



LUDWIG
SCHNEIDER
德国罗德玮格仪表公司

Intelligent Electromagnetic Flowmeter Instruction Manual

EN

智能型电磁流量计使用说明书

CH



Intelligent Electromagnetic Flow Model: FE10

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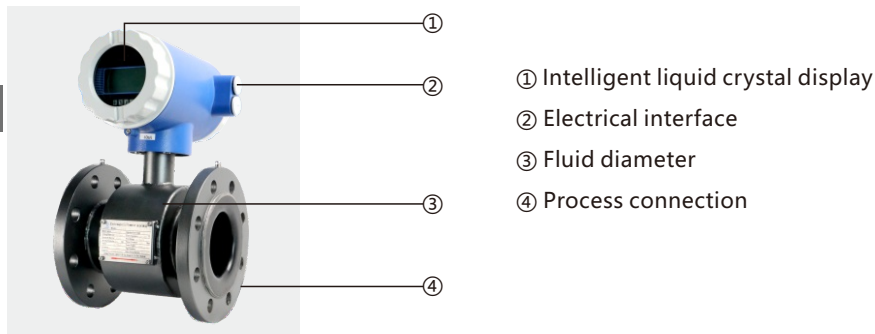
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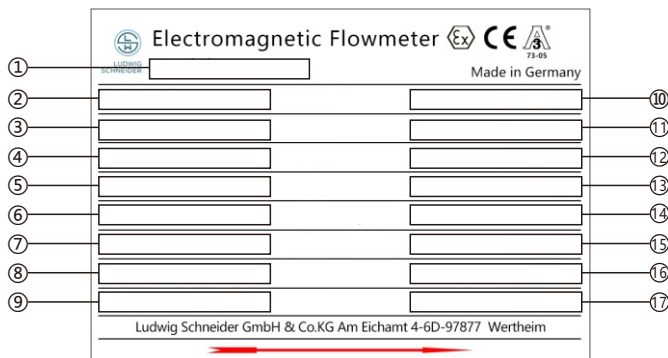
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1.Product Design Function/Signature Description

1.1 Flow meter body function



1.2 Sign Description



- | | | |
|----------------------|---------------|----------------|
| ① Model | ⑦ Accuracy | ⑬ Power Supply |
| ② Meter factor | ⑧ Ex No | ⑭ Tag Number |
| ③ Lining Material | ⑨ Code No | ⑮ Protection |
| ④ Electrode Material | ⑩ Temperature | ⑯ Ex Level |
| ⑤ Nominal Diameter | ⑪ Flow Range | ⑰ Dat |
| ⑥ Output | ⑫ Pressure | |

1. Overview

The design and manufacture of electromagnetic flowmeters conform to the standard JB / T9248-1999 "Electromagnetic Flowmeters". It is a speed-type instrument for measuring the volumetric flow of conductive media. While performing on-site monitoring display, it can input standard current signals for Record, adjust, control and use, realize automatic control of detection. It can realize long-distance transmission of signals. It is widely used in environmental protection, steel, petroleum, chemical, coal, metallurgy, minerals, papermaking, water supply and drainage, food, medicine and other industries. The structure of liquid flow measuring instruments are integrated and separated.

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2. Features

- There are no moving parts in the measuring tube, which is convenient for maintenance and management;
- The minimum electrical conductivity of the measured liquid is N20 uS / cm. With various lining materials, it can be used to measure the flow of various acids, alkalis, salt solutions and mud, mineral pulp, pulp and other media;
- The measurement accuracy is not affected by changes in the density, viscosity, temperature, pressure, and conductivity of the fluid. The sensor 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 power frequency and on-site interference, stable and reliable operation;
- It is not affected by the direction of the fluid and can be accurately measured in both forward and reverse directions;
- LCD backlit display, parameters can be modified online, simple and convenient operation;
- Chinese and English display (optional);
- Can record forward total, reverse total, and difference total;
- With empty tube measurement and glance function, and can adapt to different fluid media;

3. Measurement principle

The electromagnetic flowmeter is based on the principle of Faraday's electromagnetic induction law, that is, when a conductive object moves in the magnetic field to cut the magnetic field lines, an induced electromotive force is generated in the conductor, and the induced electromotive force E is:

$$E = KBdV$$

Flow Q is:

$$\text{Where: } Q = 3600 \times V \times S$$

—Meter factor

B —Magnetic induction(T) N

D —Electrode spacing(m) E

V —Average fluid velocity(m/s) $\downarrow$ 4/

S —Cross-sectional area(1")

Measurement schematic

■ Intelligent Electromagnetic Flowmeter

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

4.Technical index

EN ■ Applicable measuring diameter: D N6mm~ D N3000mm

■ Dielectric conductivity: 20 jAs/cm

■ Lining material: polychloroprene rubber, polyurethane rubber, polysilicon fluorine rubber, polytetrafluoroethylene (PTFE). Polyperfluoroethylene propylene F46, PFA

■ Electrode material: SUS316, Hastelloy B (IIB), Hastelloy C (IIC). Titanium (Ti), coarse (Ta), clamp / titanium alloy, stainless steel coated carbide

■ Working temperature: -20℃~70℃

■ Converter working environment humidity: W9 5%

■ Enclosure rating: I P 6 5、I P 6 7、I P 6 8

■ Flow measurement range: 0.5~10 m/s

■ Matching accuracy level: 0.5 level, 0.2 level

■ Measurement parameters: instantaneous flow, velocity, cumulative total forward and reverse

■ Detection alarm parameters: fluid empty pipe detection alarm, excitation current detection alarm, upper and lower limit alarm, system alarm

■ Internet function: HART、MODBUS、GPRS、PRO F I B U S (Optional)

■ Power supply

AC power supply, voltage applicable range: 85VAC~ 2 5 0VAC DC 2 4 V power supply, voltage

5.Dinebsions of electromagnetic flow sensor

Nominal diameter (mm)	Nominal pressure (Mpa)	Dimensions			Reference weight (kg)
		Gauge length (mm)	D	II	
6	4 · U	200	90	220	6
10		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

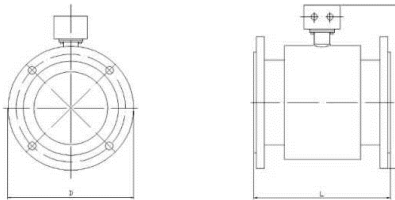
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Intelligent Electromagnetic Flowmeter ■

65	1.6	250	185	283	18
80		250	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 n l.u	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
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

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Note: Our company can customize and process according to user requirements



Outline drawing of electromagnetic flow sensor

■ Intelligent Electromagnetic Flowmeter

Appendix1、 Selection Of Electrode Material For Electromagnetic Flowmeter

Corrosion resistance of electrode materials (for reference only)

Electrode material	Corrosion resistance
SUS316	Used in industrial water, domestic water, sewage, weakly corrosive media, widely used in petroleum, chemical, steel and other industrial sectors and municipal, environmental protection and other fields
Hastelloy B (HB)	Good corrosion resistance to hydrochloric acid at all concentrations below the boiling point, and also resistant to corrosion by non-oxidizing acids, alkalis, and non-oxidizing salts such as sulfuric acid, phosphoric acid, hydrofluoric acid, and organic acids
Hastelloy C (HC)	Resistant to the corrosion of non-oxidizing acids, such as nitric acid, mixed acids or mixed media of sulfuric acid and sulfuric acid, as well as corrosion of oxidative salts such as Fe ..., Cu- or other oxidants. Corrosion of hypochlorite solution above sea temperature, seawater
Titanium(Ti)	Resistant to seawater, various chlorides and hypochlorites, oxidizing acids (including fuming sulfuric acid), organic acids, alkalis, etc., not resistant to the corrosion of relatively pure reducing acids (such as sulfuric acid, hydrochloric acid). However, if the acid contains an oxidant (such as nitric acid, Fe ..., Cu-), the corrosion is greatly reduced.
Tantalum(Ta)	Has excellent corrosion resistance, very similar to glass, except hydrofluoric acid, oleum, alkali, and can withstand almost all chemical media (including boiling point hydrochloric acid, nitric acid and sulfuric acid and aqua regia below 150P) Note: in Not resistant to alkali.
Pliers / titanium alloy	Applicable to almost all chemicals, but not to aqua regia and osmium salt.
Stainless steel coated carbide	For non-corrosive and highly abrasive media.

Note: Due to the variety of media, its corrosivity is affected by complex factors such as temperature, concentration, and flow rate, so this table is only
For reference users should be based onMake your own choices based on the actual situation, and if necessary, perform the corrosion resistance test of the materials to be selected, such as the hanging

Appendix2、 Selection of lining material for electromagnetic flowmeter

The lining material should be selected according to the corrosion, abrasion and temperature of the tested medium

Lining material	Main performance	Scope of application
Polychloroprene rubber	1.Excellent elasticity, high breaking force and good abrasion resistance 2. Resistant to general low-concentration acid, alkali and salt media, not resistant to oxidative media	Water, sewage, weak wear Sexual mud, ore slurry
Polyurethane rubber	1. Excellent abrasion resistance (equivalent to 1 times of natural rubber) 2. Poor acid and alkali resistance 3.Cannot be used in water mixed with organic solvents	Neutral strong abrasion pulp, Coal slurry, mud, etc.
Polysilicone rubber	1.Excellent elasticity, high breaking force, high temperature resistance 2, not resistant to the corrosion of any concentration of acid, alkali, salt medium	W160P water
Teflon (PTFE)	1. The material with the most stable chemical properties in plastics. It is resistant to boiling hydrochloric acid, sulfuric acid and aqua regia. It is also resistant to concentrated alkali and various organic solvents. corrosion. 2. Poor wear resistance	Strong acid and alkali Corrosive medium
Perfluoro Ethylene propylene F46	1.Corrosion resistance is the same as PTFE 2, can withstand low wear 3.Strong resistance to negative pressure	1. Same as PTFE 2.can be used for low-wear media 3.Can be used in negative pressure state
PFA	Food grade, same corrosion resistance as PTFE, strong anti-negative pressure ability	Can be used in a negative pressure state

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■ Intelligent Electromagnetic Flowmeter

Appendix3、Flow Chart Of Electromagnetic Flowmeter

Flow rate	0.5	1	2	3	4	5	10
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	190.8515	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	883.5729	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	10178.7601
700	692.7212	1386.4424	2770.8847	4156.3271	5541.7694	6927.2118	13854.4242
800	904.7787	1809.5574	3619.1147	5428.6721	7238.2295	9047.7868	18095.5741
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	113097.3363
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	162860.1631
2600	9556.7247	19113.4268	38226.8536	57340.2804	76453.7072	95567.1340	191134.2683
2800	11083.5387	22167.0774	44334.1648	66501.2322	88668.3095	110835.3869	221670.7741
3000	12723.4500	25446.9001	50893.8001	76340.7002	101787.6002	127234.5003	254469.0011

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Intelligent Plug-In Electromagnetic Flowmeter Y ■

The functional purpose and scope of application of L products

Plug-in electromagnetic flow sensor (referred to as sensor) and plug-in electromagnetic flow converter (referred to as converter) form a plug-in electromagnetic flowmeter (referred to as flowmeter), used to measure the volumetric flow of various conductive liquids in the pipeline

1.The Sensor Has The Following Characteristics:

- The sensor has no moving parts, simple structure and reliable operation.
- The plug-in electromagnetic structure can be conveniently installed and disassembled without stopping the water under low pressure or pressure. Therefore, it is very suitable for fluid measurement of existing pipelines and easy maintenance and repair of instruments.
- The measurement accuracy is not affected by changes in physical parameters such as temperature, pressure, density, viscosity, and electrical conductivity of the measured medium (as long as the electrical conductivity is greater than 20 "S / cm).
- The sensor has almost no pressure loss and extremely low energy loss.
- Lower manufacturing cost and installation cost than general flowmeters, especially suitable for large and medium diameter pipeline flow measurement.
- Adopt advanced low frequency square wave excitation. Zero point stability, strong anti-interference ability, reliable work.

Large flow measurement range. The full-scale flow velocity in the measured pipe can be arbitrarily set from 1m/s to 10m/s , and the output signal has a linear relationship with the flow rate.

- The flowmeter has not only $(\sim 1)\text{mA}$ DC or $4 \sim 20\text{mA}$ DC standard current output, but also $1 \sim 5\text{kHz}$ frequency output.

2.Product Type And Composition

The type of the product is a plug-in type, which is connected to the pipeline through a mounting base. The measuring tube type sensor is suitable for measuring clean media; the flat electrode type is suitable for measuring liquid flow rate containing other impurities in the medium.

3.Main Technical Performance

3.1 Suitable for measuring pipe diameter:

DN6mm~DN3000mm;

3.2 Flow measurement range:

$0.5 \sim 10\text{m/s}$, Full range continuously adjustable from $1 \sim 10\text{m/s}$

3.3 Measurement accuracy:

When the full-scale flow rate is $> 1\text{m/s}$, $\pm 1.5\%$.

3.4 Conductivity of measured medium:

$\geq 20\text{pts/cm}$,

3.5 Working pressure:

1.6MPa

3.6 Electrode material:

Key stainless steel, Hastelloy B, Hastelloy C, titanium Ti, Ta.

■ Intelligent Plug-In Electromagnetic Flowmeter Y

3.7 Measuring tube (measuring head) material:

ABS、PTFE

3.8 Maximum temperature of measured medium:

60℃

3.9 Enclosure rating:

Meet the relevant regulations of GB4208-2008 standard IP6S.

3.10 Maximum signal transmission distance between sensor and converter:

50m (Contact factory for special requirements)

3.11 Flowmeter output signal:

DC current: 0 ~ 10mA load resistance is 0 ~ 1kΩ; 4 ~ 20mA load resistance is 0-5000;

Frequency: 1 ~ 5kHz.

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4. Working Principle and Structure

4.1 working principle

The sensor is actually a liquid flow rate measuring instrument, which is a flow rate measuring instrument made by applying the principle of Faraday's law of induction. Figure 1 is a schematic diagram of the basic working principle of a plug-in flow meter.

Use a long rod to insert a small electromagnetic flow sensor into a specified position in the pipe being measured. When a conductive fluid flows vertically through the working magnetic field of the sensor (when the converter provides the excitation current to the sensor, it will generate working magnetic field), which is equivalent to the conductor cutting magnetic field lines in the magnetic field. According to Faraday's law of induction, it is known that an induced electromotive force is generated at both ends of the conductor. The induced electromotive force is detected by a pair of electrodes in contact with the fluid, and the magnitude of the electromotive force is proportional to the magnetic induction strength B , the distance L between the poles, and the average flow velocity of the fluid. which is

$E = K \cdot B \cdot L \cdot V$ (tt) In the formula: E —induction electromotive force, volt;

B —magnetic field strength, Tesla;

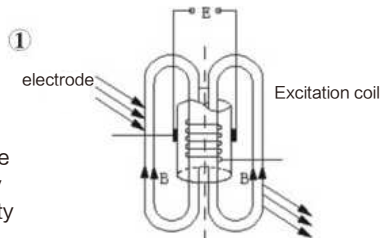
L —distance between two electrodes, meter;

V —the flow rate through the flow rate sensor

(that is, the particle flow rate representing the specified

insertion point of the pipe under test), m / s K -factor

There are two methods for the company to insert the specified insertion point of the electromagnetic flow sensor. One is to insert it on the central axis of the pipe under test; Insert it on the central axis of the pipe under test. At this time, the flow velocity sensor measures the flow velocity as the maximum flow velocity of the pipeline. The average flow velocity of the pipeline should be multiplied by a factor K .



2^n n (For smooth pipes)

$(N+1)(2n+1)$

In the formula: n is the Reynolds number exponent, which can be obtained by formula ③,

$N = 1.661gReD$

Where: R_r — Reynolds number of pipeline fluid,

] (For rough pipes)

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$1 \lg(0.2703)$

Where K —equivalent absolute roughness, the average height of the protrusions on the inner wall of the pipeline. Pipes larger than DN400 can be inserted about 0.25D from the inner wall of the pipe. At this time, the flow velocity measured by the flow velocity sensor is the average flow velocity, and the coefficient $K = L$. The flow rate of the measured pipeline can be expressed by the following formula.

$$Q = V - A (m^3/h) \quad ④$$

In the formula, A —the cross-sectional area of a circular pipe, m^2 . Substituting ①, formula into ④, formula, then Since the magnetic field strength of the plug-in electromagnetic flow sensor and the distance between the two electrodes have been determined at the time of manufacture, and the cross-sectional area of the pipe under test is also obtained, the output electromotive force of the plug-in electromagnetic flow sensor can represent the flow.

4.2 Structure

The sensor is shown in Figure 2. It is mainly composed of a measuring head (or measuring tube), an excitation system, an insertion rod, a junction box, a mounting base (divided into flange connection and screw connection), and a seal positioning mechanism.

Measuring head (or measuring tube): The measuring head (measuring tube) is located at the flow velocity mass point of the pipeline to be measured. The flow measuring head (or measuring tube) is an end or a pipe made of insulating material. A pair of electrodes are mounted on it, except for the electrode tip or the inner wall of the measuring tube, the other parts are insulated from the measured fluid.

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

Insertion rod: made of stainless steel. The measuring head and 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 direction indicator is welded on the insertion rod to ensure that the working magnetic field, the flow rate and the electrode connection are perpendicular to each other during installation. The requirements of induction law.

Junction box: The junction box is located on the upper part of the sensor, and the terminals in the junction box connect the sensor and the converter.

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

■ Intelligent Plug-In Electromagnetic Flowmeter Y

Mounting base: The mounting base is welded to the pipe to be tested, and is used to connect with the mounting ball valve and insert the flowmeter sensor.

Sealing component: Compressed screw seat, compression nut, rubber washer and positioning * screw made of stainless steel to seal and insert the sensor so that it can withstand a certain working pressure.

5. Installation And Use

EN 5.1 Preparation before installation

5.1.1 Choice of installation environment

① Keep as far away as possible from equipment with strong magnetic fields, such as large motors, large transformers, and frequency conversion equipment.

② There should be no strong vibration at the installation site, and the environment of the pipeline should be fixed firmly without changing much.

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

5.1.2 Choice of installation location

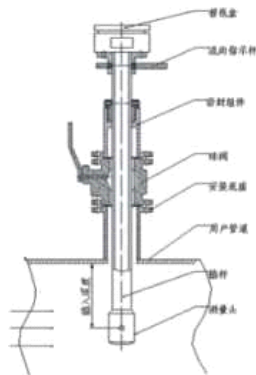
① The installation position must ensure that the pipeline is always filled with the measured fluid.

② Choose a place with a small fluid flow pulse, that is, away from local resistance parts such as pumps, valves, and elbows.

③ When measuring two-phase (solid, liquid or gas, liquid) fluids, choose a place where phase separation is not likely to occur.

④ Avoid negative pressure at the measurement site.

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



5.1.3 K degree of straight pipe section

The length of the straight pipe section on the upstream side of the sensor installation pipe should be greater than or equal to $15D$, and the downstream side should be not less than $10D$ (D is the diameter of the pipe being tested).

5.1.4 Flow control valve and V. valve

The flow control valve should be installed on the tested pipe on the upstream side of the sensor.

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

5.1.5 Welding of mounting base

Before installation, a small hole with a diameter of 60mm should be opened in the pipe under test, the size is the same as the outer diameter of the connecting pipe of the mounting base, and the welding between the mounting base and the pipe under test is shown in Figure 3.

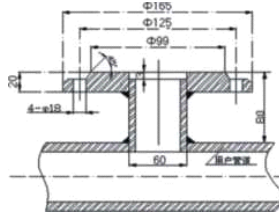


Figure 3 Mounting the base

The technical requirements for welding are as follows:

- ① The axis of the mounting base is at the center of the pipe under test and is perpendicular to the axis of the pipe under test.
- ② Use stainless steel welding rod for flat welding. After welding, ensure that the flange end face is parallel to the pipe axis, the weld is firm, and can withstand a pressure of 1.6 MPa without leakage.

5.2 Sensor installation

5.2.1 Clean up welding slag and burrs on the test tube mounting base '

5.2.2 Close the upstream flow control valve or use low-pressure water supply.

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)

5.2.4 Install the DN50 ball valve on the mounting base as shown in Figure 3. Note that the long cavity of the ball valve is upward, and check whether the ball valve can be fully opened and closed tightly.

Tighten the nuts and set screws, and pay attention to the direction of the sensor.

5.2.5 Determination of the insertion depth of the plug-in electromagnetic flow sensor:

For Dw400mm, the insertion depth is: 1/2 of the pipe diameter.

For D> 400mm, the insertion depth is: 1/4 of the pipe diameter '(the meter coefficients at the two places are different).

5.3 Laying and wiring of cables

There are two types of cable laying: bright and dark. Which kind of laying is used depends on the specific conditions of the site.

Figure 4 is the electrical wiring diagram between the sensor and the converter. As can be seen from the figure, there are two cables between the sensor and the converter. One is the excitation line where the converter supplies the excitation current to the sensor, and the other is the signal line where the sensor outputs the electromotive force to the converter.

The laying and wiring of cables must pay attention to the following points:

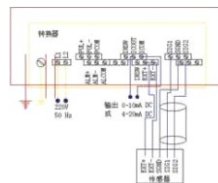
① The signal cable should not be laid in parallel with the external high-current power cable in a short distance. Signal cables should generally be electrically shielded from external cables through threaded steel pipes, and the threaded steel pipes should be connected to the ground wire.

② When laying open, 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 the steel pipe, the excitation cable should also be routed separately.

③ The distance between the sensor and the converter should generally be less than 15 meters. If special circumstances need to extend the cable, please contact our company. The type of signal cable and field cable supplied by our company is RVVP type double-core polyethylene insulation shielded sheathed cable, specification is 2x 32 / 0.2 outer diameter 4) 8mm, length is 15 meters. For special requirements, please indicate to us when ordering.

④ The company does not provide converter power supply lines and output current and frequency cable lines. Because the load current required by these two types of cables is only tens to hundreds of amps, and the transmission distance is related to the distance from the field to the control room, so Can prepare power and output signal cables according to actual needs

⑤ Connect the converter and sensor terminal indicators one by one as shown in Figure 4



■ Intelligent Plug-In Electromagnetic Flowmeter Y

5.4 Ground

The flow signal produced by the sensor is very weak, usually on the order of microvolts or table volts. Therefore, preventing the influence of external electrical interference is an important factor for the good use of the flowmeter. Grounding is a very effective measure to solve the impact of electrical interference.

EN The sensor grounding requirements are mainly the ground of the medium to be measured and the ground terminal of the converter (terminal "C" is connected to the metal shield of the flow signal cable, and connected to the medium to be tested through the plug. When the pipe to be tested is a non-metallic pipe In order to ensure a good ground, you can directly add a ground wire to the ground terminal of the sensor and install a ground electrode on the pipe under test. The resistance for grounding should be less than 10Ω .

5.5 Adjustment and use

① If the flow rate of the pipe under test is known, you can set the flow range according to the flow rate in the pipe under test and the setting method of the converter range.

② After the preparatory work is completed, first open the upstream flow control valve of the sensor, and then slowly open the downstream flow adjustment valve. Observe that the converter shows that the flow rate should change from small to large. If the display shows a negative value, the power should be cut off and the signal line "SIG1" and "SIG2" are interchangeable,

③ Set the flow range value and sensor coefficient again as needed according to the measured flow

④ Open the upstream flow control valve of the sensor, and then open the downstream flow adjustment valve to allow the fluid to be discharged for a few minutes before the gas in the pipeline is discharged. Close the downstream flow control valve and the upstream flow control valve to make the pipeline full of fluid, but not flowing, 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.

6. Maintenance, Repair And Common Troubleshooting

6.1 Maintenance

Sensors generally do not require regular maintenance. However, in the case where the measured medium is prone to fouling on the surface or the inner wall of the electrode and the measuring head (measuring tube), regular cleaning must be performed. The cleaning cycle depends on the rate of adhesion fouling. When cleaning the electrode and measuring head (measuring the tube, care must be taken not to damage the insulation material and the electrode.

6.2 Repair

If the sensor is faulty, you can determine whether the measurement system of the sensor excitation system is normal according to the inspection method described in Article 7.3 of this note. If there is any fault, please contact the company, and general users cannot repair it by themselves.

When removing the sensor, pay attention to closing the ball valve

6.3Common troubleshooting

Failure phenomenon	cause	Method of exclusion
Converter flow is negative	1. Sensor direction indicator plug with fluidFlow in the opposite direction 2. X and Y in the sensor junction box orThere is a reverse connection between A and B	1. Rotate the sensor direction 180° 2. Reconnect the converter
Converter output overrange	1.The range value of the flow meter is less than the actual measurement Magnitude 2.The fluid is not filling the pipeline excitation coil open circuit	1.Expand the flowmeter range 2.Close the small flow regulating valve 3. Reconnect
The output signal fluctuates too much	1. There is gas at the sensor electrode, Causes poor contact between the electrode and the medium 2. Deposits on the electrode	1. Exclude the gas in the pipeline 2.Clean the electrode
Output signal drifts to zero gradually	1.Sensor water 2. The electrode is covered	1. Replace the sensor 2.Clean the electrode

EN

7.Unpacking And Product Completeness

When the user unpacks, please check the model of the sensor according to the packing list, and check whether the sensor is trapped or damaged. The completeness of the sensor includes:

- 7.1 plug-in electromagnetic flow sensor 1
- 7.2 electromagnetic flow converter 1
- 7.3 Signal cable RVVP type double core PVC insulation shield 2X10 meters
- 7.4 Ball valve DN50, PN1.6MPa 1
- 7.5 Mounting base 1
- 7.6 Random files
- Installation instruction manual
- 1 product certificate

■ Converter Operation

1.220V / 24V Converter Wiring Diagram

1.1 Square meter terminal wiring and marking

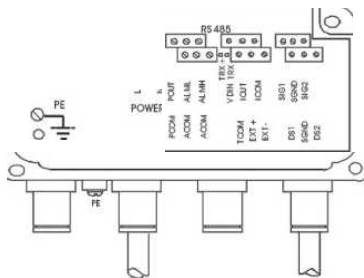


Figure 5 Square meter wiring terminal diagram

The meaning of each terminal sign is as follows:

SIG 1	signal1
SGND	Signal ground
SIG 2	Signal 2
DS 1	Incentive shield 1 With remote sensor
DS 2	Incentive Shield 2
EXT +	Excitation current +
EXT -	Excitation current-
VDIN	Current two-wire system 24V contact
IOUT	Analog current output Analog current output
ICOM	Analog current output ground
POUT	Flow frequency (pulse) output Frequency or pulse output
PCOM	Frequency (pulse) output ground
ALMH	Upper limit alarm output Two alarm outputs
ALML	Lower limit alarm output
ACOM	Alarm output location
TRX +	Communication input Communication input
TRX -	Communication input

1.2 Square meter connected to sensor signal line processing and marking

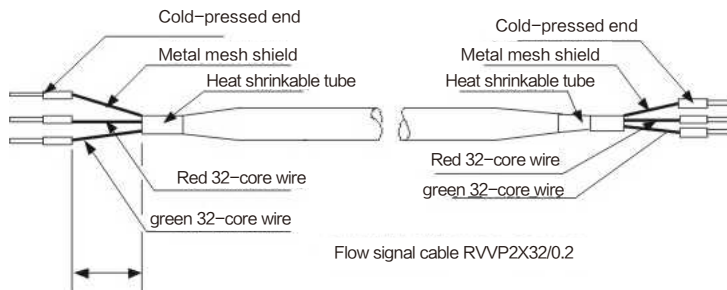


Figure 6 Signal processing and labeling

1.3 Round table terminal wiring and marking

1.4 Processing and labeling of round table signal lines

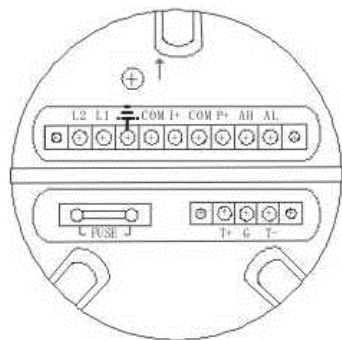
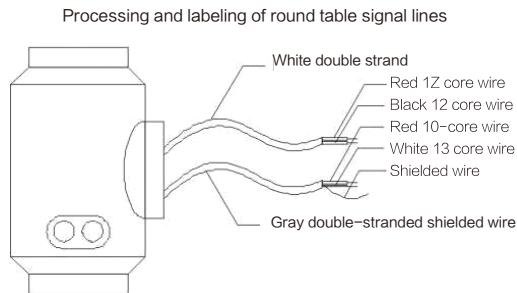


Figure 7 chart wiring terminal diagram



Processing and labeling of signal lines in Figure S

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

1.5 Marking definition of each terminal in the round table

The round table signal line is marked as follows:

White double strand: Red 12 core wire } Excitation current
Black 12 core wire

■ Converter Operation

Gray double-stranded shielded wire: Red 10-core wire is connected to "Signal 1"

White 13 core wire connected to "Signal 2"

Shielded wire connected to "signal ground"

1.6 Instrument parameter setting

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

- Tightly connect the pipes before and after the sensor with copper wires
- Ground the sensor well,
- Make sure the fluid in the pipeline is still when adjusting the zero point of the instrument.
- Make sure that the sensor electrode oxide film is formed stably (the electrode and the fluid can be in continuous contact for 48 hours).

1.6.1 Four-button converter parameters and operation

When the meter is powered on, it automatically enters the measurement state. Under the automatic measurement state, the meter 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.

1.6.1.1 Key functions

a) Key function under automatic measurement

Up key: Cycle through the content displayed on the bottom line of the screen;

Compound key + confirm key: enter parameter setting state;

Confirmation key: return to the automatic measurement state,

In the measurement state, the LCD contrast adjustment method can adjust the appropriate contrast by "composite key + up key" or "composite key + down tart".

b) Function of each key in parameter setting state

Down key: Decrease the number at the cursor by 1;

Up key: add 1 to the number at the cursor;

Compound key + down key: move the cursor to the left;

Compound key + Up key: Move the cursor to the right; Confirm key: Enter / Exit submenu;

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

Note:

(1) When using the "composite key", first press the compound tart 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 meter will automatically return to the measurement state '

(3) For the flow direction selection of flow zero correction, you can move the cursor to the leftmost or down, and use "up" or "down" to switch it to the opposite of the actual flow direction.

1.6.1.2 Parameter setting functions and function key operations

To set or modify the parameters of the meter, the meter must be switched from the measurement state to the parameter setting state: In the measurement state, press the "composite key + confirm key" once, the meter enters the function selection screen "parameter setting" and then press the confirm key Enter the state of entering the password, "00000" state, enter the password to enter and press "Compound key + confirm tart" to enter the parameter setting screen '

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

1.6.1.3 Function selection screen

Click "Composite Tart + Confirm Tart" to enter the function selection screen, and then press 'Up Tart' or "Down Key" to select. There are 3 functions to choose from in this screen;

Parameter number	Functional content	Explain
1	parameter settings	Select this function to enter the parameter setting screen
2	Total amount cleared	Select this function to reset the total amount of the meter
3	Coefficient change record	Select this function to view the modification records of flow coefficient

EN

1.6.1.4 Parameter settings

Click "Composite key + confirm tart" to display the "Parameter setting" function, the meter enters the function selection screen "Parameter setting", and then press the enter key to enter the password input state, "00000" state, enter the password to enter and press "composite tart + Confirm key" to enter the parameter setting screen,

1.6.1.5 Total amount cleared

Press the "composite key + confirmation key" to display the "parameter setting" function, and then press the "up key" to turn the page to "total zero reset", enter the total number reset password, and press the "composite key + confirmation key", When the total amount reset password automatically becomes "00000", the reset function of the meter is completed, and the total amount inside the meter is 0. 7.1.3.3 Coefficient change record

Press the "composite key + confirmation key" to display the "parameter setting" function, and then press "up tart to turn the page to" factor modification record "
(See Appendix 4 for details)

1.6.2 Parameter setting menu

There are 54 parameters in total. When using the meter, the user should set each parameter according to the specific situation. The parameter list is as follows:

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■ Converter Operation

Parameter setting menu list

Parameter number	Parameter text	Setting method	Parameter range	Password level
1	Language	select	Chinese English	2
2	Instrument communication address	Set number	0 ~ 99	2
3	Meter communication speed	select	300 ~ 38400	2
4	Measuring pipe diameter	select	DNGmm ~ DN300 () mm	2
5	Traffic niches	select	L / h. L / m. L / s, m3 / h. M3 / m3. M3 / s	2
6	Meter range setting	Set number	0 ~ 99999	2
7	Measuring damping time	select	1 ~ 50	2
8	Traffic direction options	select	Forward Reverse	2
9	Zero flow correction	Set number	0 ~ ± 9999	2
10	Small signal cut-off point	Set number	0~599.99%	2
11	Allow cut display	select	Allow, prohibit	2
12	Flow accumulation unit	select	0.001m ³ -lm ³ . 0.001L-1L	2
13	Reverse output allowed	select	Allow, prohibit	2
14	Current input type	select	0 ~ IOmA / 4 ~ 20mA	2
15	Pulse input mode	select	Frequency / pulse	2
16	Pulse unit equivalent	select	0.001m ³ -lm ³ . 0.001L-1L	2
17	Frequency output fan doctor	select	1 ~ 5999Hz	2
18	Air traffic alarm allowed	select	Allow, prohibit	2
19	Air traffic alarm country value	Set number	59999%	2
20	Ceiling alarm allowable	select	Allow, prohibit	2
21	Upper alarm value	Set number	000.0 ~ 599.99%	2
22	Lower limit alarm allowed	select	Allow, prohibit	2
23	Lower limit alarm value	Set number	000.0 ~ 599.99%	2
24	Excitation alarm value	select	Allow, prohibit	2
25	Total clear password	Set number	0 to 9999	3
26	Sensor code 1	user settings	Year and month of delivery (0~99999)	4

27	Sensor code 2	user settings	Product Number (0-99999)	4
28	Excitation mode selection	select	Mode 1, 2, 3	4
29	Sensor coefficient value	Set number	0.0000 ~ 5.9999	4
30	Traffic correction allowed	select	Allow / forbid	5
31	Flow correction point 1	user settings	Set by flow rate	5
32	Flow correction number 1	user settings	0.0000- 1.9999	5
33	Flow correction point 2	user settings	Set by flow rate	5
34	Flow correction number 2	user settings	0.0000 ~ 1.9999	5
35	Flow correction point 3	user settings	Set by flow rate	5
36	Flow correction number 3	user settings	0.0000-1.9999	5
37	Flow correction point 4	user settings	Set by flow rate	5
38	Flow correction number 4	user settings	0.0000- 1.9999	5
39	Positive total low	Can be modified	00000 ~ 99999	5
40	Positive total	Can be modified	0000 ~ 9999	5
41	Reverse total low	Can be modified	00000 to 99999	5
42	Reverse total high	Can be modified	0000 ~ 9999	5
43	Spike suppression allowed	select	Allow / forbid	5
44	Spike suppression coefficient	select	0.010 ~ 0.800m / s	5
45	Spike suppression time	select	400 ~ 2500ms	5
46	Security code 1	User can change	0000 () ~ 99999	5
47	Security code 2	User can change	0000 () ~ 99999	5
48	Security code 3	User can change	00000 ~ 99999	5
49	Security code 4	User can change	00000 ~ 99999	5
50	Current zero point correction	Set number	0.0000 to 1.999	5
51	Full current correction	Set number	0.0000 ~ 3.9999	5
52	Factory calibration factor	Set number	0.0000 ~ 5.9999	5
53	Instrument code 1	Factory settings	Year and month of delivery (0-99999)	6
54	Instrument code 2	Factory settings	Product number (0-99999)	6

■ Converter Operation

Instrument parameters determine instrument operating status, calculation method, output mode and status

Correctly selecting and setting instrument parameters can make the instrument run in the best state, and obtain higher measurement display accuracy and measurement output accuracy.

The meter parameter setting function has 6 levels of passwords, of which 1 to 5 are user passwords, and 6 is the manufacturer password. Users can use the 5th password to reset the 1 to 4 level passwords.

No matter what level of password is used, users can view the meter parameters, but if users want to change the meter parameters, they need to use different levels of passwords

Level 1 password (factory value 00521): users can only view meter parameters;

Level 2 password (factory value 03210): users can change 1 ~ 24 meter parameters;

Level 3 password (factory value 06108): users can change 1 ~ 25 meter parameters;

Level 4 password (factory value 07206): users can change 1 ~ 29 meter parameters;

Level 5 password (fixed value): Users can change 1 ~ 52 meter parameters;

It is recommended that users at the higher level of the user have a level 5 password; the level 4 password is mainly used to set the total amount; the level 1 to 3 passwords are determined by the user.

1.6.3 Instrument detailed parameter description

1.6.3.1 Language

With Chinese and English languages, users can choose to operate.

1.6.3.2 Instrument communication address

Refers to the communication address of this watch when multi-machine communication. Optional range: 01 ~ 99 address, 0 address reserved C

1.6.3.3 Instrument communication speed

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

1.6.3.4 Measuring the caliber of the pipeline

Range of diameter: DN6mm ~ DN3000mm .:

1.6.3.5 Flow unit

Select the flow display unit in the parameters. The flow display units of the meter are: L / s, L / m, L / h, m³ / s, m³ / nu, nV / h. The user can choose a suitable flow according to the process requirements and usage habits. Display units.

1.6.3.6 Meter range setting

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

Therefore, the meter range setting determines the meter range, which also determines the corresponding relationship between the meter percentage display, meter frequency output, meter current output, and flow: meter percentage display value = (flow value measurement value / meter range range) * 100% ;

Meter frequency output value = (flow value measurement value / meter range range) * frequency full range value;

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

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

1.6.3.7 Measuring the most damped time

A long measurement filtering time can improve the stability of the meter's flow display and the stability of the output signal. It is suitable for the measurement of the total pulsating flow rate. The setting of the measurement filter time is selected.

1.6.3.8 Traffic direction selection

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

1.6.3.9 Zero Flow Correction

During the zero point correction, make sure that the sensor tube is filled with fluid and the fluid is at a standstill. The zero point of the flow rate is expressed by the flow rate, and the unit is mm / s.

The converter flow zero correction is displayed as follows:

FS=0 0 0 0 0 ± 0 0 0 0 0

The upper small print shows: FS stands for the zero measurement value of the meter;

Large characters in the lower row display: zero correction value of velocity;

When the FS display is not "%", adjust the correction value so that FS = 0: Note: If you change the downstream correction value. The FS value increases, you need to change the positive and negative signs of the downstream value so that FS can be corrected to zero.

The correction value of the flow zero point is the matching constant value of the sensor, which should be recorded in the sensor's record sheet and sensor label. When entering, the sensor zero value is the flow velocity value in m m / s. Its sign is opposite to the sign of the correction value

1.6.3.10 Small signal cut-off point

The small signal cutoff point setting is expressed as a percentage flow of the range. When small signal is cut off, the user can choose to cut off the display and signal output of flow rate, flow rate and percentage at the same time; also can choose to cut off only the current output signal and frequency (pulse) output signal to maintain the display of flow rate, flow rate and percentage.

1.6.3.11 Traffic calculation unit

The converter display is a 9-digit counter with a maximum allowable counting value of 9999999999

The accumulative units used are L, nP (liters, cubic meters).

The total flow equivalent is: 0.001L. 0.010L. 0.100L. 1.000L

0.001m³. 0.010m³. 0.100m³. 1.000m³ ;

1.6.3.12 Reverse output enable function

When the reverse input permission parameter is set to the "allowed" state, as long as the fluid flows, the converter outputs pulses and current according to the flow value. When the reverse output permission parameter is set to "disabled", if the fluid flows in reverse, the converter output pulse is "0" and the current output is signal "0" (4mA or 0mA).

1.6.3.13 Current output type

The user can choose () ~ 10mA or 4 ~ 20 mA current output in the current output type.

■ Converter Operation

1.6.3.14 Pulse output mode

There are two types of pulse output modes: frequency output and pulse output:

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 / meter range) * frequency full range value;

Pulse output mode: The pulse output is a rectangular wave pulse train. Each pulse represents a flow equivalent flowing through the pipeline. The pulse equivalent is selected by the following "pulse equivalent unit" parameters. Join.

Frequency output and pulse output are generally in the form of 0C gate. Therefore, an external DC power supply and load should be connected.

1.6.3.15 Pulse equivalent unit

Pulse unit equivalent refers to the flow value represented by a pulse. The meter pulse equivalent selection range is:

Pulse equivalent	Flow value	Pulse equivalent	Flow value
1	0.001L/cp	5	0.001m ³ /cp
2	0.01L/cp	6	0.01m ³ /cp
3	0.1L/cp	7	0.1m ³ /cp
4	1.0L/cp	8	1.0m ³ /cp

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

1.6.3.16 Frequency output range

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

1.6.3.17 Air traffic alarm allowed

With empty tube detection function, no additional electrode is required. If the user chooses to allow the empty pipe alarm, the meter can detect an empty pipe state when the fluid in the pipe is lower than the measuring electrode: after detecting the empty pipe state, the meter's analog output and digital output are set to signal zero, and the meter flow Displayed as zero.

1.6.3.18 Air traffic alarm threshold

When the fluid is full of pipes (with or without flow rate), the air pipe alarm settings have been modified. The user is more convenient to use. The air pipe report threshold parameter displays the measured conductivity on the uplink, and the air pipe report threshold is set on the downlink. When setting the air pipe alarm threshold, it can be set according to the measured conductivity. It can be set to 3 to 5 times the measured conductivity.

1.6.3.19 Upper Limit Alarm Allowed

The user chooses to allow or prohibit.

1.6.3.20 h—limit alarm value

The upper limit alarm value is calculated as a percentage of the range. This parameter uses a numerical setting method. The user sets a value between 0% and 199.9%. When the alarm condition is met during the operation of the instrument, the instrument will output an alarm signal.

1.6.3.21 Lower Limit Alarm

The same cap report

1.6.3.22 Excitation alarm

Select Allowed with excitation alarm function. Select Disabled to cancel excitation alarm function.

1.6.3.23 Total clear password

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

1.6.3.24 Sensor coding

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

1.6.3.25 Sensor coefficient value

Sensor coefficient: This is the calibration coefficient of the entire electromagnetic flowmeter. This coefficient is obtained from the actual standard and stamped on the sensor plate: the user must place this coefficient in the converter parameter table.

1.6.3.26 Excitation mode selection

The electromagnetic flow converter provides three excitation frequency options: 1/16 power frequency (mode 1), 1/20 power frequency (mode 2), 1/25 power frequency (mode 3). Small-caliber sensor excitation system has small inductance. You should choose 1/16 power frequency. Large-caliber sensor excitation system has large inductance. Users can only choose 1/20 power frequency or 1/25 power frequency. In use, select the excitation method 1 first. If the zero velocity of the meter is too high, then select Mode 2 or Mode 3 in turn.

Note: Under what kind of excitation mode calibration, you must work under which excitation mode

1.6.3.27 Positive total high and low

The total high and low settings can change the value of the forward cumulative total and reverse cumulative total. It is mainly used for meter maintenance and meter replacement.

The user can use the 5-level password to enter the modifiable forward cumulative quantity (+). The general cumulative quantity cannot exceed the maximum value counted by the counter (99999999).

1.6.3.28 Reverse total high and low

The user can use the 5-level password to enter, and can modify the reverse cumulative quantity (X-). Generally, the cumulative quantity cannot exceed the maximum value (99999999) counted by the counter .:

1.6.3.29 Spike suppression allowed

For slurry flow measurement of pulp, mud, etc., the solid particles in the fluid rubbing or impacting the measuring electrode will form "point-like interference". To overcome such interference, the converter uses a rate-of-change suppression algorithm. Change rate suppression characteristics

Set this parameter to "Allow" to start the rate of change suppression algorithm. Set this parameter to "prohibited" to turn off the rate of change suppression algorithm,

1.6.3.30 Spike suppression coefficient

This coefficient selects the change rate of the sharp interference to be suppressed, and is calculated as a percentage of the flow velocity, and is divided into 0.010m / s, 0.020m / s, 0.030m / s, 0.050m / s, 0.080m / s, 0.100m / s, 0.200m / s, 0.300m / s, 0.500m / s, 0.800m / s ten grades, the smaller the grade percentage, the higher the sensitivity of sharp interference suppression.

■ Converter Operation

Note: In applications, it is not necessary to choose the higher the sensitivity, the better, but to choose according to the actual situation.

1.6.3.31 Spike suppression time

This parameter selects the time width for suppressing sharp interference, in units of table seconds. The change in flow for a duration less than the selected time is considered by the converter to be sharp interference. The flow rate change for a duration longer than the selected time, the converter considers the normal flow rate change should also be selected according to the actual situation.

1.6.3.32 User Password 1 ~ 4

The user enters with a level 5 password, which can be modified;

1.6.3.33 Current zero point correction

The current output zero adjustment of the converter makes the current output accurate to 0mA or 4mA>

1.6.3.34 Current full scale correction

The full-scale current output of the converter is adjusted to make the current output accurate to 10mA or 20mA.

1.6.3.35 Factory calibration coefficient

This coefficient is specific to the converter manufacturer

1.6.3.36 Instrument codes 1 and 2

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

2. 3.6V Battery-Powered Converter

2.1, 3.6V battery-powered electromagnetic flowmeter technical indicators

- Applicable measuring diameter: DN3–DN600
 - Dielectric conductivity: $> 20 \times s / cm$
 - lining material: polyurethane rubber, high temperature rubber, acid-resistant rubber, neoprene, PTFE, F46, PFA
 - Electrode material: stainless steel containing Hastelloy, Hastelloy B, Hastelloy C, titanium, tantalum, clamp titanium alloy
 - Integrated working environment temperature:
 - Converter working environment humidity:
 - Enclosure protection class: IP6
 - Flow velocity measurement range: 0 ~ 1
 - Supporting accuracy grade: 0.5%, 1.0%
 - Measurement parameters: instantaneous flow, instantaneous flow rate
 - Recording parameters: cumulative total flow, 3 2 sets of event records
 - Detect alarm parameters:
- Battery capacity detection alarm
- Calibration output signal: fluid empty pipe detection alarm, excitation current detection alarm,
 - Wireless communication method: GPRS

Battery working time ... sensor caliber table(1/15HZ)
Excitation frequency

Unit volume flow pulse
SRD、GPRS、CDMA

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

Battery operating time ... Sensor caliber should be shown in the table (1 / 30HZ) excitation frequency

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

EN

Large-caliber electromagnetic flow converters need special customization

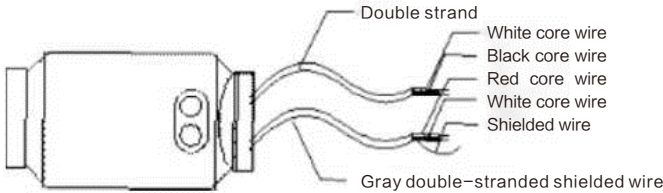
2.2 3.6V battery-powered converter signal line definition

2.2.1 R meter integrated terminal wiring and labeling

The battery-powered integrated electromagnetic flow converter has two sets of wiring: signal line group and excitation line group. Connect with the corresponding line group of the sensor. It should be connected correctly and carefully checked to avoid damage to the instrument due to incorrect wiring.

The signal lines are marked as follows:

Black double-stranded plastic wire: white core wire, black core wire

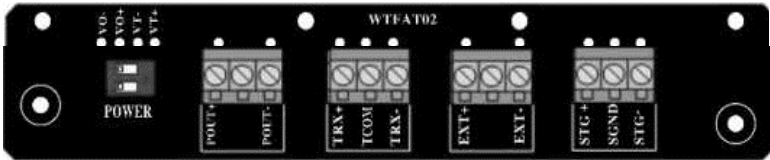


Schematic diagram of battery-powered signal cable

} Excitation current

■ Converter Operation

2.2.2 Square meter split terminal wiring and labeling



SIG1 Signal 1 Signal Ground
SGND Signal 2
SIG2 Excitation current + excitation
EXT+ Magnetic current+
EXT- Magnetic current-

Split sensor

POUT+ Pulse output
POUT- Output ground



The split electromagnetic flow converter is suitable for submersible installation. The electromagnetic flow sensor is installed in the well and the electromagnetic flow converter is installed in the well. Due to the special design, the connection cable between the sensor and the converter can reach 10 meters, and the flow Measurement accuracy is not affected by

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, status alarm, total accumulation, network communication, instrument calibration and verification. The converter parameters are defined as follows:

2.3.1 Parameter menu

Parameter number	Parameter text	Setting method	Parameter range	Password level
1	Language	select	Chinese English	1
2	Instrument communication address	select	0 ~ 99	1
3	Measuring pipe diameter	select	3 ~ 600	1
4	Traffic niches	select	L / h. L / m. L / s. m ³ / h. m ³ / m. m ³ / s	1
5	Traffic direction options	select	Forward Reverse	1
6	Zero flow correction	Set number	0 ~ ± 9999	1
7	Small signal cut-off point	Set number	Cut off settings by flow	1

8	Flow accumulation unit	select	() .001–1m³, 0.001–1L	1
9	Pulse unit equivalent	select	() .001–1 m³, 0.001–1L	1
10	Pulse Width	select	1 ~ 99ms	1
11	ATC alarm threshold	Set number	599.99%	1
12	Total clear password	Set number	0 ~ 59999	1
13	Sensor coefficient value	Set number	0.0000 ~ 2.9999	1
14	Sensor coded value	user settings	0 ~ 59999	1
15	Traffic correction allowed	select	Allow, prohibit	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	Positive total low	Set number	00000 ~ 99999	1
25	Positive total	Set number	0000 ~ 9999	1
26	Parameter setting password	Set number	0 ~ 59999	2
27	Factory calibration factor	Set number	0.0000 ~ 1.9999	2
28	Instrument code	Factory settings	0 ~ 59999	2
29	Parameter setting flag	Set number	Reserve	2

2.3.2 Instrument detailed parameter description

2.3.2.1 Language

The battery-powered electromagnetic flow converter is available in Chinese and English, and the user can choose to operate it.

2.3.2.2 instrument communication address

When referring to multi-machine communication, the communication address of this table, the optional range: address 01–99, address 0 is reserved,

2.3.2.3 Measuring the Caliber of a Pipe

Sensor range of battery-powered electromagnetic flowmeter converter: 3 ~ 600 mm

■ Converter Operation

2.3.2.4 Flow units

The meter flow display units are: L/h. L/m. L/s. m³/h. m³/m. m³/s The user can select an appropriate flow display unit according to process requirements and usage habits.

2.3.2.5 Flow direction selection

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

2.3.2.6 Small Signal Resection Point

The small signal cut-off point is set according to the flow rate. When small signal cut-off is performed, the flow rate, cumulative amount, and pulse output are cut off at the same time.

2.3.2.7 Flow Accumulation Unit

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

Flow accumulation unit: 0.001L. 0.010L. 0.100L. 1.000L

2.3.2.8 Pulse unit equivalent

0.001m³. 0.010m³. 0.100m³. 1.000m³

Output pulse unit: 0.001L,

0.001m³. 0.010L. 0.100L. 1.000L

0.010m³. 0.100m³. 1.000m³ At the same flow rate, the pulse equivalent is small, the frequency of output pulse is high, and the accumulated flow error is small.

2.3.2.9 Pulse width

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

Parameter setting menu list

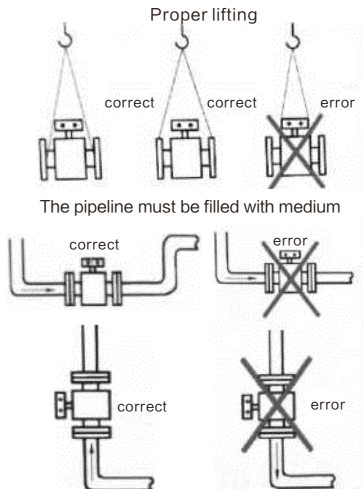
number	Pulse Width (ms)	Maximum input pulses per hour (p/h)
1	99	14400
2	80	18000
3	40	36000
4	20	720000
5	10	1440000
6	8	180000
7	4	360000
8	2	720000
9	1	1440000

There are two possibilities for the SYS warning. The converter's excitation is broken or the battery pack is low. After the battery pack low warning, the battery pack can still work for about 100 hours, but the measurement accuracy is reduced. The user should replace the battery in time.

3. Instrument Installation

Selecting the correct installation location and using the correct installation method are the keys to good use of the electromagnetic flowmeter. If the installation is incorrect, it will not only affect the measurement results, but also affect the measurement accuracy. It will also affect the service life of the flowmeter and even damage the flow meter

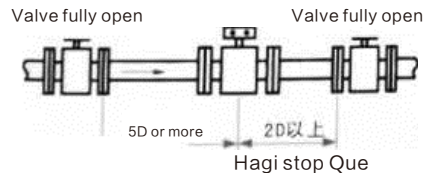
3.1 Correct installation



Do not install flow meter on pump suction side
(prevent vacuum)



Avoid air bubbles



Requirements for straight sections

Can be above $0 \vee 1^\circ D$

3.2 Installation site selection

In order to make the sensor work reliably and stably, pay attention to the following requirements when selecting the installation site:

- (1) Avoid as far as possible 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) It should be installed in a dry and ventilated place as far as possible, and it should not be installed in a humid and prone to water accumulation.
- (3) Modify the installation method of the pipeline: when the flow rate of the medium fails to meet the requirements, a smaller diameter flowmeter should be used. At this time, a reducer or a part of the

■ Converter Operation

2.3.2.10 Air Traffic Control Alarm I

The battery-powered electromagnetic flowmeter judges whether the tube is empty or not by measuring the resistance between the two electrodes of the sensor. In the case that the measurement state is full of the tube, observe the measured resistance value (MTP) of the fluid, and then take 1.5–2 times the measured value to set Empty tube alarm threshold. When the fluid is empty, the resistance between the electrodes increases and exceeds the threshold to trigger the empty tube alarm.

2.3.2.11 Flow zero correction

EN

During the zero point correction, make sure that the electromagnetic flow sensor tube is filled with fluid and that the fluid is at a standstill. The zero point of the flow is expressed by the flow rate, and the unit is mm / s.

The flow zero correction of the electromagnetic flow converter is displayed as follows:

FS=00000
± 00000

The upper small print shows: FS stands for the zero measurement value of the meter;

Large characters in the lower row display: zero correction value of velocity;

When the FS display is not "0", adjust the correction value so that FS = 0 (Note: If you change the downward correction value. The FS value increases, you need to change the positive and negative signs of the downstream value to make FS correct to zero.

The correction value of the flow zero point is the matching constant value of the electromagnetic flow sensor. It should be recorded in the record sheet and sensor label of the electromagnetic flow sensor. The opposite sign.

2.3.2.12 Total clear password

The user can use the advanced password to set the total amount reset password, and then enter the function selection menu. Press the page key to enter the total amount reset menu. This password is built in to complete the total amount reset.

2.3.2.13 Sensor coefficient value

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

2.3.2.14 Positive total high and low

This parameter is used to set the cumulative total. It is mainly used for maintenance and replacement of the electromagnetic flow converter.

2.3.2.15 Factory calibration coefficient

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

2.4 Instrument alarm display

The instrument has three kinds of glance display, SYS is system warning, MTP is air traffic warning, CUT is small signal cut-off warning.

pipeline should be modified so that it has the same diameter as the sensor, but the straight section of the front and back At least the front straight pipe section N10DN and the rear straight pipe M5DN must be satisfied (DN is the pipe diameter).

(4) Avoid sunlight and rain as much as possible, and avoid ambient temperature higher than 60Y and relative humidity greater than 95%.

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

(6) The flow meter should be installed at the rear end of the pump and must not be installed on the suction side; the valve should be installed on the downstream side of the flow.

3.3 Grounding of the sensor

Sensor, pipe connection, wiring and ground (see Figure 20, 21, 22, 23)

EN

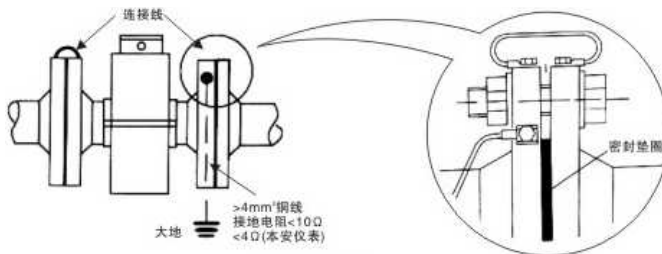


Figure 20 Metal pipes

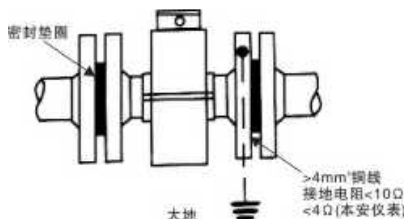


Figure 21 Non-metallic pipes and slow sensors with ground electrodes

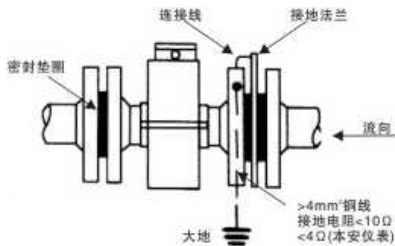


Figure 22 Non-metallic official, regret sensor without ground electrode

■ Converter Operation

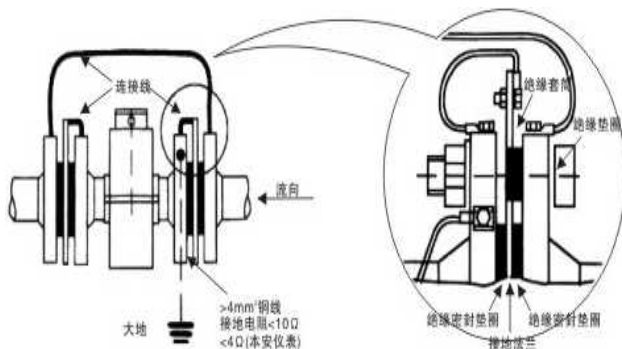


Figure 23 Pipeline with cathode protection

3.4 installation needs

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

- (1) The sensor can be installed on a vertical pipe or on a horizontal or inclined pipe, but the center connection of the two electrodes is required to be horizontal.
- (2) The medium should flow in the full pipe at the installation position to avoid dissatisfied pipe and gas from adhering to the electrode.
- (3) For liquid–solid two–phase fluids, it is best to use vertical installation to make the sensor lining wear uniform and prolong the service life.
- (4) When the medium is not full in the installation position of the flowmeter, you can take the method of raising the pipeline at the back of the flowmeter to make it full. It is strictly prohibited to install the flowmeter at the highest point of the pipeline and the water outlet.
- (5) The front and rear straight pipe sections are $\geq 10\text{DN}$ in front of the flowmeter and $\geq 5\text{DN}$ in the back end.

3.5 Instrument wiring

- If the signal cable used for split installation is a customized special cable, the shorter the cable, the better.
- Yz medium–sized rubber sheathed cable can be used as the excitation cable, and its length is the same as the signal cable.
- Signal cables must be strictly separated from other power sources and cannot be laid in the same tube.
- The signal cable and the excitation cable are as short as possible, and the excess cables cannot be rolled together. Cut off the excess cables and resolder the joints.
- When the cable is connected to the electrical interface of the sensor, a U–shape is made at the port to prevent rainwater from penetrating into the sensor.

4. Troubleshooting

4.1 The instrument has no display

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

4.2 Excitation alarm

- Whether the excitation wiring EX1 and EX2 are open;
- Whether the total resistance of the sensor excitation coil is less than 150;
- If both a.b are normal, the converter is faulty.

4.3 Air traffic alarm

- Measuring fluid is filled with sensor measuring tube;
- Use a wire to short the converter signal input terminals SIG1, SIG2, and SGND at three points. At this time, if the "empty tube" prompt is cancelled, the converter is normal, it may be that the conductivity of the measured fluid is low or the empty tube threshold is set incorrectly;
- Check if the signal connection is correct;
- Check if the sensor electrode is normal;

Make the flow rate be zero, and observe that the conductivity should be less than 100%. In the case of flow rate, measure the resistance of terminals SIG1 and SIG2 to SGND respectively. You can see the charging and discharging phenomenon during the measurement).

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

4.4 Inaccurate measured flow

- Measuring fluid is filled with sensor measuring tube;
- Whether the signal cable connection is normal;
- Check whether the sensor coefficient and the zero point of the sensor are set according to the sensor label or the factory check list;

5. Download Google

1. When ordering, please specify the name of the measured medium, working pressure, medium temperature, flow (flow rate) range, pipe diameter and the situation of the pipe network to be tested.
2. The split type electromagnetic flowmeter is equipped with a 10m cable as standard. If the installation site requires a longer cable, please specify in the order.

6. Supply And Demand Sides Shall Be Responsible During The Warranty Period

1. When stored in a warehouse, it should be placed in a dry, ventilated, non-corrosive gas place, where the ambient temperature is in the range of 0–40 ° C and the relative humidity is less than 85%.
 2. The company implements three guarantees for products with a warranty period of one year (counting from the date of shipment). During the warranty period, if the user complies with the requirements for product use, storage and transportation, if the product has quality problems, the company is responsible for free repair or replacement.
- Service guarantee: immediacy, efficiency, and life-long system.

■ Converter Operation

- Richtek responding agent: Receive customer service information and give the customer a solution within one hour. Those who need on-site service arrive at the scene within 4 hours and arrive at the scene within 2 hours outside the province.
- Warranty mechanism: The warranty period of the products sold by our company is 12 months. Due to any non-artificial quality problems, we will repair or replace the products as soon as possible.
- Wart mechanism: All products harmed by our company are maintained for life. If man-made or wood can resist the product damage caused by external causes, our company is responsible for providing free testing services. If the damaged parts need to be replaced, our company only charges the corresponding cost.
- Personal agent: The technical professional will provide you with free technical services and consultation for 4 hours.



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