FvLuoky FLOW

Electromagnetic flowmeter

FMF90 Series

User Manual

FY/JC 30 A / O 15/03 V 1.9

FuYi Intelligent Instrument (Shanghai) Co., Ltd.

CONTENT

1、Forwrd

1.1 Safety Tips

● The installation and wiring of the electromagnetic flowmeter must be completed by professional technicians;

● The terminals and connecting wires of the instrument must be inserted and removed after the power is cut off;

● When measuring high temperature fluid, the sensor case will become very hot, beware of burns;

● When the instrument is detached from a toxic or corrosive medium, the operator must avoid contact with the medium or inhale residual gas. After removal, the residual media in the sensor should be cleaned.

The contents of this manual must be observed at all stages of product operation to maintenance, especially with the following logo

 **Warning: Indicates a hazard that could result in personal injury and death**

 **Note: Indicates a hazard that may result in partial and overall damage to the instrument.**

 **Prohibited: Indicates that the meter will not work properly or be damaged.**

 **Important: Arouse attention to the operator to avoid damage to the instrument.**

 **Note: Information that the meter operation and features must know.**

1.2 Disclaimer

The following conditions are not product liability:

(1) Damage caused by customer negligence or lack of maintenance of the product.

(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 repairs or modifications made by authorized personnel of the company.

(5) The Company shall not be liable for any injury to the customer or a third party when using the product and if the injury is caused by an unpredictable defect of the product.

2、Acceptance inspection&Storage

2.1 Open box to check

When the product is out of the box, please check the goods in time.

（1）Appearance

The instrument has been carefully inspected before leaving the factory. If it is damaged during transportation

(Please pay attention to the lining and outer casing) Please contact us.

（2）Name plate

Check whether the product is consistent with the order requirement according to the nameplate content, see 4.4

（3）Accessories

Check whether the accessories in the package 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 meter must be stored in the original box and stored.
- ●The storage location must be dry and free of vibration. The ambient temperature is suitable.

2.3 Transpor

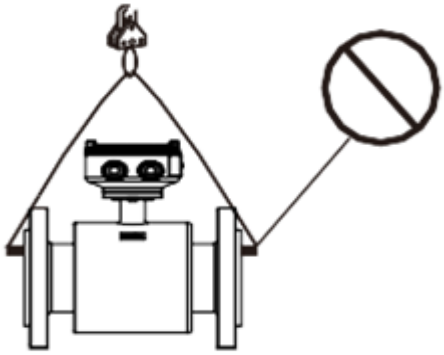
Carefully handle all parts to prevent damage, please transport the meter to the installation site in the original box. The PTFE-lined sensor is equipped with protective covers on both sides to prevent mechanical damage and slack deformation of the lining sealing surface. Please remove only in front of the meter access pipe.

Important

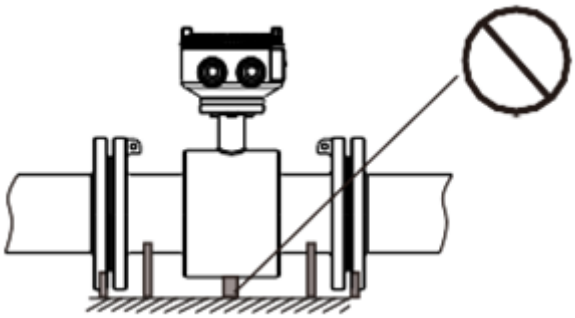
- ●Damage to the lining will cause the sensor to be scrapped。
- ●Since the cable is not properly selected (see 7.1), if the cable gland or instrument cover is not tightened, the product may be scrapped due to water or moisture into the instrument case.

⚠Caution

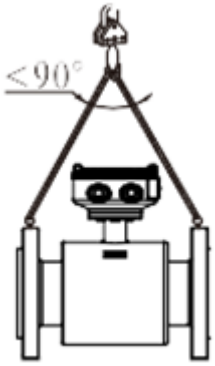
The lining is easily damaged during shipment. Do not put anything like rope, stick, etc. for easy handling.Passing through the measuring tube, the pair may otherwise cause damage to the lining.



The outer casing must be protected from external impact, heavy pressure or load bearing. The inner casing and electrode may be damaged after the sensor casing is recessed, making the product unrepairable.



Lifting correctly



Supportive consciousness

3、 product description

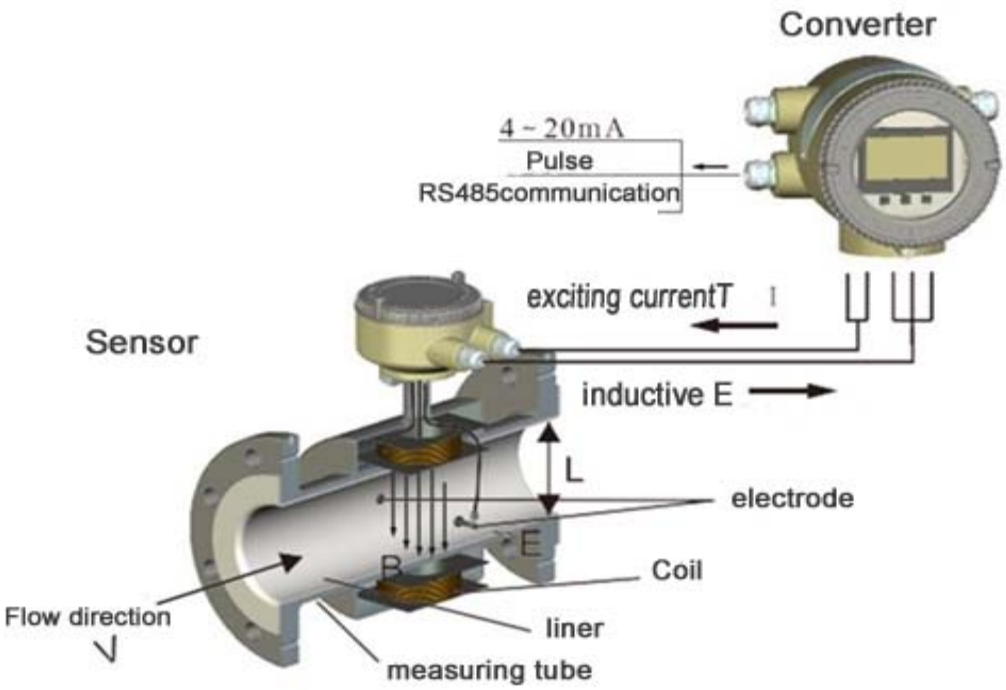
3.1 Working principle

The electromagnetic flowmeter is a product for measuring the flow rate of conductive liquid in a circular pipe, and its working principle is based on Faraday's law of electromagnetic induction

When the conductor moves in the magnetic field and cuts the line of force, the two ends of the conductor will generate an induced electromotive force perpendicular to the direction of motion and the direction of the magnetic field. The electromotive force (E) is proportional to the speed of motion of the conductor (V), ie E=BLV (B magnetic field strength, L is the length of the conductor)

After the excitation current drives the coil, a magnetic field is formed in the measuring pipe. When the medium cuts the magnetic line along the measuring flow, the induced electromotive force generated is transmitted to the converter through the two electrodes on the inner wall of the measuring tube for signal processing and budget, that is, obtained. Measured flow value.

The measured flow data is displayed on the display and output in the form of 4-20 mA, pulse, field bus (RS485), etc.。



Schematic diagram

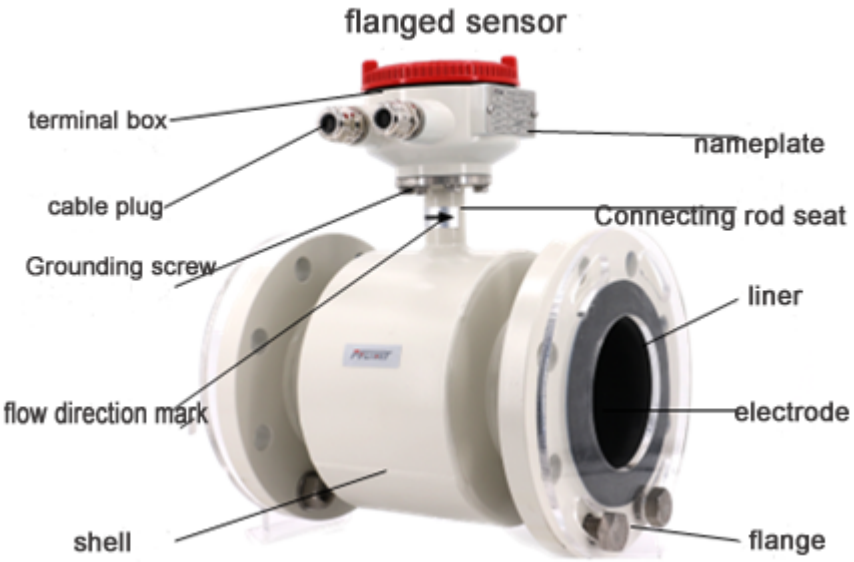
3.2 Product Structure

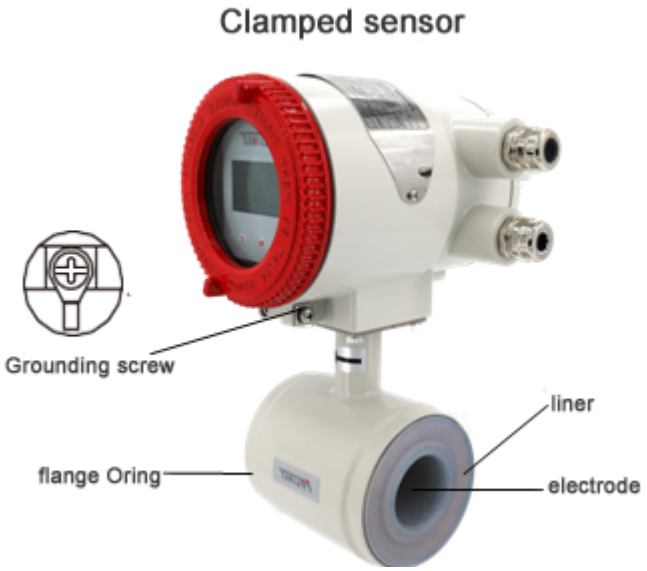
The electromagnetic flowmeter consists of a sensor and a converter.

3.2.1 Sensor

(1) Basic structure of the sensor

The sensor consists of a measuring tube with an insulated lining, a coil, an electrode and a housing. The connection between the sensor and the pipe is in the form of flange connection and flange clamping.





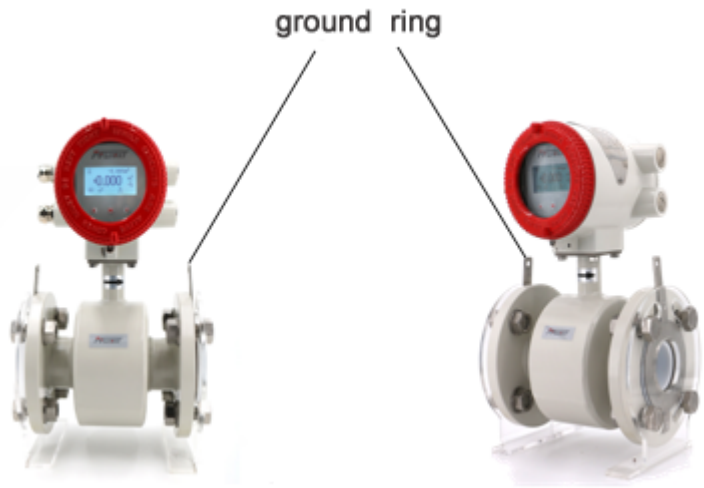
(2) Grounding element

Medium grounding is one of the necessary conditions for the normal operation of the electromagnetic flowmeter. When the sensor is installed in a metal pipe, the medium can be directly grounded through the pipe itself. When installing the insulated pipe, it needs to be grounded through a grounding ring or a grounding electrode. See Chapter 6, "Grounding".

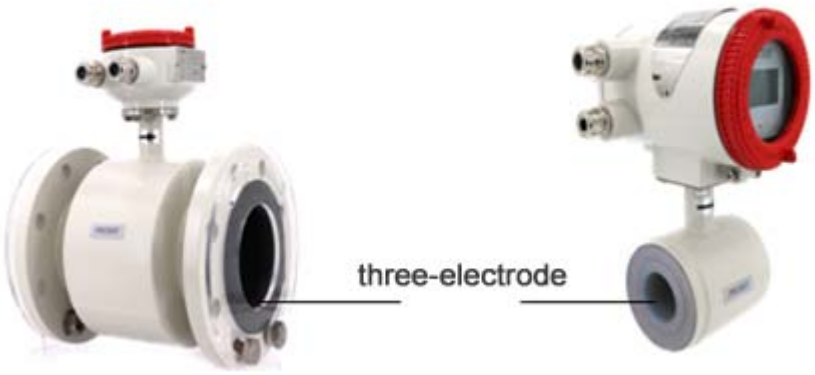
The grounding ring is made of stainless steel 304, 316L, Hastelloy C, and the grounding electrode is made of 316L, Hastelloy C, tantalum, platinum, etc.

The ground electrode is mounted on the sensor, referred to as the "three-electrode sensor".

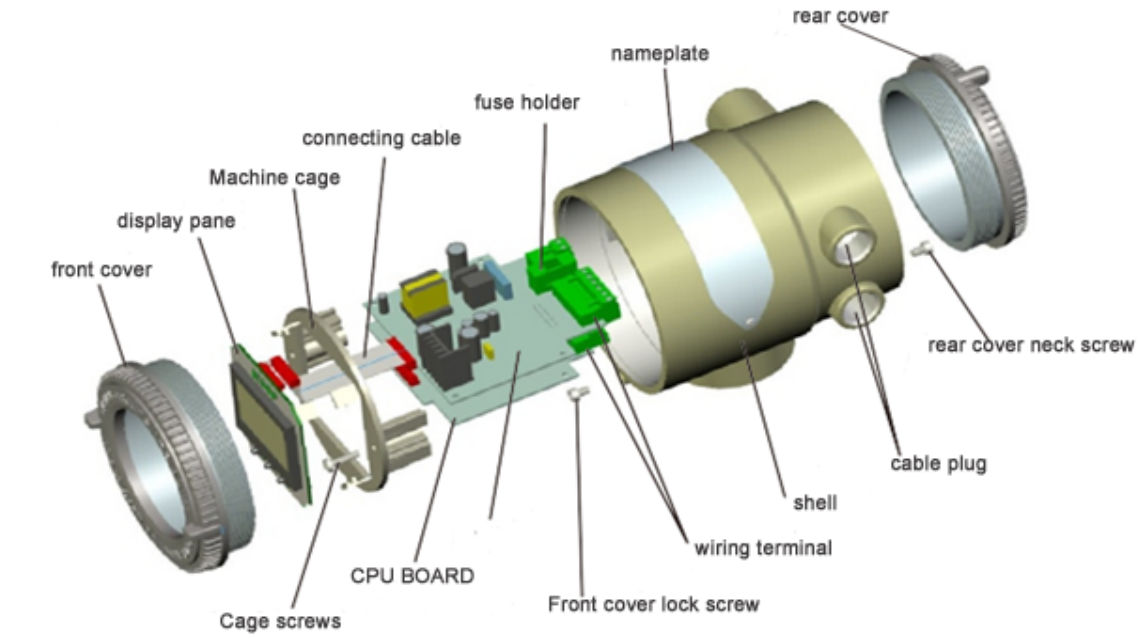
a) Grounding ring

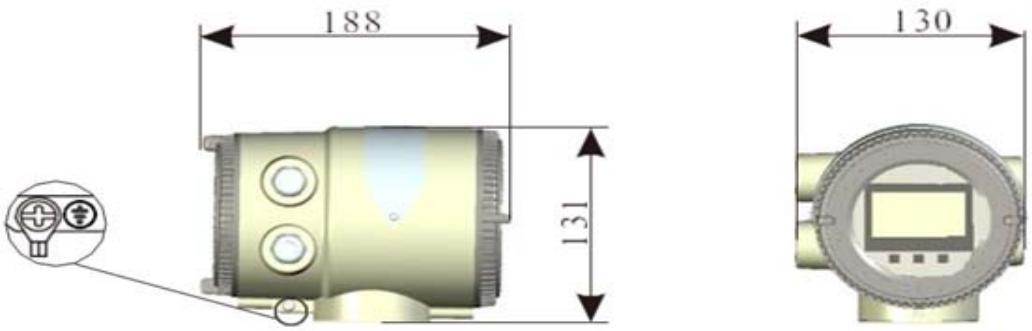


b) Three-e senso



3.2.2 Converter





Annotation

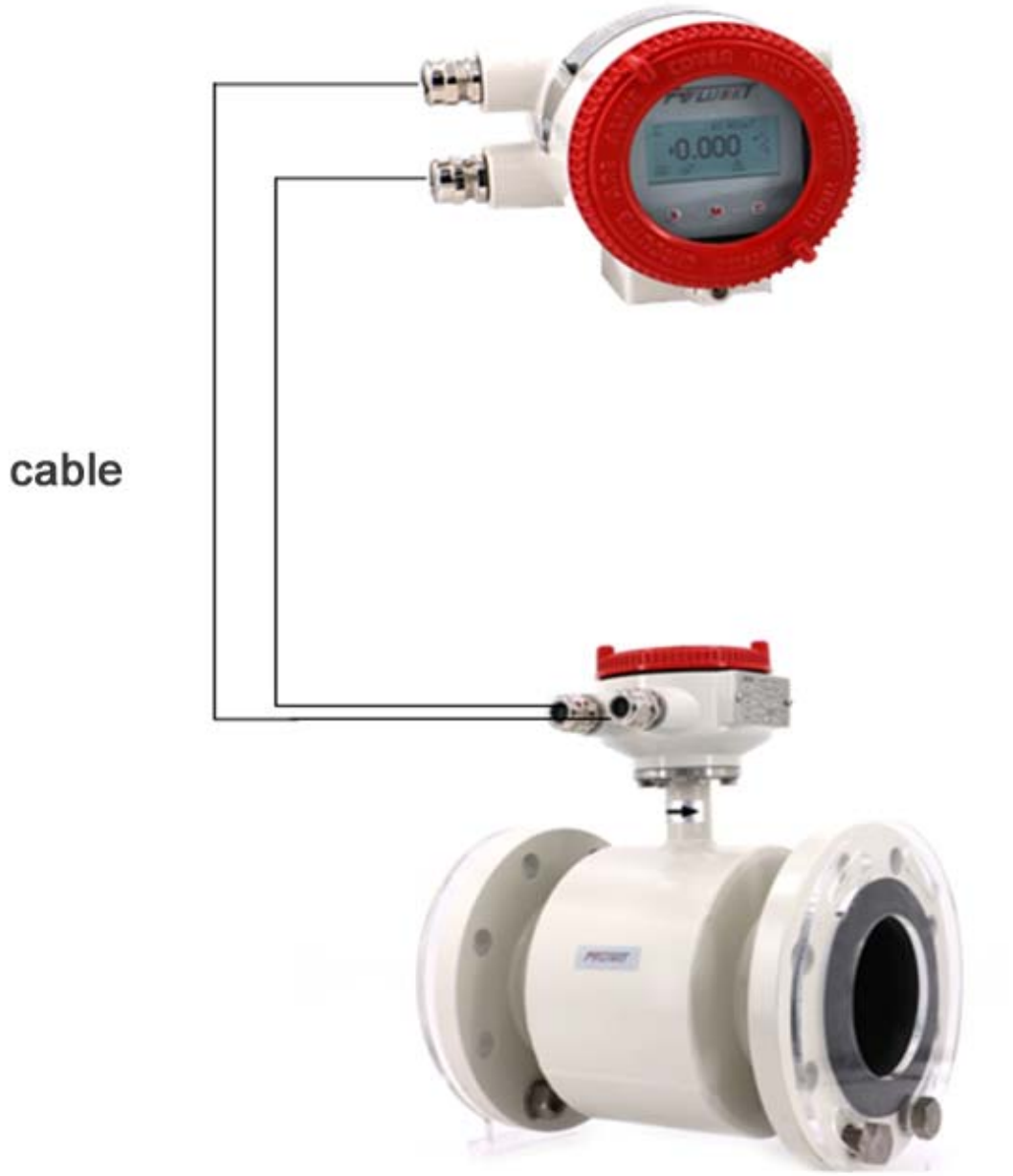
（1）Before and after the instrument is grounded, the cover should be tightened. Method: Loosen the locking screw counterclockwise with an Allen key until the screw is in contact with the cover and continue to screw 1/2 turn (the torque may cause the screw to slip). Make sure that the cover cannot be turned by hand. When the cover needs to be opened, first screw it into the cover with the Allen key and screw it into the cover.

（2） Pull out the grounding terminal and the grounding wire of the instrument to remove the cage fixing screw, and push the tail of the circuit board forward to push the instrument movement out.

3.2.3 Split electromagnetic flowmeter

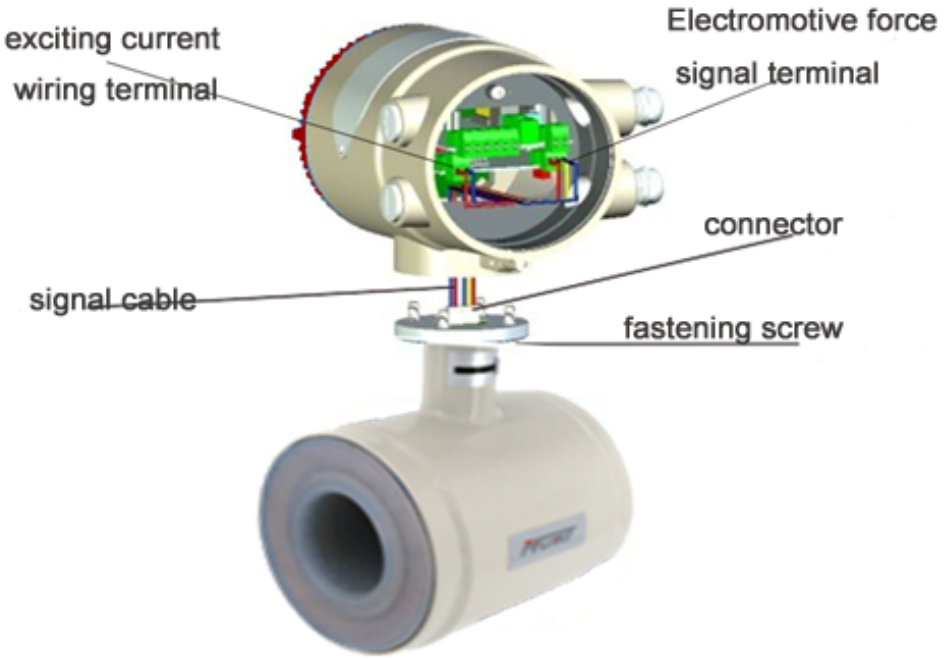
The converter and sensor are independently installed in the form of product structure.

Electrical connection is achieved through signal cables and excitation cables.



3.2.4 Integrated electromagnetic flowmeter

The converter is assembled with the sensor,Internal electrical connections have been made at the factory.



Note:Very important

Please do not pull the signal line when pulling the terminal to avoid the loose plug.

4 Technology data

4.1 Basic parameter

(1) Application : Conductive liquid, liquid solid two phase flow

The conductivity of the medium should be no less than 5 MB S/cm

(2) Range of measured velocities 0-12m/s

(3) Accuracy (class) 0.5. 0.3. 0.2.

(4) Correct and two-way flow measurement function

4.2 Converter

4.2.1 Display

(1) 128*64 Full lattice liquid crystal display

(2) Language:Chinese English

(3) Flow/flow rate display unit

M^3/h , % L/h , t/h kg/h GPH, GPM L/min m^3/min m/s

4.2.2 Output signal

(1) Current output (optional with HART protocol)

4-20mA DC ((load resistance: biggest 500 Ω))

(2) PIO signal interface

The parameters can be defined as pulse output, state output/alarm output, and contact point signal input

a) Passive pulse output

Transistor contact capacity: 30 V DC (on), 200 mA on

Output frequency: 0.0001-5000hz (pulse/second)

A scaled pulse can be output by setting the pulse equivalent

Pulse width: 50% duty ratio or fixed value (no. 200ms)

b) Active pulse output

Outout Voltage：15 VDC ±20%, current：≦150 mA

pulse frequency：0.0001-2 Hz

pulse width：≦200 ms （Stable：100 ms ）

c ）Status/alarm output

Transistor contact output, contact capacity: 30 V DC (on), 200 mA (on)

b ）tate input (passive contact, load resistance: ≦ 200 Ω when closed, disconnected Ω ≧ 100 K)

（3）RS485 output

Parameter Settings can be defined as MODBUS.BACNET and other protocol methods。

4.2.3 Power Supply 0：DC 24V（-15%+20%）

1：AC 220V(-15%+10%)，48~62Hz

2：DC100-240V，48-62Hz

4.2.4 Ambient Temperature -10℃~60℃（Ac power supply）

-10℃~50℃（DC power supply）

4.2.5 Protection Level IP67

4.2.6 Cable plug M20*1.5、G1/2'

4.2.7 terminal blocks Plug and pull connector (wiring diameter 0.3-1.5mm)

4.2.8 Shell Casting aluminum alloy, surface coating pure polyester plastic powder

4.3 Sensor

4.3.1 Size（mm）

（1）Flanged sensor

Line	Size Unit：mm	
	Normal type	high precision
PTFE	10-1600	10-300
N E	50-2000	
FEP	10-500	10-300
P U	50-500	25-125

（2） Clamping sensor

The caliber is selected according to the following specifications：

25.32.40.50.65.80.100.125.150.200.250.300。

4.3.2 The electrode material

SUS316L hastelloy C Titanium ,tantalum, platinum。

4.3.3 Line material

PTFE Polyurethane. Neoprene. Polyperfluoroethylene propylene. Soluble tetrafluoroethylene。

4.4.4 Meidum Temperature

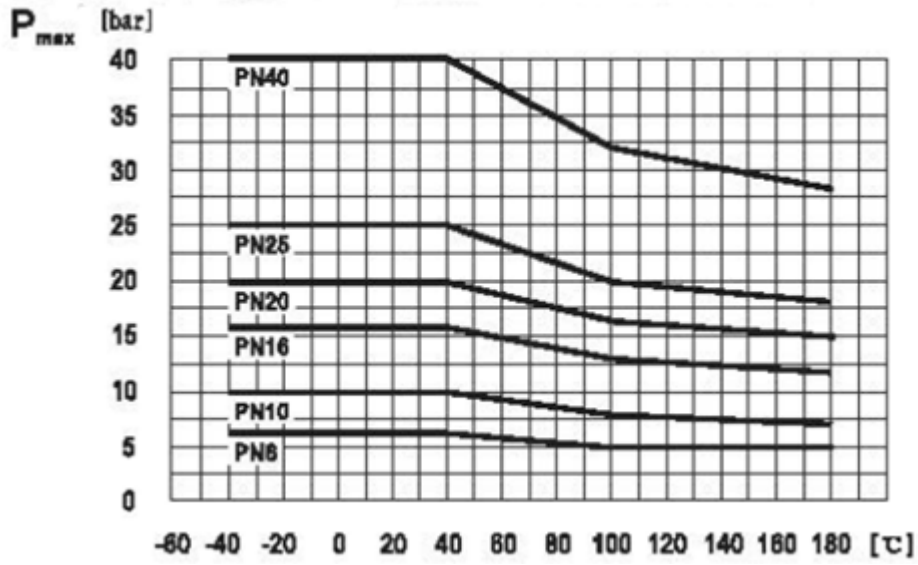
It is related to the temperature resistance of lining materials，PTFE and PFA：-40℃~-180℃、FEP：-40℃~-140℃.PU&NE：-30℃~-80℃。

4.3.5 Presure level (Pmax **Unit：MPa)**

Flange standard applicable to the pressure rating of the instrument

P_{max}	flange standard
0.6	DIN PN6 / JIS 10K / ANSI CLASS 150
1.0	DIN PN10 / JIS 10K / ANSI CLASS 150
1.6	DIN PN16 / JIS 20K / ANSI CLASS 150 /ANSI CLASS 300
2.0	DIN PN25 / JIS 20K / ANSI CLASS 150 /ANSI CLASS 300
2.5	DIN PN25 / ANSI CLASS 300
4.0	DIN PN40 / ANSI CLASS 300

flowmeter size and default pressure tolerance level, flanged standard table



flowmeter size and default pressure tolerance level, flanged standard table

size	Dielectric Strength	flange standard	illustrate
3－80	4.0	PN40	connected size PN10、PN16、PN25
100～150	1.6	PN16	connected size PN10
200－1000	1.0	PN10	

4.3.6 Protection grade

IP65 IP67 IP68

4.3.7 Terminal box

（1） Cable connection port m20*1.5、G1/2'

（2） The shell is cast aluminum alloy, the surface coating pure polyester plastic powde

5 Installation

lote

1. There should be enough operating space around the instrument installation location for easy maintenance and repair.

2. Avoid areas vulnerable to lightning strikes or possible flooding and rain showers;

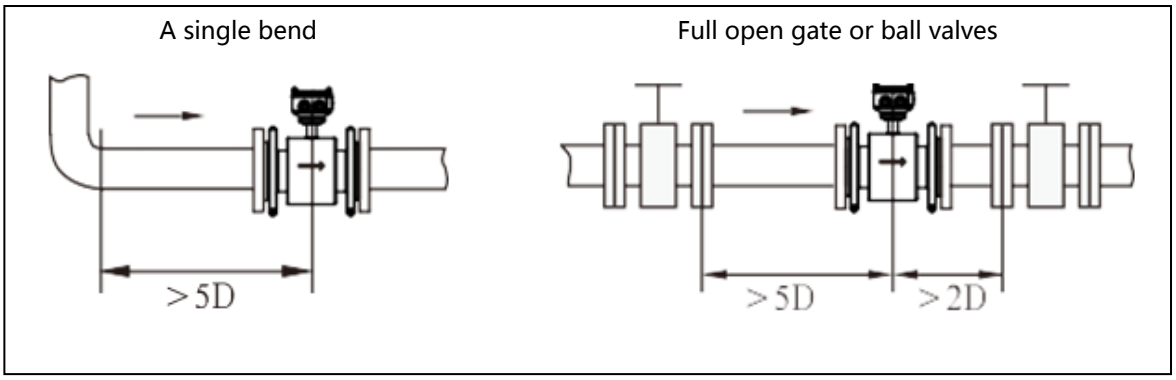
3. Avoid installation in the environment of overheating, direct sunlight and vulnerable to corrosion. If the pipe temperature is higher, measures should be taken to ensure that the working environment temperature of the converter meets the requirements of 4.2.4

4. Choose places where the pipe is vibration-free or vibration-free

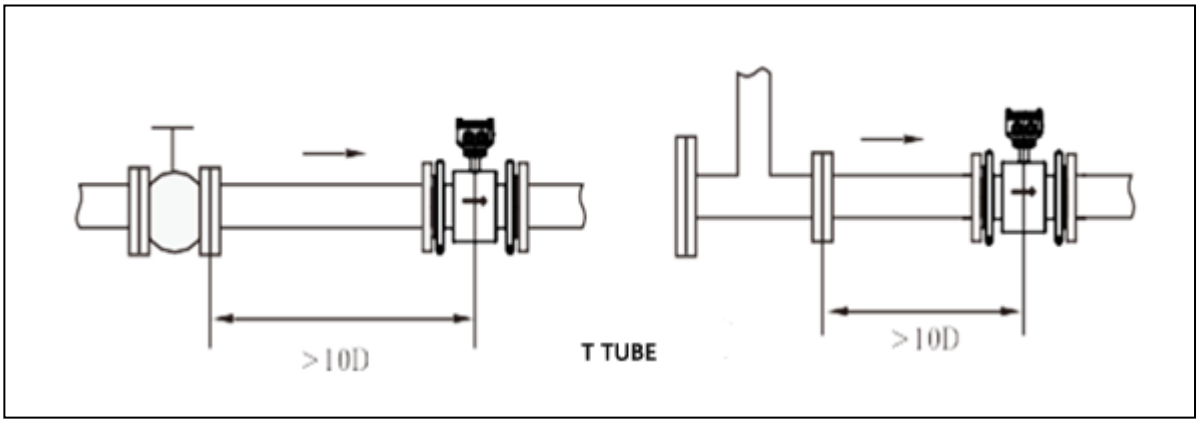
5.1 Sensor mounting position selection

(1) The upstream and downstream straight pipe shall be of sufficient length

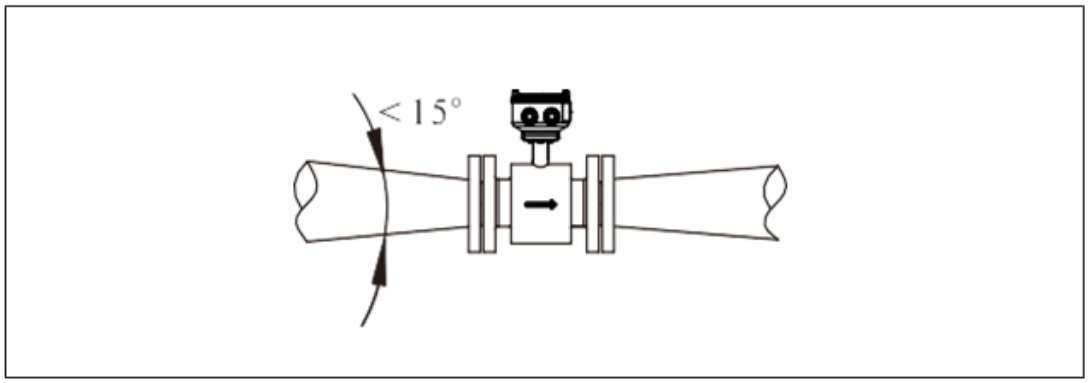
a) The minimum length allowed for the straight pipe section upstream of the sensor is 5D, and the downstream is 2D (D is the pipe diameter)



b) When there is a spoiler component upstream (such as a half-open valve, regulating valve, shut-off valve, etc.), the length of the straight pipe should be lengthened.

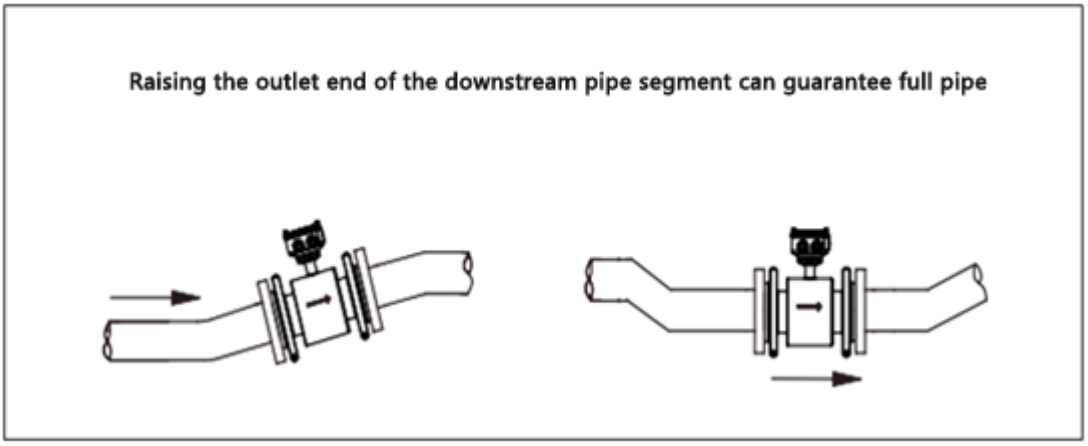


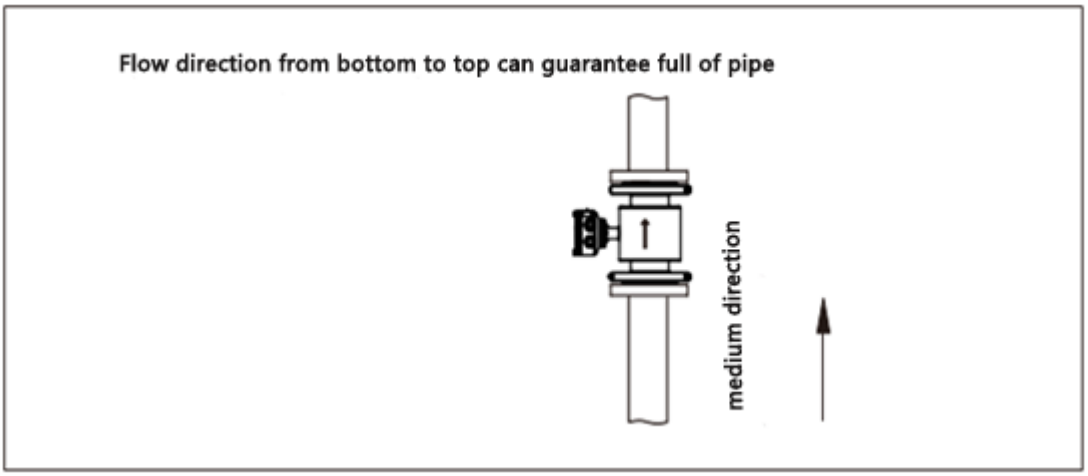
c) A tapered tube with a taper of less than 15° is installed as a straight tube when measuring the upstream and downstream sides.



(2) The sensor should be installed in a section filled with media

In the case of non-full tube, the electromagnetic flowmeter will have serious measurement error or the measurement value will not be displayed normally.

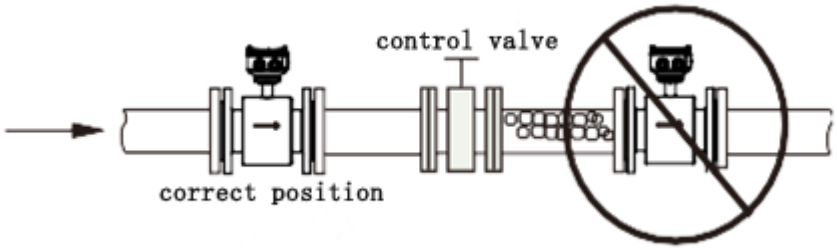




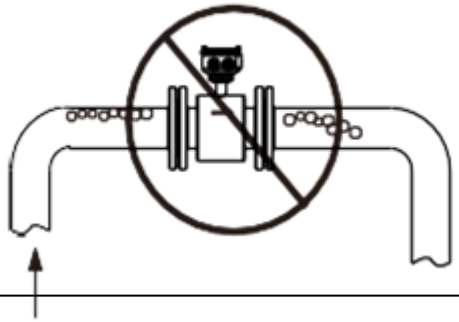
(3) It should be ensured that the measuring tube installation position does not generate or accumulate air bubbles

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

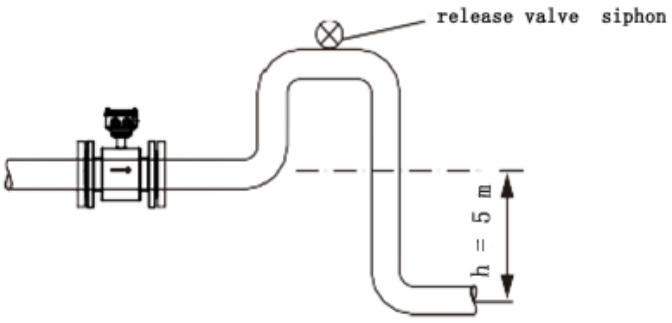
Air bubbles are easy to form downstream of control valve



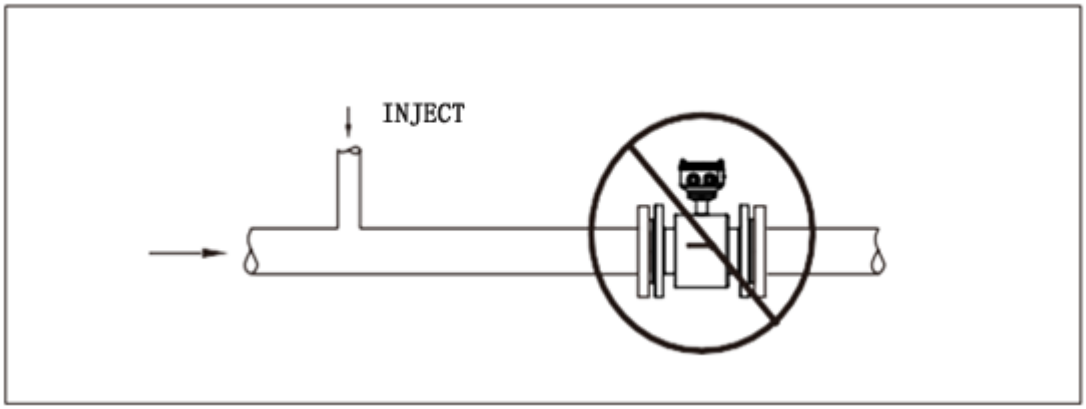
Exit down the pipe, the highest point easy to accumulate air bubbles



In a down pipe longer than 5 meters, air pockets are generated due to system pressure drop and siphon or discharge valve should be installed downstream of the sensor



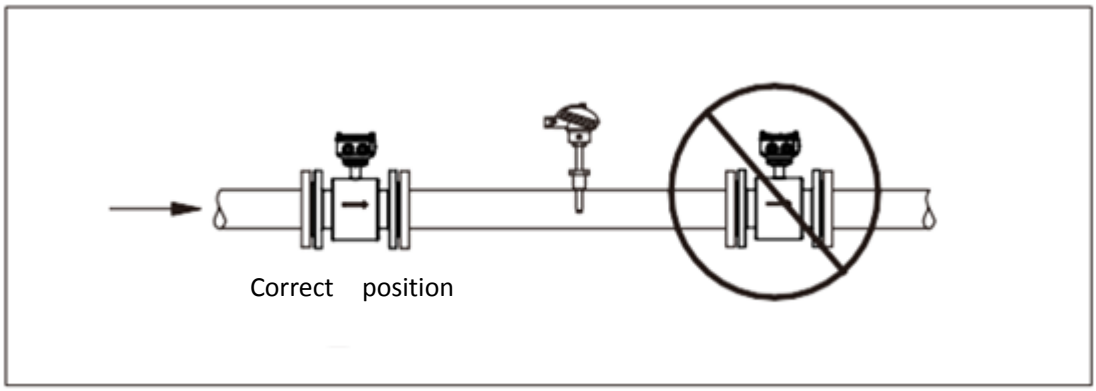
(4) The conductivity of the fluid remains stable in the pipe section where the measuring tube is located



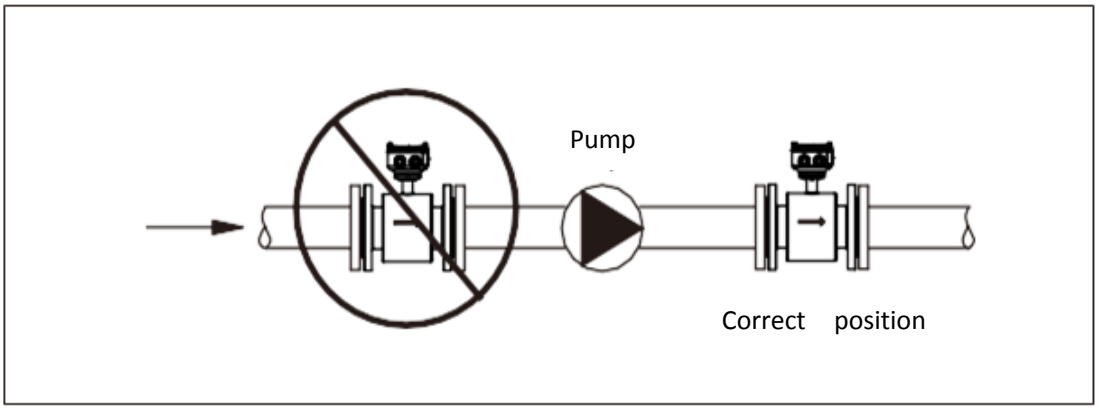
Note

In the case of chemical injection upstream, the fluid conductivity may fluctuate drastically, which may affect the normal operation of the flowmeter. In order to avoid this situation, it is recommended to change the injection port of the chemical substance to the downstream side of the flow meter. If it is necessary to inject from the upstream side, a sufficient distance (above 50D) should be ensured to ensure that the fluid is thoroughly mixed with the injected material.

(5) Pipe segments near the upstream side of the sensor are not allowed to have protrusions



(6) The flowmeter is not allowed to be installed in a negative pressure pipe such as the suction side of the pump.



5.2 Installation instructions

（1）The pipe flange for installing the flowmeter should be welded before the instrument is in place, and the instrument is prohibited from being placed.

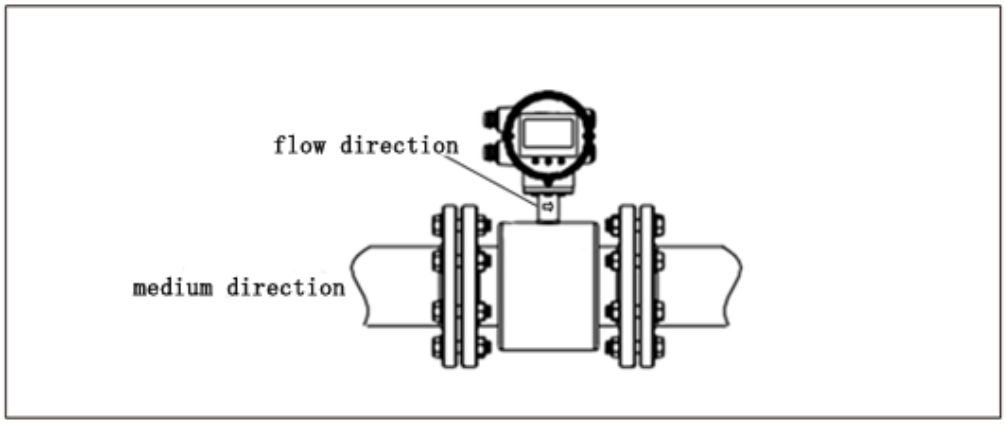
Conduct welding operation; after the instrument is installed, other parts of the pipeline need to be welded, must disconnect the instrument power first

（2）Newly installed pipes generally have foreign objects such as welding slag, which should be washed away before the sensor is in place. To prevent damage to the lining.

Note

Pipes that are not centered or tilted can cause leakage or damage to the lining

（3）The direction of the arrow of the instrument flow direction mark should be consistent with the flow direction of the medium.

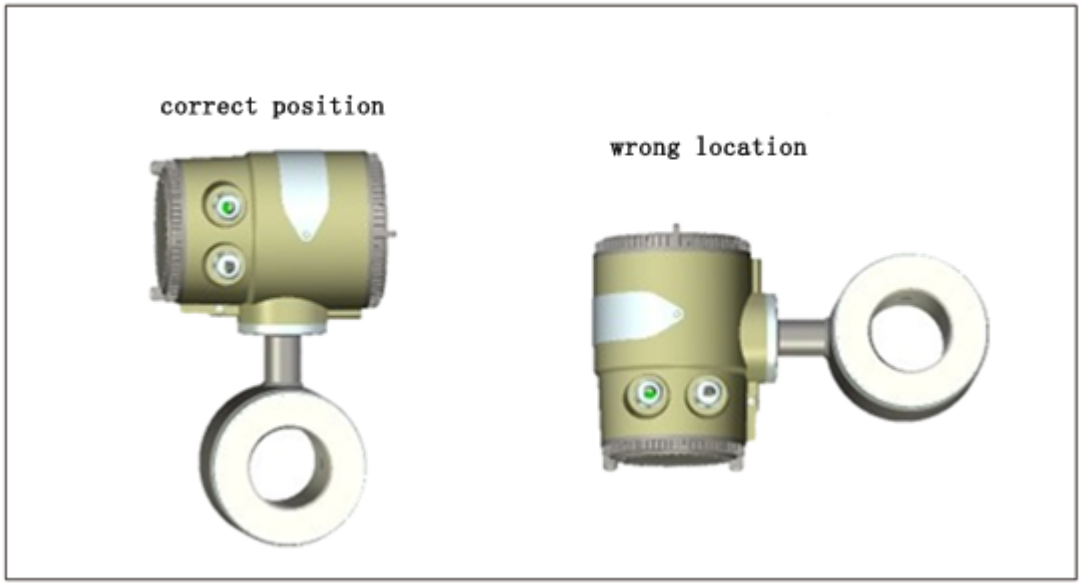


Comments

In order to facilitate instrument operation or data observation, the direction of the converter can be changed；

Unscrew the four fastening screws at the bottom of the converter shell, the converter can rotate + 90 ° or 180 °, and then tighten Screw. During the tightening of the screw, the O-ring seal at the bottom of the casing should be properly positioned. There should be no gap between the casing and the connecting rod seat after tightening.。

（4）After the sensor is put into the pipeline, the connection between the two electrodes shall be as horizontal as possible



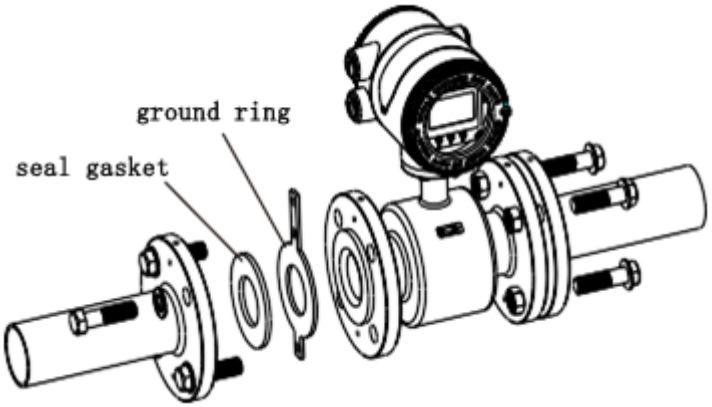
Pay attention

The electrode shown in the upper right figure is located at the top of the measuring tube. The air bubbles in the medium will cause the electrode to be insulated from the medium for a short time, which will make the measurement result wrong.

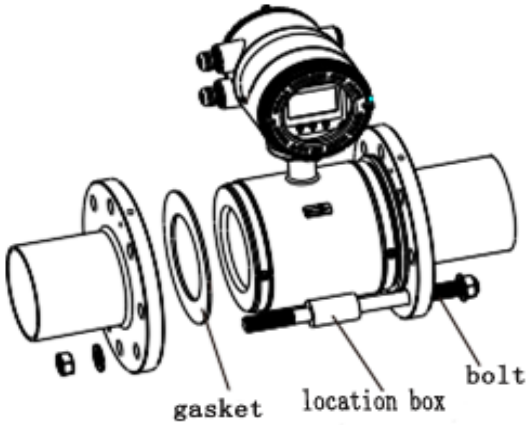
（5）The gasket at the junction of the sensor and the pipe must be fitted with a suitable gasket；

- Gasket material must be compatible with process fluids and operating conditions；
- Metal or spiral gaskets are not allowed, otherwise the liner will be damaged
- Graphite gaskets are not allowed, otherwise a conductive layer will be formed on the inside of the measuring tube to short the measurement signal.
- Flange gaskets are not allowed to protrude into the pipe cross section

When flanged flow meter is installed, both size flanges should be slowly close to the sensor. Do not tighten one side first and then tighten the other side to avoid crushing the lining.



When clamped flow meter is installed, Use the positioning sleeve to keep the measuring tube coaxial with the upstream and downstream pipelines Positioning kit on the two bolts on the bottom of the sensor



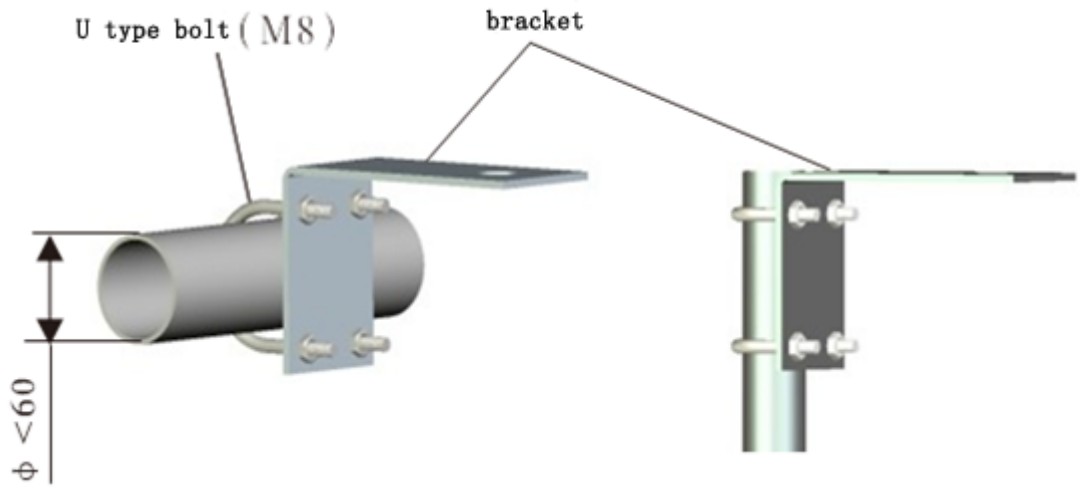
Pay attention

The bolts should be alternately tightened gradually. When any one of the bolts is still in a slack state, it is not allowed to tighten the opposite bolts Do not over tighten when initial installation. It is generally recommended to perform secondary tightening after 24 hours.

5.3 Converter (separate) installation

The converter should be installed as far as possible from the high-power motor or inverter ;

The mounting bracket can be fixed on the round pipe or directly mounted on the wall.



The converter is fixed to the bracket through the nut

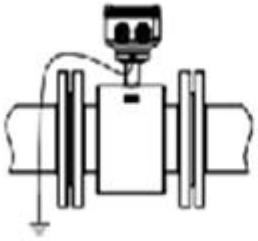
Comment

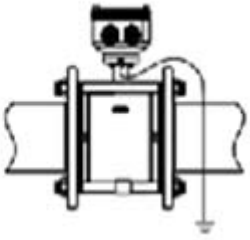
Sufficient operating space shall be reserved at the mounting position of the converter to facilitate wiring and connection of the conduit。

6 Ground connection

One of the necessary conditions for the flowmeter to work properly when the instrument case is grounded together with the media

map6-1



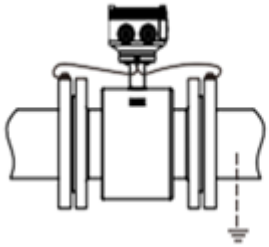


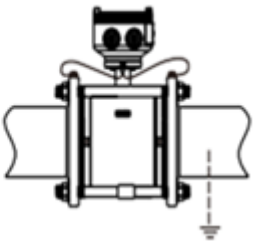
map6-2

6.1 metallic conduit

Connect the sensor grounding terminal to the pipe flange with a wire

map6-3

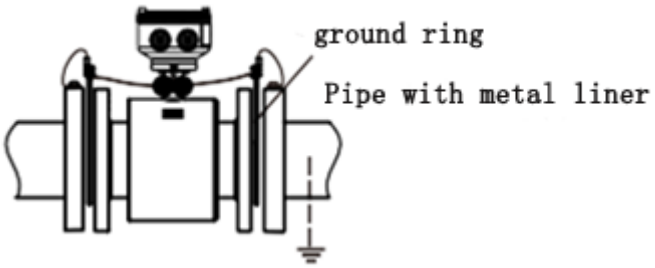




map6-4

6.2 A metal pipe lined with insulating material (The grounding ring or grounding electrode must be used)

When the earthing ring is used, the earthing mode of the flanged sensor is adopted



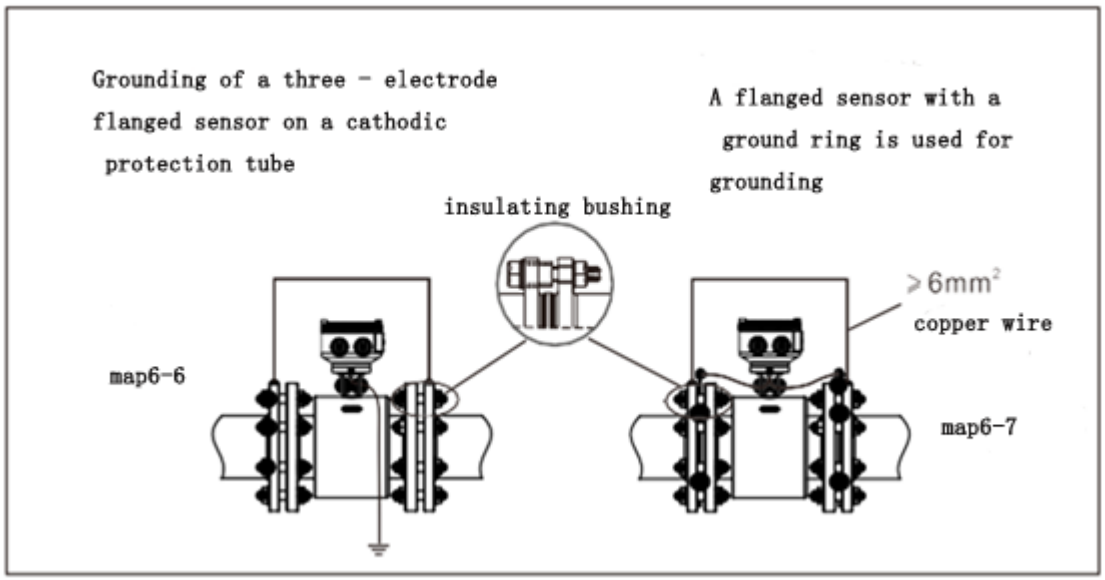
Comment

When using the ground ring, the ground mode of the clamping sensor is shown in figure 6-2 or 6-4。

When adopting three-electrode sensor, the grounding mode is shown in FIG. 6-1 and FIG. 6-2.

6.3 Cathodic protection pipeline (The grounding ring or grounding electrode must be used)

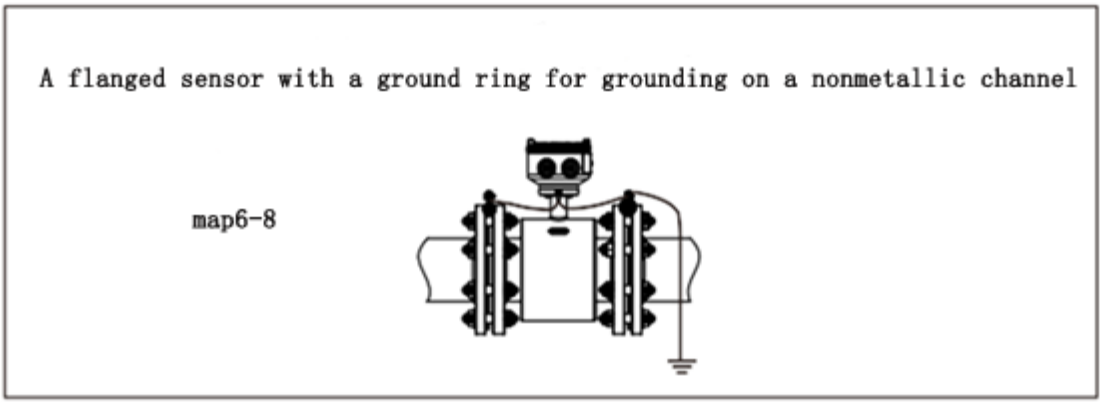
The pipe flange and the flowmeter casing shall be electrically insulated, and the pipe flanges on both sides shall be electrically connected by copper wires.。



Comment

Fig.6-2 shows the ground mode of the clamping sensor

6.4 non metal pipeline (The grounding ring or grounding electrode must be used)



Comment

Fig.6-2 shows the ground mode of the clamping sensor

The grounding mode of the flanged three-electrode sensor is shown in figure 6-1

7 Wiring connection

The connection of electromagnetic flowmeter includes the following three aspects：

1、Select the appropriate cable；

2、Cable laying；

3、Wire connection。

7.1 Cable Select

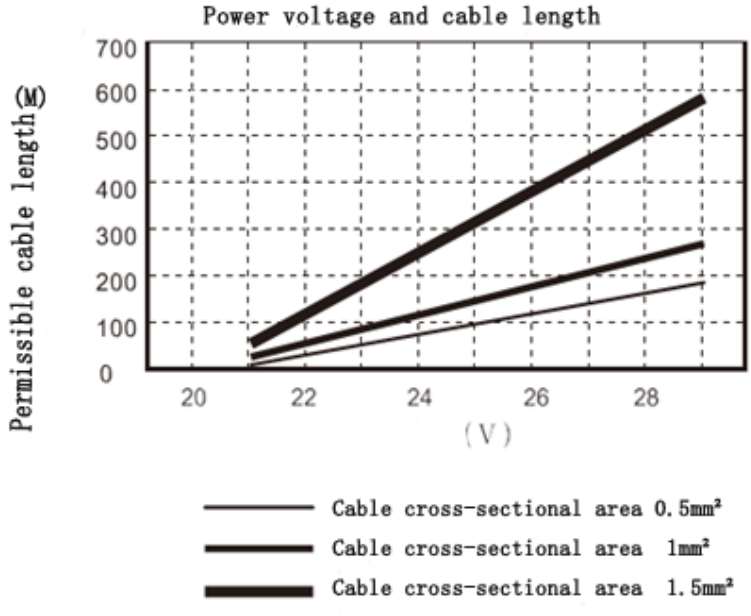
（1）Power cable

In order to ensure the sealing of the instrument access hole, a circular three-core multi-strand sheath cable with an outer diameter of 6-9mm should be selected, and the cross-sectional area of each core is selected to be 1.0-1.5mm2.

Cables rated at 80 °C should be used at ambient temperatures above 60 °C. If the ambient temperature exceeds 80 ° C, use a cable rated at 110 ° C。

Pay attention

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



(2) Output signal cable

In order to ensure the sealing performance of the instrument access hole, a circular multi-strand sheath cable with an outer diameter of 6-9mm should be selected, and the cross-sectional area of the copper core is selected to be 0.5-1.5mm2.

If ambient noise and crosstalk can adversely affect the signal, use an RVVP shielded cable.

(3) Split type flowmeter dedicated signal cable

●Signal wire：

3x0.5 mm2RVVP type shielded cable, cable outer diameter is about 7mm。

●Excitation cable：

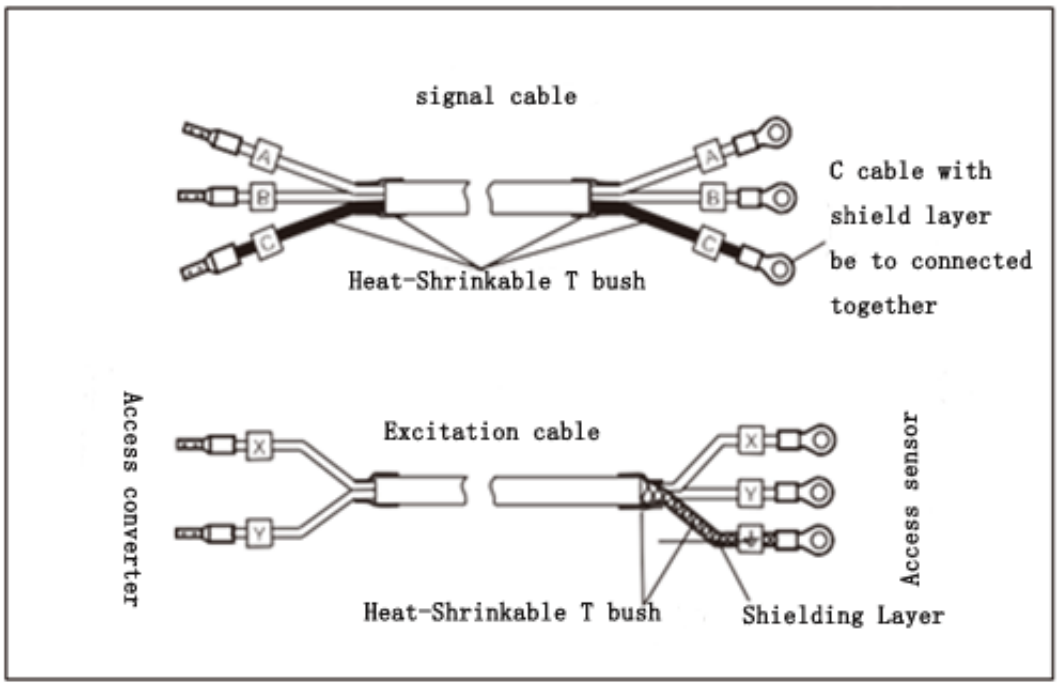
2x0.75 mm2RVVP type shielded cable, the outer diameter of the cable is about 7mm.

Pay attention

If you find that the signal cable provided with the product is too short, please contact us to replace it。

If the signal cable is too long for practical use, do not wrap it up; if it needs to be cut short,handle the thread as shown below:

map7-1



7.2 Cable laying

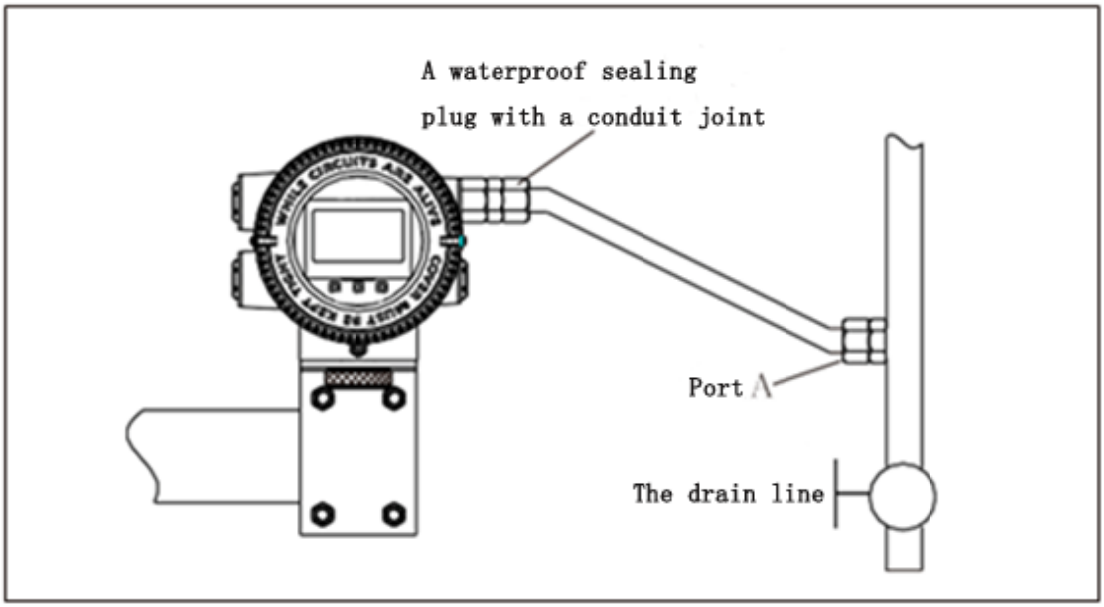
7.2.1 How to use correctly Conduit

To protect the cable and prevent electrical noise interference, it is recommended to use a conduit to lay the cable and construct it as follows:

（1）The power cable and output signal cable do not allow common conduits, and are not allowed to be connected to the excitation cable and signal cable. The power cable cannot be placed in the same cable tray or at least isolated from other cables.

（2）The excitation cable and the signal cable are allowed to share the conduit, but the excitation cable and signal cable of different flowmeters are prohibited from sharing the conduit or being bundled together.

（3）The instrument should be connected to the conduit with a waterproof sealing plug with a conduit fitting. The location of the conduit connection (see figure below) should be lower than the instrument cable inlet. A drain valve is installed at the end of the standpipe to periodically drain the water in the conduit.



⚠ Pay attention

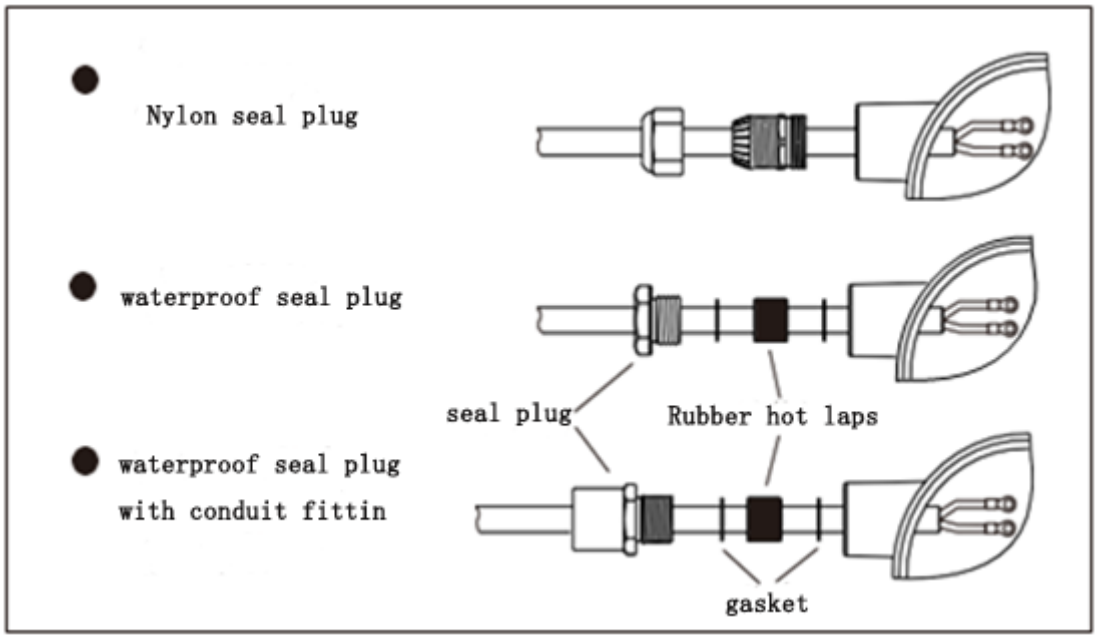
The power supply of the flowmeter and each signal cable allow bare wiring, but must be protected from external factors; the signal cable of the split flowmeter should be away from the high-power motor and the inverter.。

7.2.2 Cable access hole seal

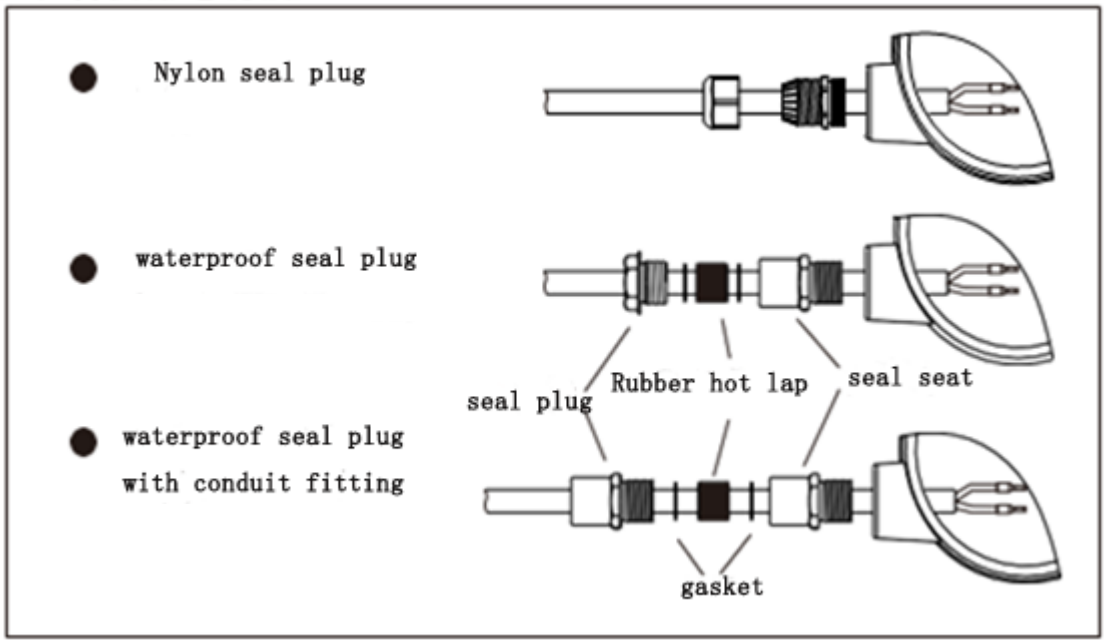
Insert the components of the sealing plug into the cable as shown in the figure, and then screw them into the cable access hole of the instrument.

When the conduit is connected to the sealing plug, care should be taken not to damage the sealing performance of the cable, and it is not allowed to over-tighten the cable.。

（1）Sensor cable access



（2）Converter cable



7.3 Wiring connection

Important

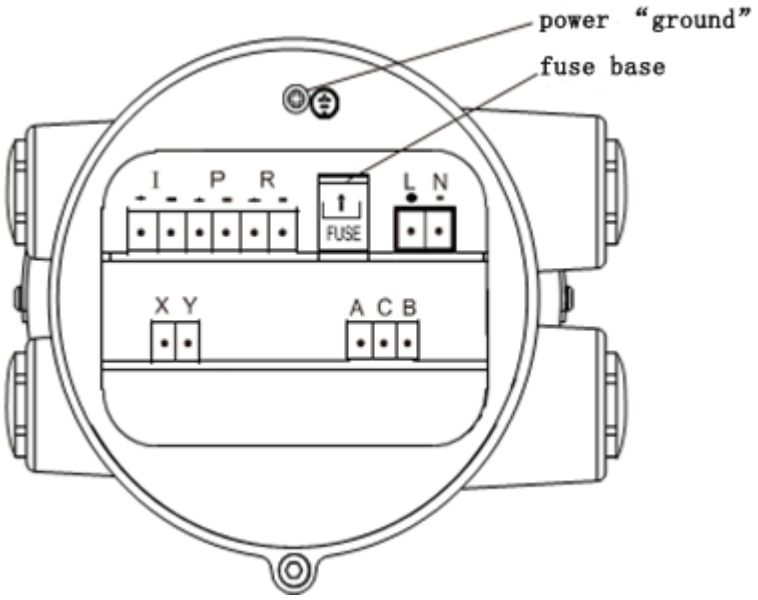
●To prevent damage caused by condensation, do not connect the cable outdoors on rainy days. ;

●Unused cable access holes do not allow removal of the sealed cover ;

●The cable protector should enter the meter housing completely and appropriately

Converter terminal structure

The converter terminal block is plug-in type. First tighten the wire end plug. After checking, insert the plug into the corresponding terminal block.

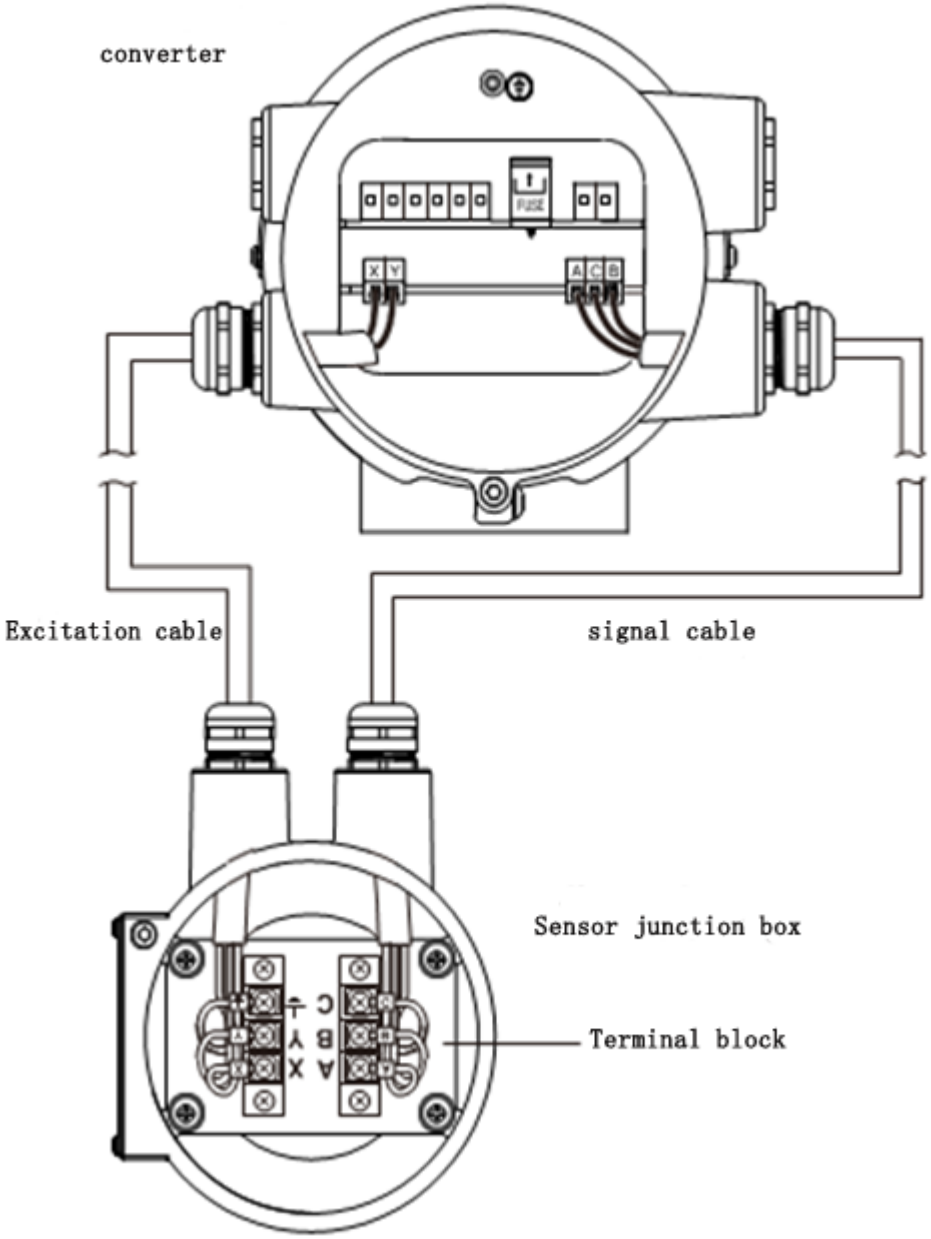


Terminal description

terminal symbols	explain
I+ / I-	4~20mAoutput port
P+ / P-	PIO Port
R+ / R-	RS485 Port
L / N (+ / -)	power port

terminal symbols	explain
A	A and b:
C	Emf signal input
B	c :signal Common end
X	Field current output power source
Y	
⏚	

7.3.1 Wiring between converter and sensor (separate flow meter)



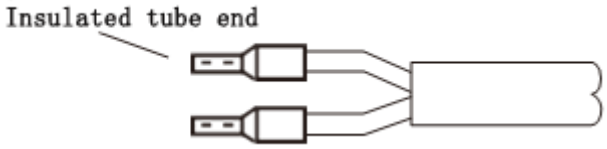
Pay attention:

Excitation cable：One end with a ring-shaped insulated end is connected to the X, Y、 Teminal，and terminal terminals in the sensor junction box.。

Signal cable：One end with a ring-shaped insulating end is connected to the A, B, C terminals in the sensor junction box, and the other end is connected to the A, B, C terminals in the converter.。

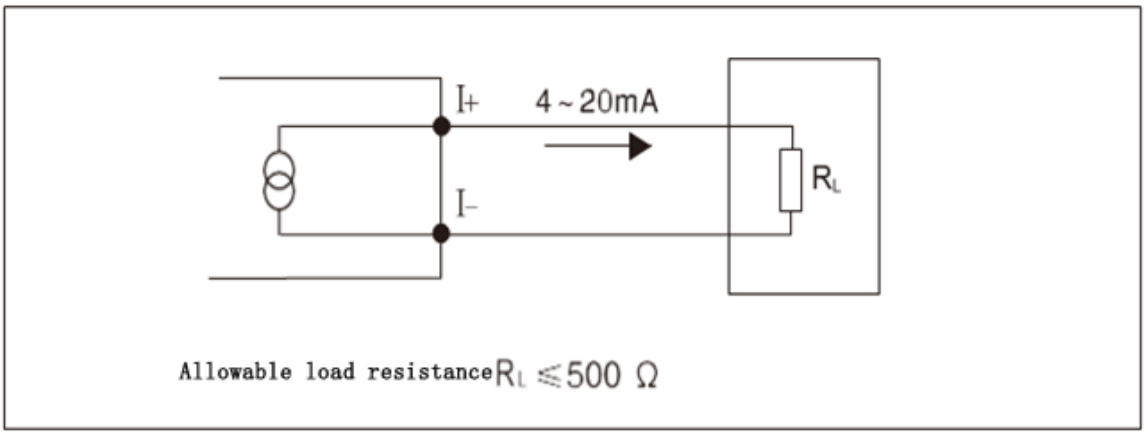
7.3.2 Wiring of the converter and external instruments

This product is connected to the external instrument through the terminals I+, I-, P+, P-, R+, R-.The cable should be crimped to the end of the insulated straight tube before being connected to the terminal block.

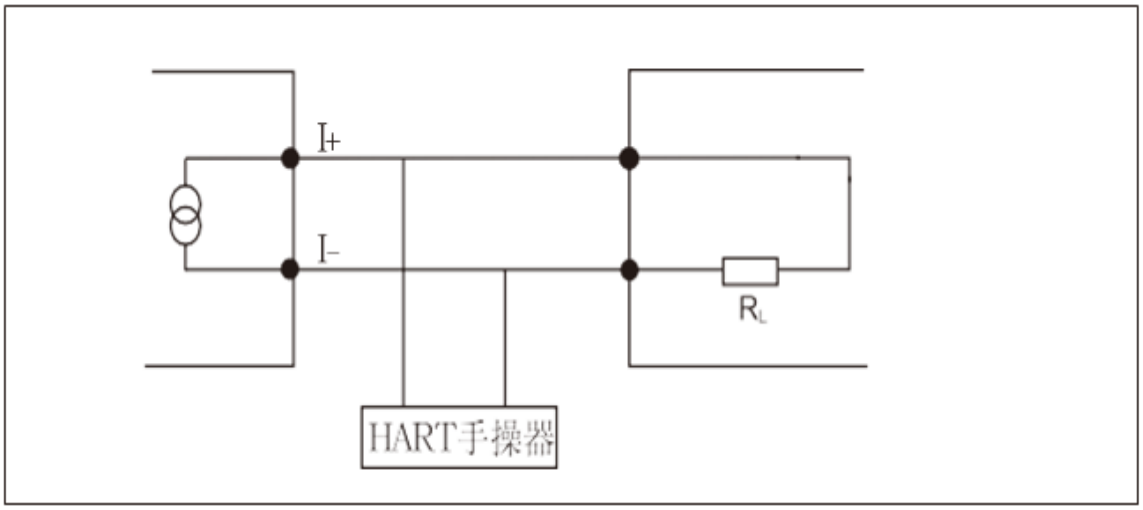


(1) Lop Output (signal output)

a) 4-20mA Output



b) 4-20mA output with HART protocol≦

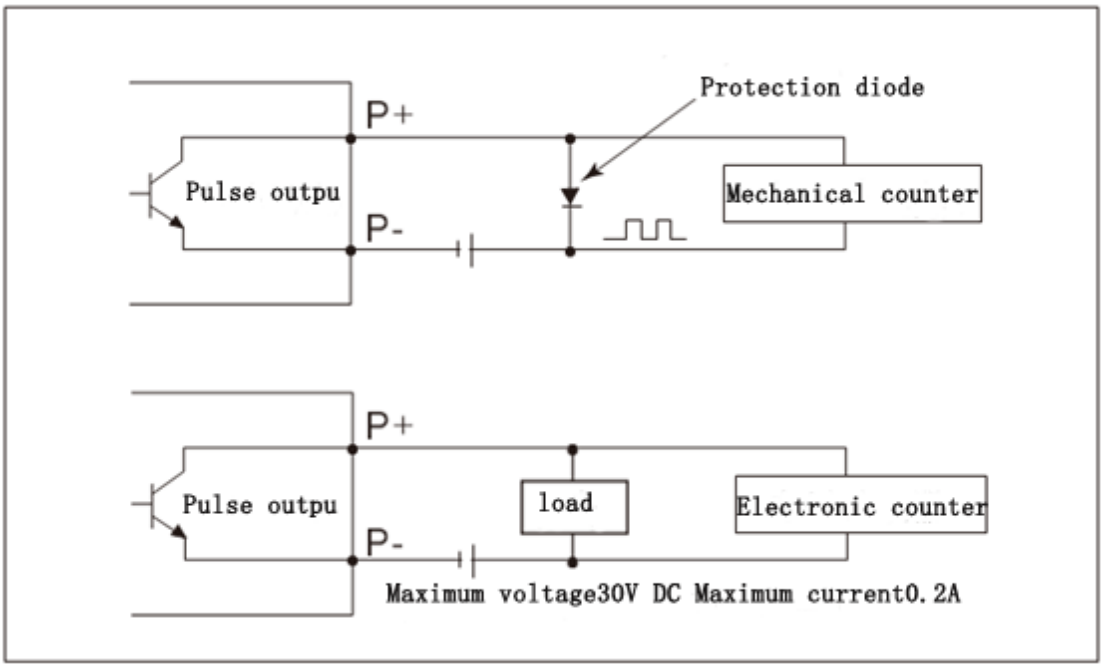


(2) PIO Signal interface

The parameters of the PIO interface can be set according to the ordering requirements before the instrument leaves the factory.。

In actual use, the function and parameters of the PIO interface can be modified through parameter settings, as described in 9.1.

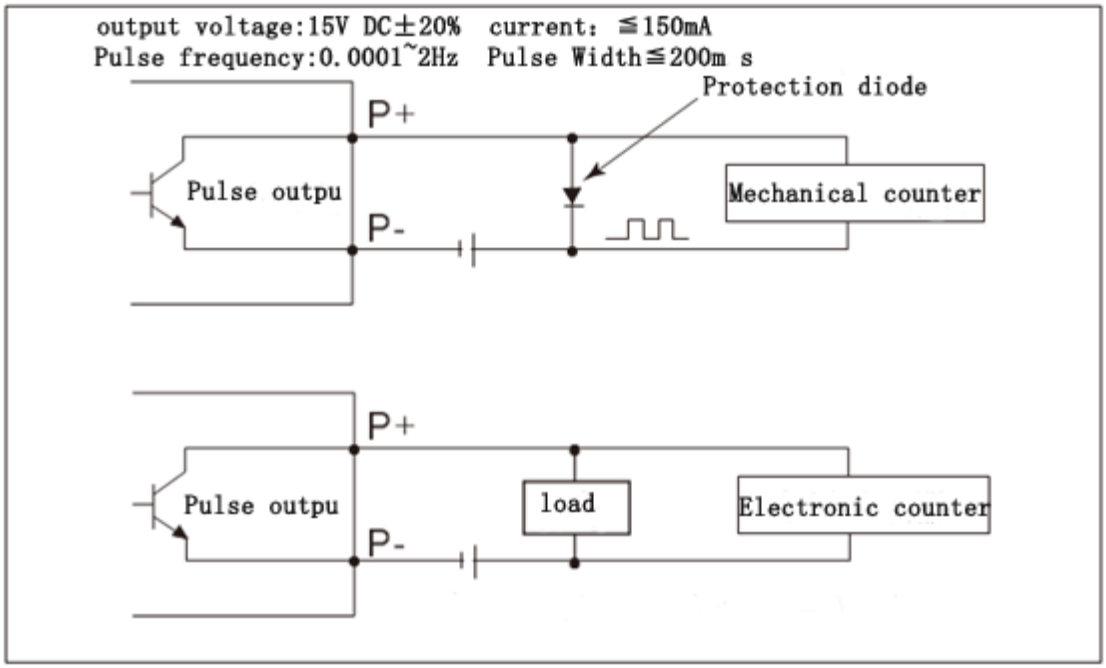
a ） Passive pulse output



Comment

- Since it is a transistor contact output (isolated type), please pay attention to voltage and power polarity when wiring.。
- The voltage of the loop power supply should not be greater than 30V. The current in the loop after the load is connected must not exceed 0.2A to prevent damage to the meter.
- When the input filter constant of the electronic counter is larger than the pulse width, it may cause the counting to be inaccurate, so try to increase the pulse width setting value.。
- If the input impedance of the electronic counter is large, the induced noise of the power supply may cause a counting error. Use shielded cable or fully reduce the input impedance of the electronic counter to within the specifications of the pulse output of the electromagnetic flowmeter。

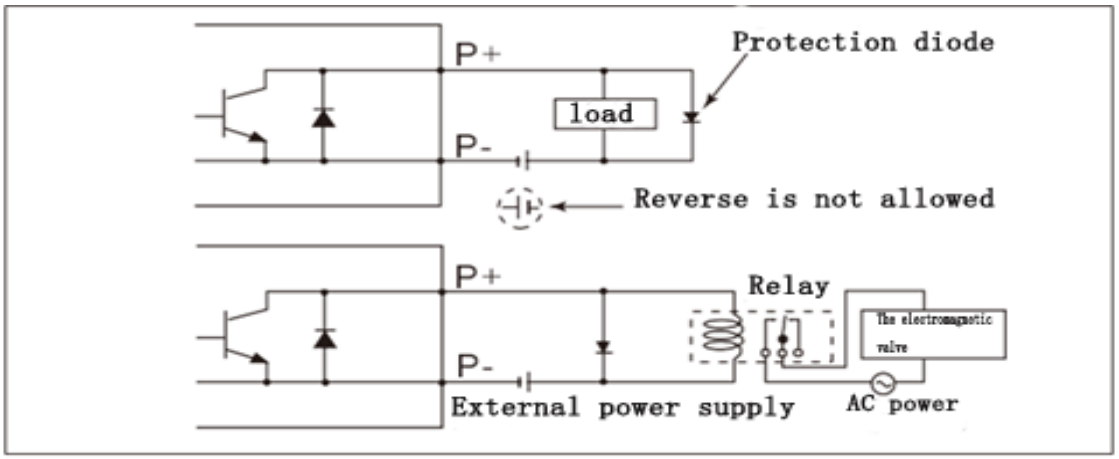
b) Active pulse output



Comment

P+ and P- cannot be short-circuited when the interface is set to active pulse output !

c) Status/alarm output

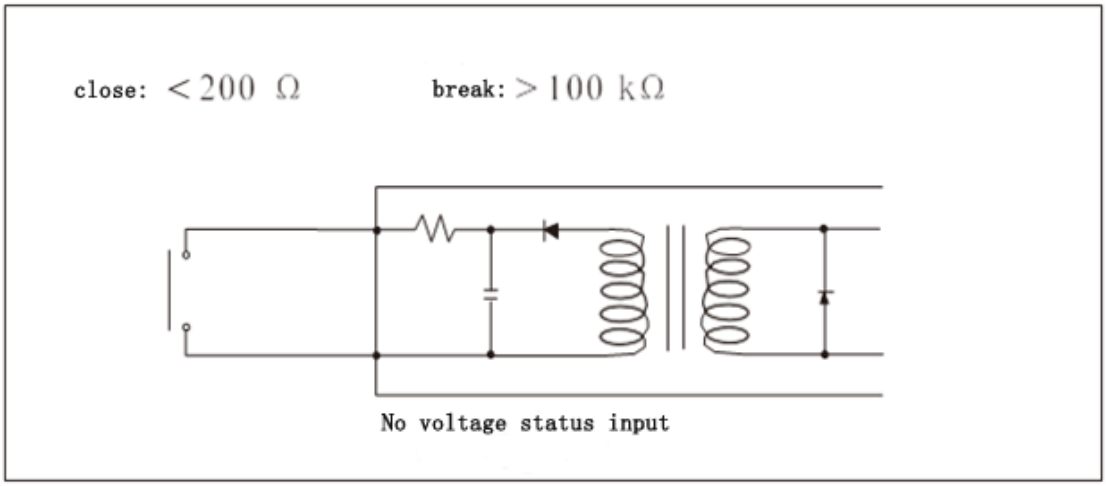


Comment

When wiring, pay attention to voltage and electrode polarity. External power supply voltageshall not be greater than 30V and current shall not be greater than 0.2a In case of damage to the instrument ,

The PIO interface must pass the intermediate relay to drive the AC load, see above。

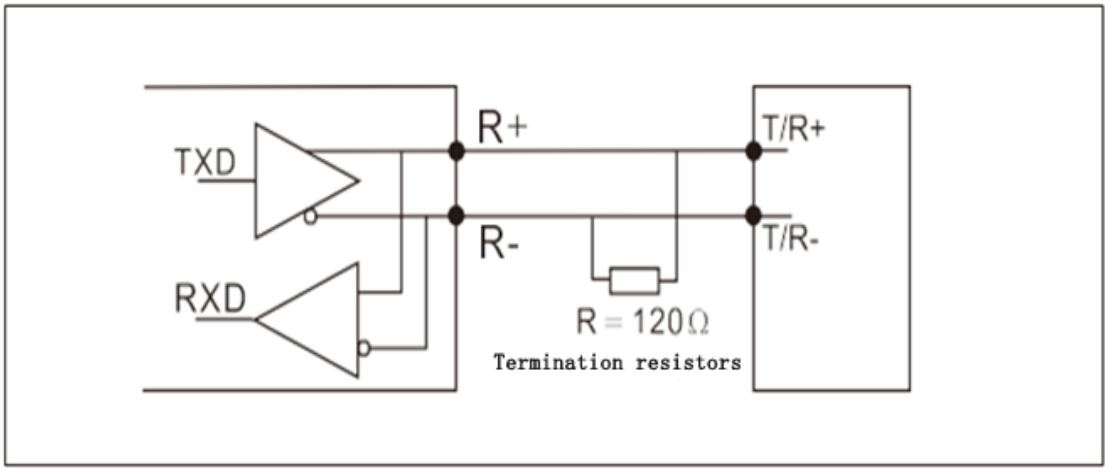
d) Contact signal inp



Comment

The electric shock must be dry (no voltage), there must be no other power supply in the signal loop, otherwise it will damage the instrument.。

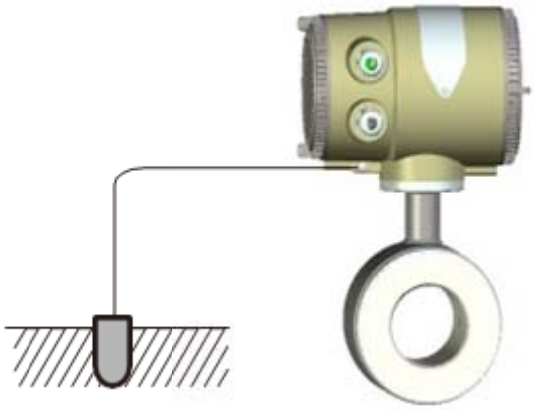
3) RS485 Output



7.3.3 Power cable wiring

Protective groun ding

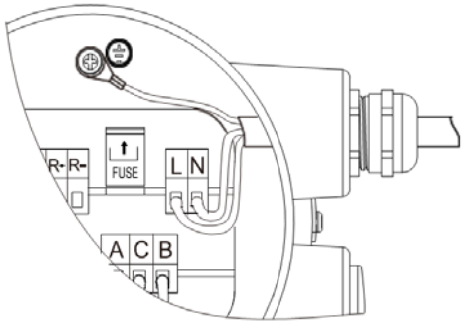
Before the power cable is connected, the instrument case should be grounded to ensure the safety of the operator. The ground wire should be 600V insulated wire, the wire cross-sectional area should be greater than 2mm2, and the grounding resistance should be less than 10Ω.



Wiring connection

AC power supply: “N” is connected to the power supply neutral line, and “L” is connected to the power supply phase line;
DC power supply: "-" is connected to the negative pole of the power supply, and "+" is connected to the positive pole of the power supply;

Cable ground and ground ⏚connection。



⚠ Waring

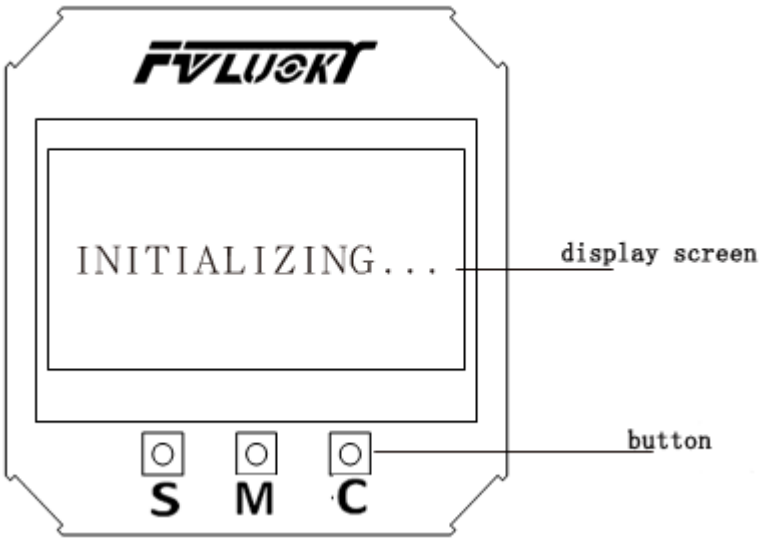
The following points must be observed when connecting the power cable：

- Check if the power supply meets the requirements of the instrument ;
- Make sure the power is disconnected before wiring ;
- The power supply should be connected to the meter via an external fuse or circuit breaker (2 amps)。

8.Panel operation and display

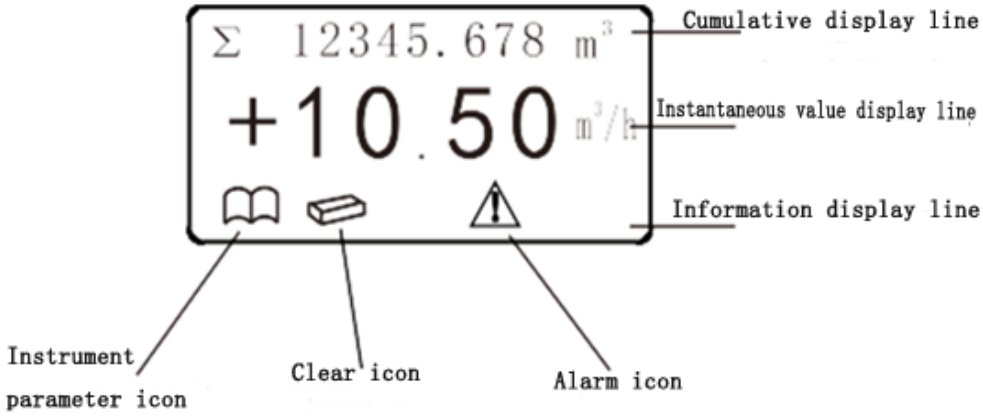
In the measurement state, the electromagnetic flowmeter can view the current measurement data, instrument parameters, alarm information, and perform the cumulative value clear operation by pressing the button operation.。

After power-on, the meter enters the initialization stat



Display interface of the initialization process

After 5 seconds, the meter automatically enters the measurement state, and the display interface is as follows



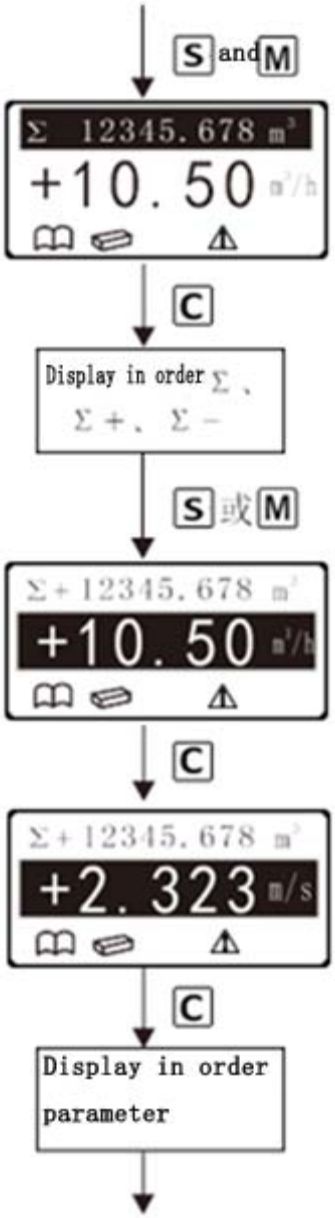
(Display when alarmmessage)

8.1 View measurement data and meter information

Press any key on the panel, the cursor (black block) will appear on the display,press S or M key to move the cursor to each display line or icon, press C key to display the line (or icon) of the cursor in turn. Various parameters and information.。

Operation steps :

1) View cumulative valueThe cursor displays the row in the cumulative value



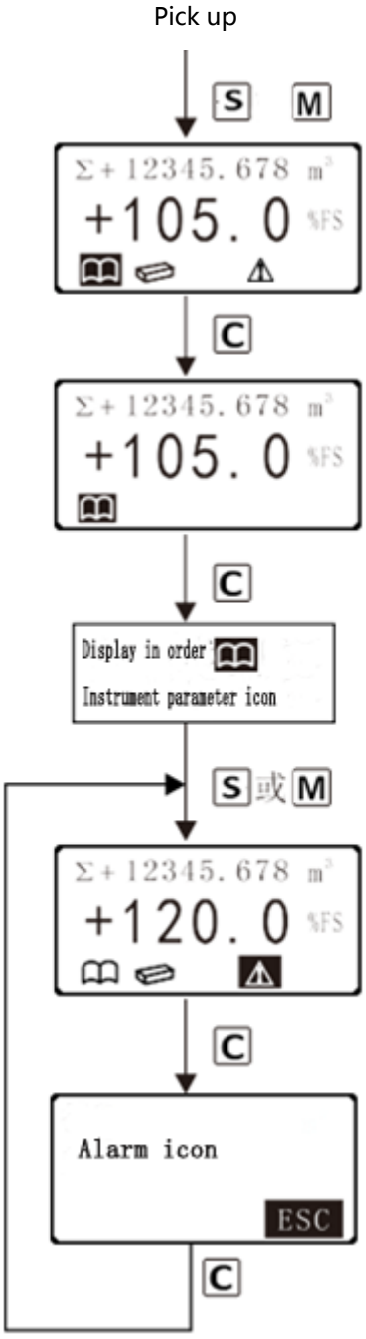
Cursor in cumulative value display line

2) View instantaneous values

Move cursor to instant value display line

Display item changed to flow rate

3) Query instrument parameters



Cursor to Icon

Check the meter in umber

4 Query alarm information

Move the cursor to icon

Current alarm information:

Over range (if there are other

Alarm information, at the same time

display)

Remark

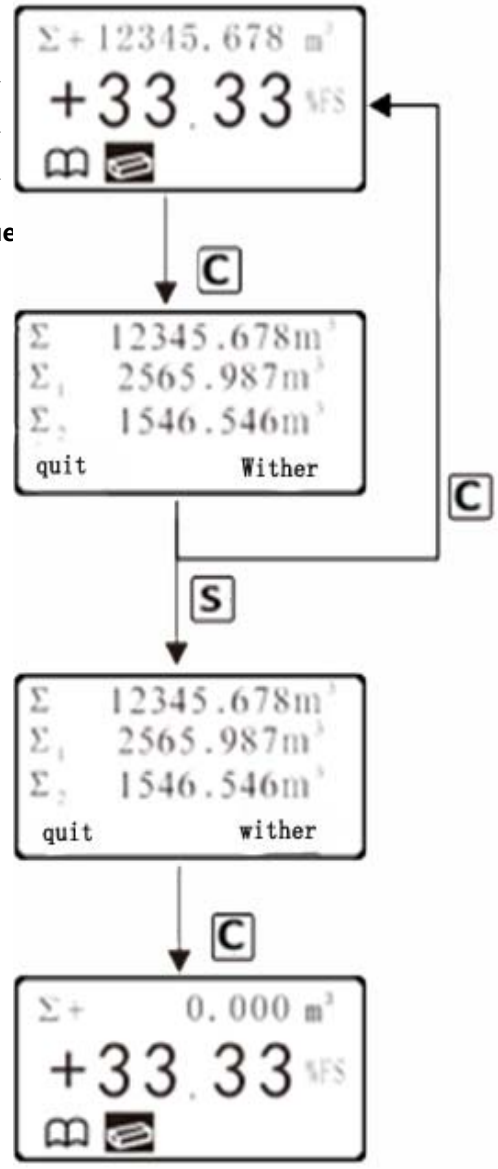
In the above process, if no button operation within 1 minute, the cursor will disappear automatically.。

8.2 Clear

The current cumulative flow display value ∑, ∑, ∑ is zeroed。

Operation steps as below:

In the state of measurement, press [S] key move cursor to icon , press [C] key Into The cumulative value reset interface



Remark

Mover the cursor to ∑1or∑2 Behind, Press [C] key to check∑。

9.Parameter setting

Before the electromagnetic flowmeter is put into operation, the working parameters of the meter should be set according to actual use

In the measurement state, press and hold the button [C]. After 3 seconds, the meter screen prompts the user to enter the password:

Button function in parameter setting state

Key symbol	Function
[S]	Move the cursor
[M]	Modify the value of the cursor or change it to a decimal point.
[C]	Save the data or options and go to the next parameter setting interface.

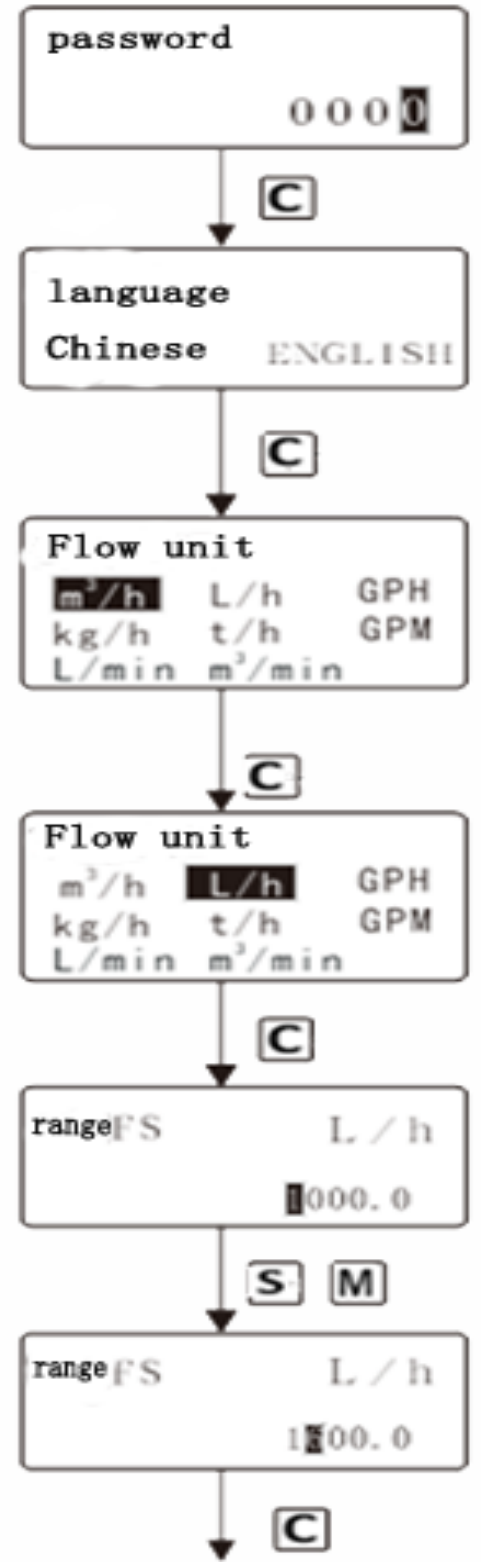
Press [C] Key，After 3 seconds，The instrument exit parameter setting interface returns to the measurement state

Remark:

In the display interface of parameter setting, if the button is not pressed within 5 minutes, the instrument will exit the parameter setting interface automatically and return to the measurement state.。

9.1 Parameter setting steps

1) Input passwor “0000”



2) Set language

The cursor move to “Chinese”

Save the language option as "Chinese"

3) Setting flow unit

(Note：Current flow unit:m³/h)

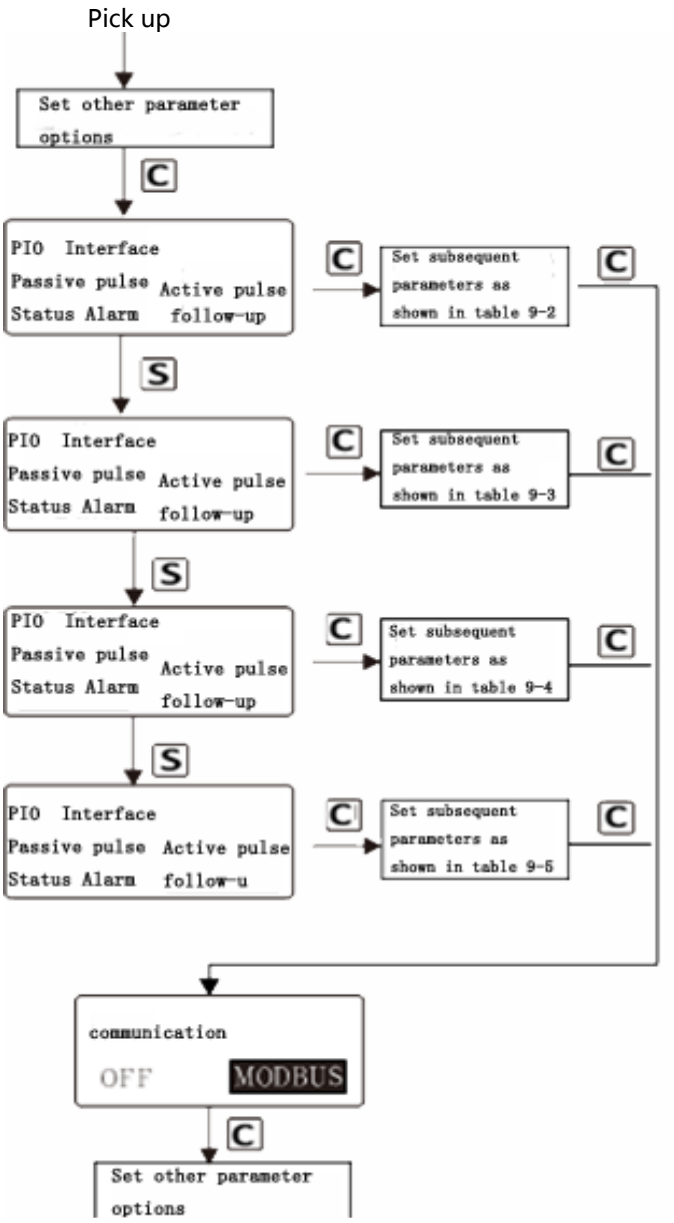
Cursor move to “L/h”

4) Setting range

Use S M key to revise range valume

save the selected flow unit

5) Setting other parameter



6) Setting PIO parameter

(Note 1)

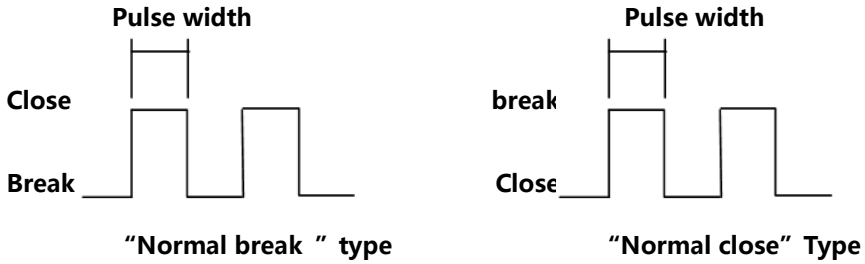
7) Setting RS485 Parameter

Note 1: This parameter is used to suppress the fluctuation of the output signal of the flow measurement display value. The larger the damping value, the smaller the fluctuation indicated by the measurement result will be, and the corresponding time will be delayed. Normally, the damping grease is set to 1-3 (s).

Note 2: When "Forward" is selected, the meter can only measure and display the forward flow (consistent with the direction of the flow direction arrow); select "Bidirectional" to measure and display the positive and negative flow simultaneously.

Note 3: After selecting "YES", the meter prompts to set "empty tube detection threshold". The threshold is usually set to 40-50%. If you need to increase the detection sensitivity, you can increase the value appropriately.

Note 4, Pulse width: refers to the time when the contact mode is "normally open", the contact is closed (transistor pass) in one pulse signal period, or the contact is off during one pulse period when the contact mode is "normally closed" time:



"Normal break " type **"Normal close" Type**

The pulse width is set according to the requirements of the signal receiving device. The corresponding signal frequency upper limit is shown in the following table: :

Pulse with setting volume (ms)	200	100	50	20	10	50%
Signal frequency upper limits (Hz)	2.2	5	10	25	50	5000

When the signal frequency is less than the upper frequency limit in the list, the instrument outputs the pulse signal according to the set value of pulse width; when the signal frequency is greater than the corresponding upper frequency limit of the set value of pulse width, the instrument automatically outputs the signal pulse according to the 50% duty cycle, and displays icons on the display screen ⚠ To prompt the user to reset the pulse width. Value or pulse equivalent.

Pulse width default value: 100ms.

Statues/alarm output parameter setting options:

Setting item	Value range	Declare
Upper Alarm value limit (%FS)	0-130	Acutal flow(Percentage flow)value if more than theUpper alarm value , PIO closing of contact
Lower Alarm value limit (%FS)	0-130	Actual flow(percentage flow)value if less than upper alarm value,PIO closing of contact
FLOW Direction		PIO contact is closed when flow direction is reversed

Contactor input signal parameter setting options:

Setting item	Function options	Declare
Contact input	Reset	The time of inputting contactor closed is over 1 second , meter Cumulative reset
	other	Design by user specified function

MODBUASProtocol parameter Settings

Settings	Option/value range	Declare
Modbus type	RTU,ASC11	
Baud rate	1200.2400.4800.9600.19200	
Data bits	7.8	RTU type choose 8 , ASC11 type choose 7or 8
Check out	No check, odd check, even check	
Stop bit	1.2	No check select 1 or 2 odd/even 1
Modbus address	1-247	

MODBUAS Communication parameter address table

Item	Type	register length	Name	DATA ADDRESS (HEX)	Read/Write (R/W)	Options
1	in1	0001	Flow direction	0*0017	R/W	0:Positive 2 : Reverse
2	in1	0001	Instantaneous flow unit	0*0042	R/W	0*10 :GPN 0*11:L/min 0*13 : m³/h 0*4B : kg/h 0*4E : 1/h 0*83 : m³ /min 0*88 : GPH 0*8A:L/H
3	long	0002	Sensor	0*0127	R/W	0~9999999
4	long	0002	Positive cumulative flow	0*0311	R	0~9999999
5	long	0002	Reverse cumulative flow	0*0315	R	0~9999999
6	float	0002	Damp	0*0189	R/W	0~9.9
7	float	0002	Microsignal resection	0*0197	R/W	0~9.9
8	float	0002	Current output	0*0203	R	4~20
9	float	0002	Scale Flow	0*0209	R/W	0~9999
10	float	0002	instantaneous Flow	0*0253	R	0~9999

9.2 Zero check and zero set

9.2.1 zero Meaning

The value of the electromotive force signal when the sensor is full and the quiescent state (see the V value in the interface on the next page) is called the "zero point value" or "zero point" of the meter. The difference between this value and "0" is called Is the "zero offset value".

The more "zero" deviates from "0", the greater the measurement error.

The so-called "zeroing" is to set a value opposite to the current zero point value inside the meter through the steps of 9.2.2, so that the measurement result of the meter at the "0m/s" flow rate is "0"!

Check that the "zero point" of the meter has determined whether zero adjustment is required

Closing the pipe determines that the media is full and stationary

Change the instantaneous value display line display parameter to flow rate (m/s) (see 8.1) and analyze the current flow rate display value:

1) If the displayed value fluctuation range exceeds ±20mm/s, the possible causes are:

1 The pipe contains air or bubbles passing through the measuring tube;

2 dielectric conductivity is less than 10μS / cm;

3 The meter is not properly grounded (see Chapter 6 of this manual);

4 improper cable laying (see 7.2.7.-(3));

5 The medium is corroded to the electrode material;

6 sensor failure (see 10. Fault check and treatment Note 5, Note 8)

Please exclude the above reasons. For reasons 2, 5, 6, please contact us.

2) Under the premise that the "zero point" display value is stable, if the average value of the displayed value is >+2.5mm/s or <-2.5mm/s, the following situations may exist:

1 The pipeline has not been completely shut down or there is a leak;

2 The condition was not sufficient at the last zero adjustment operation.

If cause 1 does not hold, the meter needs to be zeroed.

After the instrument is put into operation, the measurement value is not stable or the error is large, most of the reasons can be judged and solved by zero check and "zero adjustment"!

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9.2.2 "Zero adjustment" step

After confirming that the instrument needs to be zeroed (the current zero point is greater than +2.5mm/s or less than -2.5mm/s) and the zero adjustment condition is satisfied (the medium is full and the display fluctuation is less than +20mm/s), follow the steps below to zero. :

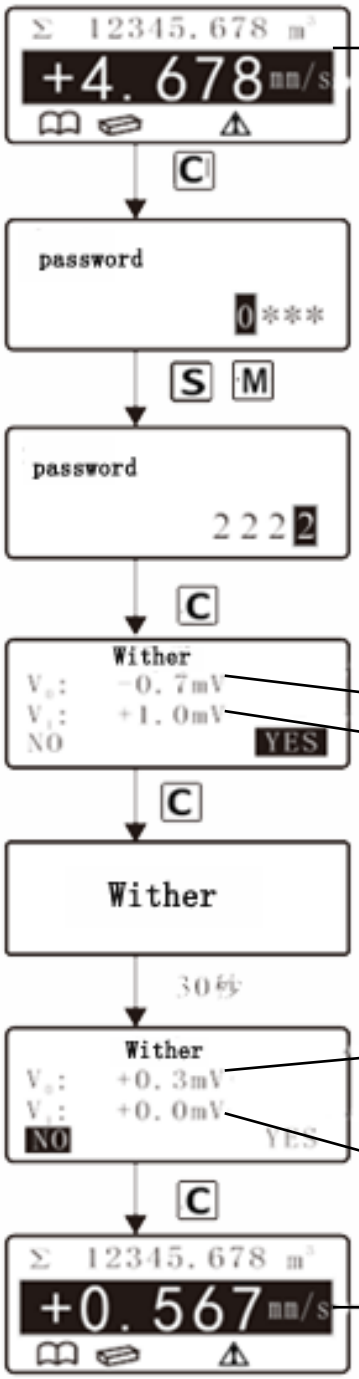
1) Press C key in 3 seconds
Then display as right image :

2) Press password “2222”

3) Move “YES”

4) Automatic zero adjustment

5) Display nulling result



zero velocity is too high

The previous zero setting value

Current emf signal value

Display interface of zero adjustment process

The setting value of this zero point
(the sum of V1 and V0 before Zeroing)

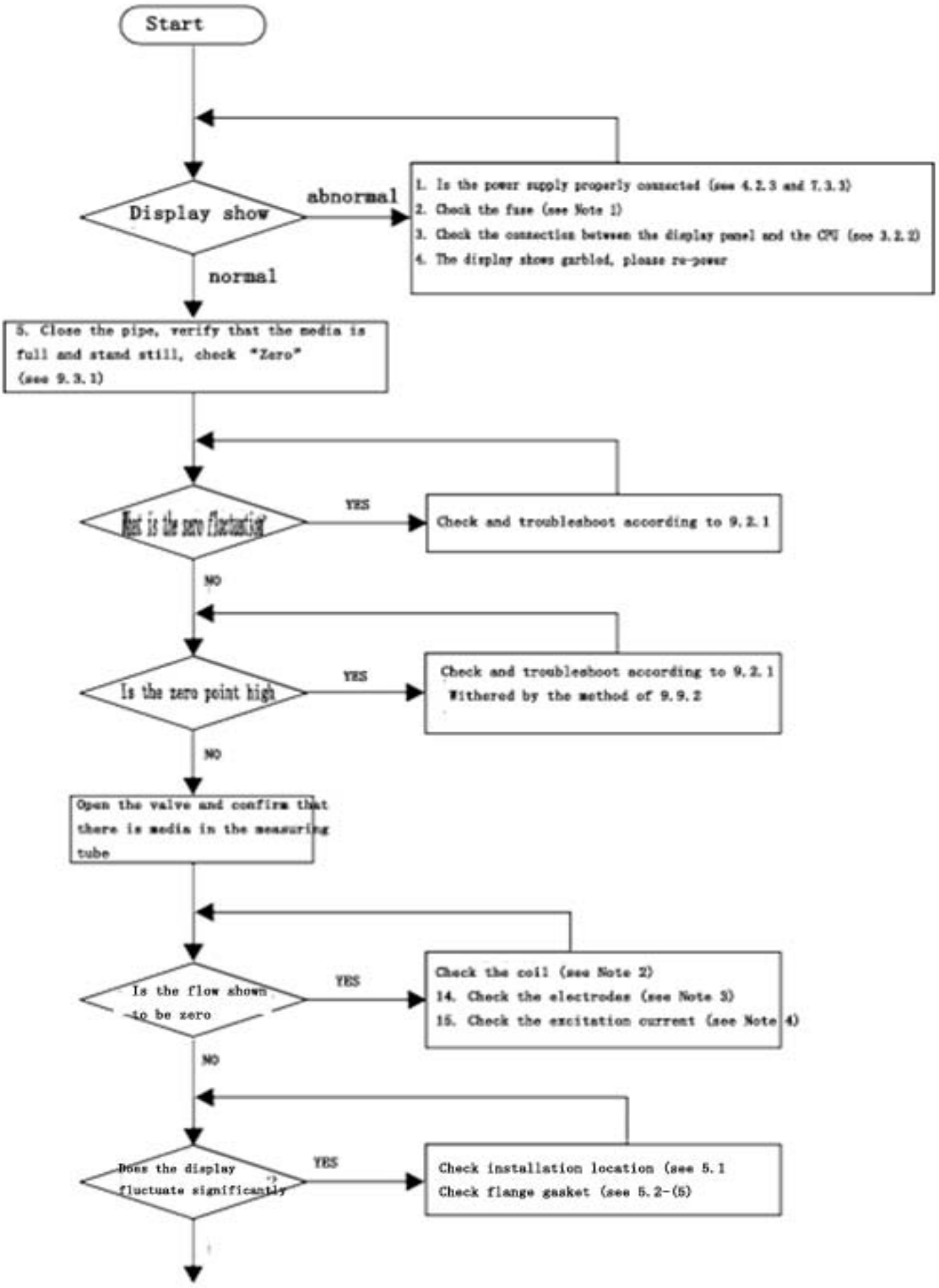
Current electromotive force signal value

zero velocity value is in the suitable range

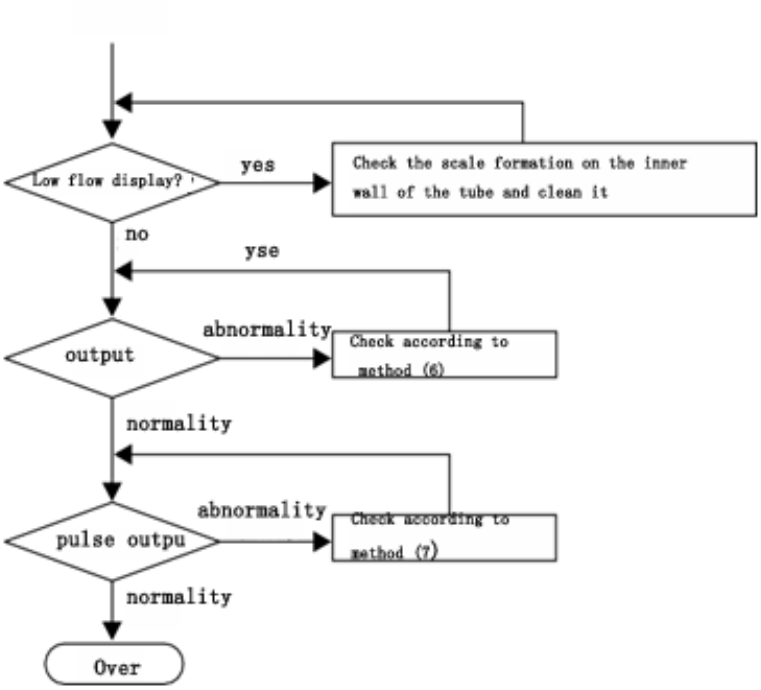
10.Failure checking and handling

Fault treatment method

(After the following methods can not be troubleshooting)



Pick up



Note:

1. Turn off the power, open the converter cover, take out the fuse, check the fuse, and replace if it is blown.

2. After the meter is powered off, measure the resistance between the sensors X and Y, and the resistance value is about 100Ω.

3. After the meter is powered off, measure the resistance between terminals A, B and C and should not be short-circuited.

4. After the instrument is powered off, use the multimeter DC voltage file to measure both ends of X and Y. The readings are positive and negative, indicating that the converter works normally.

5. Empty the medium or remove the flowmeter to keep the inner wall of the measuring tube dry. Dial the signal terminal of the converter and measure the insulation resistance between terminals A, B and C with a megger. It should be greater than 100MΩ. Otherwise, the flow measurement result will be biased. small.

6. Disconnect the converter signal terminal and directly measure the current value I0 between the terminal block I+ and I- with a milliampere meter. I0 should be equal to the mA value displayed by the meter (see Table 8-2). Turn on the load line and measure I0. If I0=0mA, the external circuit is open. If I0 is too small, the external line is poorly connected or the loop load is too large (R1 should be less than 500Ω).

7. The pulse output signal f0 should be equal to the frequency value displayed by the meter (see Table 8-2). If f0=0, please check if the external wiring method is correct (see 7.3.2-(2) and Table 9-2 Note 4).

8. Remove the excitation and signal terminals of the converter. Measure the insulation resistance of X, Y and C with a megohmmeter. The insulation resistance of X, Y and C should be greater than 100MΩ. Otherwise, the flow measurement result will be too large or fluctuating.

11. Selection Code

Sensor code										Transmitter code				Optiona	Description
FMF90	-X	-X	( )	-X	X	X	X	X	X	-X	X	-X	X	-X	-Range (m3/h)
Type	-F														flange
	-J														clamp type
	-W														clamp type
	-C														plug in
	-E														energy type
	-D														battery type
Ex type	—														standard type
	Ex														CT4-6
Caliber		DN													Digital show
Electrode(grounding ring) material			-L												SUS 316L
			-H												HC
			-V												Ti
			-T												Ta
			-W												W
			-P												Pt
			-X												special negotiation
Liner material				N											Ne
				F											PTFE
				E											FEP
				P											PU
				A											PFA
				C											ceramics
Temperature range					1										0~+80°C
					2										0~+120°C
					3										0~+180°C
					4										-40~+80°C
Protection level						0									IP65
						1									IP67
						2									IP68
Pressure class							0								4.0MPa
							1								1.6MPa
							2								1.0MPa
							3								0.6MPa
							X								special negotiation
Structure type								Y							one type
								F							Split type
Power supply									-1						220V AC
									-2						24V DC
Signal/communication output										1					4~20MA+RS485
										2					4~20MA+HART
Electrical interface											-M				M20*1.5
											-G				G1/2"
Accuracy class														A	0.5
														B	0.3
Accessory															flange, signal wire (__m)

Illustration

Model：FMF90-F(100)-HF101Y-11-MA-100m³/h

Flange electromagnetic flowmeter , Caliber :DN100 ,electrode: HC，line :PTFE, Temperature range:0~120℃，protection level：IP65, pressure class：1.6MPa，structure type：one type，power supply：220V AC, signal ouput：4~20mA, protocol：RS485: Electrical interface：M20*1.5internal thread, Cast aluminum housing with LCD head，Accuracy class：0.5，No explosion-proof，Range ：0-100m3/h

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