Start from Passion, Excelling in Concentration

ELECTROMAGNETIC FLOWMETER USER MANUAL

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Directory

1 Intelligent Electromagnetic Flowmeter

1.1 Overview

Electromagnetic flowmeters are designed and manufactured in accordance with the standard JB /T -9248-1999 Electromagnetic Flowmeter is a meter for measuring the volume flow of conductive media. while on-site monitoring and display, it can output standard current signals for recording, adjustment and control, realizing automatic detection control and long-distance signal transmission. It is widely used in the flow measurement of conductive liquids in environmental protection, steel, petroleum, chemical, coal, metallurgy, minerals, papermaking, water supply and drainage, food, medicine and other industries. The structure of the instrument has a body type and split type.

1.2 Characteristics

★There are no movable parts in the measuring tube, which is convenient for maintenance and management; there are no blocking parts and no pressure loss;

★The minimum conductivity of the measured liquid is ≥ 20μS /cm. With various lining materials, it can be applied to measure the flow of various acids, alkalis, salt solutions and media such as mud, pulp and pulp;

★The measurement accuracy is not affected by the density, viscosity, temperature, pressure and conductivity of the fluid. The sensor induced voltage signal has a linear relationship with the average flow rate, and the measurement accuracy is high;

★Low frequency rectangular wave excitation, not affected by the power frequency and various field interference, stable and reliable work;

★Not affected by the fluid direction, both forward and reverse directions can be accurately measured;

★LCD backlight display, can modify parameters online, simple and convenient operation;

★Chinese and English display modes (optional);

★The total amount of forward direction, total amount of reverse direction and total amount of difference can be recorded;

★With empty pipe measurement, alarm function, and can adapt to different fluid medium.

1.3 Measurement principle

The electromagnetic flowmeter uses the principle of Faraday's law of electromagnetic induction, that is, when a conductive object cuts the magnetic lines of force in a magnetic field, an induced electromotive force is generated in the conductor. its induced electromotive force

E is: $E = KBd$

The flow rate Q is

Q = 3600×V×S.

In the formula,

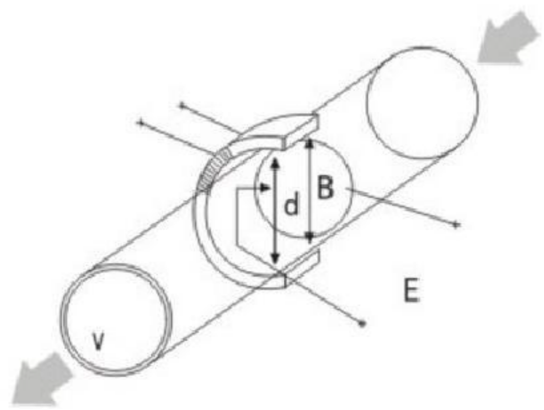
k-instrument coefficient

B-magnetic induction intensity(T)

D-electrode spacing (m)

V-average flow velocity of fluid (m/s)

S-cross-sectional area of duct (m^2)



Measurement Schematic

When measuring the flow rate, the conductive liquid flows through a magnetic field perpendicular to the flow direction at a flow velocity V. The flow of the conductive liquid induces a voltage proportional to the average flow velocity, and the induced voltage signal is detected by an electrode in direct contact with the liquid. For the same flowmeter S, B, d is constant, so the flow and induced electromotive force E flow (or V) is proportional.

1.4 Technical indicators

- Applicable measuring diameter: DN6mm ~ DN3000mm
- Medium conductivity:≥20 μ s/cm
- Lining material: polychloroprene rubber, polyurethane rubber, silicone fluorine rubber, polytetrafluoroethylene (PTFE), polytetrafluoroethylene F46, PFA
- Electrode material: SUS316, Hastelloy B(HB), Hastelloy C(HC), Titanium (Ti), Tantalum (Ta), Platinum/Iridium alloy
- Working environment temperature: - 20 ℃ ~ 60 ℃
- Converter working environment humidity:≤ 95%
- Enclosure rating: IP65, IP67, IP68
- Velocity measurement range: 0.5~10 m/s
- Matching accuracy grade: 0.5 and 0.2
- Measurement parameters: instantaneous flow rate, flow rate, positive and negative cumulative total
- Detection and alarm parameters: fluid empty pipe detection alarm, excitation current detection alarm, upper and lower limit alarm, system alarm
- Network function: HART, MODBUS, GPRS, PROFIBUS (optional)

- **Power supply**

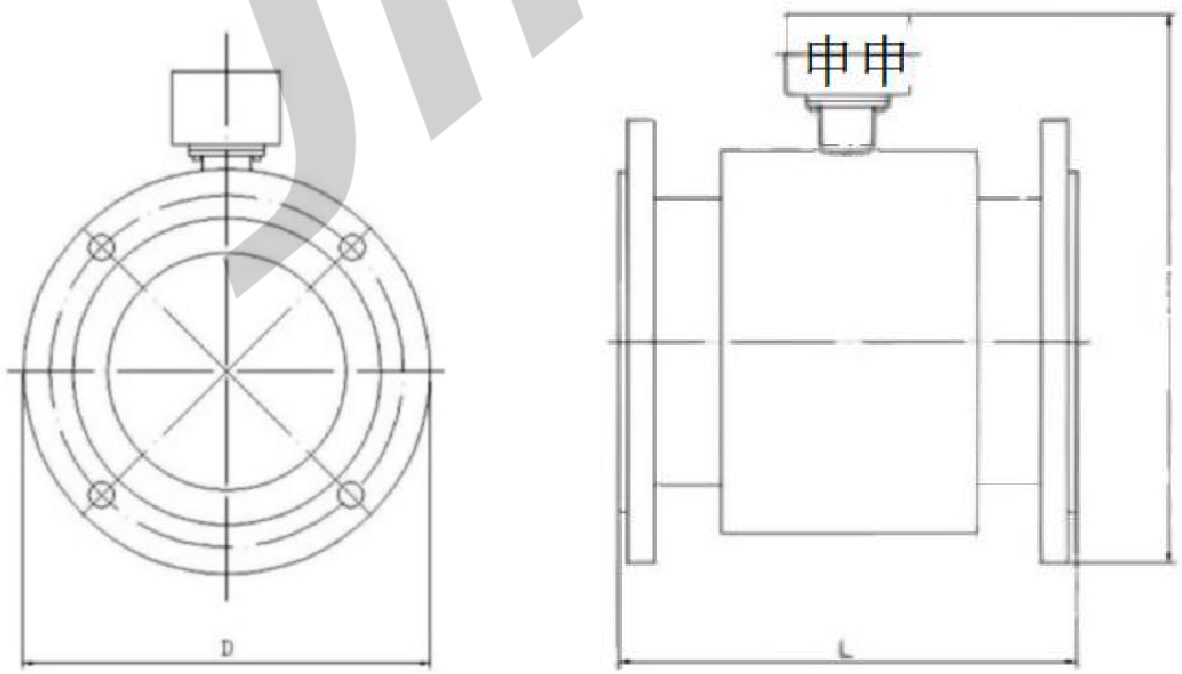
AC power supply, voltage range: 85VAC ~ 250VAC
DC 24V power supply, voltage range: 20VDC ~ 36VDC
Self-powered 3.6V power supply

1.5 Contour and size of electromagnetic flow sensor

Diameter (mm)	Pressure (Mpa)	**Overall dimension**			**Reference weight (kg)**
		Instrument length (including lining)	D	H	
6	4.0	160	90	220	6
10		160/200	90	220	6
15		200	95	220	8
20		200	105	220	10
25		200	115	223	12
32		200	140	240	13
40		200	150	250	14
50		200	165	263	15
65	1.6	250/200	185	283	18
80		250/200	200	290	20
100		250	235	318	25
125		250	270	350	28
150		300	300	380	30
200		350	340	430	50
250		450	405	495	70
300	1.0	500	460	547	95
350		550	520	602	120
400		600	580	665	140
450		600	640	720	160
500		600	715	783	200
600		600	840	897	280

Note: Our company can be customized and processed according to user requirements. The dimension of 160 * is the length of F46 lining. DN65 and DN80 length has 200 and 12500.00g kinds of specifications, the need to explain when ordering.

Diameter (mm)	Pressure (Mpa)	Overall dimension			Reference weight (kg)
		Instrument length (including lining)	D	H	
700	1.0	700	895	982	350
800		800	1015	1092	400
900		900	1115	1192	480
1000		1000	1230	1299	550
1200	0.6	1200	1405	1488	660
1400		1400	1630	1700	750
1600		1600	1830	1924	850
1800		1800	2045	2134	980
2000		2000	2265	2344	1200
2200		2200	2475	2549	1600
2400		2400	2685	2754	2000
2600		2600	2905	2964	2400
2800		2800	2905	3169	2700
3000		3000	3315	3369	2900



Outline drawing of electromagnetic flowmeter sensor

Appendix 1. Selection of Electrode Materials for Electromagnetic Flowmeters

Corrosion resistance of electrode materials (for reference only)

electrode material	Corrosion resistance
SUS316	Used for industrial water, domestic water, sewage, weak corrosive medium, widely used in petroleum, chemical, steel and other industrial sectors and municipal, environmental protection and other fields.
Hastelloy B(HB)	The boiling point of all the following concentrations of hydrochloric acid has good corrosion resistance, resistance to sulfuric acid, phosphoric acid, hydrofluoric acid, organic acids and other non oxidizing acid, alkali, non oxidizing salt corrosion.
Hastelloy C(HC)	It can resist the corrosion of non-oxidizing acids, such as nitric acid, mixed acid or mixed medium of chromic acid and sulfuric acid, and also resist the corrosion of oxidizing salts such as Fe ***, Cu **or other oxidants. Such as the corrosion of hypochlorite solution and seawater higher than normal temperature.
Titanium (Ti)	Resistant to seawater, various chlorides and hypochlorites, oxidizing acids (including Including fuming sulfuric acid), organic acids, alkali, etc. corrosion, not resistant to pure Corrosion of reducing acids (such as sulfuric acid, hydrochloric acid). However, if the acid contains an oxidizing agent (such as nitric acid, Fe **, Cu**), the corrosion is greatly reduced.
Tantalum (Ta)	Has excellent corrosion resistance, and glass is very similar, in addition to hydrofluoric acid, fuming sulfuric acid, alkali, almost all chemical media (including boiling Point of hydrochloric acid, nitric acid and sulfuric acid below 150 ℃ and aqua regia) corrosion. Note: It is not resistant to corrosion in alkali.
platinum/iridium alloy	It is suitable for almost all chemical substances, but not for aqua regia and ammonium salts.

Note: Due to the wide variety of media, its corrosivity is affected by temperature, concentration, flow rate and other complex factors, so this table is for reference only. Users should make their own choices according to the actual situation, and if necessary, they should do the corrosion resistance test of the material to be selected, such as the hanging piece test.

Appendix 2. Selection of Lining Material for Electromagnetic Flowmeter

The lining material shall be selected according to the corrosiveness, abrasiveness and temperature of the medium to be measured.

lining material	Main performance	Scope of application
Polychloroprene rubber	1. Excellent elasticity, high breaking force and good wear resistance 2. resistance to general low concentration acid, alkali, salt medium corrosion, not resistant to oxidation medium the corrosion	Water, sewage, weak abrasive mud,Pulp Temperature range -20˚ C～+60˚ C
Polyurethane rubber	1. has excellent wear resistance (equivalent to 10 times of natural rubber) 2. Poor acid and alkaline resistance 3. can not be used for water mixed with organic solvents	Neutral strongly worn slurry, coal slurry, mud,etc. Temperature range -20˚ C～+60˚ C
Polysilicon fluorine rubber	1. has excellent elasticity, high breaking force, high temperature resistance 2. not resistant to any concentration of acid, alkali, salt medium corrosion	Water, Temperature range -20˚ C~+180˚ C
PTFE	1. The 1 material with the most stable chemical properties in plastics is resistant to boiling hydrochloric acid, sulfuric acid and aqua regia, concentrated alkali and various organic solvents, and is not resistant to chlorine trifluoride, high flow rate liquid fluorine, liquid oxygen and ozone corrosion. 2. Poor wear resistance	Temperature resistance range of strong corrosive media such as concentrated acid and alkali -40˚ C～+170˚ C
Perfluoroethylene propylene F46	1. Corrosion resistance is the same as PTFE 2. Low wear resistance 3. Strong anti-negative pressure ability	Same as PTFE, can be used Temperature resistance range for low wear media: -40˚ C to +160˚ C
PFA	Corrosion resistance with PTFE, anti-negative pressure ability	Can be used in negative pressure state temperature range: 40˚ C～+160 ˚

Appendix 3. Electromagnetic Flowmeter Flow Rate Comparison Table

Diameter(mm)/Flow rate(m³ /h)/Flow velocity(m/s）

	0.5	1	2	3	4	5	10
6	0.0509	0.1018	0.2036	0.3054	0.4072	0.5089	1.0178
10	0.1414	0.2827	0.5654	0.8482	1.1309	1.4137	2.8271
15	0.3181	0.6362	1.2723	1.9085	2.5447	3.1809	6.3625
20	0.5655	1.1310	2.2619	3.3929	4.5239	5.6549	11.3103
25	0.8836	1.7671	3.5343	5.3014	7.0686	8.8357	17.6714
32	1.4476	2.8953	5.7906	8.6859	11.5812	14.4765	28.9533
40	2.2619	4.5238	9.0478	13.5717	18.0956	22.6195	45.2384
50	3.5343	7.0686	14.1372	21.2058	28.2743	35.3429	70.6862
65	5.9730	11.9459	23.8918	35.8377	47.7836	59.7295	119.4591
80	9.0478	18.0956	36.1911	54.2867	72.3823	92.4779	180.9563
100	14.1372	28.2743	56.5487	84.8230	113.0973	141.3717	282.7432
125	22.0893	44.1786	88.3573	132.5359	176.7146	220.8932	441.7861
150	31.8086	63.6173	127.2345	190.8518	254.4690	318.0863	636.1733
200	56.5487	113.0973	226.1947	339.2920	452.3893	565.4867	1130.9735
250	88.3573	176.7146	353.4292	530.1438	706.8583	833.5729	1767.1464
300	127.2345	254.4690	508.9380	763.4070	1017.8760	1272.3450	2544.6901
350	173.1803	346.3606	692.7212	1039.0818	1385.4424	1731.8030	3463.6063
400	226.1947	452.3893	904.7787	1357.1680	1809.5574	2261.9467	4523.8932
450	286.2776	572.5553	1145.1105	1717.6658	2290.2210	2862.7763	5725.5533
500	353.4292	706.8583	1413.7167	2120.5750	2827.4334	3534.2917	7068.5835
600	508.9380	1017.8760	2035.7520	3053.6281	4071.5041	5089.3801	10178.760
700	692.7212	1385.4424	2770.8847	4156.3271	5541.7694	6927.2118	3854.4242
800	904.7787	1809.5574	3619.1147	5428.6721	7238.2295	9047.7868	8095.5741
900	1145.1105	2290.2210	4580.4421	6870.6631	9047.7868	11451.1052	22902.2102
1000	1413.7167	2827.4334	5654.8668	8482.3002	11309.7336	14137.1669	28274.3344

1200	2035.7520	4071.5041	8143.0082	12214.5122	16286.0163	20357.5204	40715.0412
1400	2770.8847	5541.7694	11083.5389	16625.3083	22167.0778	27708.8472	55417.6941
1600	3619.1147	7238.2295	14476.4589	21714.6884	28952.9179	36191.1474	72382.2951
1800	4580.4420	9160.8842	18321.7684	27482.6526	36643.5367	45804.4209	91608.8423
2000	5654.8667	11309.7336	22619.4671	33929.2007	45238.9342	56548.6678	13097.3363
2200	6842.3887	13684.7776	27369.5552	41054.3328	54739.1104	68423.8880	136847.7763
2400	8143.0080	16286.0163	32572.0326	48858.0490	65144.0653	81430.0816	62860.1631
2600	9556.7247	19113.4268	38226.8536	57340.2804	76453.7072	95567.1340	191134.2683
2800	11083.5387	22167.0774	44334.1548	66501.2322	88668.3095	110835.3869	221670.774
3000	12723.4500	25446.900	50893.8001	76340.7002	101787.6002	127234.5003	254469.0011

2. Intelligent Plug-in Electromagnetic Flowmeter

2.1 The product's functional use and scope of application.

The plug-in electromagnetic flow sensor (referred to as the sensor) and the plug-in electromagnetic flow converter (referred to as the converter) form a plug-in electromagnetic flowmeter (referred to as the flowmeter), which is used to measure the volume flow of various conductive liquids in the pipeline.

The sensor has the following characteristics:

- The sensor has no moving parts, simple structure and reliable work.
- The plug-in electromagnetic structure can be easily installed and disassembled without stopping water under low pressure or under pressure. Therefore, it is very suitable for fluid measurement of existing pipelines and is convenient for maintenance and repair of instruments.
- The measurement accuracy is not measured medium temperature, pressure, density, viscosity, conductivity (as long as the conductivity is greater than 20 S/cm) and other physical parameters change.
- The sensor almost no pressure loss, energy loss is very low.
- The manufacturing cost and installation cost of the general flowmeter are lower. Especially suitable for large and medium diameter pipeline flow measurement.
- The use of advanced low-frequency square wave excitation. Zero stability, strong anti-interference ability, reliable work.

- Large flow measurement range. The full-scale flow velocity in the measured pipeline can be 1 m/s to 10 m/s, and the output signal and flow rate are linear.
- The flowmeter not only has 0 ~ 10mA or 4 ~ 20mA standard current output, but also has 1~5 kHz frequency output.

2.2 Product type and composition

The type of the product is plug-in, connected with the pipeline through the installation base.

2.3 Main technical performance

2.3.1 Diameter:

DN100mm ~ DN3000mm;

2.3.2 Flow rate measurement range

0.5~10 m/s, 1~10m/s in full scale range continuously adjustable.

2.3.3 Accuracy Class:

When the flow velocity is less than or equal to 0.5 m/s, ± 1.5. ± 1.0 m/s at flow velocity> 1.

2.3.4 Measured medium conductivity: ≥20 μ s/cm

2.3.5 Working pressure: ≤1.6MPa

2.3.6 Electrode Material

molybdenum-containing stainless steel, Hastelloy B, Hastelloy C, titanium Ti, tantalum Ta.

2.3.7 Measuring tube (measuring head) material:ABS

2.3.8 Measured medium maximum temperature:60℃

2.3.9 Enclosure protection class:

The sensor conforms to the relevant provisions of the GB4208-2008 standard IP68.

2.3.10 The maximum signal transmission distance between the sensor and the converter:

50m (special requirements please contact us)

2.3.11 Flowmeter output signal:

Analog current: 0~10 mA load resistanceis 0~1.5kΩ;
4 ~ 20mA load resistance is 0~7500;
Frequency: 1 to 5 kHz.

2.4 Working principle and structure

2.4.1Working principle

The sensor is actually a 1 liquid flow rate measuring instrument. It is the application of the principle of Faraday induction made flow rate measuring instrument. 1 is a schematic diagram of the basic working principle of the insertion type flowmeter.

With a long rod will be a small electromagnetic flow sensor is inserted into the pipe to be measured in the specified position, the conductive fluid vertical flow through the sensor's working magnetic field (converter to provide excitation current to the sensor, the excitation coil in the excitation system will produce working magnetic field), equivalent to the conductor in the magnetic field for cutting magnetic lines of motion. According to Faraday's law of induction, an induced electromotive force is generated at both ends of a conductor. This induced electromotive force is detected by a pair of electrodes in contact with the fluid. The magnitude of the electromotive force is proportional to the magnetic induction intensity B, the distance L between the two poles and the average flow velocity of the fluid. namely

$E = K \cdot B \cdot L \cdot V$ (V) ①

In the formula: E-induced electromotive force,

B- -magnetic field strength, Tesla; L-distance between two electrodes, m;

V -- Flow velocity flowing through the flow velocity sensor (I. e., particle velocity representing the specified insertion point of the tested pipeline), m/s

K-Coefficient.

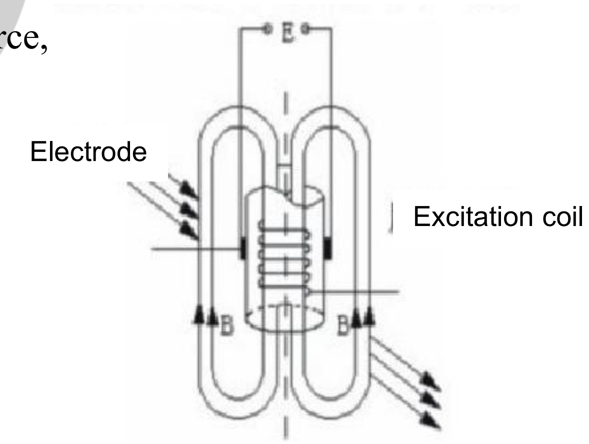


Figure 1 Working principle

There are two ways for our company to insert the electromagnetic flow sensor into the specified insertion point. The 1 is to insert it into the central axis of the pipeline to be tested. The 2 is to insert it into the inner wall of the pipeline at about 0.25D of the pipeline, d is the diameter of the pipeline, and the pipeline generally smaller than DN400 can be inserted into the central axis of the pipeline to be tested. at this time, the flow rate measured by the sensor is the maximum the flow rate is multiplied by a coefficient K.

$$K = \frac{2n^2}{(N+1)(2n+1)}$$ (For smooth pipes) ②

where: n is the Reynolds number index, which can be obtained by equation 3, n = 1.66lgReD ③

In the formula: R-pipeline fluid Reynolds number.

$$K = \frac{1}{1 - \frac{0.72}{Lg(0.2703\frac{K}{D}) \frac{5.74}{R_D^{0.9}}}}$$ (for rough pipes)

In the formula, K-equivalent absolute roughness, the average height of the protrusions on the inner wall of the pipeline.

Pipes larger than DN400 can be inserted at about 0.25 from the inner wall of the pipe. At this time, the flow rate measured by the flow rate sensor is the average flow rate, and the coefficient K = 1. The flow rate of the measured pipeline can be determined by the following table

Shown

Q=VA(m^3/h) ④

In the formula, A- cross-sectional area of round pipe, m^2 .
Substituting from type ① to type ④, we get

$$Q = \frac{E}{BL} A$$ ⑤

Since the working magnetic field strength of the plug-in electromagnetic flow sensor and the distance between the two electrodes have been determined during manufacture, and the cross-sectional area of the measured pipeline is also obtained, the output electromotive force of the plug-in electromagnetic flow sensor can represent the flow size.

2.4.2 Structure

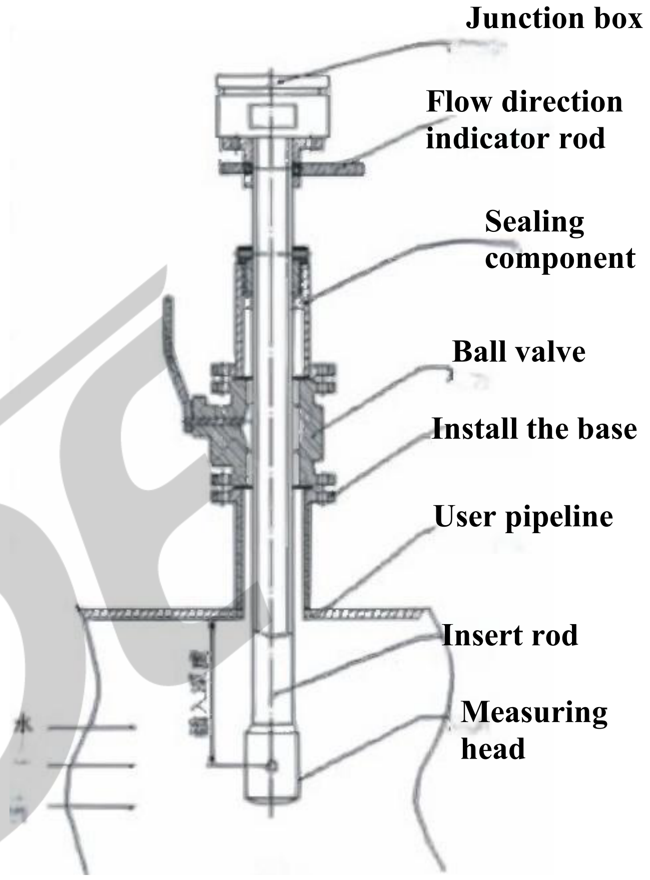
As shown in Figure 2, the sensor is mainly composed of a measuring head (or measuring tube), an excitation system, an insertion rod, a junction box, a mounting base (divided into two forms: flange connection and threaded connection), and a sealing positioning mechanism.

Measuring head (or measuring tube): The measuring head (measuring tube) is located at the mass point of the measured fluid flow rate in the pipeline to detect the flow rate at this point. The measuring head (or measuring tube) is a tip or conduit made of an insulating material on which a pair of electrodes is mounted. Except for the electrode end or the inner wall of the measuring tube, other parts are insulated from the measured fluid.

Excitation system: The function of the excitation system is to generate a working magnetic field, which is composed of an excitation coil and an iron core, which is insulated and sealed in the measuring head.

Insert rod: made of stainless steel material. The measuring head and the measuring tube are fixed in the insertion tube. The excitation lead and the electrode lead are sealed with the measured medium through the insertion rod and connected to the junction box, the insertion rod is welded with a direction indicator mark to ensure the working magnetic field and flow rate during installation.

And the electrode connection line three perpendicular to each other, in line with the requirements of Faraday's law of induction.



Junction box: The junction box is located on the upper part of the sensor, and the wiring terminals in the junction box are used to connect the sensor and the converter to each other.

Mounting base: The mounting base is welded on the pipeline to be measured and used to connect with the installation ball valve and insert the part of the flowmeter sensor.

Sealing assembly: composed of a compression thread seat made of stainless steel, a compression nut, a rubber gasket and a positioning screw, etc., to seal the inserted sensor so that it can withstand a certain working pressure.

2.5 Installation and Use

2.5.1 Preparation before installation

2.5.1.1 Selection of installation environment

① Should be as far away from the equipment with strong magnetic field, such as large motor, large transformer, frequency conversion equipment, etc.

② There should be no strong vibration at the installation site, and the pipeline should be firmly fixed. The ambient temperature should not change much.

③The installation environment should be easy to install and maintain.

2.5.1.2 Selection of installation position

① The installation position must ensure that the pipeline is always filled with the measured fluid.

② Select the place where the fluid flow pulse is small, that is, it should be away from the pump and valves, elbows and other local resistance parts.

③ When measuring two-phase (solid, liquid or gas,liquid) fluid, a place that is not easy to cause phase separation should be selected.

④ Avoid negative pressure at the measurement site.

⑤ It is easy to measure the diameter or circumference of the side pipe, and the ovality should be small.

2.5.1.3 Length of straight pipe section

The length of the straight pipe section on the upstream side of the sensor installation pipe shall be greater than or equal to 15 D, the downstream side shall not be less than 10D (D is the diameter of the pipeline under test)

2.5.1.4 Flow Control and Regulating Valves

The flow control valve should be installed in the pipeline under test on the upstream side of the sensor The flow regulating valve should be installed on the downstream side of the sensor. When measuring, usually the flow control valve should be fully open.

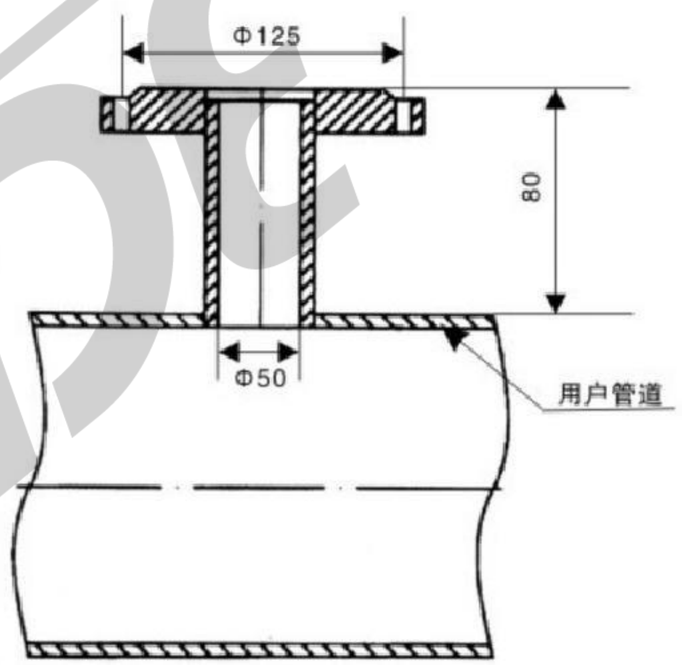


Fig. 3 Mounting Base

2.5.1.5 Welding of mounting base

Before installation, a 60-diameter mm hole should be opened on the tested pipeline. The size is consistent with the outer diameter of the connecting pipe of the mounting base. The welding of the installation base and the tested pipeline is shown in Figure 3.

The technical requirements for welding are as follows:

① The axis of the mounting base is at the center of the pipeline under test and perpendicular to the axis of the pipeline under test.

② Flat welding with stainless steel electrode. After welding, ensure that the flange end face is parallel to the pipe axis, the weld is firm, and can withstand 1.6- MPa pressure without leakage.

2.5.2 Sensor Installation

2.5.2.1 Remove the welding slag and burrs on the test tube mounting base.

2.5.2.2 Turn off the upstream flow control valve or use low-pressure water supply.

2.5.2.3 Determine the insertion depth of the plug-in electromagnetic (the position of the two electrodes on the plug-in electromagnetic flow sensor in the pipeline).

2.5.2.4 Install the DN50 ball valve on the mounting base as shown in Fig. 3. Note that the long cavity of the ball valve is upward. Check whether the ball valve can be fully opened and fully closed. Tighten the gland nut and set screw, and at the same time, pay attention to the direction of the sensor direction mark should be consistent with the fluid flow direction.

2.5.2.5 Determination of insertion depth of plug-in electromagnetic flow sensor:

For D<400mm, the depth of insertion is: 1/2 times the diameter of the tube.

For D<400mm, the insertion depth is 1/4 times of the pipe diameter. (two instrument coefficient is not the same)

2.5.3 Laying of cable

The laying of the cable is divided into two types: light application and dark application. Which kind of laying depends on the specific situation of the site.

Fig 4 is an electrical wiring diagram between the sensor and the transducer. It can be seen from the figure that there are two cables between the sensor and the converter. The 1 is an excitation line through which the converter supplies an excitation current to the sensor, and the 1 is a signal line through which the sensor outputs an electromotive force to the converter.

Cable laying and wiring must pay attention to the following points:

①The signal cable should not be laid in parallel with the external high current power cable. Generally, the signal cable shall be electrically shielded from the external cable through the threaded steel pipe. The threading steel pipe shall be connected with the ground wire.

② When laying, the distance between signal cable and power cable should be more than 1 meter. The signal cable and the excitation cable should also be kept at a certain distance. When laying through steel pipe, the excitation cable should also pass through the pipe separately.

③ The distance between the sensor and the converter should generally be less than 15 meters, special circumstances need to extend the cable, should contact the company. The signal cable and excitation cable manufactured by our company are RVVP double-core polyethylene insulated and shielded sheathed cables with a specification of 2*0.75 diameter φ 8mm and a length of 10 meters. If special requirements, please indicate to our company when ordering.

④The company does not provide the converter power supply cord and output current and frequency cable. Since the load current required by these two cables is only tens to hundreds of milliamperes, and the transmission distance is related to the distance from the site to the control room, the user can prepare the power supply and output signal cables according to actual needs.

2.5.4 Grounding

The flow signal generated by the sensor is very weak, usually in the order of microvolts or millivolts. Therefore, preventing the influence of external electrical interference is an important factor in making good use of the flowmeter. Grounding is a very effective measure to solve the influence of electrical interference.

Sensor grounding requirements are mainly measured medium grounding. The grounding terminal of the sensor and the converter (terminal "C" is connected to the metal shielding net of the flow signal cable, and is connected to the measured medium through the insertion rod. When the pipeline under test is non-metal pipeline, in order to ensure good grounding.

A grounding wire can be directly connected to the ground terminal of the sensor, and a grounding electrode can be installed on the tested pipeline. The grounding resistance shall be less than 100.

2.5.5 Adjustment and use

① If the flow of the pipeline to be measured is known, the flow range can be set according to the flow in the pipeline to be measured and the setting method of the converter range.

② After the preparation work is completed, first open the upstream flow control valve of the sensor, and then slowly open the downstream flow control valve, and observe that the converter shows that the flow should change from small to large. If a negative value is displayed, the signal lines "SIG1" and "SIG2" shall be interchanged after the power is cut off.

③ Re-set the flow range value and sensor coefficient as required according to the measured flow.

④ Open the upstream flow control valve of the sensor, and then open the downstream flow control valve, so that the fluid is discharged for a few minutes, so that the gas in the pipeline is discharged. Close the downstream flow control valve and the upstream flow control valve, so that the pipeline is full of fluid, but does not flow, and zero the instrument.

⑤ Open the upstream flow control valve, and then slowly open the downstream flow control valve, the instrument can be put into operation.

2.6 Maintenance, repair and common troubleshooting

2.6.1 Maintenance

Sensors generally do not require regular maintenance. But for the measured medium is easy to make the electrode and measuring head (measuring tube) surface or inner wall adhesion fouling situation, must be regularly cleaned. The cleaning cycle depends on the rate of adhesion and scaling. When cleaning the electrode and measuring head (measuring tube), care must be taken not to damage the insulating material and the electrode.

2.6.2 Repair

If the sensor is faulty, it can be determined whether the measurement system of the sensor excitation system is normal according to the inspection method described in Article 7.3 of this description. If there is a fault, should contact the company, the general user can not repair their own.

Close the ball valve when removing the sensor.

2.6.3 Common Troubleshooting

Fault phenomenon	Cause	Exclusion method
Converter flow is negative	1. The sensor direction indication plug is opposite to the fluid flow direction 2. There is a reverse connection between X and Y or A and B in the sensor junction box	1. Rotate the sensor direction 180 ° 2. Reconnect the converter
Converter output overrange	1. The range value of the flowmeter is less than the actual measured value 2. Fluid does not fill the pipeline 3. Excitation coil open circuit	1. Expand the range of the flowmeter 2. Close the flow control valve 3. Re-wiring
Excessive output signal fluctuation	1. There is gas at the sensor electrode, causing the electrode to interact with the dielectric. Poor quality contact 2. There are deposits on the electrode	1. Eliminate the gas in the pipeline 2. Clean the electrode
The output signal gradually drifts towards the zero value	1. Sensor water 2. Electrode is covered	1. Replace the sensor 2. Clean the electrode

2.7 Unpacking and Complete Product

When unpacking, the user should check the model of the sensor according to the packing list, and check whether the sensor is defective or damaged. The complete set of sensors includes:

2.7.1 Plug-in electromagnetic flow sensor, 1 set

2.7.2 Electromagnetic flow converter, 1 set

2.7.3 Signal cable RVVP type double core PVC insulated shield 2 ×10 m (split type optional)

2.7.4 Ball valve 1 DN50,PN1.6MPa

2.7.5 Mounting base 1 piece

2.7.6 Random files

1 copy of instruction manual

1 copy of product certificate

3. Converter operation

3.1 220V/24V Wiring Diagram of Converter

3.1.1 Square Terminal Wiring and Marking

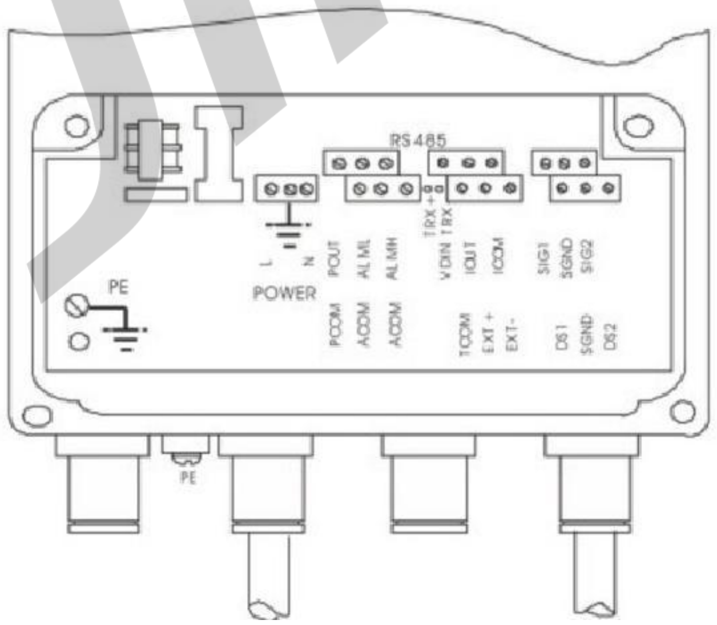


Fig. 4 terminal

diagram of square table each terminal

mark meaning is as follows:

SIG 1	Signal 1	Connect the split-type sensor
SGND	Signal Ground	
SIG 2	Signal 2	
DS1	Incentive shielding 1	
DS2	Incentive shielding 2	
EXT+	Excitation current +	
EXT	Excitation current	
VDIN	Two-wire current 24V contact	Analog current output
IOUT	Analog current output	
ICOM	Analog current output site	
POUT	Flow frequency (pulse) output	Frequency or pulse output
PCOM	Frequency (pulse) output location	
ALMH	Upper limit alarm output	Two alarm outputs
AL ML	Lower limit alarm output	
ACOM	Alarm output location	
TRX+	Communication input	Communication input
TRX	Communication input	
TCOM	485/232 communication location	

3.1.2 Square surface sensor signal line processing and marking

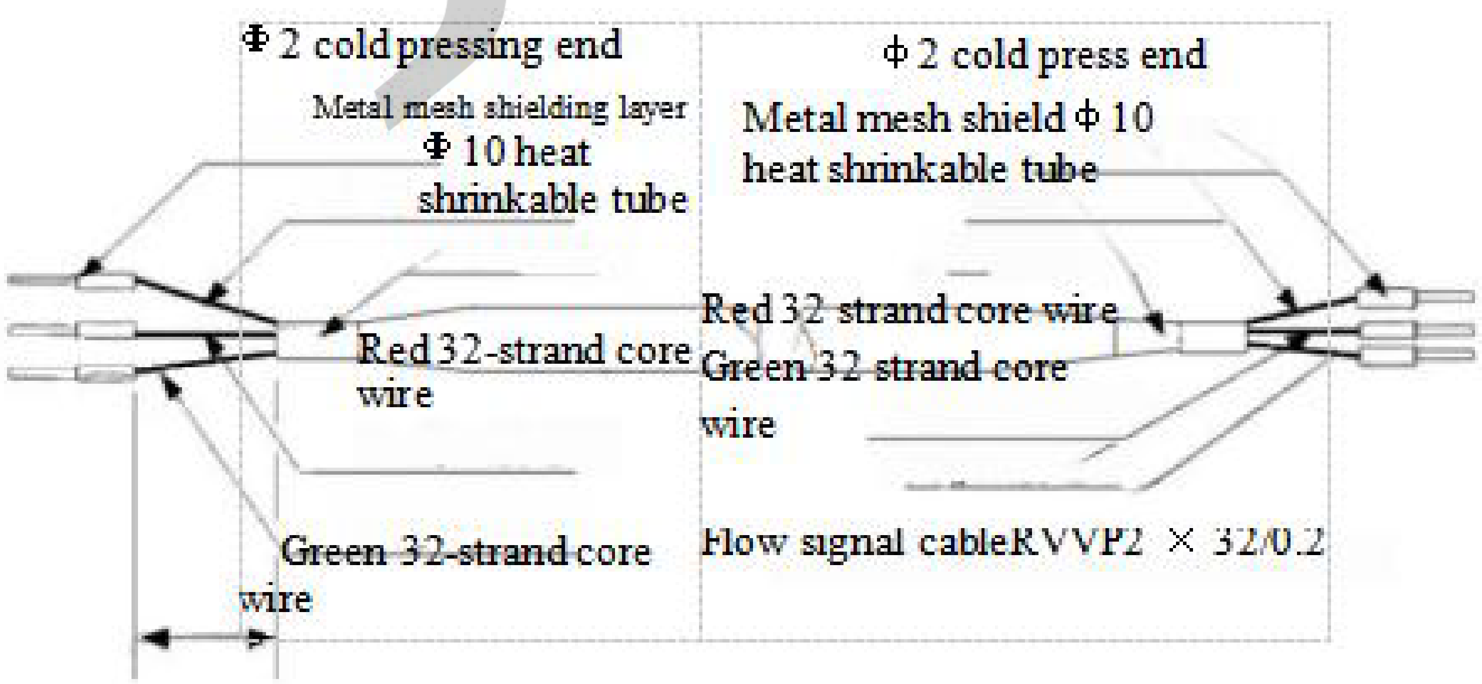
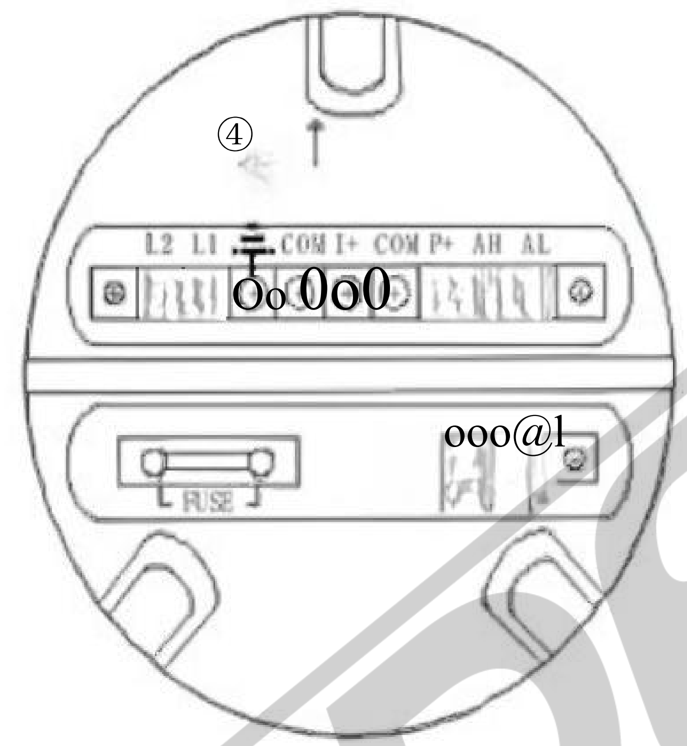


Fig. 5 Signal line processing and marking of square surface sensor

3.1.3 Round Table Terminal Wiring and Marking



3.1.4 Circle table each terminal mark definition

I +:	**Flow current output**
COM:	**Current output ground**
P+:	**Bi-directional flow frequency (pulse) output**
COM:	**Frequency (pulse) output ground**
AL:	**Lower limit alarm output**
AH:	**Upper limit alarm output**
COM:	**Alarm output ground**
FUSE:	**Input power fuse**
T+:	**Communication input**
T -:	**Communication input**
G:	**RS485/232 communication**
L1:	**220V(24V) power input**
L2:	**220V(24V) power input**

3.1.5 Processing and Marking of Signal Line of Round Table

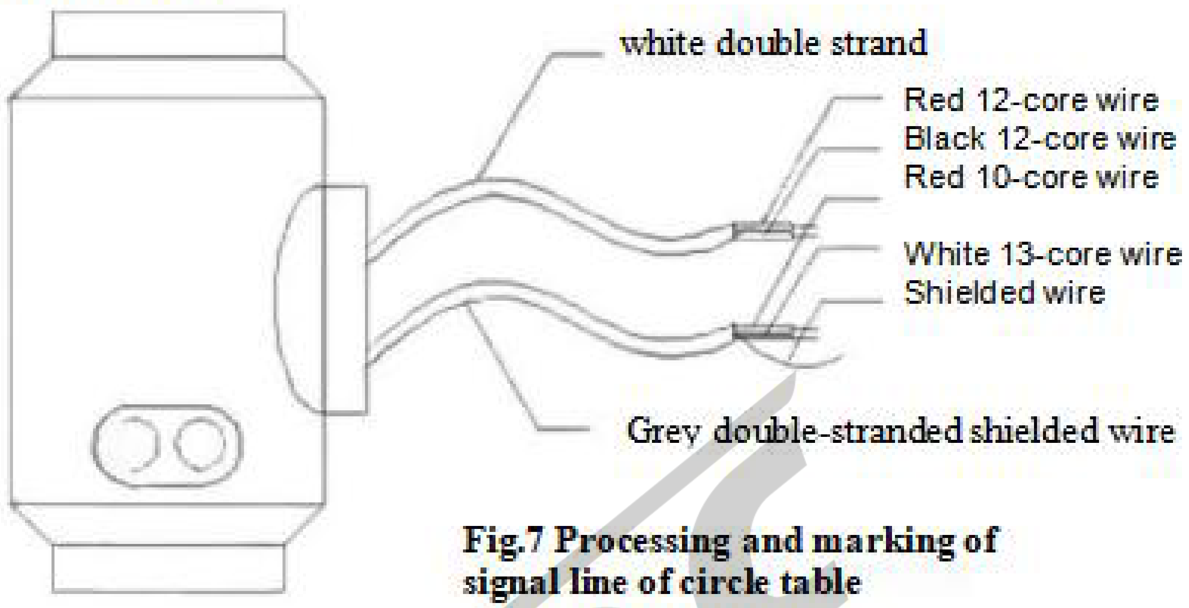


Fig.7 Processing and marking of signal line of circle table

The signal lines of the circle table are marked as follows:

White double stranded wire: red 12 core wire
Black 12-core wire — Excitation current

Gray double-stranded shielded wire: 10-core red wire to "signal 1"
White 13 core wire to "signal 2"
shielded wire to "signal ground"

3.1.6 Instrument parameter setting

After the electromagnetic flowmeter converter and sensor are connected to the fluid pipeline (whether it is calibration or use), the following work should be performed first:

The pipes before and after the sensor are well fastened with copper wire. Ground the sensor well.

Ensure that the fluid in the pipeline is still when adjusting the zero point of the instrument.

Ensure that the sensor electrode oxide film is stable (continuous contact between the electrode and the fluid for 48 hours).

3.1.6.1 Four-key converter parameters and operation

When the instrument is powered on, it will automatically enter the measurement state. In the automatic measurement state, the instrument automatically completes each measurement function and displays the corresponding measurement data. In the parameter setting state, the user uses the four panel keys to complete the instrument parameter setting.

3.1.6.1.1 Key functions

a) Key function in automatic measurement state

Up key: select the display content of the screen cyclically; compound key + confirmation key: enter the parameter setting state; confirmation key: return to the automatic measurement state.

In the measurement state, the adjustment method of LCD display contrast is to adjust the appropriate contrast by "composite key + up key" or "composite key + down key.

b) In the parameter setting state, each key function key: the number at the cursor minus 1;

Up key: the number at the cursor plus 1; compound key + down key: the cursor moves to the left;

Compound key + up key: move the cursor to the right; confirm key: enter/exit submenu;

Confirm key: In any state, press it continuously for two seconds to return to the automatic measurement state.

Note:(1) When using the "compound key", press the compound key first and then press and hold the "up key" or "down key" at the same time ".

(2) In the parameter setting state, if there is no key operation within 3 minutes, the instrument will automatically return to the measurement state.

(3) The flow direction selection of the flow zero point correction can be moved to the leftmost "+" or "-" and switched with the "up key" or "down key" to make it opposite to the actual flow direction.

3.6.1.2 Parameter setting function and function key operation

For instrument parameter setting or modification, the instrument must be brought from the measurement state to the parameter setting state. In the measurement state, press the "compound key + confirmation key", the instrument enters the function selection screen "parameter setting", then press the confirmation key to enter the password state, "00000" state, enter the password to enter, press the "compound key + confirmation key" to enter the parameter setting screen.

The instrument is designed with 6-level passwords, of which 4-level users can set their own password values, the highest 2-level is a fixed password value, and 6-level passwords are used for operators of different security levels.

3.1. 6. 1. 3 Function Selection Screen

Press "compound key + confirmation key" to enter the function selection screen, and then press "up key" or "down key" to select. There are 3 functions to choose from in this screen;

Parameter No.	Functional content	Description
1	Parameter setting	Select this function to enter the parameter setting screen
2	Total Clearing	Select this function to clear the total amount of the instrument.
3	Coefficient change record	Select this function to view flow coefficient modification records

3.1. 6. 1. 4 Parameter Setting

Click "compound key + confirmation key" to display "parameter setting" function, the instrument enters "parameter setting" on the function selection screen, then press the confirmation key to enter the password input state, "00000" state, enter the password, press "compound key + confirmation key" to enter the parameter setting screen.

3.1. 6. 1. 5 Total amount reset to zero

Press the "compound key + confirmation key" to display the "parameter setting" function, then press the "up key" to turn the page to the "total amount zero clearing", enter the total amount zero clearing password, press the "compound key + confirmation key", when the total amount zero clearing password automatically changes to "00000", the zero clearing function of the instrument is completed, and the total amount inside the instrument is 0.

3.1. 6. 1. 6 Coefficient change record

Click the "compound key + confirmation key" to display the "parameter setting" function, and then press the "up key" to turn the page to the "coefficient modification record".

3.1.6.2 Parameter Setting Menu

There are 54 parameters. When using the instrument, the user should set each parameter according to the specific situation.

Instrument parameters determine the operating state, calculation method, output mode and state of the instrument. Correct selection and setting of instrument parameters can make the instrument run in the best condition and obtain higher measurement display accuracy and measurement output accuracy.

The instrument parameter setting function is provided with a 6-level password. Among them, level 1~5 is the user password, and level 6 is the manufacturer password. The user can use the level 5 password to reset the level 1-4 password.

No matter which level of password is used, the user can view the meter parameters. However, if the user wants to change the meter parameters, a different level of password will be used.

Level 1 password (factory value 00521): the user can only view the instrument parameters;

Level 2 password (factory value 03210): the user can change 1~24 instrument parameters; Level 3 password (factory value 06108): the user can change 1~25 instrument parameters; Level 4 password (factory value 07206): the user can change 1~29 instrument parameters; Level 5 password (fixed value): the user can change 1~52 instrument parameters.

It is recommended that the user's higher-level personnel master, level 5 password; level 4 password, mainly used to set the total amount; level 1~3 passwords, by the user to decide what level of personnel to master.

3.1.6.3.1 Language

With Chinese and English two languages, users can choose their own operation.

3.1.6.3.2 Instrument communication address

Refers to the communication address in this table for multi-machine communication, optional range: 01~99 address, address 0 is reserved.

3.1.6.3.3 Instrument communication speed

Instrument communication baud rate selection range: 600, 1200, 2400, 4800, 9600, 19200.

3.1.6.3.4 Measurement of pipe diameter

Diameter range: DN6 mm ~ DN3000 mm.

3.1.6.3.5 Flow Units

Select the flow display unit in the parameters, and the meter flow display units are: L/s, L/m, L/h, m3/s, m/m, m/h. Users can select a suitable flow display unit according to process requirements and usage habits.

3.1.6.3.6 Instrument Range Setting

The meter range setting refers to the determination of the upper limit flow value, and the lower limit flow value of the meter is automatically set to "0"

Therefore, the range setting of the instrument determines the range of the instrument, which also determines the correspondence between the percentage display of the instrument, the frequency output of the instrument, the current output of the instrument and the flow:

Percentage display value of instrument = (flow value measurement value/instrument range) * 100%;

Instrument frequency output value = (flow value measurement value/instrument range) * frequency full range value;

Instrument current output value = (flow value measurement value/instrument range) * current full range value + base point;

The pulse output value of the instrument is not affected by the range setting of the instrument;

3.1.6.3.7 measurement of damping time

Long measurement filtering time can improve the stability of the meter flow display and the stability of the output signal, which is suitable for the pulsating flow measurement of total accumulation. The short measurement filter time is characterized by a fast measurement response speed, which is suitable for production process control. The measurement filter time is set in a selective manner.

3.1.6.3.8 Flow Direction Option

If the user thinks that the fluid direction during debugging is inconsistent with the design, the user does not need to change the connection method of the excitation line or the signal line, but can set the parameter change with the flow direction.

3.1.6.3.9 Flow Zero Correction

Zero correction should ensure that the sensor tube is full of fluid, and the fluid is in a static state. The flow zero point is expressed in the flow rate, and the unit is mm/s.

The converter flow zero correction is displayed as follows:

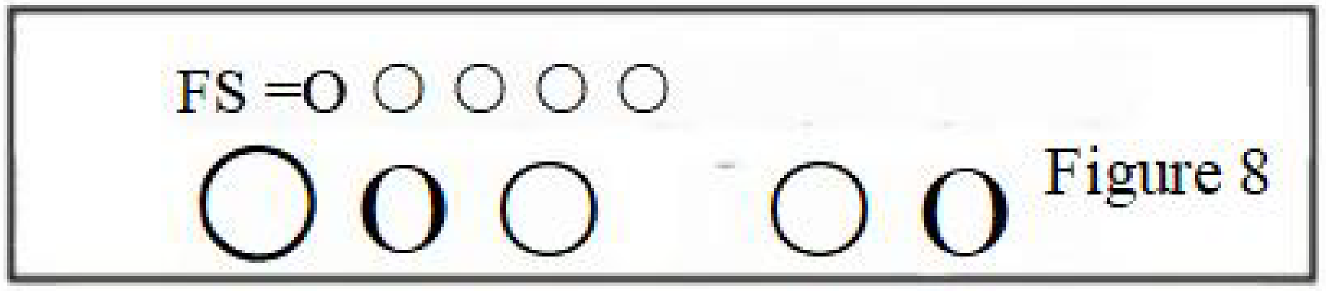


Figure 8

Upward small print display: FS represents the measured value of the zero point of the instrument; downward large print display: the corrected value of the zero point of the flow velocity;

When FS is not displayed as "0", the correction value should be adjusted so that FS = 0. Note: If you change the downward correction value and the FS value increases, you need to change the positive and negative sign of the downward value so that FS can be corrected to zero.

The corrected value of the flow zero point is the matching constant value of the sensor and should be recorded in the record sheet of the sensor and the sensor label. The zero point value of the sensor at the time of recording is the flow rate value in mm/s, and its sign is opposite to the sign of the correction value.

3.1. 6. 3. 10 Small signal cut point

The small signal cut point setting is expressed as a percentage flow of the span. When the small signal is removed, the user can choose to simultaneously remove the flow rate, flow rate and percentage of the display and signal.

Output; You can also choose to cut only the current output signal and frequency (pulse) output signal to maintain the display of flow, flow rate and percentage.

3.1. 6. 3. 11 Flow Accumulation Unit

The converter display is a 9-bit counter with a maximum allowable count value of 999999999. The accumulative units used are L, m^3 (liters, cubic meters).

Flow accumulation equivalent: 0.001 L, 0.010L, 0.100L, 1.000L $0.001m^3$, $0.010m^3$, $0.100m^3$, $1.000m^3$;

3.1. 6. 3. 12 Reverse Output Allow Function

When the reverse output enable parameter is set to the "allow" state, the converter outputs a pulse and current at the flow value as long as the fluid flows. When the reverse output permission parameter is set to "prohibit", if the fluid flows in the reverse direction, the converter output pulse is "0" and the current output is the signal "0" (4mA or 0 mA)

3.1. 6. 3. 13 Current Output Type

The user can select 0 to 10 mA or 4 to 20 mA current output in the current output type.

3.1. 6. 3. 14 Pulse Output Mode

Pulse output mode has frequency output and pulse output two options:

Frequency output mode: the frequency output is a continuous square wave, and the frequency value corresponds to the flow percentage.

Frequency output value = (flow value measurement value/instrument range) * frequency full range value;

Pulse output mode: the pulse output is a rectangular wave pulse train, each pulse represents a flow equivalent through the pipeline, and the pulse equivalent is selected by the following "pulse equivalent unit" parameter. The pulse output mode is mostly used for total accumulation, and is generally connected by an accumulation meter.

The frequency output and pulse output are generally in the form of OC gates. Therefore, the DC power supply and load shall be externally connected.

3.1. 6. 3. 15 Pulse Equivalent Units

The pulse unit equivalent refers to the flow value represented by a pulse, and the selection range of the instrument pulse equivalent is:

pulse equivalent	**Flow value**	**pulse equivalent**	**Flow value**
1	0.001L/cp	5	0.001m3/cp
2	0.01L/cp	6	0.01m3/cp
3	0.1L/cp	7	$0.1m^3$ /cp
4	1.0L/cp	8	$1.0m^3$ /cp

In the same flow, the pulse equivalent is small, the output pulse frequency is high, the cumulative flow error is small.

3.1. 6. 3. 16 Frequency Output Range

The meter frequency output range corresponds to the upper flow measurement limit, which is 100 percent of the percent flow. The upper limit of frequency output can be arbitrarily set in the range of 1~5000Hz.

3.1.6.3.17 Air traffic control alarm permission

With empty tube detection function, and no additional electrode. If the user chooses to allow the empty pipe alarm, the meter can detect an empty pipe condition when the fluid in the pipe is lower than the measuring electrode. After the empty pipe state is detected, the analog output and digital output of the instrument are set to signal zero, and the flow rate of the instrument is displayed as zero.

3.1.6.3.18 Air traffic control alarm threshold

When the fluid is full (with or without flow rate), the air traffic control alarm setting is modified to make it more convenient for users to use. The measured conductivity is displayed in the upward direction of the air traffic control alarm threshold parameter, and the air traffic control alarm threshold is set in the downward direction. When the air traffic control alarm threshold is set, it can be set according to the measured conductivity and set to 3~5 times of the measured conductivity.

3.1.6.3.19 The upper limit alarm

Allows the user to choose to enable or disable.

3.1.6.3.20 Upper Alarm Value of

The upper limit alarm value is calculated as a percentage of the range. The parameter is set by a numerical value. The user sets a numerical value between 0% and 199.9. When the alarm conditions are met during the operation of the instrument, the instrument will output an alarm signal.

3.1.6.3.21 Lower limit alarm of

Same as upper limit alarm

3.1.6.3.22 Excitation alarm for

Select to allow, with excitation alarm function, select to prohibit, cancel the excitation alarm function.

3.1.6.3.23 Total Clearing Password for

The user can set the password by using the password above the third level, and then set the password within the total amount cleared.

3.1.6.3.24 Sensor coding

The sensor code can be used to mark the factory time and number of the matching sensor to match the setting of the sensor coefficient.

3.1.6.3.25 Sensor coefficient value

Sensor coefficient: the electromagnetic flowmeter calibration coefficient. The coefficient is obtained from the real mark and stamped on the sensor plate. The user must place this factor in the converter parameter table.

3.1.6.3.26 Excitation mode selection of

The electromagnetic flow converter provides three excitation frequency options: 1/16 power frequency (mode 1), 1/20 power frequency (mode 2) and 1/25 power frequency (mode 3). Small diameter sensor excitation system inductance is small, should choose 1/16 frequency. The large-diameter sensor excitation system has a large inductance, and the user can only choose 1/20 power frequency or 1/25 power frequency. In use, select excitation mode 1 first, and then select mode 2 or mode 3 in turn if the meter flow rate zero point is too high. Note: In which excitation mode

Under the calibration, you must work in which excitation mode.

3.1.6.3.27 Positive Total High, Low

The high and low setting of the total amount can change the values of the forward cumulative total amount and the reverse cumulative total amount, which are mainly used for instrument maintenance and instrument replacement.

The user uses the level 5 password to enter the modifiable forward cumulative amount (Σ +). Generally, the cumulative amount set cannot exceed the maximum value (999999999) counted by the counter.

3.1.6.3.28 Reverse Total High, Low

The user uses the 5-level password to enter, and can modify the reverse accumulation amount (2-). Generally, the accumulation amount set cannot exceed the maximum value (999999999) counted by the counter.

3.1.6.3.29 Spike Suppression Allowable

For pulp, mud and other slurry flow measurement, the solid particles in the fluid friction or impact measurement electrode, will form a "sharp interference", in order to overcome such interference, the converter adopts the rate of change suppression algorithm, designed with 3 parameters, the rate of change suppression characteristics to select.

Set this parameter to "allow" and start the change rate suppression algorithm. Set this parameter to "Prohibit" and turn off the change rate suppression algorithm.

3.1.6.3.30 Peak Suppression Coefficient of

The coefficient is selected to suppress the rate of change of the sharp interference, calculated as a percentage of the flow rate, divided into 0.010 m/ s, 0.020 m/s, 0030 m/s, 0.050 m/s, 0.080 m/s,
There are ten grades of 0.100 m/s, 0.200 m/s, 0.300 m/s, 0.500 m/s and 0.800 m/s. The smaller the grade percentage, the higher the sensitivity of sharp interference suppression. Note that in the application, it is not necessary to choose the higher the sensitivity, but to choose according to the actual situation.

3.1.6.3.31 Spike Suppression Time

This parameter selects the time width, in milliseconds, for which the cusp interference is to be suppressed. If the duration of the flow change is less than the selected time, the converter considers the sharp interference. If the duration of the flow change is greater than the selected time, the converter considers the normal flow change. The parameter should also be selected according to the actual situation.

3.1.6.3.32 User Password 1~4

The user uses level 5 password to enter and can modify this password;

3.1.6.3.33 Current Zero Correction

The current output zero point of the converter is adjusted at the factory so that the current output is accurately 0 mA or 4mA.

3.1. 6. 3. 34 **Current Full Scale Correction**

The converter's factory current output is fully adjusted so that the current output is accurate to 10 mA or 20mA.

3.1. 6. 3. 35 **Factory calibration factor of**

This coefficient is specific to the converter manufacturer.

3.1. 6. 3. 36 **Instrument codes 1 and 2**

The converter code records the factory time and number of the converter.

3.2 3.6V Battery powered converter

3.2.1 3.6V Battery-powered electromagnetic flowmeter technical indicators

■ Applicable measurement path: DN3 ~ D N800

■ Medium conductivity: > 2 0 μs/cm

■Lining material: polyurethane rubber, high temperature rubber, acid-resistant rubber, neoprene rubber, PTFE, F46, PFA

■ Electrode material: molybdenum-containing stainless steel, Hastelloy B, Hastelloy C, titanium, tantalum, platinum-iridium alloy

■ Integrated working environment temperature: - 20 ℃ ~ 50 ℃

■ Converter working environment humidity: ≤ 95%

■ Enclosure rating: I P 65, I P 68

■ Velocity measurement range: 0~15 m/s

■ Matching accuracy grade: 1.0 and 0.5

■ Measurement parameters: instantaneous flow rate, instantaneous flow rate

■ Record parameters: cumulative total traffic, 32 groups of event records

■ Detection and alarm parameters: fluid empty pipe detection alarm, excitation current detection alarm, battery capacity detection alarm

■ Calibration output signal: unit volume flow pulse

■ Wireless communication modes: SR D, G P R S, C DM A

Battery working time-sensor caliber correspondence table (1/15HZ) excitation frequency

Caliber range	DN3-150	DN200-350	DN400-600	DN700-1000
Battery working time	40 months	32 months	30 months	26 months

Battery working time-sensor caliber correspondence table (1/30HZ) excitation frequency

Caliber range	DN3-150	DN200-350	DN400-600	DN700-1000
Battery working time	66 months	60 months	50 months	* 46 months

* Electromagnetic flow converter of this caliber needs special customization

3.2.2 3.6V battery-powered converter signal line definition

3.2.2.1 Round table integrated terminal wiring and marking

Battery-powered integrated electromagnetic flow converter has two sets of wiring: signal line group and excitation line group. respectively connected with the corresponding line group of the sensor. The wiring should be correctly connected, carefully nuclear
Yes, so as not to damage the instrument due to incorrect wiring.

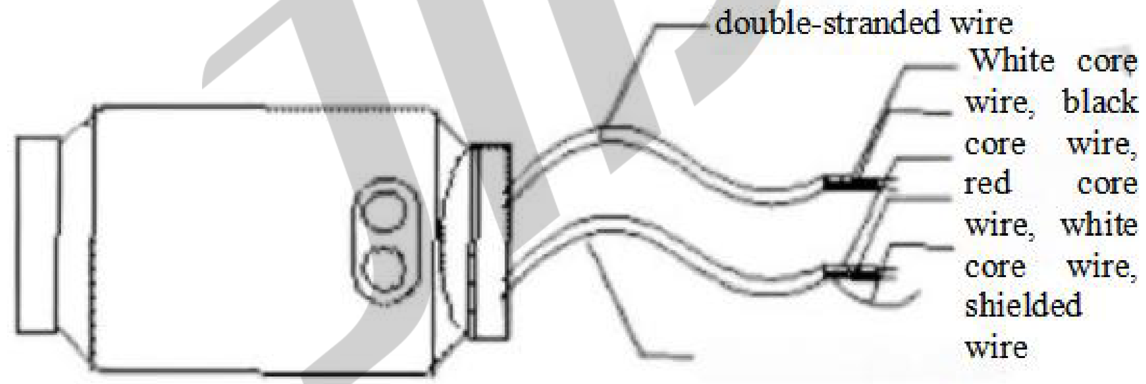


Fig. 9 Schematic diagram of battery power supply signal line

Signal lines are marked as follows:

Black double-stranded plastic wire: White core wire
Black Core Wire
Excitation current

Gray double-stranded drain wire: Red core wire is connected to "signal 1"
White core wire to "signal 2"
Shielded wire to "signal ground"

3.2.2.2 Wiring and marking of square split terminal

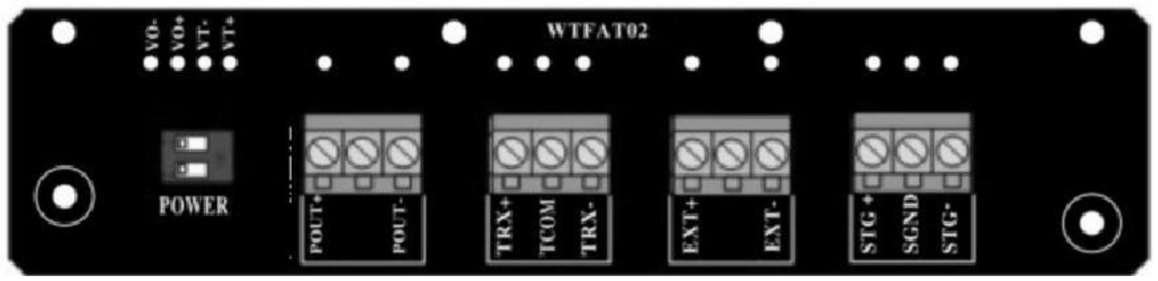


Figure 10

SIG1	Signal 1	By split type sensor
SGND	Signal ground	
SIG2	Signal 2	
EXT+	Excitation current +	
EXT-	Excitation current-	
POUT+	Pulse output	Pulse output
POUT-	Pulse output ground	

The split electromagnetic flow converter is suitable for submersible installation. The electromagnetic flow sensor is underground, while the electromagnetic flow converter is installed on the well. Due to the special design, the connecting cable between the sensor and the converter can reach 10 meters, and the flow measurement accuracy is not affected.

3.2.3 instrument parameter setting

The battery-powered electromagnetic flow converter is designed with 29 parameters, which are divided into six categories: flow measurement, flow correction, state alarm, total amount accumulation, network communication, instrument calibration and verification. The converter parameters are defined as follows:

3.2.3.1 Parameter Menu

Parameter Setting Menu List

Para meter No.	Parameter Text	Setting method	Parameter range	Password Level
1	Language	Select	Chinese, English	1
2	Instrument Communication Address	Select	0 to 99	1
3	Measuring pipe diameter	Select	3 to 600	1
4	Flow Unit	Select	L/h,L/m, L/s, m³ /h, M³ /m, m³ /s	1
5	Flow direction option	Select	Forward, reverse	1

6	Flow zero correction	Set Number	0 to ± 9999	1
7	small signal excision point	Set Number	**Cut by Flow Setting**	1
8	Flow totaled unit	Select	0.001~1m, 0.001~1 L	1
9	Pulse unit equivalent	Select	0.001~1 m, 0.001 ~ 1L	1
10	Pulse width	Select	1 to 99ms	1
11	Air traffic control alarm threshold	Set Number	599.99 percent	1
12	Total Clearing Password	Set Number	0 to 59999	1
13	Sensor coefficient value	Set Number	0.0000~2.9999	1
14	Sensor code value	User Settings	0 to 59999	1
15	Flow correction allowed	Select	Permitted, Prohibited	1
16	Flow correction point 1	Set Number	Set by flow rate	1
17	Flow correction number 1	Set Number	0.0000~1.9999	1
18	Flow correction point 2	Set Number	Set by flow rate	1
19	Flow correction number 2	Set Number	0.0000~1.9999	1
20	Flow correction point 3	Set Number	Set by flow rate	1
21	Flow correction number 3	Set Number	0.0000~1.9999	1
22	Flow correction point 4	Set Number	Set by flow rate	1
23	Flow correction number 4	Set Number	0.0000~1.9999	1
24	Forward Total Low	Set Number	00000~99999	1
25	Positive Total High	Set Number	0000~9999	1
26	Parameter Set Password	Set Number	0 to 59999	2
27	Factory calibration factor	Set Number	0.0000~1.9999	2
28	Instrument code	Manufacturer setting	0 to 59999	2
29	Parameter setting tag	Set Number	Reserved	2

3.2.3.2 Detailed parameter description of instrument

3.2.3.2.1 Language language

Battery-powered electromagnetic flow converters are available in both Chinese and English languages and are user-selectable.

3.2.3.2.2 Instrument Communication Address

Refers to the communication address in this table during multi-machine communication, which can be selected from 01 to 99 addresses, and 0 address is reserved.

3.2.3.2.3 Measuring pipe diameter

Battery-powered electromagnetic flowmeter converter matching sensor diameter range: 3~600mm.

3.2.3.2.4 Flow Unit

Instrument flow display units are: L/h, L/m, L/s, m3/h, m/m, m3/s users can select a suitable flow display unit according to process requirements and usage habits.

3.2. 3. 2. 5 Flow Direction Option

If the fluid direction indication is inconsistent with the actual, the user does not need to change the excitation line or signal line connection method, but can adjust the flow direction setting parameters.

3.2.3.2.6 Small signal cut point

The small signal cut point setting is expressed in terms of flow. When the small signal is cut off, the flow rate, accumulation amount and pulse output are cut off at the same time.

3.2. 3. 2. 7 Flow Accumulation Unit

Battery-powered 9-bit total counter with a maximum allowable count of 999999999

Flow totalizing unit: 0.001 L, 0.010L, 0.100L, 1.000L
0.001m, 0.010m, 0.100m, 1.000m

3.2. 3. 2. 8 Pulse Unit Equivalent of

Output pulse unit: 0.001 L, 0.010L, 0.100L, 1.000L
$0.001m^3$, $0.010m^3$, $0.100m^3$, 1.000m

At the same flow rate, the pulse equivalent is small, the frequency of the output pulse is high, and the cumulative flow error is small.

3.2. 3. 2. 9 Pulse Width of

Pulse output is active low, pulse width: 1~99 mS

Pulse width 1 maximum output pulse number corresponding table

Serial Number	Pulse width (ms)	Maximum output pulse number per hour (p/h)
1	99	14400
2	80	18000
3	40	36000
4	20	720000
5	10	1440000
6	8	180000
7	4	360000
8	2	720000
9	1	1440000

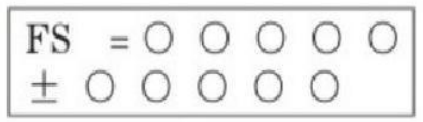
3.2.3.2.10 Air traffic control alarm threshold

Battery-powered electromagnetic flowmeter by measuring the resistance between the two electrodes of the sensor to determine whether the empty pipe, in the measurement of the state of the fluid full pipe, observe the fluid measured resistance value (MTP), and then take the measured value of 1.5 to 2 times to set the empty pipe alarm threshold. When the fluid is empty pipe, the resistance between the electrodes increases and exceeds the threshold, triggering an empty pipe alarm.

3.2.3.2.11 Flow Zero Correction

Zero correction should ensure that the electromagnetic flow sensor tube is full of fluid, and the fluid is in a static state. The flow zero point is expressed in the flow rate, and the unit is mm/s.

The electromagnetic flow converter flow zero correction is shown as follows: Figure 11



Upward small print display: FS represents the measured value of the zero point of the instrument;

Downward large print display: the corrected value of the zero point of the flow

When FS is not displayed as "0", the correction value should be adjusted so that FS = 0. Note: If you change the downward correction value and the FS value increases, you need to change the positive and negative sign of the downward value so that FS can be corrected to zero.

The corrected value of the flow zero point is the matching constant value of the electromagnetic flow sensor, which should be recorded in the record sheet of the electromagnetic flow sensor and the sensor label. The zero point value of the sensor at the time of recording is the flow rate value in mm/s, and its sign is opposite to the sign of the correction value.

3.2.3.2.12 Total Clearing Password

The user can set the total clearing password by using the advanced password, then enter the function selection menu, press the page turning key to enter the total clearing menu and enter the password to complete the total clearing.

3.2. 3. 2. 13 Sensor coefficient values

Sensor coefficient: the electromagnetic flowmeter calibration coefficient. The coefficient is obtained from the actual mark and stamped on the sensor plate. The user must place this factor in the battery-powered converter parameter table.

3.2. 3. 2. 14 Positive Total High, Low

This parameter is used to set the cumulative total, mainly used for electromagnetic flow converter maintenance change.

3.2. 3. 2. 15 factory calibration factor

This coefficient is a special coefficient for the electromagnetic flow converter manufacturer, which is used to normalize the electromagnetic flow converter measurement circuit system to ensure that the interchangeability between all battery-powered electromagnetic flow converters reaches 0.1%.

3.2.4 instrument alarm display

The instrument has three warning displays: SYS is the system warning, MTP is the air traffic control warning, and CUT is the small signal cutting warning.

There are two possibilities for a SYS warning, the converter excitation is broken or the battery pack is low. After the battery pack power shortage warning appears, the battery pack can still maintain working for about 100 hours, but the measurement accuracy is reduced. The user should replace the battery in time.

Choosing the correct installation location and adopting the correct installation method is the key to using the electromagnetic flowmeter. If the installation is wrong, it will not only affect the measurement effect, but also affect the measurement accuracy,

It will affect the service life of the flowmeter and even damage the flowmeter.

3.3.1 Installed correctly

Correct hoisting instrument alarm display

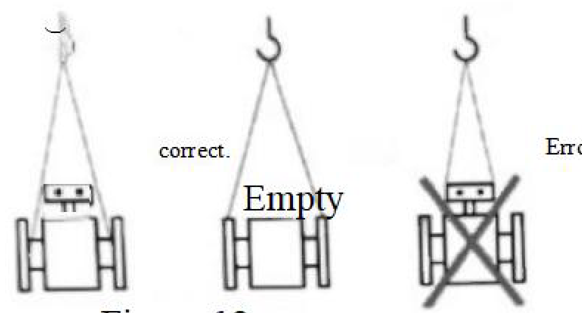


Figure 12

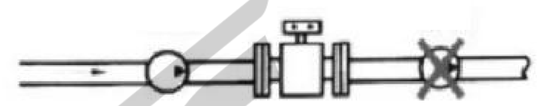


Figure 13

The pipe must be filled with medium

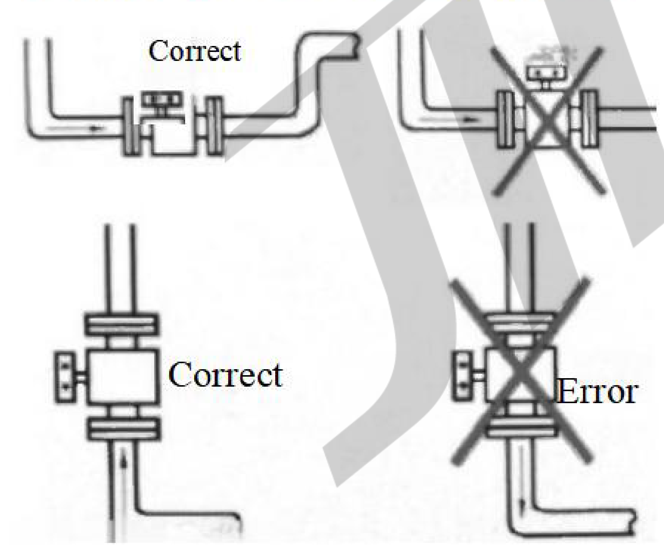


Figure 14

Avoid air

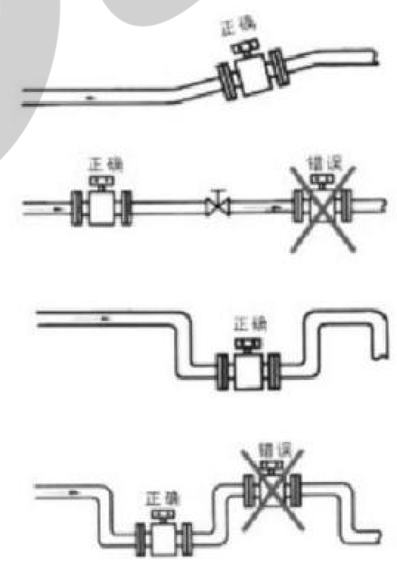


Figure 15

Note: The installation position is only applicable to rubber Glue, F46, PFA lining.

Requirements for straight pipe section

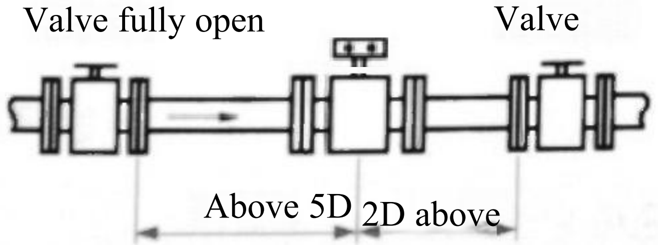


Figure 16

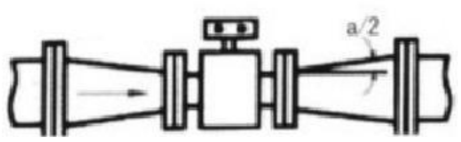


Figure 17

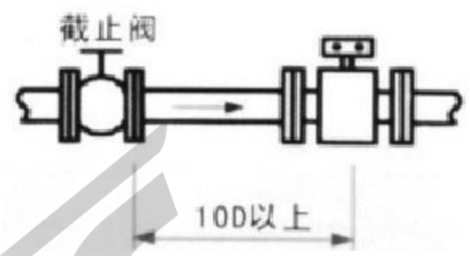


Figure 18

3.3.2 Installation location selection

In order to make the sensor work reliably and stably, the following requirements should be paid attention to when selecting the installation location:

(1) Try to avoid ferromagnetic objects and equipment with strong magnetic fields (such as large motors, large transformers, etc.), so as not to affect the working magnetic field and flow signal of the sensor.

(2) should be installed in a dry and ventilated place as far as possible, not in a damp, easy to water place to install.

(3) Modify the installation method of the pipeline: when the medium flow rate does not meet the requirements, a flowmeter with a smaller diameter should be selected. At this time, a reducer pipe should be used or some pipelines should be modified to make it the same diameter as the sensor, but the front and rear straight pipe sections must at least meet the requirements of the front straight pipe section ≥ 10DN and the rear straight pipe ≥ 5DN(D N is the pipe diameter).

(4) should try to avoid the sun and rain, to avoid the ambient temperature is higher than 60 ˚C and the relative humidity is greater than 95%.

(5) Choose a place that is convenient for maintenance and activities.

(6) The flow meter should be installed at the back end of the water pump, never on the suction side; the valve should be installed on the downstream side of the flow.

3.3.3 Ground for sensor

Connection, wiring and grounding of sensor and pipeline (see Fig. 19, 20, 21 and 22)

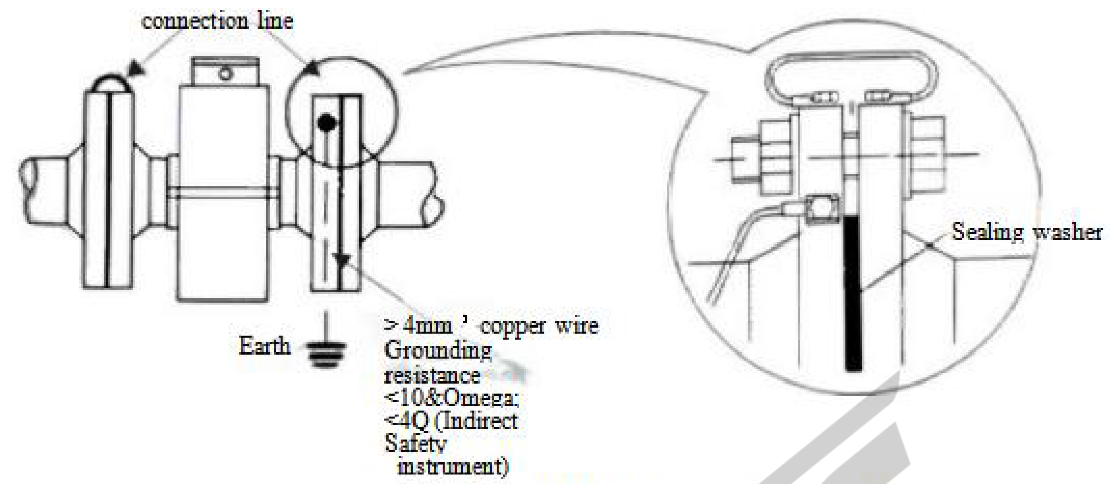


Figure 19 Metal Piping

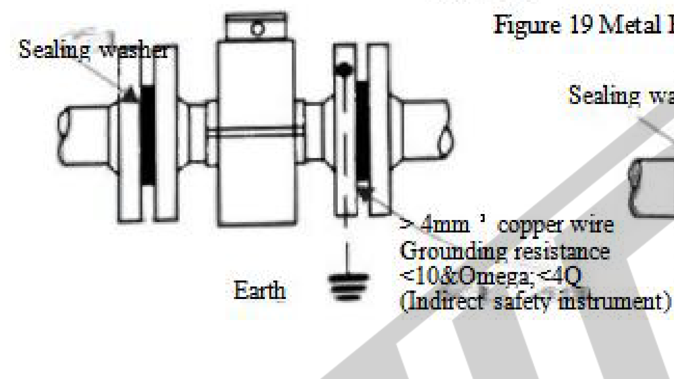


Fig. 20 Non-metallic pipeline and sensor installation

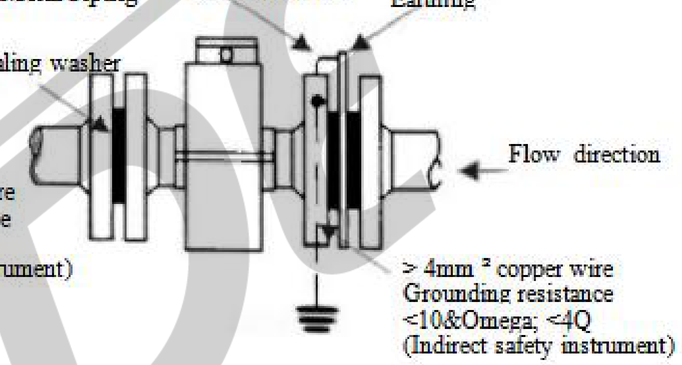


Fig. 21 Non-metallic pipeline and sensor without grounding electrode with grounding electrode

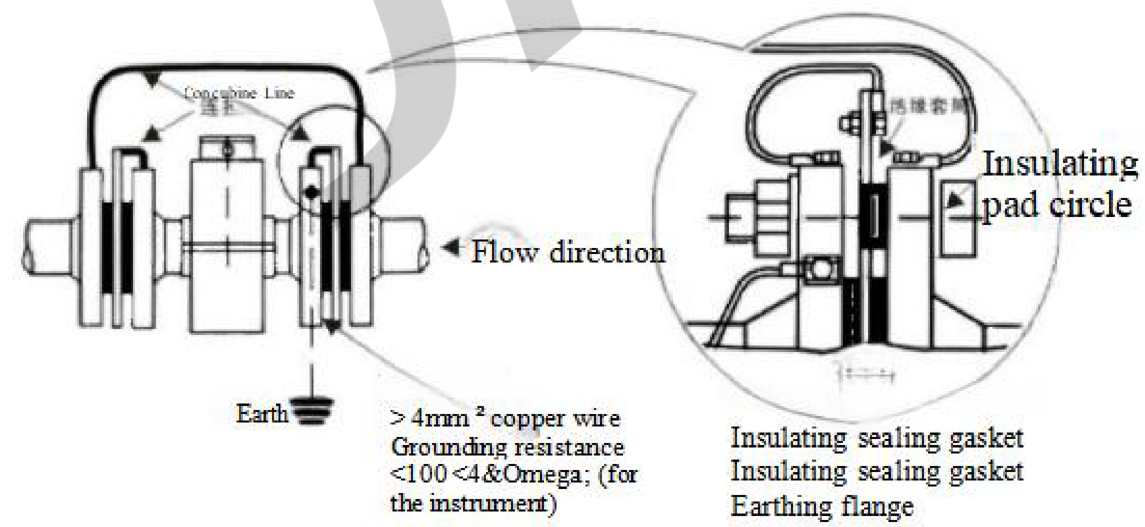


Figure 22 Piping with Cathodic Protection

3.3.4 Installation requirements

For your correct measurement, you should pay attention to the following requirements when selecting the location on the pipeline:

(1) The sensor can be installed on either a vertical pipe or a horizontal or inclined pipe, but the center connection of the 2 electrode is required to be horizontal.

(2) medium in the installation position should be full of pipe flow, avoid the tube and gas attached to the electrode.

(3) For liquid-solid two-phase fluids, it is best to use vertical installation to make the sensor lining wear evenly and extend the service life

(4) When the medium at the installation position of the flowmeter is not satisfied, the method of raising the rear pipeline of the flowmeter can be adopted to make it full. It is strictly prohibited to install the flowmeter at the highest point of the pipeline and the outlet.

(5) The front and rear straight pipe sections shall be ≥ 10DN in front of the flowmeter and ≥ 5DN in rear.

3.3.5 Instrument wiring

★If the signal cable connected by split installation adopts customized special cable, the shorter the cable, the better.

★The excitation cable can be RVVP2 * 0.3mm ^{2} two-core insulated rubber soft cable with the same length as the signal cable.

★Signal cables must be strictly separated from other power supplies and cannot be laid in the same pipe.

★The signal cable and excitation cable shall be as short as possible. The redundant cable shall not be rolled together. The redundant cable shall be cut off and the joint shall be welded again.

★When the cable is connected to the electrical interface of the sensor, it is made into a U-shape at the port to prevent rainwater from penetrating into the sensor.

3.4. Fault handling

3.4.1 No display on meter

* Check whether the power is on;
* Check whether the power fuse is intact;
* Check whether the power supply voltage meets the requirements;

3.4.2 excitation alarm

A Whether excitation wiring EX1 and EX2 are open circuit;

B Whether the total resistance of the sensor excitation coil is less than 1500;

* If items a and B are normal, the converter is faulty;

3.4.3 air traffic control alarm

* Measure whether the fluid is full of the sensor measuring tube;
* Use wires to short-circuit the converter signal input terminals SIG1, SIG2 and SGND. At this time, if the "empty pipe" prompt is canceled, the converter is normal, and it may be that the measured fluid conductivity is low or the empty pipe threshold is set incorrectly;
* Check whether the signal connection is correct:
* Check whether the sensor electrode is normal;

Make the flow rate zero, and observe that the conductance ratio should be less than 100%; In the case of flow, the resistance of measuring terminals SIG1 and SIG2 to SGND should be less than 50 kΩ (for medium, water is measured. It is best to use a pointer multimeter to measure, and you can see the charging and discharging phenomenon during the measurement process).

* Use a multimeter to measure the DC voltage between DS1 and DS2 should be less than 1 V, otherwise the sensor electrode is contaminated and should be cleaned.

3.4.4 measured flow rate is not accurate

* Measure whether the fluid is full of the sensor measuring tube;
* Whether the signal line is connected normally;
* Check whether the sensor coefficient and sensor zero point are set according to the sensor label or factory verification sheet;

4. Ordering Instructions

1. Please specify the name of the measured medium, working pressure, medium temperature, flow (velocity) range, pipe diameter and the measured pipe network when ordering.
2. Split type electromagnetic flowmeter comes standard with 10 meters cable, if the installation site requires a longer cable, please indicate in the order.

5. The supply and demand sides shall be responsible during the warranty period.

1.When stored in the warehouse, it should be placed in a dry, ventilated, non-corrosive gas place, the ambient temperature is in the range of 0-40 ℃ and the relative humidity is less than 85%.

2. The company implements three guarantees for the products, and the warranty period is one year (from the date of delivery). During the warranty period, under the condition that the user complies with the product use, storage and transportation regulations, if the product has quality problems, the company is responsible for free repair or replacement.

Service guarantee: immediacy, efficiency, life-long system.

- Immediate response mechanism: Receive customer service information, give customers solutions within 1 hour, arrive at the scene within 24 hours in the province that needs on-site service, and arrive at the scene within 72 hours outside the province.
- Warranty mechanism: The warranty period of the products sold is 12 months. If there is any non-human quality problem during the warranty period, we will repair or replace the products as soon as possible.
- Maintenance mechanism: the products sold are life-long maintenance. Such as man-made or irresistible external causes.Our company is responsible for providing free testing services for product damage. If you need to replace damaged parts, our company will only charge the corresponding cost.

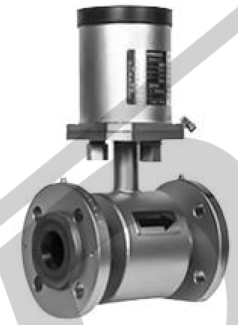
JIDE INTELLIGENT FLOWMETER

Integrated electromagnetic flowmeter

Split-type electromagnetic flowmeter

Split-type electromagnetic flowmeter

Split-type electromagnetic flowmeter



Intelligent water meter

Vortex flowmeter

Vortex flowmeter

Turbine flowmeter

Mass flowmeter

Float flowmeter

Thermal gas mass flowmeter

Controller