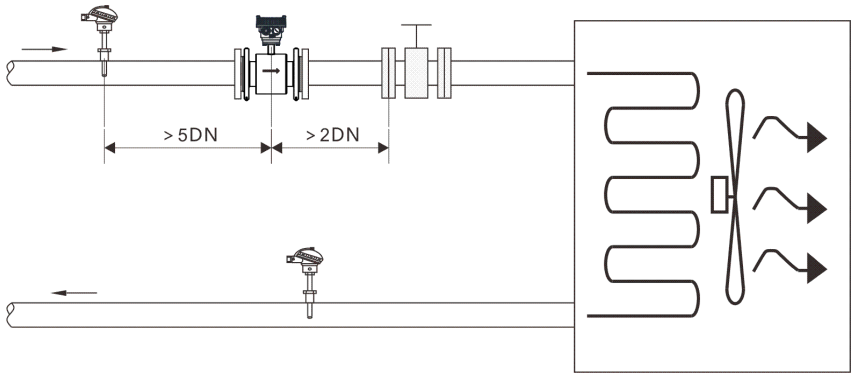
5. Installation

important

1. Sufficient operating space shall be reserved at the installation position of the instrument to facilitate overhaul and maintenance;
2. Avoid places that are prone to lightning strikes or may be flooded and sprayed by rainwater:
3. Avoid being installed in an environment that is overheated, exposed to direct sunlight and prone to corrosion; For the flow sensor, if the pipeline temperature is high, measures should be taken to ensure that the working environment temperature of the converter meets the requirements of 4.2.4. 0
4. Choose a place where the pipeline has no vibration or less vibration.

5.1 Installation position

The flow sensor shall be installed at the water supply end.

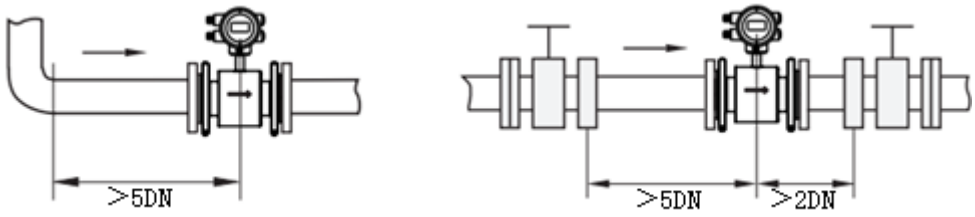


5.2 Pipe section meeting the working conditions of flow sensor

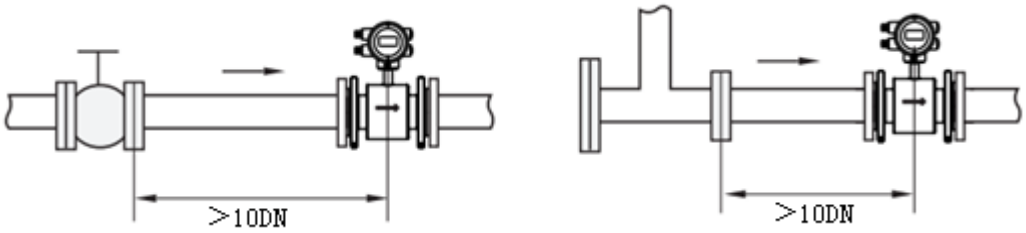
5.2.1 The upstream and downstream straight pipe sections shall be of sufficient length

5.2.1.1 The minimum allowable length of the upstream straight pipe section of the sensor is 5dn and the downstream is 2DN (DN is the pipe diameter)

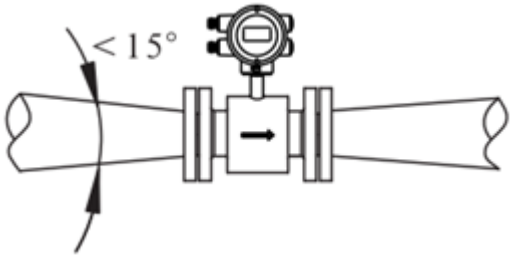
Single elbow full open gate valve or ball valve



5.2.1.2 When there are spoiler components (half open valve, regulating valve, stop valve, etc.) upstream, the length of the straight pipe should be extended



5.2.1.3 When the reducer with a taper of less than 15 ° is installed on the upstream and downstream sides of the measurement, it can be regarded as a straight pipe



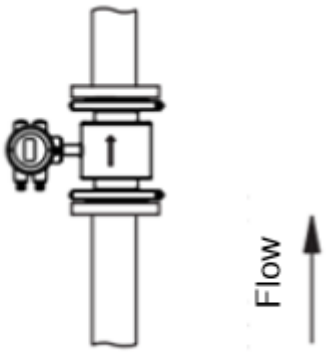
5.2.2 The sensor shall be installed in the pipe section filled with medium

When the pipe is not full, the flow sensor will have serious measurement error or

cannot display the measured value normally.

Raise the outlet end of the downstream pipe section to ensure full pipe.

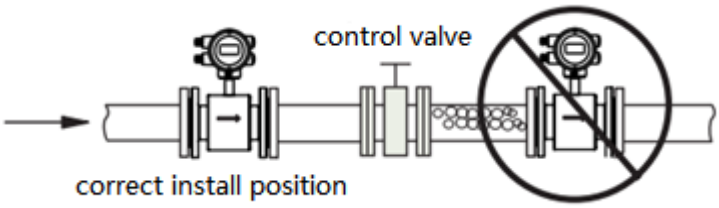
The flow direction is from bottom to top, which can ensure the full pipe.



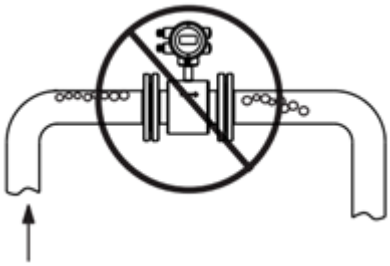
5.2.3 It should be ensured that the installation position of the measuring pipe will not produce or accumulate bubbles

If bubbles enter the sensor measuring tube, the flow display will be affected and measurement errors will occur.

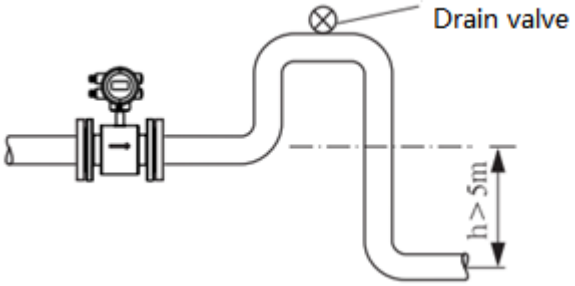
Bubbles are easily generated downstream of the regulating valve.



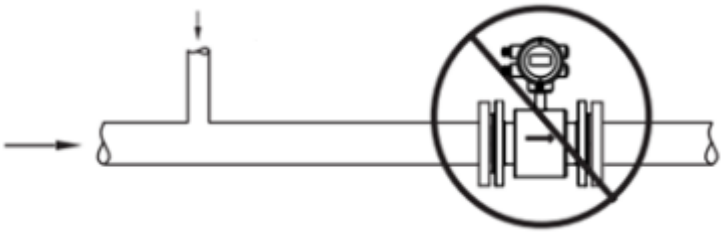
The pipe with the outlet facing downward is easy to accumulate bubbles at the highest point.



In the downward pipeline longer than 5 meters, cavitation occurs due to the pressure drop of the system, so it is necessary to install a siphon or relief valve downstream of the sensor.



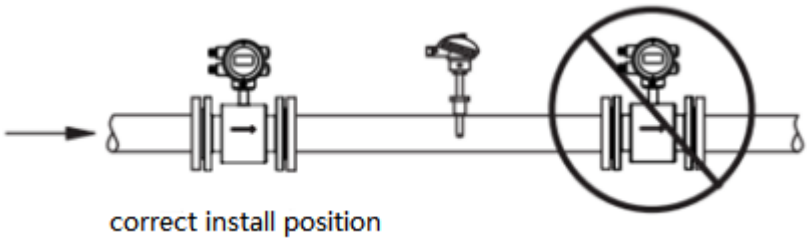
5.2.4 In the pipe section where the measuring pipe is located, the fluid conductivity should remain stable



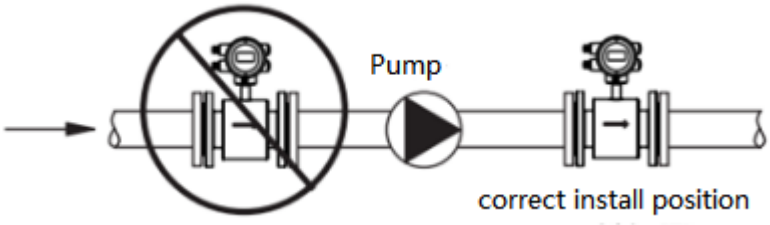
important

In the case of upstream chemical injection, the fluid conductivity may fluctuate violently, thus affecting the normal operation of the flow sensor. To avoid this situation, it is recommended to change the injection port of chemical substances to the downstream side of the flow sensor. If it is necessary to inject from the upstream side, a sufficient distance (more than 50D) should be ensured to ensure that the fluid and the injected material are fully mixed.

5.2.5 The pipe section near the upstream side of the sensor is not allowed to have projections

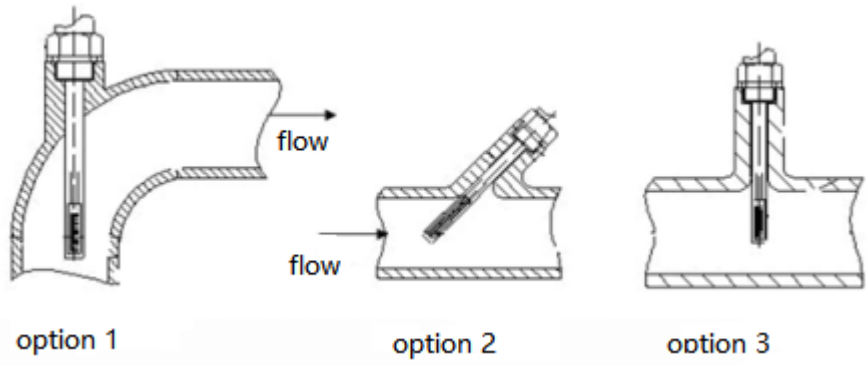


5.2.6 The flow sensor is not allowed to be installed in the negative pressure pipeline such as the suction side of the pump



5.3 Installation of temperature sensor

To ensure that the insertion depth of the temperature sensor is greater than half of the pipe diameter, refer to below pictures for details. 0



5.4 Installation instructions

5.4.1 welding

The pipe flange for installing the flow sensor should be welded before the instrument is in place. Electric welding is prohibited after the instrument is in place; After the instrument is installed, when welding is required at other positions of the pipeline, the power supply of the instrument must be disconnected first.

5.4.2 Pipe cleaning

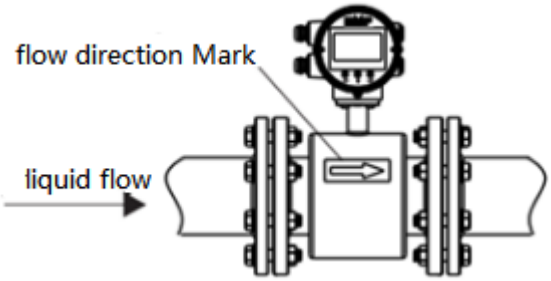
The newly installed pipeline usually has foreign matters such as welding slag, which should be washed away before the sensor is in place. To prevent damage to the lining.

⚠ Attention

Pipes that are not centered or inclined will cause leakage or damage to the lining.

5.4.3 flow direction

The arrow direction of the instrument flow direction sign should be consistent with the medium flow direction.

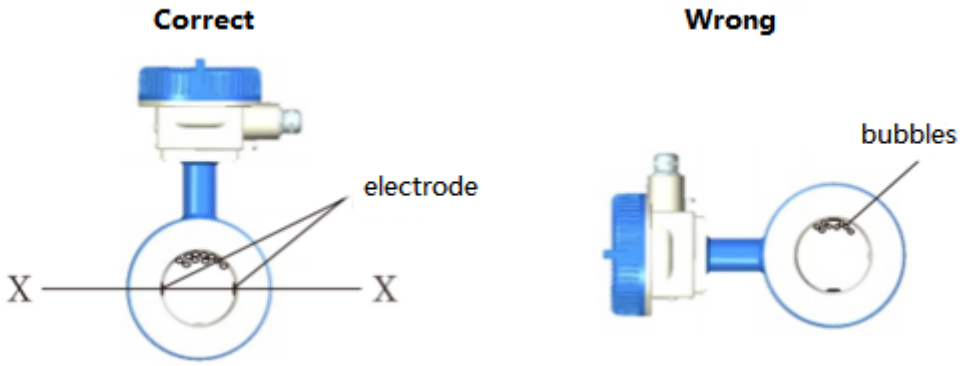


notes

For instrument operation or data observation, the direction of the converter can be changed: Remove the four fastening screws at the bottom of the converter housing. The converter can be rotated ± 90 ° or 180 °, and then reinstall the screws. Pay attention to the correct position of the sealing gasket at the bottom of the shell during the tightening of the screws.

5.4.4 Horizontal installation

After the sensor is installed in the pipeline, the connecting line XX between the two electrodes should be kept as horizontal as possible.

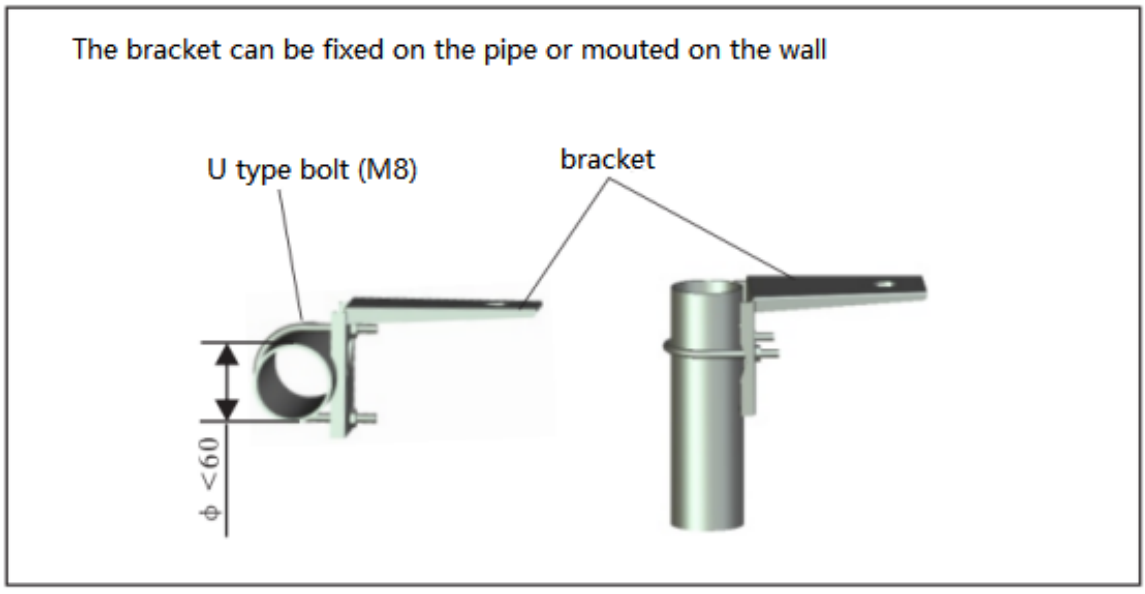


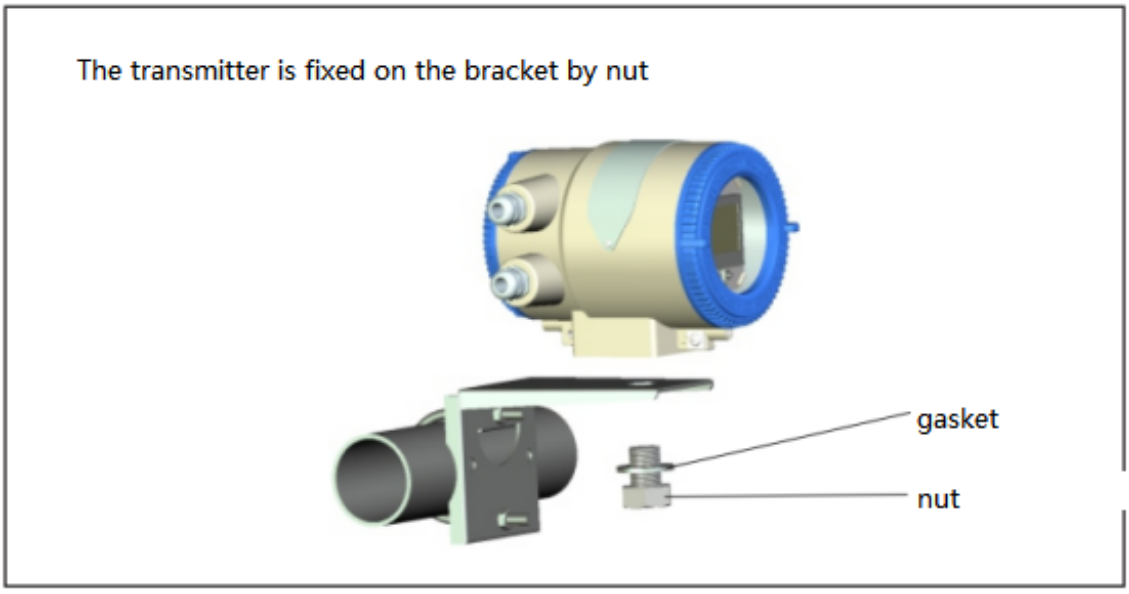
important

The electrode shown in the above figure on the right is located at the top of the measuring tube, and the bubbles released from the medium will cause the electrode to be insulated from the medium for a short time, thus making the measurement result wrong.

5.5 Converter (split) installation

The installation position of the converter should be as far away from the high-power motor or frequency converter as possible;





important

Sufficient operating space shall be reserved at the installation position of the converter to facilitate wiring and connecting conduit.

When wall hanging is installed, enough length of cable shall be reserved.

6. Grounding

The instrument housing and the medium must be grounded together.

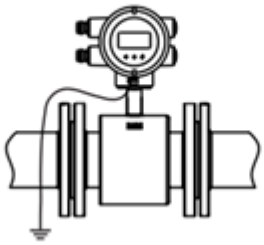


Figure 6 - 1 Schematic diagram of instrument grounding61

6.1 Metal pipe

Connect the grounding of the instrument shell with the pipe flange by wire.

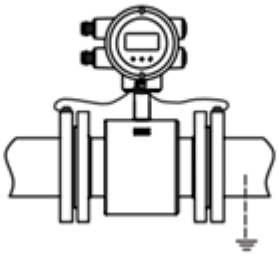


Figure 6 - 2 Schematic diagram of metal pipeline instrument grounding62

6.2 Non metallic pipe

Grounding ring or grounding electrode must be used.

Grounding connection of flow meter with grounding ring on nonmetallic pipe.

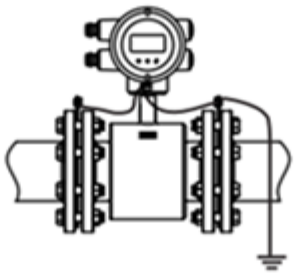


Figure 6 - 5 Schematic diagram of non-metallic pipeline instrument grounding63

notes

The grounding mode of the three electrode sensor is shown in Figure 6 - 1.

7. Connection

The wiring of electromagnetic calorimeter includes the following three aspects:

1. Select the appropriate cable;
2. Cable laying;
3. Wiring.

7.1 Cable selection

important

It is forbidden to use hard copper wire for the power supply and output signal of the heat meter.

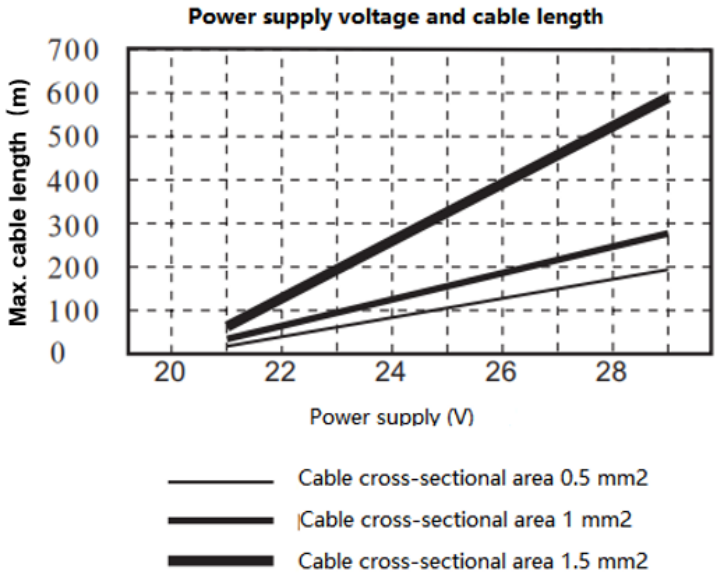
7.1.1 Power cable

In order to ensure the sealing of the instrument access hole, a circular three core multi strand sheathed cable with an outer diameter of 6 ~ 10mm shall be selected, and the cross-sectional area of each core shall be 1.0 ~ 1.5mm2.

Cables with a rated temperature of 80 ℃ should be used in ambient temperatures above 60 ℃. If the ambient temperature exceeds 80 ℃, cables with a rated temperature of 110 ℃ should be used.

important

When using 24V DC power supply, the voltage delivered to the converter end will drop due to the cable resistance. The relationship between the power supply voltage and the allowable cable length is shown in the table below.



7.1.2 Input / output signal cable

In order to ensure the sealing performance of the instrument access hole, the single hole sealed cable should be a round multi strand sheathed cable with an outer diameter of 6 ~ 10mm, and the double hole sealed cable should be a round multi strand sheathed cable with an outer diameter of 3 ~ 5mm, with a copper core cross-sectional area of 0.5 ~ 1.5mm2.

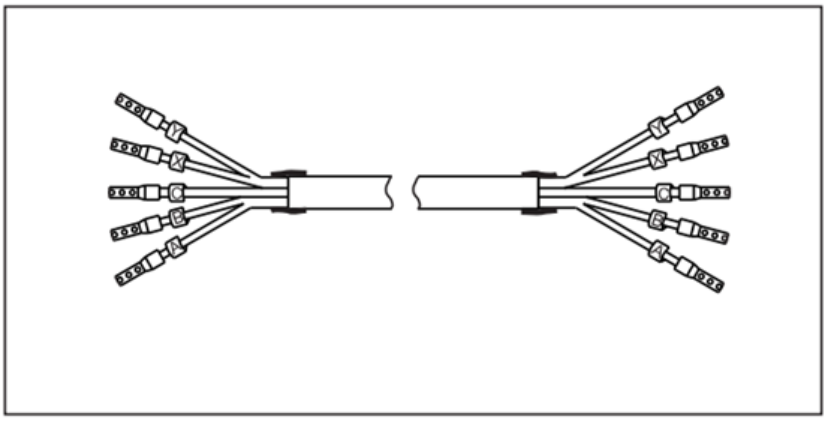
If ambient noise and crosstalk will adversely affect the signal, please use RVVP shielded cable.

7.1.3 Temperature sensor signal cable

The signal cable of temperature sensor shall be a round multi strand sheathed cable with an outer diameter of 3 ~ 5mm, and the cross-sectional area of copper core is 0.2 ~ 0.3mm2.

7.1.4 Special signal cable for split flow sensor

five×0.5mm2rvvp special shielded cable, with an outer diameter of 8-10mm.



important

If the signal cable provided with the product is found to be too short, please contact our company for replacement. It is forbidden to lengthen it at will.

If the signal cable is too long in practical application, please do not wind it up; If you need to cut it short, please handle the thread end as shown in the above figure.

7.2 Cable laying

7.2.1 Cable access hole sealing

Put the parts of the sealing plug into the cable as shown in the figure below, and then screw them into the cable access hole of the instrument in turn.

When connecting the conduit with the sealing plug, pay attention not to damage the sealing performance of the cable, and do not over compress the cable.

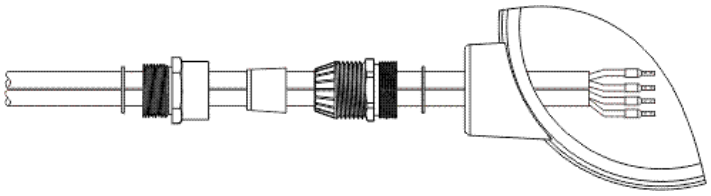


Figure 7 - 1 Schematic diagram of double hole sealed cable threading (applicable wire diameter 3-5mm)71

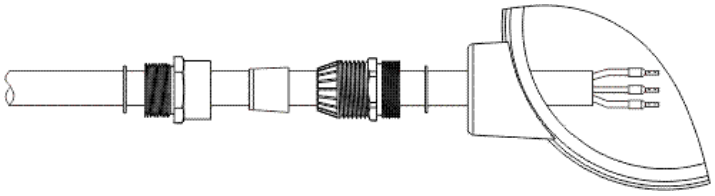


Figure 7 - 2 Schematic diagram of single hole sealed cable threading (applicable wire diameter 6-10mm)72

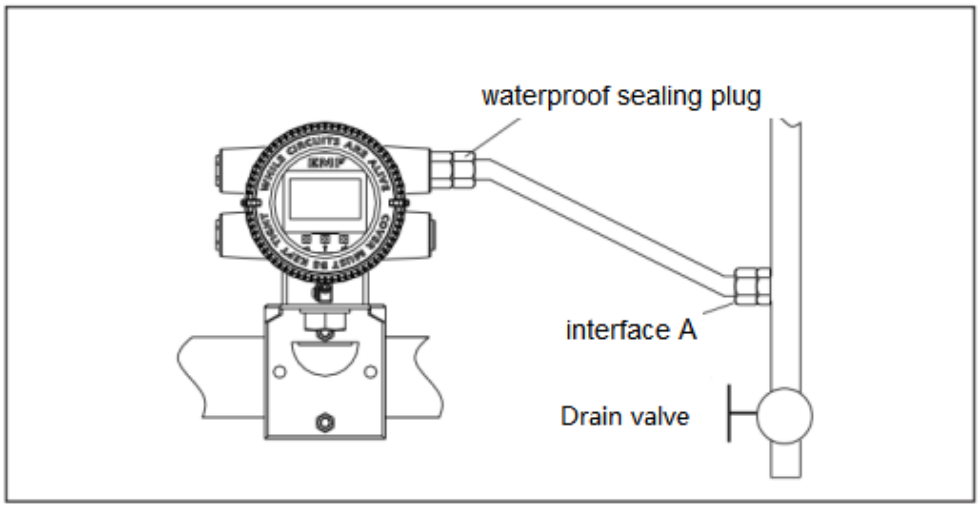
7.2.2 Use conduit correctly

In order to protect cables and prevent electrical noise interference, it is recommended to use conduit to lay cables and construct according to the following requirements:

(1) Power cables and output signal cables are not allowed to share conduit, nor are they allowed to share conduit with excitation cables and signal cables, and power cables cannot be laid in the same cable tray with the above other cables or at least kept isolated.

(2) Excitation cables and signal cables are allowed to share conduit, but excitation cables and signal cables of different heat meters are not allowed to share conduit or bundle together.

(3) The instrument shall be connected with the conduit with a waterproof sealing plug with conduit connector, and the position of conduit A (see the figure below) shall be lower than the instrument cable access port. Install a drain valve at the end of the standpipe to regularly drain the accumulated water in the conduit.



Be careful

The power supply and signal cables of the heat meter are allowed to be exposed, but they must be protected from external factors; Please keep the signal cable and excitation cable of the split heat meter away from high-power appliances and frequency converters as far as possible.

7.3 Connection

important

● In order to prevent instrument damage caused by condensation, do not connect cables outdoors in rainy days;
● The unused cable access hole is not allowed to remove the sealing cover.
● The cable sheath shall enter the instrument housing completely and moderately.

7.3.1 Terminal block

The connection terminals of the converter are plug-in type. First connect the wire head to the plug and tighten it. After checking that there is no error, insert the plug into the corresponding terminal base.

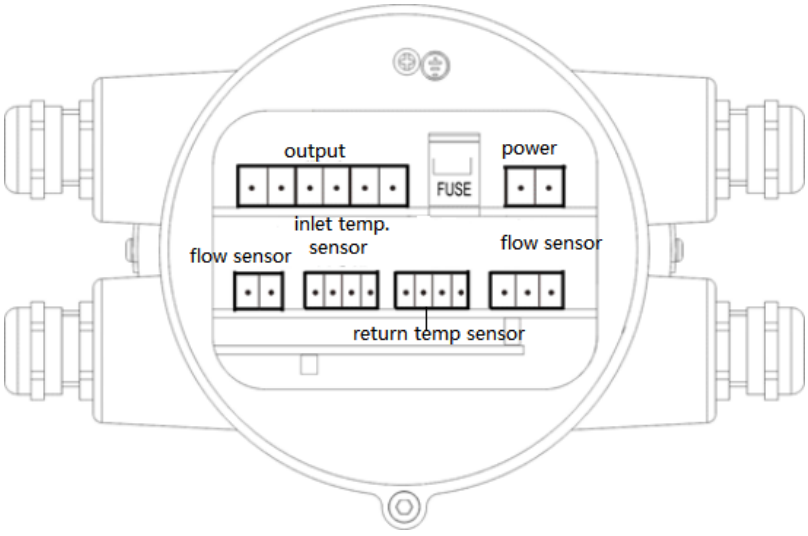


Figure 7 - 3 overview of terminal blocks73

Table 7 - 1 description of power terminals71

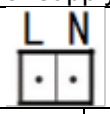
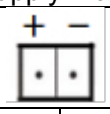
220V AC power supply mode		24V DC power supply mode	
			
Terminal symbols	meaning	Terminal symbols	meaning
L	220V AC L	+	24V DC +
N	220V AC N	-	24V DC -

Table 7 - 2 description of flow sensor terminals72

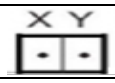
	
Terminal symbols	meaning
A	EMF signal input
C	Common end of electromotive force signal
B	EMF signal input
X	Excitation current output
Y	

Table 7 - 3 description of output terminals73

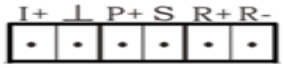
	
Terminal symbols	meaning
I+	Current output positive
⊥	Output public
P+	Frequency output positive
S	485 communication ground
R+	485 communication positive
R-	485 communication negative

Table 7 - 4 temperature sensor terminal description74

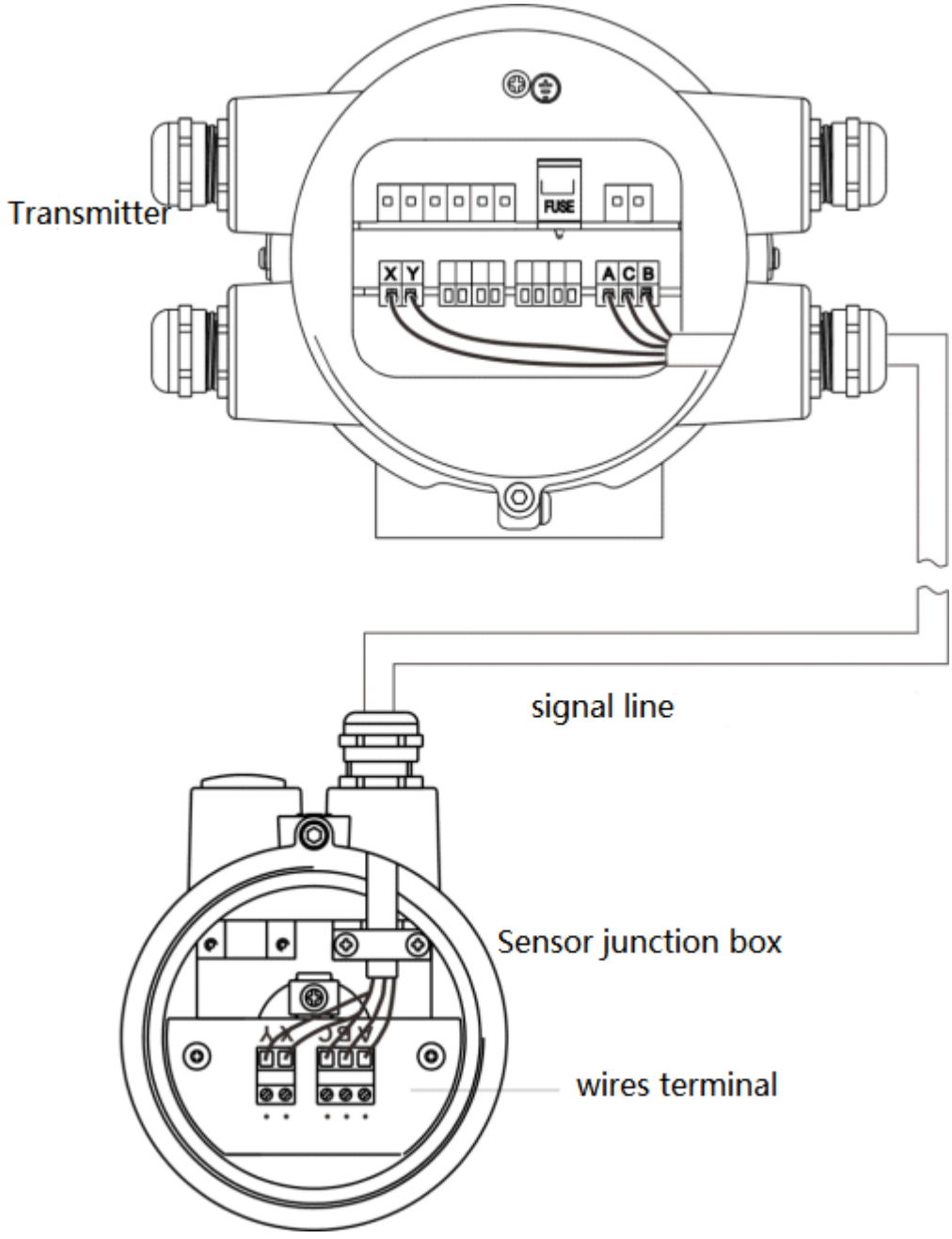
Four wire terminal		Two wire terminal	
			
Terminal symbols	meaning	Terminal symbols	meaning
TS	Water supply end temperature sensor	TS	Water supply end temperature sensor
Tr	Temperature sensor at return end	Tr	Temperature sensor at return end

Four wire system to two-wire system: short circuit ts+ and ts+, ts- and ts-, and connect ts+ and ts-; Short circuit tr+ and tr+, tr- and tr-, and connect tr+ and tr-.

7.3.3 Wiring between converter and sensor (split heat meter)

important

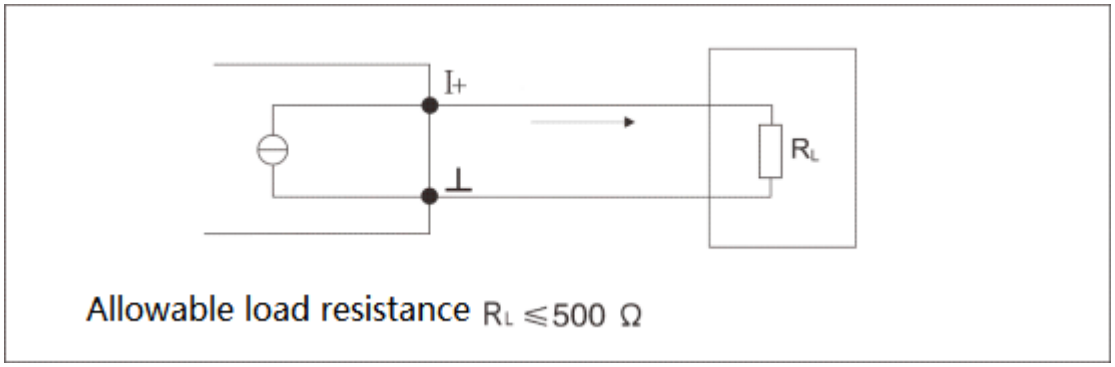
The connection terminals of the converter are plug-in type. First connect the wire head to the plug and tighten it. After checking it, insert the plug into the corresponding terminal base.



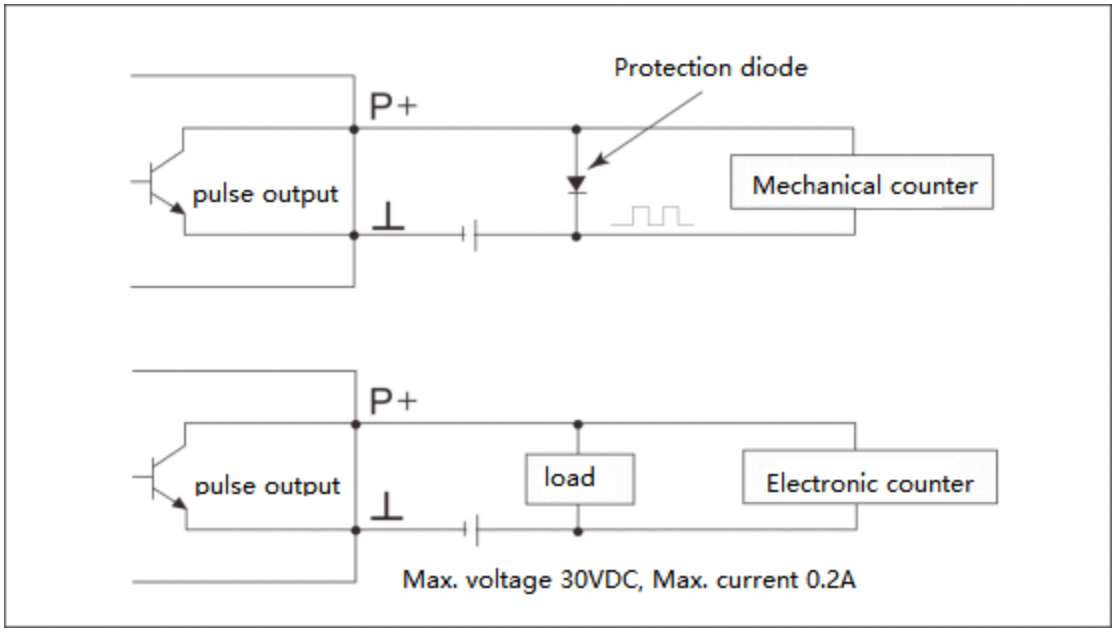
7.3.4 Connection between converter and external instrument

The cable shall be connected to the terminal after crimping the end of the insulated straight pipe.

7.3.4.1 Flow and heat current output



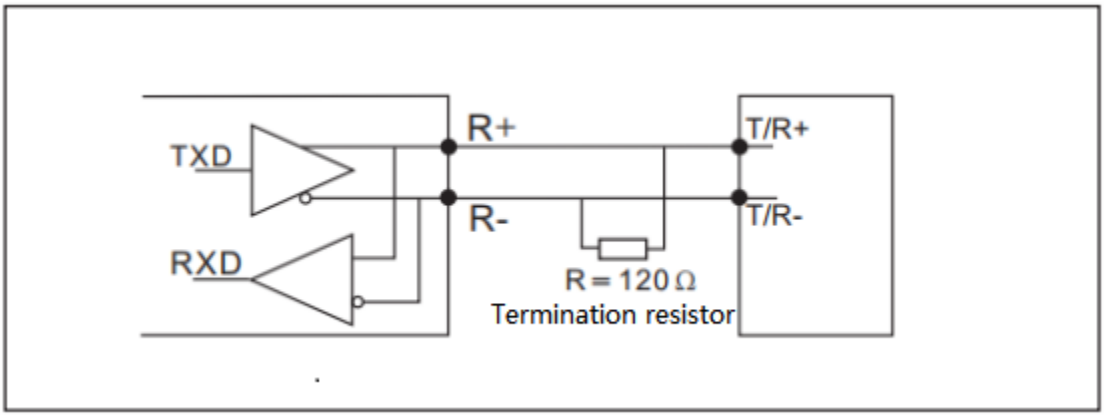
7.3.4.2 Flow and heat passive pulse output



important

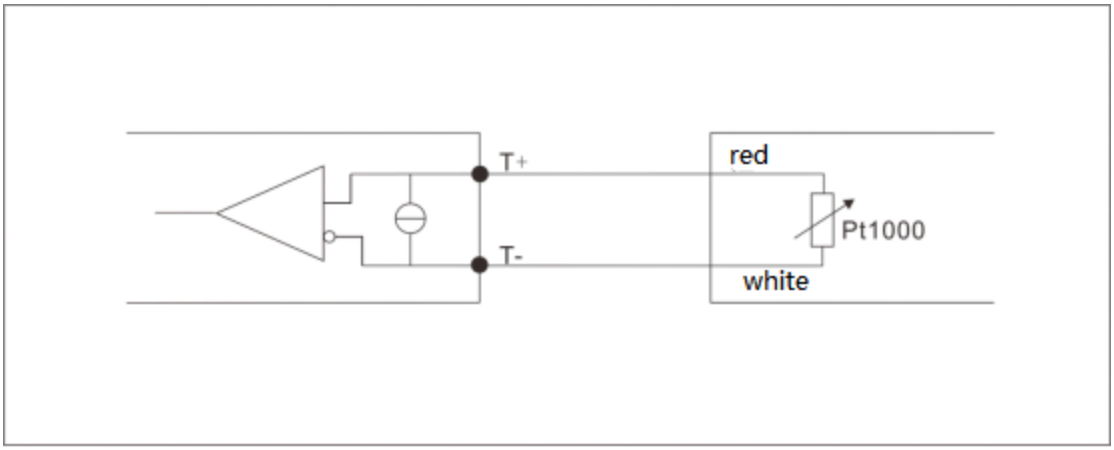
- as it is a transistor node output (isolated type), please pay attention to the voltage and power polarity when wiring.
- the DC voltage shall not be greater than 30 V and the current shall not be greater than 0.2 a to prevent damage to the instrument.
- when the input filter constant of the electronic counter is larger than the pulse width, it will cause inaccurate counting, so try to increase the set value of the pulse width.
- if the input impedance of the electronic counter is large, the induced noise of the power supply will cause counting errors. Use shielded cables or fully reduce the input impedance of the electronic counter to make it within the specification range of the pulse output of the electromagnetic heat meter.

7.3.4.3 RS485 output

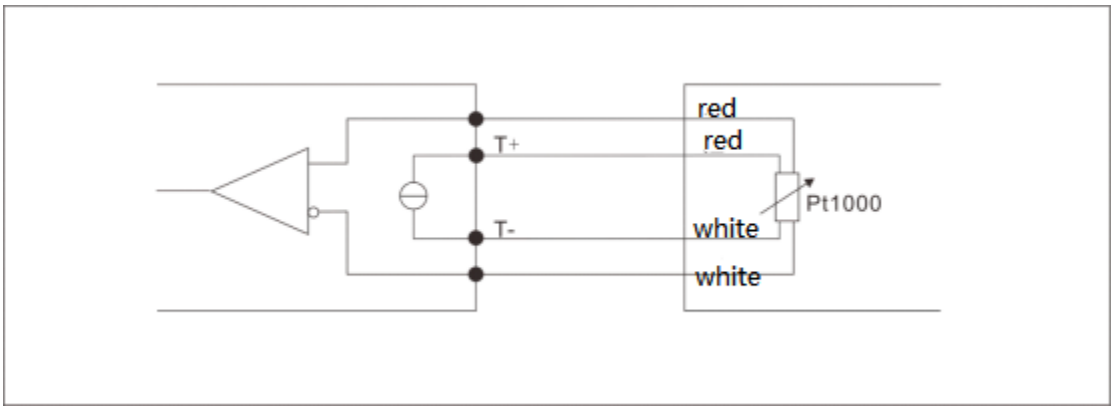


7.3.4.4 Temperature sensor wiring

Two wire temperature sensor wiring:



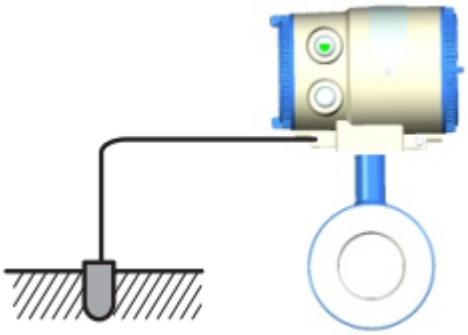
Four wire temperature sensor wiring:



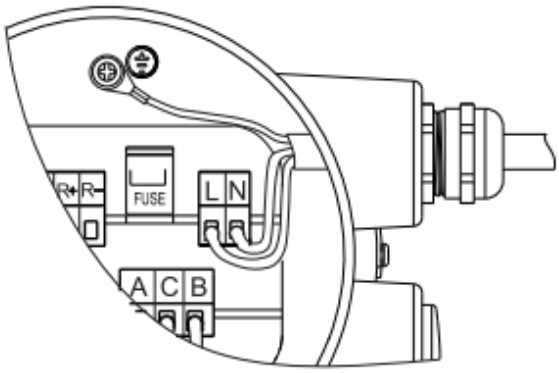
7.3.5 Power cable wiring

Protective grounding

Before the power cable is connected, the instrument shell should be grounded to ensure the safety of operators. The grounding wire should use 600V insulated wire, the cross-sectional area of the wire should be greater than 2mm2, and the grounding resistance should be less than 10 Ω.



Connection



⚠warning

When connecting the power cable, the following points must be observed:

● check whether the power supply meets the instrument requirements;

● ensure that the power supply is disconnected before wiring;

● the power supply shall be connected to the instrument through an external fuse or circuit breaker (2A).

8. Panel operation and display

8.1 Panel and key description

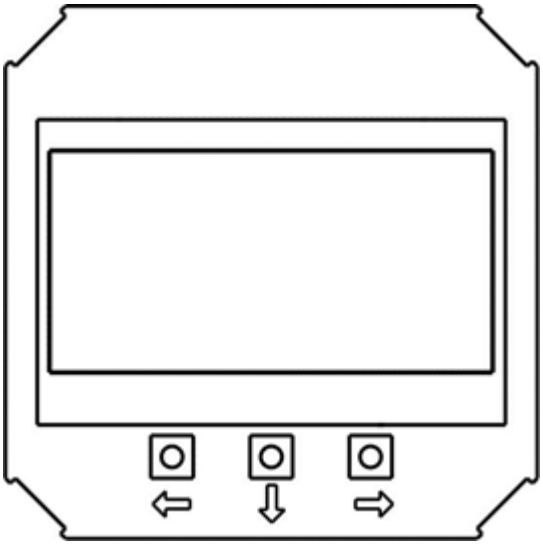


Figure 8 - 1 panel and keys81

Table 8 - 1 key description81

No.	name	Key function		
		Measurement interface	Parameter setting interface	Record queryinterface
1	Click move right →	Enter the parameter setting main menu interface	Enter parameter setting or lower submenu or password input interface	Move cursor, execute option function
2	Click the down key ↓	Switch measurement interface	Switch numbers, decimal points, parameter options, or switch menu items	Switch numbers, options
3	Click the move left key ←	Switch the cumulative measurement content in the measurement interface	Confirm parameter modification or return to the upper menu	Previous Menu
4	Long press the down key ↓	Enter the advanced setting mode. See Appendix D for details. Enter the advanced setting state**Fel! Hittar inte referenskälla.**		
5	Press the left shift key ← and the right shift key →	Enter the quick zero adjustment interface, see 9.1 for details0		

8.2 Real time data display interface

8.2.1 Measurement interface display

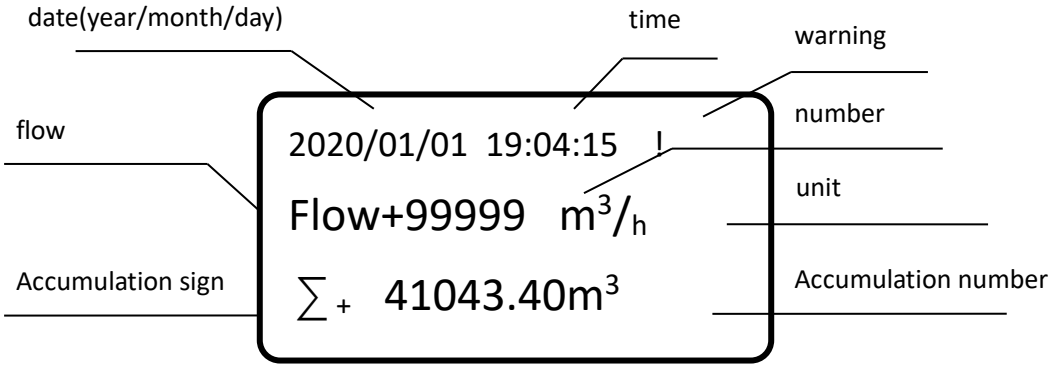


figure 8-2 flow data interface

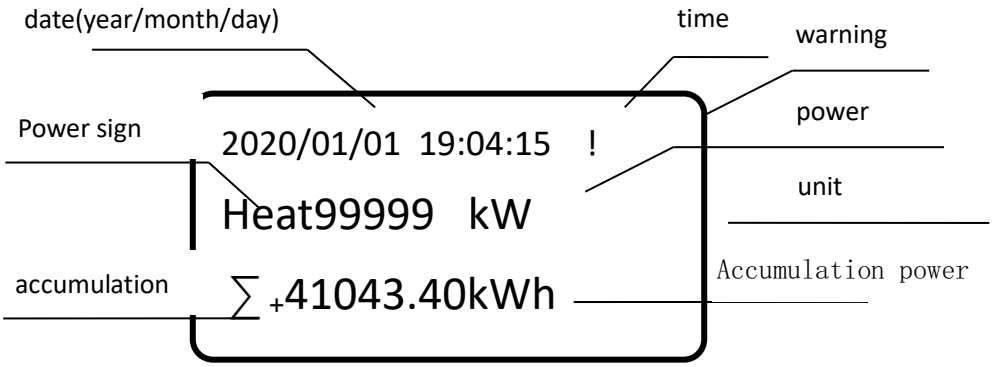


figure 8-3 heat data interface

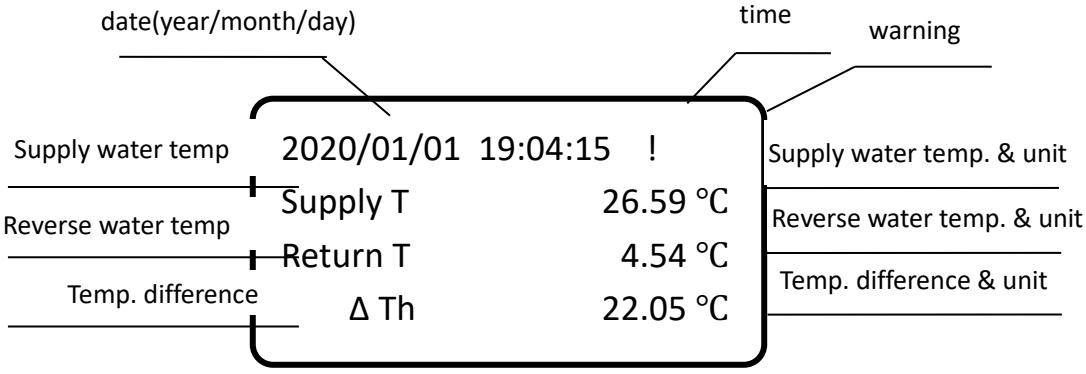


figure 8-4 temp. difference interface

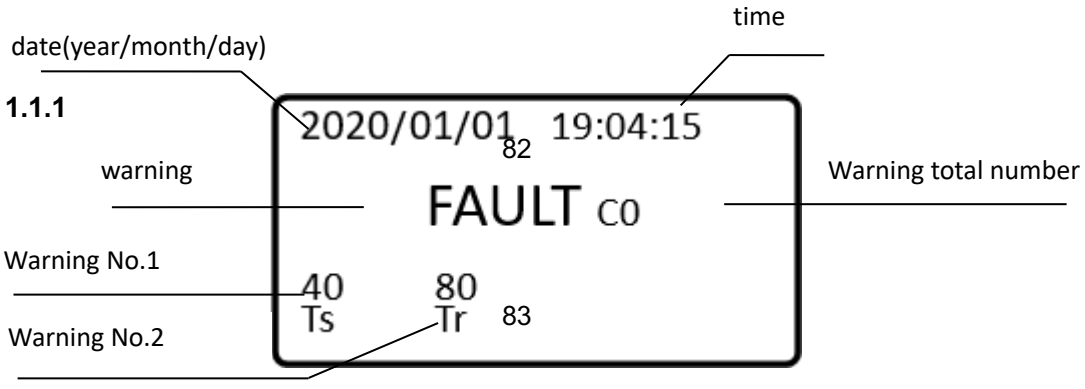


Figure 8 - 5 alarm interface84

8.2.2 Description of interface display items

□Date (year / month / day): display format xxxx/xx/xx

□Time (H / min / s): display format xx/xx/xx

□Instantaneous flow: see Appendix E for terms and expressions. **Fel! Hittar inte referenskälla.**

□Cumulative flow (∑ +: positive cumulative flow, ∑ -: negative cumulative flow): see Appendix E for terms and terms. **Fel! Hittar inte referenskälla.**

□Power (heat: heat, cold: cooling capacity): see Appendix E for terms and terms. **Fel! Hittar inte referenskälla.**

□Accumulated heat (∑ H: accumulated heat, ∑ C: accumulated cooling capacity): see Appendix E for terms and terms. **Fel! Hittar inte referenskälla.**

□Supply temperature: see Appendix E for nouns and terms. **Fel! Hittar inte referenskälla.**

□Return temperature (returnt): see Appendix E for nouns and terms. **Fel! Hittar inte referenskälla.**

□Temperature difference (△ th: water supply temperature - return water temperature, △ TC: return water temperature - water supply temperature): see Appendix E for terms and terms. **Fel! Hittar inte referenskälla.**

□Alarm prompt (!): When the system alarms, it will flash.

□Total alarm code: the sum of all alarm codes. Note that the alarm codes are hexadecimal.

□Alarm item: the code and content corresponding to the alarm item.

Table 8 - 2 list of heat mode alarm codes82

Alarm display code	Alarm display character	Alarm meaning
8000		retain
4000		retain
2000		retain
1000		retain
800		retain
400	HTs30	In auto mode, when the flow is positive and ts>tr, ts<30; Tr<30 when the flow is negative and ts<tr
200	CTs18	In auto mode, ts>18 when the flow is positive and ts<tr; Tr>18 when the flow is negative and ts>tr
100		retain
80	Tr	TR not connected
40	TS	TS not connected
20	TSL	TS < TR in heat metering mode
10	TSH	TS > TR in cooling metering mode
08		retain
04		retain
02	Empty	Air traffic control
01	Store	EEPROM memory card not installed

8.3 Menu list

There are 6 menus available to users, including basic, system, power, query, test and calibration:

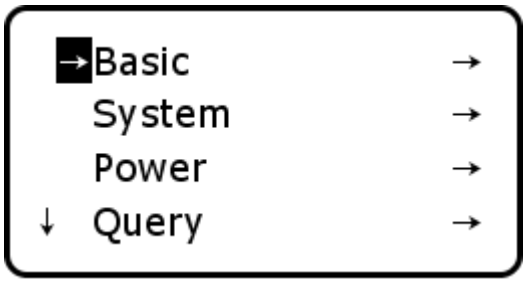


Figure 8 - 6 available menus of heat measurement mode (1)85

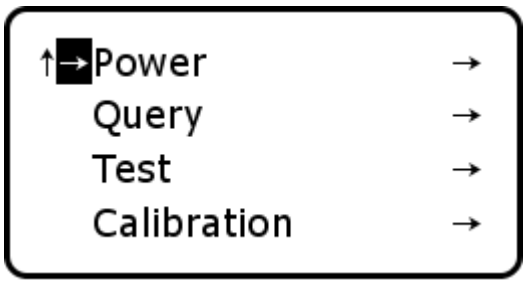


Figure 8 - 7 available menus of heat measurement mode (2)86

When entering the advanced setting state, the user can add two items of detail and special in the operation menu. See Appendix D for the entry method to enter the advanced setting state. Non manufacturer personnel are not allowed to enter the advanced setting state. Modifying the parameters may cause the calorimeter to fail to work normally. **Fel! Hittar inte referenskälla.**

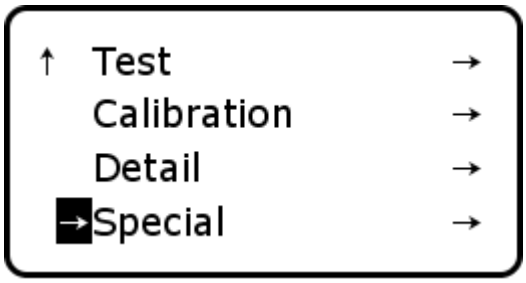


Figure 8 - 8 new menu of heat measurement mode in advanced setting state87

See 10. Parameter list for specific menu settings.

8.4 Operation examples

The parameter settings of this product are divided into five types: password, enumeration type parameters, parameters with fixed or no decimal point, parameters with variable decimal point, and parameters with mixed letters and numbers.

8.4.1 Example of password setting

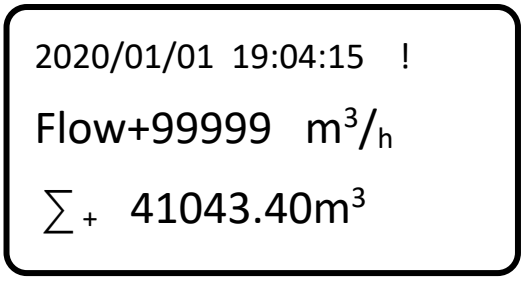


Figure 8 - 9 arbitrary measurement interface88

Click the → key in any measurement interface to enter the menu selection page.

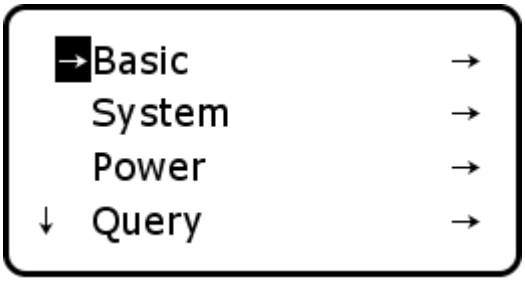


Figure 8 - 10 menu selection page89

Click the ↓ key to select the menu you want to enter. Basic, query and calibration do not need a password to enter.

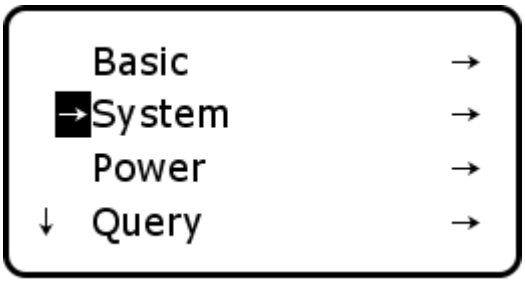


Figure 8 - 11 select system menu10

Click the → key to enter the password input interface.

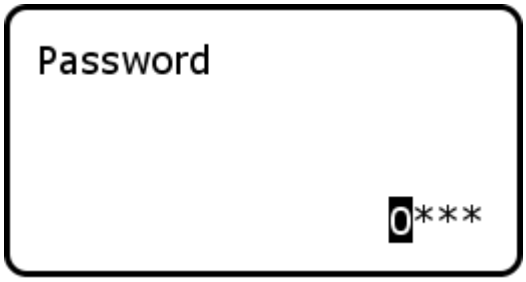


Figure 8 - 12 password input interface811

The position of the anti black display is the selected number. Click the → key to change the selected position.

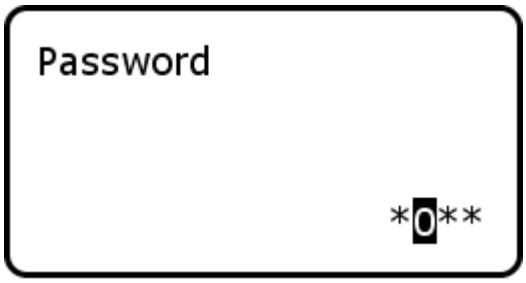


Figure 8 - 13 changing the selected position812

Click the ↓ key to modify the selected number.

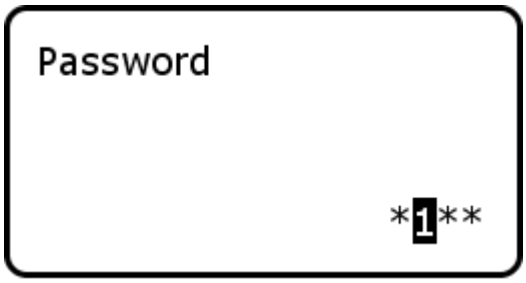


Figure 8 - 14 changing the selected number813

After entering the correct password, click the ← key to confirm the input and enter the menu.

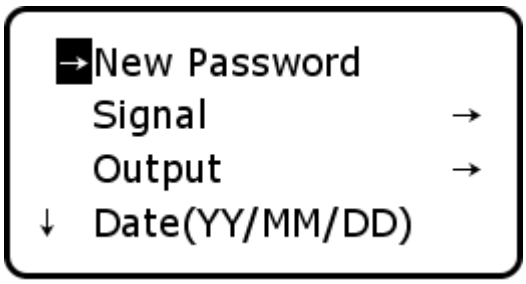


Figure 8 - 15 entering the system menu

8.4.2 Enumeration type parameter setting example

Take basic->pv units as an example, click on any measurement interface → enter the menu selection interface, and select the basic menu

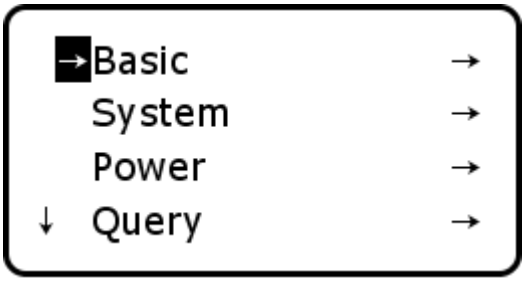


Figure 8 - 16 selecting the basic menu814

Click → to enter the basic menu.

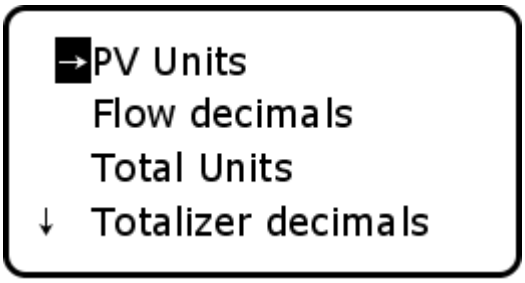


Figure 8 - 17 entering the basic menu815

Click → to enter the PV units setting interface.

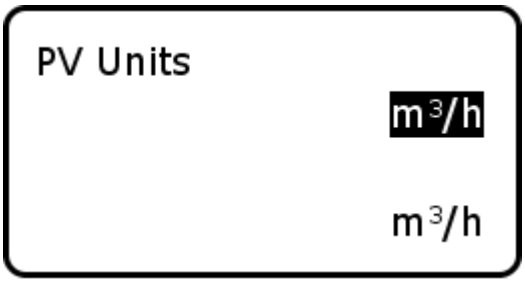


Figure 8 - 18 PV units setting interface816

Click ↓ to change the options.

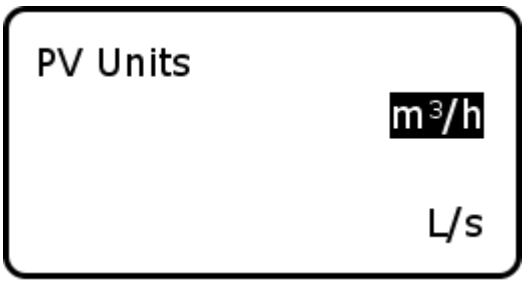


Figure 8 - 19 change options

Click ← to jump out of the confirmation screen.

Figure 8 - 20 confirmation screen817

Click ← again to confirm the modification and exit, or click → cancel the modification and exit.

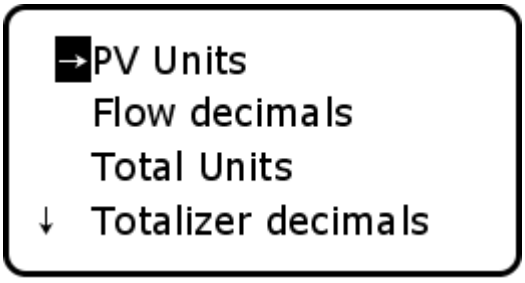


Figure 8 - 21 exit to basic menu

8.4.3 Example of parameter setting with fixed or no decimal point

Take system->signal->low cutoff% as an example, click → in any measurement interface to enter the menu selection interface, and click ↓ to select the system menu.

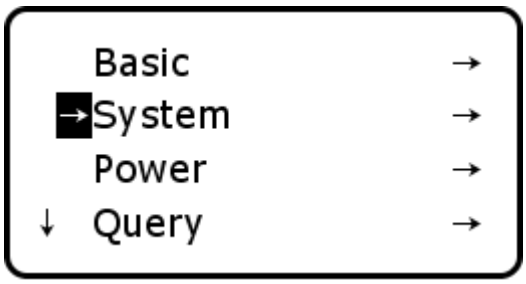


Figure 8 - 22 select system menu818

Click → enter the password to enter the system menu, click ↓ and select signal.

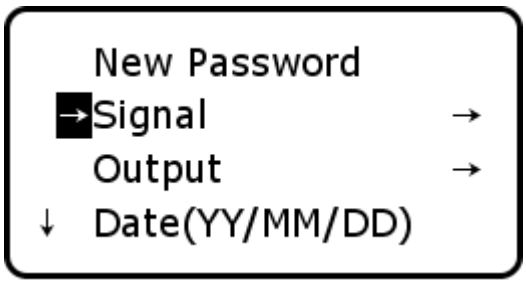


Figure 8 - 23 entering the system menu819

Click → to enter the signal submenu, click ↓ to select low cutoff%.

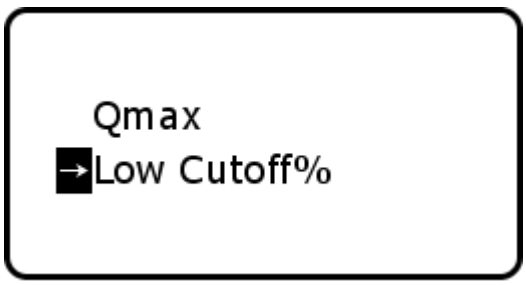


Figure 8 - 24 entering the signal submenu820

Click → to enter the low cutoff% setting interface.

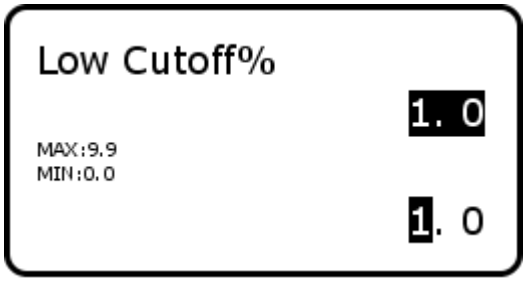


Figure 8 - 25low cutoff% setting interface

The position of the anti black display is the selected number. Click the → key to change the selected position.

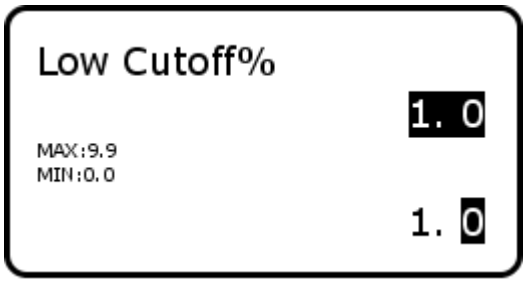


Figure 8 - 26 changing the selected position821

Click the ↓ key to modify the selected number.

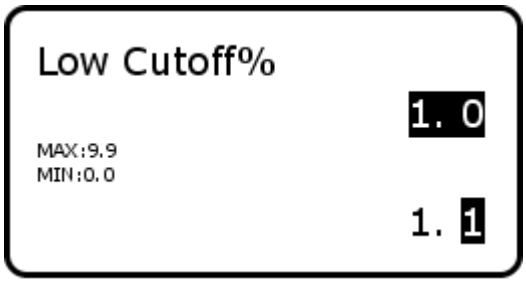


Figure 8 - 27 modify the selected number822

Click ← to jump out of the confirmation screen.

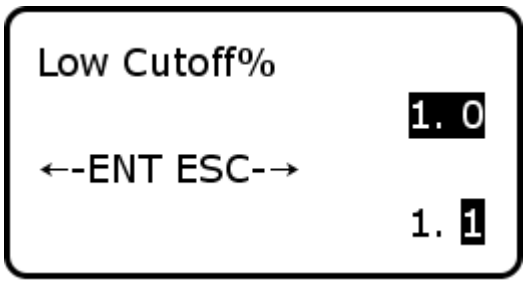


Figure 8 - 28 confirmation screen823

Click ← again to confirm the modification and exit, or click → cancel the modification and exit.

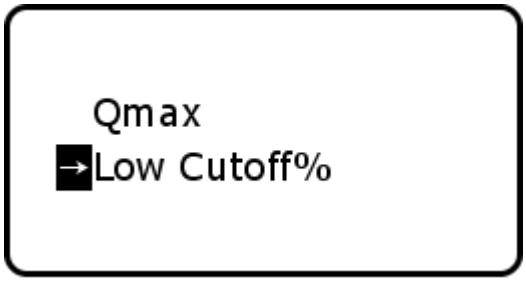


Figure 8 - 29 exit to signal menu

8.4.4 Example of parameter setting with non fixed decimal point

Take system->signal->qmax as an example, click → in any measurement interface to enter the menu selection interface, and click ↓ to select the system menu.

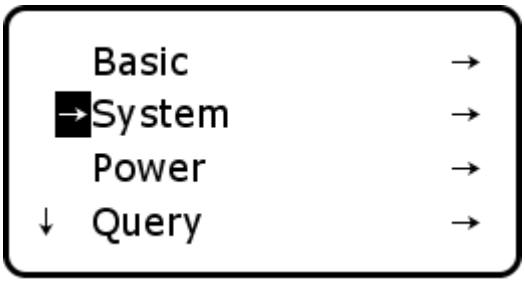


Figure 8 - 30 select system menu824

Click → enter the password to enter the system menu, click ↓ and select signal.

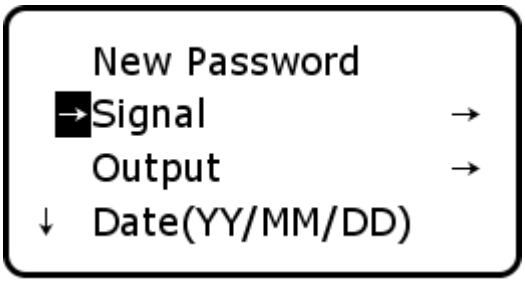


Figure 8 - 31 entering the system menu825

Click → to enter the signal submenu and select Qmax.

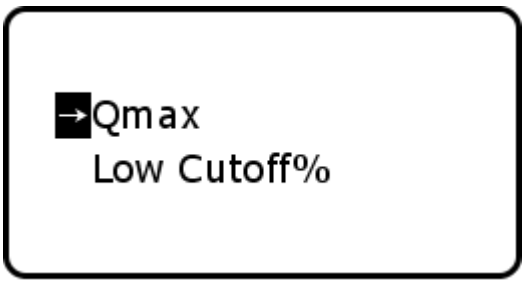


Figure 8 - 32 entering the signal submenu826

Click → to enter the Qmax setting interface.

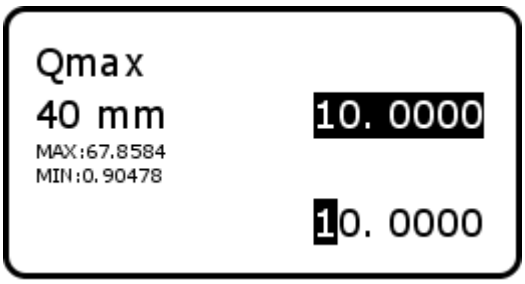


Figure 8 - 33low cutoff% setting interface

The position of the anti black display is the selected number. Click the → key to change the selected position.

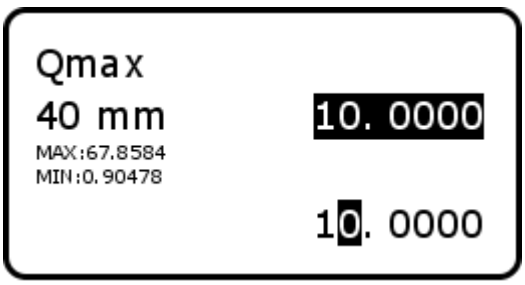


Figure 8 - 34 changing the selected position827

Click the ↓ key to modify the selected number.

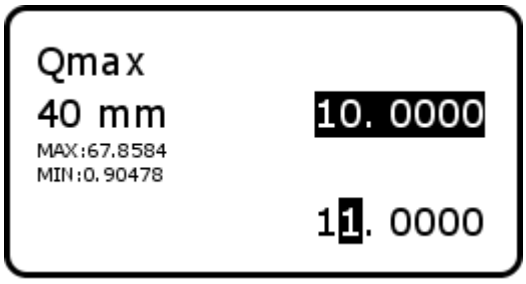


Figure 8 - 35 modify the selected number828

Click the → key to change the selected position to select the decimal point.

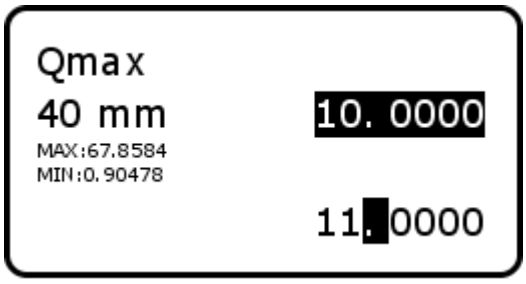


Figure 8 - 36 select decimal point829

Click ↓ to change the decimal point position.

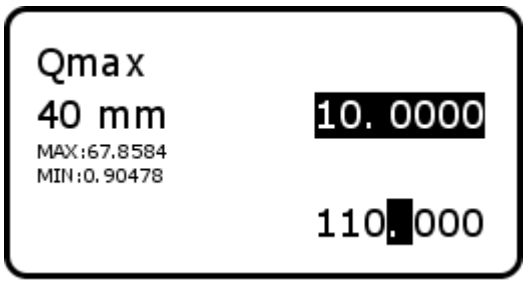


Figure 8 - 37 changing the decimal point position

Modify the setting value to make it within the limit range of Max and min, and click ← to jump out of the confirmation screen.

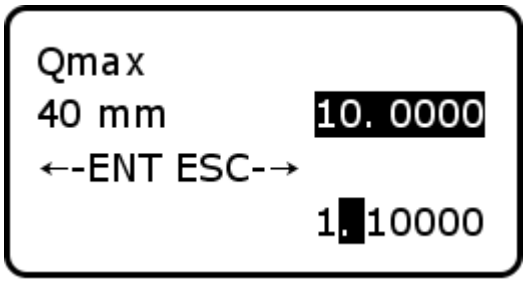


Figure 8 - 38 confirmation screen830

Click ← again to confirm the modification and exit, or click → cancel the modification and exit.

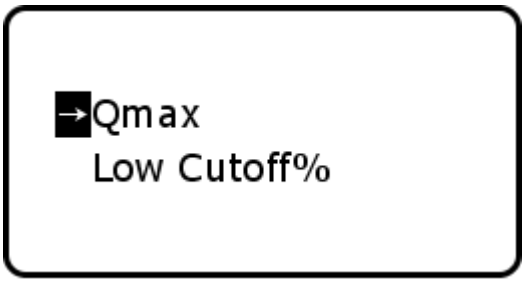


Figure 8 - 39 exit to signal menu

8.4.5 Example of mixed alpha numeric parameter setting

With Take detail ->bluetooth name as an example, click on any measurement interface → enter the menu selection interface, and click ↓ to select the detail menu.

Figure 8 - 40 select the detail menu831

Click → enter the password to enter the detail menu, and click ↓ to select Bluetooth name.

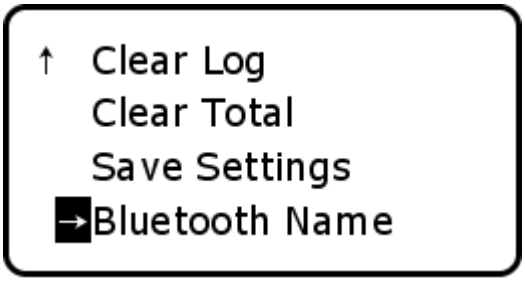


Figure 8 - 41 select Bluetooth name832

Click → to enter the Bluetooth name setting interface.

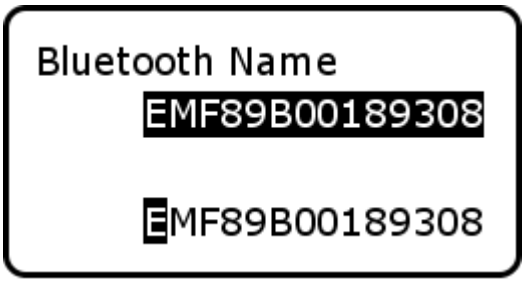


Figure 8 - 42 Bluetooth name setting interface833

The position of the anti black display is the selected number or letter. Click the → key to change the selected position.

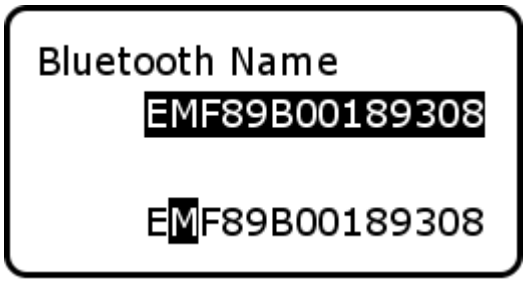


Figure 8 - 43 changing the selected position

Click the ↓ key to modify the selected numbers or letters. The modification range is numbers 0 ~ 9, capital letters a ~ Z, symbols ",", "-", "".

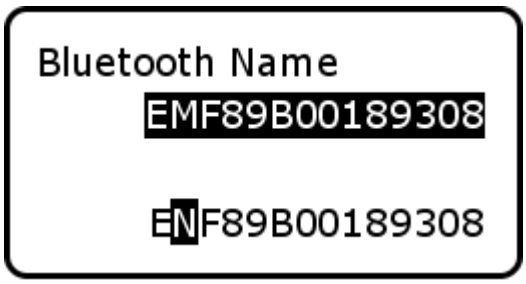


Figure 8 - 44 modify the selected numbers or letters834

Click ← to jump out of the confirmation screen.

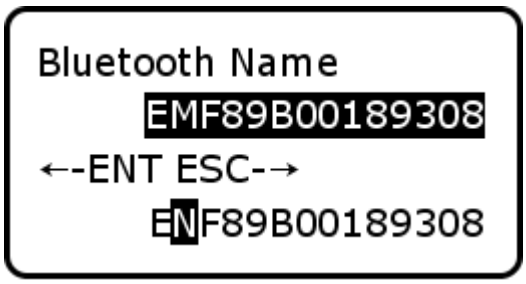


Figure 8 - 45 confirmation screen835

Click ← again to confirm the modification and exit, or click → cancel the modification and exit.

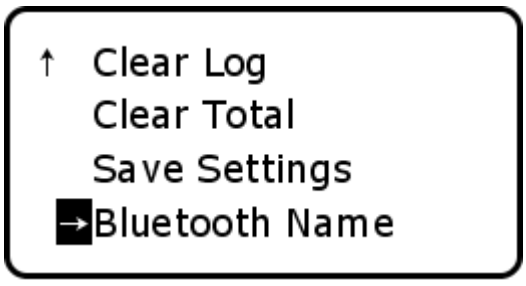


Figure 8 - 46 exit to the detail menu

9. Major function

9.1 Zero check and zero adjustment

9.1.1 Zero point check and meaning of "zero adjustment"

The electromotive force signal value when the pipe where the measuring tube is located is filled with medium and static is called the "zero value" or "zero point" of the instrument.

The so-called "zero adjustment" is to record the current zero value inside the instrument through the steps in 9.1.2, so that the measurement result of the instrument at the "0m/s" flow rate is set to "0". 0

After the instrument is put into operation, the measured value is unstable or has large error. Most of the reasons can be determined and solved through zero point inspection and "zero adjustment".

Check the "zero point" of the instrument to determine whether zero adjustment is required:

Close the pipe and confirm that the medium is full and static;

Turn off the small signal removal function, that is, set the small signal removal value to 0;

Calculate the current flow rate value and analyze it: (see Appendix E for flow rate calculation formula terms and terms)**Fel! Hittar inte referenskälla.**

1） 1) If the fluctuation range of flow rate exceeds 0.02m/s, the possible reasons are:

1 ① There is air in the pipe or bubbles pass through the measuring pipe;

2 ② Medium conductivity is less than 10μS/cm ;

3 ③ The instrument is not properly grounded;

4 ④ Improper cable laying;

5 ⑤ The medium corrodes the electrode material.

6 ⑥ Sensor failure

Please eliminate the above reasons. If the reasons are ②, ⑤, ⑥, please contact our company.

2） 2) On the premise of stable flow rate, if the average flow rate is ≥ +0.0025m/s or ≤ -0.0025m/s, the following situations may exist:

1 ① The pipeline has not been completely shut off or there is leakage;

2 ② Insufficient conditions during the last zero adjustment operation.

If the reason ① is not tenable, the instrument needs to be zeroed.

9.1.2 "Zero" step

Click → to enter the menu and select the calibration menu.

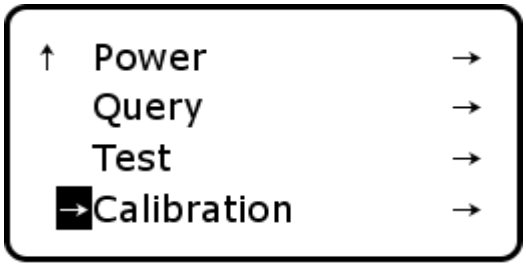


Figure 9 - 1 menu selection interface91

Select the zero trim option

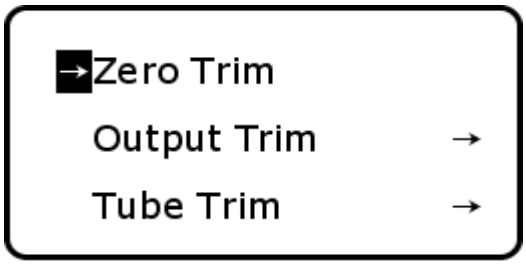


Figure 9 - 2calibration menu92

Click → to enter the setting interface, set the option to yes, and click ← twice to enter the zero setting confirmation interface

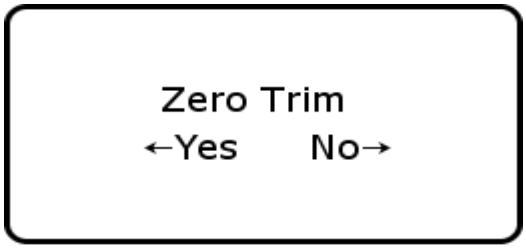


Figure 9 - 3 zero setting confirmation interface93

Click → return to the measurement interface, and click ← to start the instrument zeroing. The zeroing process lasts about 30 seconds. About 5 seconds after the start of zero adjustment, the zero adjustment value is displayed in the middle of the screen.

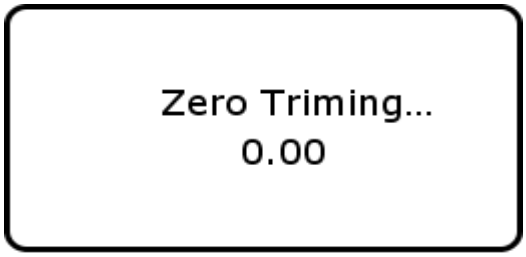


Figure 9 - 4 zero adjustment process interface94

Return after zero adjustment Calibration menu.

9.1.3"Zero adjustment" quick operation

Press ← and → in the measurement interface, release them at the same time, and quickly enter the zero setting confirmation interface.

9.2 Clearing accumulation and report clearing

Enter the details interface (see Appendix D for the entry method to enter the advanced setting state), click → enter the menu, and select the detail menu. **Fel! Hittar inte referenskälla.**

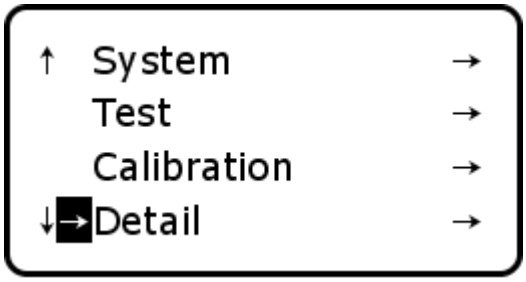


Figure 9 - 5 menu selection interface95

Select the clear total option to clear the accumulation, or select the clear log option to clear the report

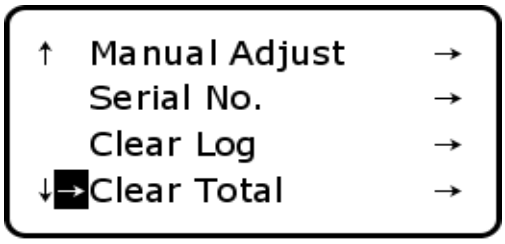


Figure 9 - 6detail menu96

Click → to enter the setting interface, set the option to yes, and click ← twice to clear it successfully

9.3 Report query

Enter the query menu.

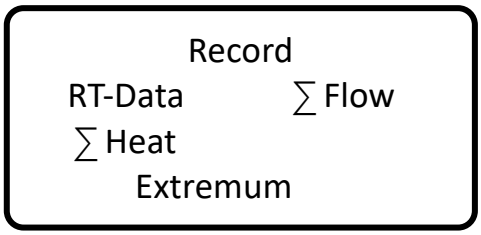


Figure 9 - 7 report main menu97

9.3.1RT data real-time record query

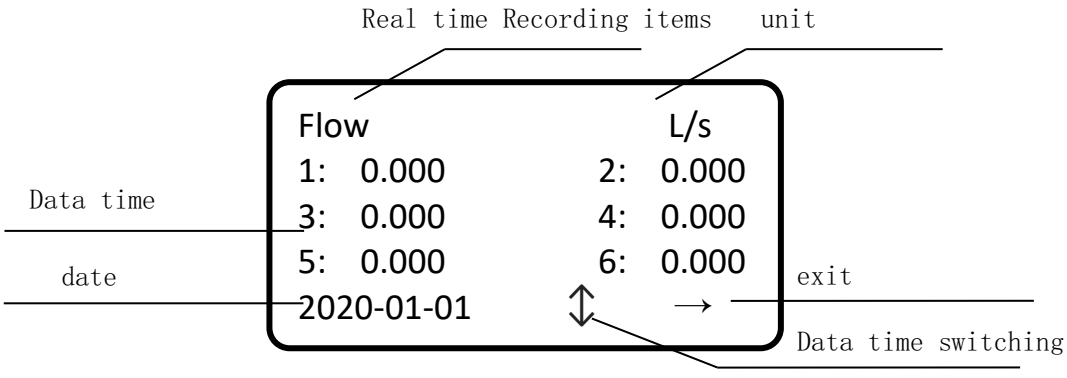


Figure 9 - 8 real time recording interface98

Press the → key to select the selected item, and the selected item will be displayed in the anti black form. Press the ↓ key to modify.

Real time recording items: options include instantaneous flow, power, inlet temperature temp.-in, outlet temperature temp.-out, and temperature difference temp.-diff.

□Unit: switch the unit of display data.

□Data time content: display the instantaneous value per hour.

□Date: each number can be selected separately and modified to query reports of

different dates.

□Data time switching: press the ↓ key to turn the page and display the instantaneous values at different times.

□Exit: press the ↓ key to return to the main page of report query.

9.3.2 Σ flow cumulative flow query

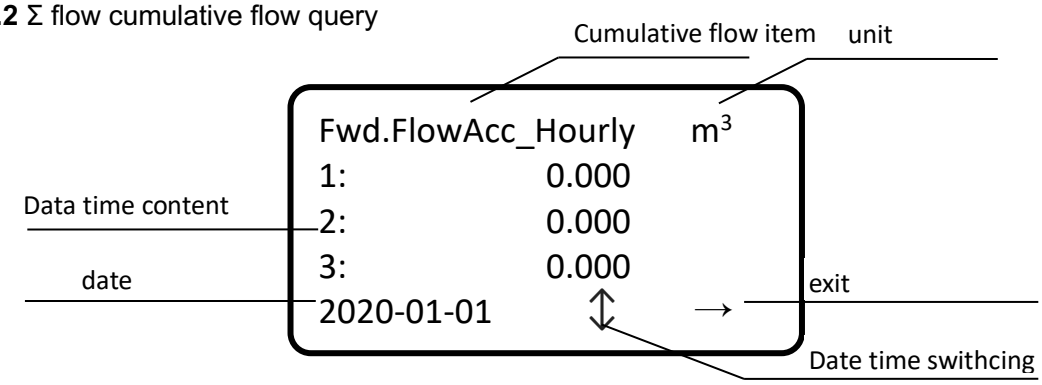


Figure 9 - 9 cumulative flow query interface99

Press the → key to select the selected item, and the selected item will be displayed in the anti black form. Press the ↓ key to modify.

□Cumulative flow item: if the option is positive, the cumulative value fwdFlowAcc_Hourly, cumulative value in reverse revFlowAcc_Hourly, positive daily cumulative value fwdFlowAcc_Daily, reverse daily cumulative value revFlowAcc_Daily, positive monthly cumulative value fwdFlowAcc_Monthly, reverse monthly cumulative value revFlowAcc_Monthly, positive annual cumulative value fwdFlowAcc_Yearly, reverse annual cumulative value revFlowAcc_Yearly.

□Unit: switch the unit of display data.

□Data time content: display the instantaneous value per hour.

□Date: each number can be selected separately and modified to query reports of different dates.

□Data time switching: press the ↓ key to turn the page and display the cumulative value of different times.

□Exit: press the ↓ key to return to the main page of report query.

1.1.2 9.3.3Σ energy cumulative heat query

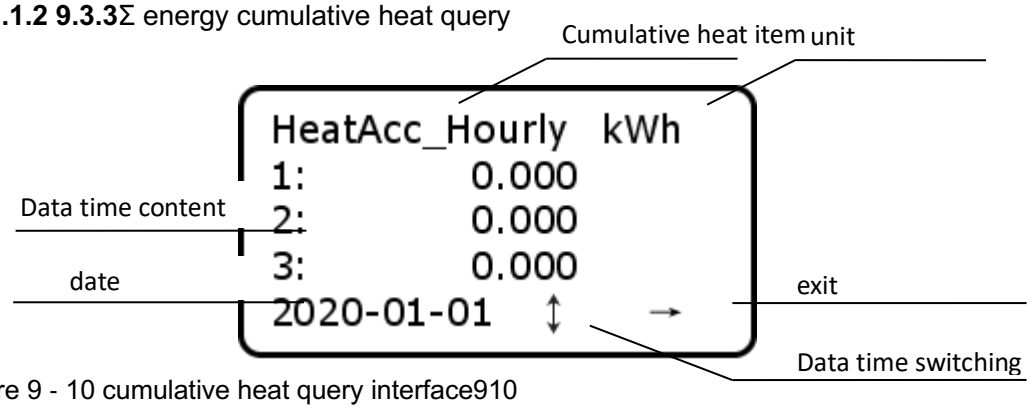


Figure 9 - 10 cumulative heat query interface910

Press the → key to select the selected item, and the selected item will be displayed in the anti black form. Press the ↓ key to modify.

Cumulative heat item: optional cumulative value heat ac with heat_Hourly, cumulative value of cooling capacity clodacc_Hourly, daily cumulative value of heat heatac_Daily, daily accumulated value of cooling capacity clodacc_Daily, monthly cumulative value of heat heatac_Monthly, monthly cumulative value of cooling capacity clodacc_Monthly, annual cumulative value of heat heatac_Yearly, annual cumulative value of cooling capacity clodacc_Yearly.

Unit: switch the unit of display data.

Date: each number can be selected separately and modified to query reports of different dates.

Data time switching: press the ↓ key to turn the page and display the cumulative value of different times.

Exit: press the ↓ key to return to the main page of report query.

9.3.4 Extreme extreme statistical query

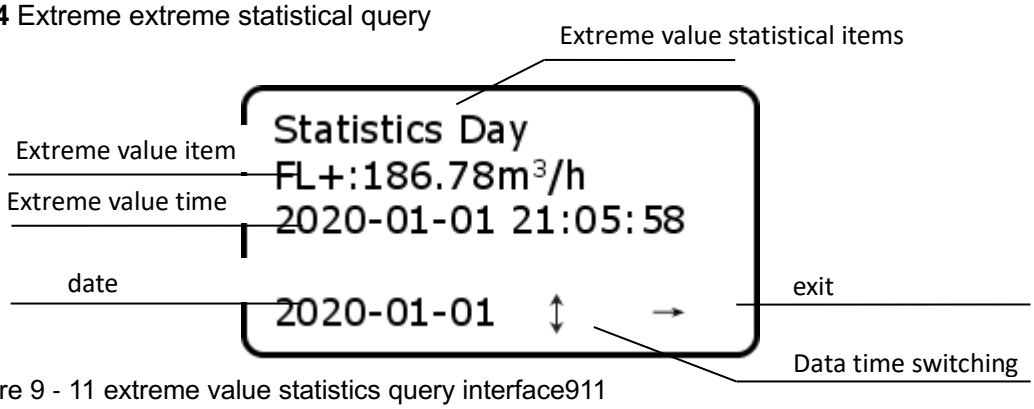


Figure 9 - 11 extreme value statistics query interface911

Press the → key to select the selected item, and the selected item will be displayed in the anti black form. Press the ↓ key to modify.

Extreme value statistical items: the options are daily extreme value statistics day, monthly extreme value statistics month, and annual extreme value statistics year.

Date: each number can be selected separately and modified to query reports of different dates.

Data time switching: press the ↓ key to turn the page and display the extreme value items at different times.

Exit: press the ↓ key to return to the main page of report query.

9.3.5 Shut power down record query

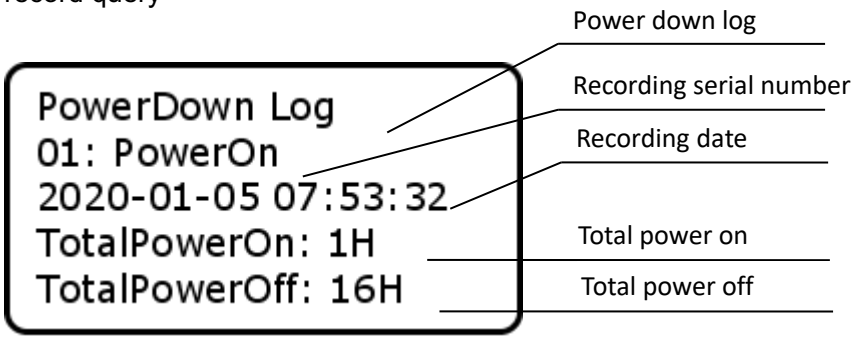


Figure 9 - 12 power failure record query interface912

Record serial number: provide up to 100 pieces of power on and power off information.

9.3.6 Alarm record query

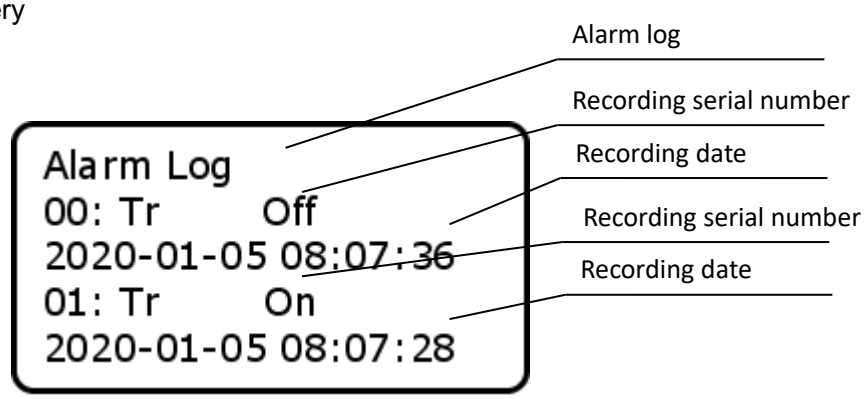


Figure 9 - 13 alarm record query interface913

Record serial number: provide up to 100 pieces of power on and power off information. OFF means over, ON means start.**Fel! Hittar inte referenskälla.**

9.4 Empty and full pipe functions

9.4.1 Significance of ATC function

The heat meter cannot work normally without medium, so it is necessary to judge whether the pipe is empty.

When the empty pipe alarm is abnormal (such as low medium conductivity), empty and full pipe calibration is required. See 9.4.3 for operation steps.

9.4.2 The use of ATC sensitivity

When it is impossible to calibrate the empty pipe, the sensitivity of the empty pipe can be modified to adjust the ability of the instrument to detect the empty pipe. The higher the sensitivity of ATC, the easier it is to be judged as ATC. When there is air in the pipe, it is necessary to set the sensitivity higher. When the sensitivity of empty pipe is 0, turn off the empty pipe detection function.

9.4.3 Empty pipe, full pipe calibration operation and empty pipe sensitivity setting

Click → to enter the menu and select the calibration menu.

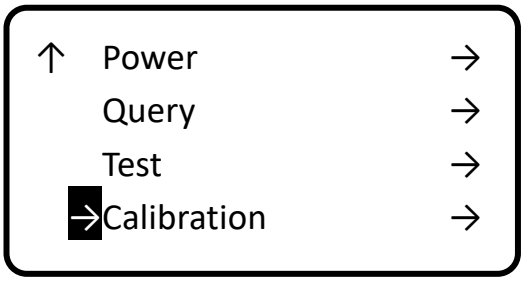


Figure 9 - 14 menu selection interface

Select the tube trim option

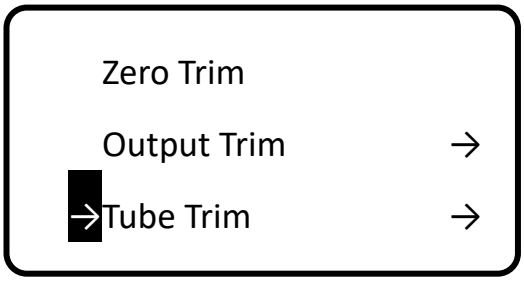


Figure 9 – 15calibration menu

Select empty trim option for empty pipe calibration, full trim option for full pipe calibration, and tube region option to set empty pipe sensitivity

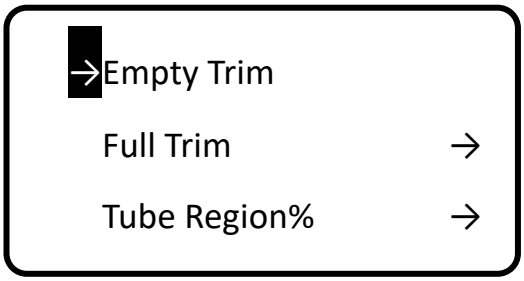


Figure 9 - 16tube trim menu

9.5 RS485 communication function (MODBUS-RTU)

9.5.1 RS485 communication parameter setting item (Modbus)

Table 9 - 1485 communication parameter setting items

Set item	Description	Options / value range	Default value	explain
Protocol	Communication protocol	MODBUS,BACNET	MODBUS	
Baud rate	Baud rate	1200,2400,4800,9600,19200,38400	9600	
Data Bit	Data bit	8	8	Fixed to 8.
Parity	Check bit	None,Odd,Even	None	
Stop Bit	Stop bit	1,2	1	Select 1 or 2 for no check and 1 for odd / even check
Dev Address	Device address	1~247	1	Decimal number.

9.5.2 Modbus communication parameters

Table 9 - 2modbus communication parameters

type	read	write	Parameter name	remarks	address	length
Int	0x03	0x06	Communication mode	0:MODBUS 2:BACNET	0x0019	0x0001
Int	0x03	0x06	flow to	0:FORWORD 2:Bid.	0x0017	0x0001

Int	0x03	0x06	Instantaneous flow unit	0x1C:m3/s 0x83:m3/m 0x13:m3/h 0X18:L/s 0X11:L/m 0X8A:L/h	0x0042	0x0001
Int	0x03	0x06	Power unit	0x7F:kW 0xF6:MW 0xF4:kJ/h 0x8D:MJ/h 0xF5:GJ/h 0xEA:cal/h 0xF8:kcal/h 0x8C:Mcal/h	0x062E	0x0001
long	0x03	0x10	Sensor number	0 ~ 9999999	0x0127	0x0002
float	0x03	0x10	Range FS	0.0001 ~ 99999	0x014B	0x0002
float	0x03	0x10	Maximum power	0.001 ~ 999999	0x0614	0x0002
Int	0x03	--	Total power on time hour		0x0501	0x0001
Int	0x03	--	Total power on time minute		0x0502	0x0001
Int	0x03	--	Total power on time second		0x0503	0x0001
Int	0x03	--	Alarm fault code	See Table 8 - 2 list of heat mode alarm codes	0x0504	0x0001
ulong	0x03	--	Positive cumulative flow high level	Fixed unit L	0x0201	0x0002
ulong	0x03	--	Low level of positive cumulative flow	Fixed unit L	0x0203	0x0002
ulong	0x03	--	Accumulated heat high level	Fixed unit wh	0x0205	0x0002
ulong	0x03	--	Accumulated heat low level	Fixed unit wh	0x0207	0x0002
ulong	0x03	--	Daily accumulated heat	Fixed unit wh	0x0209	0x0002
ulong	0x03	--	Monthly accumulated heat	Fixed unit wh	0x020B	0x0002
ulong	0x03	--	Annual accumulated heat	Fixed unit wh	0x020D	0x0002
ulong	0x03	--	Reverse cumulative flow high	Fixed unit L	0x020F	0x0002
ulong	0x03	--	Reverse cumulative flow low	Fixed unit L	0x0211	0x0002
ulong	0x03	--	Accumulated cooling capacity high level	Fixed unit wh	0x0213	0x0002
ulong	0x03	--	Low level of accumulated cooling capacity	Fixed unit wh	0x0215	0x0002

ulong	0x03	--	Daily accumulated cooling capacity	Fixed unit wh	0x0217	0x0002
ulong	0x03	--	Monthly accumulated cooling capacity	Fixed unit wh	0x0219	0x0002
ulong	0x03	--	Annual accumulated cooling capacity	Fixed unit wh	0x021B	0x0002
float	0x03	--	Instantaneous flow	Fixed unit m3/h	0x0401	0x0002
float	0x03	--	Water supply temperature	Fixed unit ℃	0x0403	0x0002
float	0x03	--	Return water temperature	Fixed unit ℃	0x0405	0x0002
float	0x03	--	Temperature difference (water supply return)	Fixed unit ℃	0x0407	0x0002
float	0x03	--	power	Fixed unit kw	0x0409	0x0002
float	0x03	--	Power (unsigned)	Fixed unit kw	0x040F	0x0002
float	0x03	--	Output current		0x040B	0x0002

9.5.3 Modbus communication example

Example 1: read the instantaneous flow value

Set the Modbus address as 1, check the communication parameter table, and the data address of the instantaneous flow value is 0x0401, the length is 0x0002, and the data type is float. Send the command as follows:

Table 9 - 3 example of sending data

Format meaning	send content
Modbus address	01
Function code	03
Data address	0400
length	0002
Check code	C5 3B

Received the following:

Table 9 - 4 examples of received data

Format meaning	Receive content
Modbus address	01
Function	03
Data length	04
Data content	C1 48 00 00
Check code	47 D9

The received instantaneous flow value is a four byte single precision number: C1 480000, which is converted into a fixed-point number in IEEE754 format as: -12.5, that is, the current instantaneous flow value is -12.5m³/h.

Example 2: read forward cumulative flow value

Set the Modbus address as 1, check the communication parameter table, and the data address of the high bit of the positive cumulative flow value is 0x0201, the length is 0x0002, and the data type is long. Send the command as follows:

Table 9 - 5 example of reading high-order transmission data

Format meaning	send content
Modbus address	01
Function code	03
Data address	0200
length	0002
Check code	C5 3B

Received the following:

Table 9 - 6 example of reading high-order received data

Format meaning	Receive content
Modbus address	01
Function	03
Data length	04
Data content	00 000002
Check code	7B F2

The data address of the low bit of the positive cumulative flow value is 0x0203, the length is 0x0002, and the data type is long. Send the command as follows:

Table 9 - 7 example of reading low order transmission data

Format meaning	send content
Modbus address	01
Function code	03
Data address	0202
length	0002
Check code	6473

Received the following:

Table 9 - 8 example of reading low order received data

Format meaning	Receive content
Modbus address	01
Function	03
Data length	04
Data content	4F CA 35 43
Check code	7B F2

The high-order data of the received positive cumulative flow value is 00 00 02, which is converted into a decimal number of 2; The data of the low order of the received positive cumulative flow value is 4f Ca 3543, which is converted into a decimal number of 1338651971; Therefore, the actual value of the positive cumulative flow value is 2*2^32 + 1338651971 = 9928586563 L.

9.6 RS485 communication function (bacnetms/tp)

9.6.1 RS485 communication parameter setting item (BACNET)

Table 9 - 9 485 communication parameter setting items

Set item	Description	Options / value range	Default value	explain
Protocol	Communication mode	MODBUS,BACNET	MODBUS	
Baudrate	Baud rate	1200,2400,4800,9600,19200,38400	9600	
DataBit	Data bit	8	8	Fixed to 8.
Parity	Verification method	None,Odd,Even	None	
StopBit	Stop bit	1,2	1	Select 1 or 2 for no check and 1 for odd / even check
MAC Address	MAC address	1 ~ 127	1	Decimal number.
Dev Address	Device address	0~4194303	0	Decimal number.

9.6.2 Object object

Table 9 - 10 BACnet objects

project	name	Description
AI-0	Flow	Instantaneous flow, m3/h
AI-1	Power	Power in kw
AI-2	Inlet temp	Inlet water temperature, unit ℃
AI-3	Exit temp	Outlet water temperature, unit ℃
AI-4	Diff temp	Temperature difference, in ℃
AI-5	FFAH	High level of cumulative value of positive flow, unit: l
AI-6	FFAL	Low level of cumulative value of positive flow, unit: l
AI-7	RFAH	High level of cumulative value of reverse flow, unit: l
AI-8	RFAL	Low level of cumulative value of reverse flow, unit: l
AI-9	FEAH	High value of accumulated heat, unit: wh
AI-10	FEAL	Low value of accumulated heat, unit: wh
AI-11	REAH	High level of accumulated cooling capacity, unit: wh
AI-12	REAL	Low level of accumulated cooling capacity, unit: wh
AI-13	Power(unsigned)	Power (unsigned number), in kw
BO-0	BO-0	Switch back to MODBUS mode

Table 9-11 cumulative flow unit

Flow Total unit	BACNET Enum
L	82

Table 9-12 instantaneous flow unit

Flow rate Unit	BACNET Enum
m3/h	135
m3/min	165
m3/s	85
L/h	136
L/m	86
L/s	87

Table 9 - 13 heat units

Power Total unit	BACNET Enum
KWh	19
MWh	146
KJ	17
MJ	126(Provisional)
GJ	126(Provisional)

Table 9 - 14 power units

Power rate Unit	BACNET Enum
KW	48
MW	49
kJ/h	17(Provisional)
MJ/h	126(Provisional)
GJ/h	126(Provisional)

Table 9 - 15 temperature units

Temp Unit	BACNET Enum
℃	62

10. Parameter list

10.1 Basic (basic parameter) setting item

Table 10 - 1Basic (basic parameters) setting items

Set item	Description	Options / value range	Default value	explain
PV Units	Flow unit	m3/s,m3/m,m3/h, L/s,L/m,L/h	m3/h	The instantaneous flow data is displayed after conversion according to this configuration.
Flow decimals	Flow decimal point	1,2,3	3	The decimal digits of the instantaneous flow data value are displayed according to this configuration, but if the integer digit is too long, the integer digit will be

10.2 System (system parameter) setting item

				displayed first, and the deci digits will be reduced according
Total Units	Cumulative flow unit	m3,L,mL	M3	The cumulative flow data displayed after convers according to this configuration.
Totalizer decimals	Cumulative decimal point	1,2,3	3	The decimal digits of the cumula flow data value are displa according to this configuration, if the integer digit is too long, integer digit will be displayed f and the decimal digits will reduced accordingly.
Power Units	Power unit	kW,MW,kJ/h,MJ/h ,GJ/h,cal/h,kcal/h, Mcal/h	KW	The power data is displayed a conversion according to configuration.
Power decimals	Power decimal point	1,2,3	3	The decimal digits of the po data value are displayed accor to this configuration, but if integer digit is too long, the inte digit will be displayed first, and decimal digits will be redu accordingly.
Energy decimals	Energy decimal point	1,2,3	3	The decimal digits of the heat value are displayed according this configuration, but if the inte digit is too long, the integer digit be displayed first, and the deci digits will be reduced according
Damping(s)	Flow damping time (s)	0 ~ 99	3	The flow display value is affecte the damping value. The greater damping, the slower and m stable the response is; The sma the damping, the faster response, but the more unstabl
T Damping(s)	Temperature damping time (s)	0 ~ 99	4	The temperature display valu affected by the damping value. greater the damping, the slo and more stable the respo is; The smaller the damping, faster the response, but the m unstable
User No.	User number	0 ~ 99999999	0	

Table 10 - 2System (system parameters) setting items (default password 0200)

Set item	Description	Options / value range	Default value	explain
New Password	New password	0 ~ 9999	0200	
Signal	Signal input			
Qmax	Scale flow (m3/h)	Change according to caliber setting	Change according to caliber setting	Range setting affects flow percentage, current output, etc. The unit is fixed as m3/h. The decimal point can be set by pressing ↓.
Low Cutoff%	Small signal removal (%)	0 ~ 9.9	1	It is used to calculate a threshold. When the traffic is less than this threshold, the traffic will be cut off. It

				is used to eliminate interference at low flow rate. The threshold value is calculated according to the range and small signal cut-off value.
Output	signal output			
Loop Out	Current output			
Loop	Current output	FLOW,POWER	POWER	When selecting power, you need to set the maximum power value.
Power Max	Upper power limit	0.001 ~ 999999	100	When the current output is configured as power, the maximum power setting affects the current output value. The unit is fixed as kW. The decimal point can be set by pressing ↓.
Pulse Out	Pulse output			
Pulse	Pulse output	FLOW,ENERGY,DIRECTION	FLOW	
Contact Mode	contact scheme	Normally On, Normally Off	NormallyOff	Normally open or closed state of pulse output.
Freq Max(Hz)	Upper frequency limit (Hz)	100 ~ 5000	2000	When the pulse equivalent is not 0, the maximum pulse is invalid. The decimal point can be set by pressing ↓.
Liter/Pulse	Pulse equivalent	0 ~ 999999	Change according to caliber setting	
Val/Pulse	Energy pulse equivalent	0 ~ 999999	Change according to caliber setting	
Pulse Width(ms)	Pulse width (MS)	200,100,50,20,10,50%	100	The inappropriate pulse width setting is automatically adjusted to 50%.
Communication	Communication output			See 9.5rs485 communication function (MODBUS-RTU) for details
Date(YY/MM/DD)	Date (month / day / year)			
Time(hh/mm/ss)	Time (H / min / s)			
Load Settings	Restore factory settings			Restore all configuration items to the factory configuration.

10.3Power setting item

Table 10 – 3power (heat parameter) setting items (default password 0030)

Set item	Description	Options / value range	Default value	explain
New Password	New password		0030	
Diff Temp Cutoff	Small temperature difference setting	0.0 ~ 3.0	1	The temperature difference less than the set value is regarded as 0.
Power Opt	Power Options	AUTO,COLD,HEAT	AUTO	Auto will automatically determine whether it is

				currently in heat or cold metering.
Pressure Opt	Pressure options	0.6MPa,1.6MPa	0.6MPa	Setting according to the actual working conditions will affect the heat calculation.

10.4 Query (report query)

See 9.3 report query for details.

10.5 Test

Table 10 - 4 test (default password 0004)

Set item	Description	Options / value range	Default value	explain
New Password	New password		0004	
Loop Test	Current output test			
4-20mA Test	4-20mA test	4~20		The set flow value will be output. The hardware needs to confirm that the output interface function is in the current output state.
Pulse Test	Pulse output test	1~5000		The set pulse value will be output. The hardware needs to confirm that the input / pulse output interface function is in the pulse output state.

10.6 Calibration

Table 10 - 5 calibration

Set item	Description	Options / value range	Default value	explain
Zero Trim	Zero calibration			The zeroing process lasts about 30 seconds.
Output Trim	Output calibration			
4mA Trim	4mA calibration	3 ~ 5	4	The hardware needs to confirm that the output interface function is in the current output state.
20mA Trim	20mA calibration	19 ~ 21	20	The hardware needs to confirm that the output interface function is in the current output state.
Tube Trim	Empty full tube calibration			
Empty Trim	Air traffic control calibration		2500	
Full Trim	Full tube calibration		250	Generally, re-calibration is required in low conductivity media. At the end of zero adjustment, the system will automatically conduct a full tube calibration.

Tube Region%	Sensitivity of air traffic control (%)	0 ~ 99	40	It is used to set the boundary between empty pipe and full pipe. The higher the sensitivity, the easier it is to judge as empty pipe. When there is air in the pipe, it is necessary to set the sensitivity higher. When the sensitivity is 0, turn off the empty pipe detection function.

10.7 Detail (other) setting item

Set item	Description	Options / value range	Default value	explain
New Password	New password		1111	
Flow Set	Flow setting			
Size(mm)	Diameter (mm)	1 ~ 9999	According to order requirements	Refers to the nominal diameter of the sensor. When the caliber changes, the range, flow pulse equivalent and heat pulse equivalent will change accordingly. See Appendix C comparison table of caliber change range equivalent for details
Sensor K	Sensor coefficient (KS)	0.01 ~ 99.99999	Calibrated before delivery	Only related to sensors. It corresponds to the sensor coefficient displayed on the sensor nameplate.
Zero K(mV)	Zero correction factor (MV)	-29.999 ~ 29.999	Calibrated before delivery	The zero point is compensated, and the converter calculates the actual zero point according to the sensor zero point and the zero compensation value.
Coil Freq(Hz)	Excitation frequency (Hz)	2、3.125、6.25	6.25	According to the performance adjustment of the sensor, the excitation frequency should be as high as possible under the condition that the zero point is not biased when the sensor is static with full tube.
Coil Current	Excitation current (a)	0.001 ~ 1.000	0.18	Please set according to the actual excitation current, otherwise the measurement data will be affected.
Power Freq(Hz)	Power frequency (Hz)	50Hz、60Hz	50Hz	
Direction	Measurement direction	Bid.、Pos.	Bid.	Select bid(bidirectional), the heat meter will measure the bidirectional flow and calculate the bidirectional accumulation; When pos. (positive) is selected, the calorimeter only measures the positive flow and calculates the positive accumulation.
Indication	Flow direction	FORWARD、BACKWARD	FORWARD	When selecting backward, the heat meter will exchange forward

				and reverse flow: the actual forward flow is displayed as reverse flow, the actual reverse flow is displayed as forward flow, and the cumulative amount is also calculated according to the displayed direction.
Power Set	Power setting			
Medium	medium	Water、Other	Water	When selecting water, the heat meter will calculate the heat according to the density and enthalpy of water at various temperatures. When other is selected, the calorimeter will use the density and enthalpy values set under the menus of density and heat C for heat calculation.
Density(g/cm³)	Density (g/cm³)	0.001 ~ 9.999	1.0	It can be set when selecting other in medium.
Heat C	Enthalpy	1.00 ~ 999.99	4.2	It can be set when selecting other in medium.
Temp Trim	Temperature calibration	NO、Tin-1000、Tin-1500、Tout-1000、Tout-1500、Tio-1000、Tio-1500	No	Options other than no will be subject to corresponding temperature calibration.
Tin Revise	Temperature compensation	-3.0 ~ +3.0	0	Compensate the water supply temperature.
Tout Revise	Temperature return compensation	-3.0 ~ +3.0	0	Compensate the return water temperature.
Manual Adjust	Calibration parameters			
Actual Zero(mV)	Zero calibration value (MV)	-99.99 ~ +99.99	0	When the sensor is full, the zero point obtained by adjusting the zero point in the static state of the medium has generally been adjusted before leaving the factory.
Empty Freq(mV)	Air traffic control frequency (Hz)	0 ~ 9999	Automatic writing during ATC calibration	The frequency value when the sensor is empty. It is used to judge the empty and full pipe state.
Full Freq(mV)	Full tube frequency (Hz)	0 ~ 9999	Automatic writing when full tube calibration	Frequency value when the sensor is full. It is used to judge the empty and full pipe state.
Sensor No.	Sensor number		Number shown on the sensor nameplate	
Serial No.	serial number	0 ~ 99999999	0	
Clear Log	Clear log			Clear all logs. It is recommended to clear the log after setting the date or time.

Clear Total	Clear accumulation			Clear the accumulated value of flow and heat.
Save Settings	Save factory parameters			Save the current settings as factory settings.
Bluetooth Name	Bluetooth name			This name will be displayed when the mobile app searches Bluetooth.
Bluetooth PW	Bluetooth password		0000	The password that needs to be entered when the mobile app connects to Bluetooth.

Table 10 - 6 detail (other) setting items (the default password is 1111, and you need to enter the advanced setting state first. See Appendix D for the entry method to enter the advanced setting state)

10.8 Special setting item

Table 10 - 7sepcial (special) setting items (the default password is 8365, and you need to enter the advanced setting state first. See Appendix D for the entry method to enter the advanced setting state)

Set item	Description	Options / value range	Explain
Convector	Converter coefficient (KC)	0.01 ~ 99.99999	The converter coefficient is generally set before leaving the factory. Used for instantaneous quantity calculation.
Coil Test	Excitation test	OFF,X->Y,Y->X	The default is off. X->y and y->x are generally used to measure the excitation current.
Trim Value	Calibration value		
Output 4mA Value	Output 4mA current calibration value		Used to calibrate 4mA current output. After entering the menu, the current port will output 4mA current. At this time, input the actual output current value to automatically calibrate the 4mA output value.
Output 20mA Value	Output 20mA current calibration value		Used to calibrate 20mA current output. After entering the menu, the current port will output 20mA current. At this time, input the actual output current value to automatically calibrate the 20mA output value.
Tin 1000 Value	TS 1000 calibration value		It is used to calibrate the temperature supply 1000 Ω resistance. Connect the standard 1000 Ω resistance to the temperature supply port, and set the actual displayed temperature to automatically calibrate the input value of the 1000 Ω resistance.
Tin 1500 Value	TS 1500 calibration value		Used to calibrate the temperature supply 1500 Ω resistance. Connect the standard 1500 Ω resistance to the temperature supply port, and set the actual displayed temperature to

			automatically calibrate the input value of the 1500 Ω resistance.
Tout 1000 Value	TR 1000 calibration value		Used to calibrate the temperature return 1000 Ω resistance. Connect the standard 1000 Ω resistance to the temperature return port, and set the actual displayed temperature to automatically calibrate the input value of the 1000 Ω temperature return resistance.
Tout 1500 Value	TR 1500 calibration value		Used to calibrate the temperature return 1500 Ω resistance. Connect the standard 1500 Ω resistance to the temperature return port, and set the actual displayed temperature to automatically calibrate the input value of the 1500 Ω temperature return resistance.
Function	Instrument function	FLOW POWER	Used to set the current instrument mode.
Reset Password	Password Reset		Reset the password of all interfaces to the default value.

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