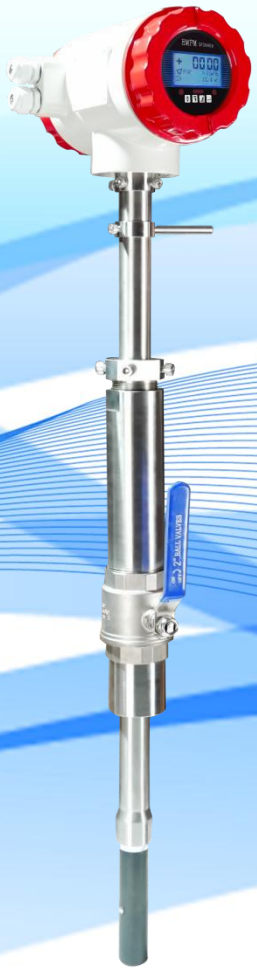
LDG series

Intelligent electromagnetic flowmeter

User Guide



catalogue

1. Product characteristics and use scope

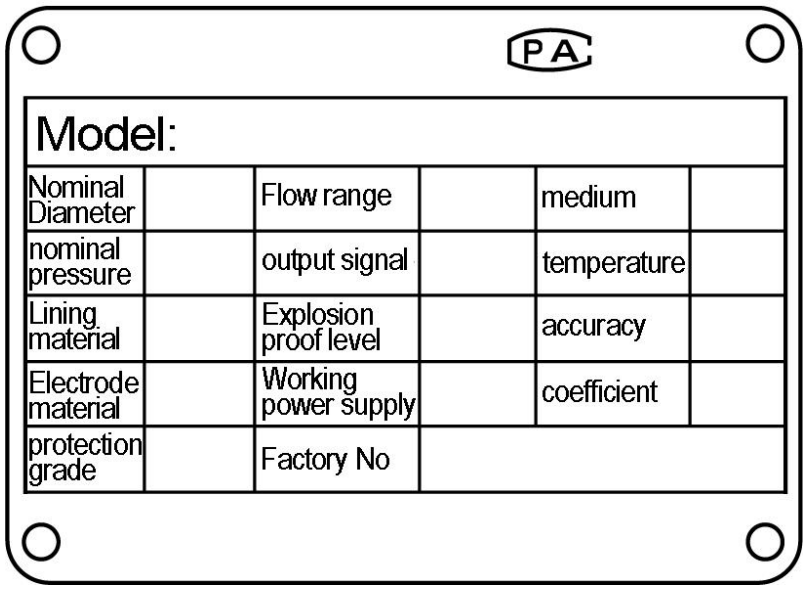
LDG series intelligent electromagnetic flowmeter is a new liquid flow meter developed by our company with the domestic leading level. The flowmeter based on Faraday law of electromagnetic induction, according to the conductive fluid through the external magnetic field induced electromotive force to measure conductive fluid flow of an instrument, its working characteristic is to measure the conductive performance of liquid, fearless sediment impurities, is chemical industry, electric power, metallurgy, environmental protection, municipal and other industries for the ideal instrument of liquid measurement.

After the arrival of the intelligent electromagnetic flowmeter, please be sure to check its appearance to confirm whether the instrument is damaged during transportation.

The customer shall urge relevant personnel to read, understand and follow the instructions and tips provided in this manual before installing the equipment.

1.1 Check the model and specifications

The model and technical specifications can be checked from the nameplate of the intelligent electromagnetic flow meter and the factory check sheet, and check whether the model and technical specifications of the instrument are consistent with the model and technical specifications of the instrument.



1.2 Storage precautions

After the arrival of the product, if the instrument needs to be stored for a long time, pay special attention to the following points:

(1) Install the instrument with the original packaging box and keep the instrument as well as possible before delivery.

(2) Select the storage location according to the following conditions:

Don't put it in the wind and rain.

Do not place them with a vibration impact.

Do not open the meter cover of the instrument to avoid damp affecting the normal operation of the instrument.

The ambient temperature, humidity, and atmospheric pressure shall be:

Ambient temperature: -30~ + 65℃; relative humidity: 5%~95%; atmospheric pressure: 86 ~ 106 Kpa

1.3 Notes for installation in the danger area

This equipment is approved for use in the danger area and obtains the following certification: explosion-proof type: ExdIICT6 Gb

1.4 Main features of the products

■ Programmable frequency low frequency rectangular wave excitation, improve the stability of flow measurement, low power loss;

■ Using a 32-bit embedded microprocessor, fast computing speed, high accuracy;

■ Full digital quantity processing, strong anti-interference ability, reliable measurement, high accuracy, flow measurement range up to 100:1;

■ Ultra-low EMI switch power supply, the applicable power supply voltage change range is large. Good anti-EMC performance;

■ Full Chinese character menu operation, easy to use, easy to operate, easy to learn and easy to understand;

■ High-definition backlight LCD display;

■ With two-way flow measurement, two-way total accumulation function, current, frequency output function;

■ There are three product ators to display the forward, reverse, and difference accumulation respectively;

■ With the RS485 digital communication signal interface;

■ Has the conductivity measurement function, can determine whether the sensor is air traffic control;

■ Using SMD device and surface installation (SMT) technology, high circuit reliability;

■ The instrument has multiple languages display, Chinese and English can be changed to each other;

2. operational principle

The electromagnetic flowmeter works based on Faraday's law of electromagnetic induction. When a conductor moves in a magnetic field, there will be an induced electromotive force at the two ends of the conductor in the direction of the magnetic field. The magnitude of the EMF is proportional to the speed of the conductor motion and the magnitude of the magnetic induction intensity.

In FIG. 1.1, when the conductive fluid flows at an average flow rate V (m/s) through an insulated pipe with an inner diameter of D (m) containing a pair of measuring electrodes, and the tube is in a magnetic field with a uniform magnetic induction intensity of B (T). Then, an electromotive force (E) perpendicular to the magnetic field and the flow direction is induced on a pair of electrodes. By the law of electromagnetic induction can be written to do (1) formula:

$$E = B \cdot D \cdot V \quad (v) \quad \cdots\cdots\cdots\cdots\cdots\cdots \quad (1)$$

Usually, the volume flow can be written

$$q_v = \frac{\pi D^2}{4} V \quad (m^3/s) \quad \cdots\cdots\cdots\cdots \quad (2)$$

From formulas (1) and (2):

$$q_v = \frac{\pi D^2}{4} \frac{E}{B} \quad V \quad (m^3/s) \quad \cdots\cdots\cdots\cdots \quad (3)$$

Therefore the motive F can be expressed as:

$$E = \frac{4B}{\pi D} q_v \quad (V) \quad \cdots\cdots\cdots\cdots\cdots\cdots \quad (2)$$

When B is a constant, formula _ (3) is rewritten as = k, $\frac{\pi D}{4}\frac{1}{B}$

It can be seen that the flow rate is directly proportional to the EMF E.

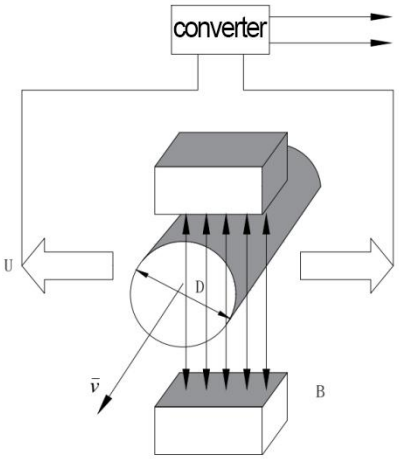


Figure 1.1 Schematic diagram of the working principle

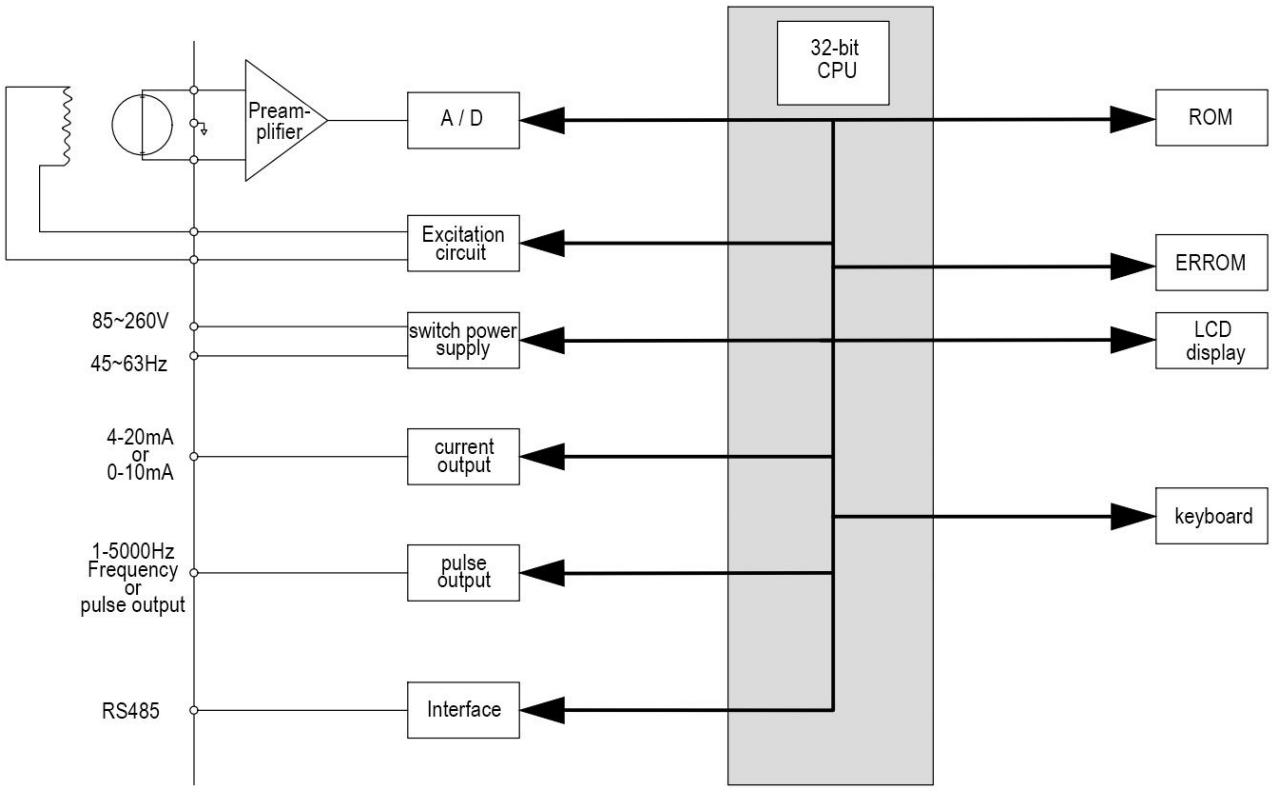


Figure 1.2 Structure of the converter

On the one hand, the electromagnetic current converter provides stable excitation current to the excitation coil of the electromagnetic current sensor to achieve B constant; at the same time, the electromotive force induced by the sensor is amplified and converted into standard current signal or frequency signal to facilitate flow display, control and regulation. Figure 1.2 shows the converter circuit structure.

3. Functional and technical performance indicators

3.1 Technical parameter table

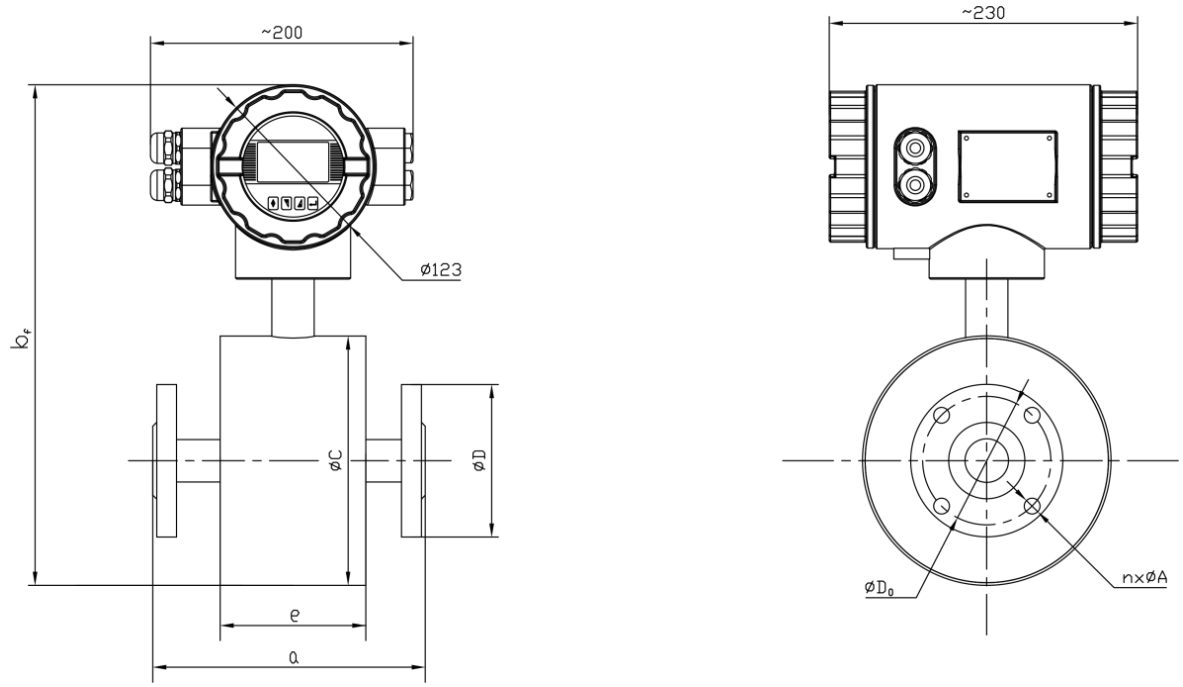
Execution standard: electromagnetic flowmeter (JB / T 9248-1999) measuring fluid: conductive liquid, slurry

<table>
<tr><th>Measurement accuracy and repeatability</th><th>structure type</th><th>definition</th><th>repetitiveness</th></tr>
<tr><td></td><td>Pipe type</td><td>±0.5%、±1.0%、±1.5%</td><td>±0.15%</td></tr>
<tr><td colspan="2" rowspan="3">Rated pressure: GB 0.25MPa, 0.6MPa, 1.0MPa, 1.6MPa, 4.0MPa
DIN PN16、PN25、PN40、PN63
JIS 10K、20K、40K
ANSI Class150、Class300、Class600</td><td colspan="2">H-0-180℃; L-35~0℃</td></tr>
<tr><td colspan="2">Electrode form: standard fixed type</td></tr>
<tr><td colspan="2">Structure type: pipe-type electromagnetic flowmeter</td></tr>
<tr><td colspan="2">Special pressure: customizable</td><td colspan="2">Caliameter: pipeline DN10-DN3000</td></tr>
<tr><td colspan="4">Structural material</td></tr>
<tr><td>electrode</td><td>316L, Platinum (pt), Harbin (HB, HC), Tantalum (Ta), titanium (Ti), tungsten carbide (WC)</td><td>flange</td><td>Carbon steel (conventional), stainless steel (optional)</td></tr>
<tr><td>lining</td><td>CR neoprene, PU polyurethane rubber, F4(PTFE)、F46(FEP)、PFA、PO hard rubber</td><td>Table body</td><td>Carbon steel (conventional), stainless steel (optional)</td></tr>
</table>

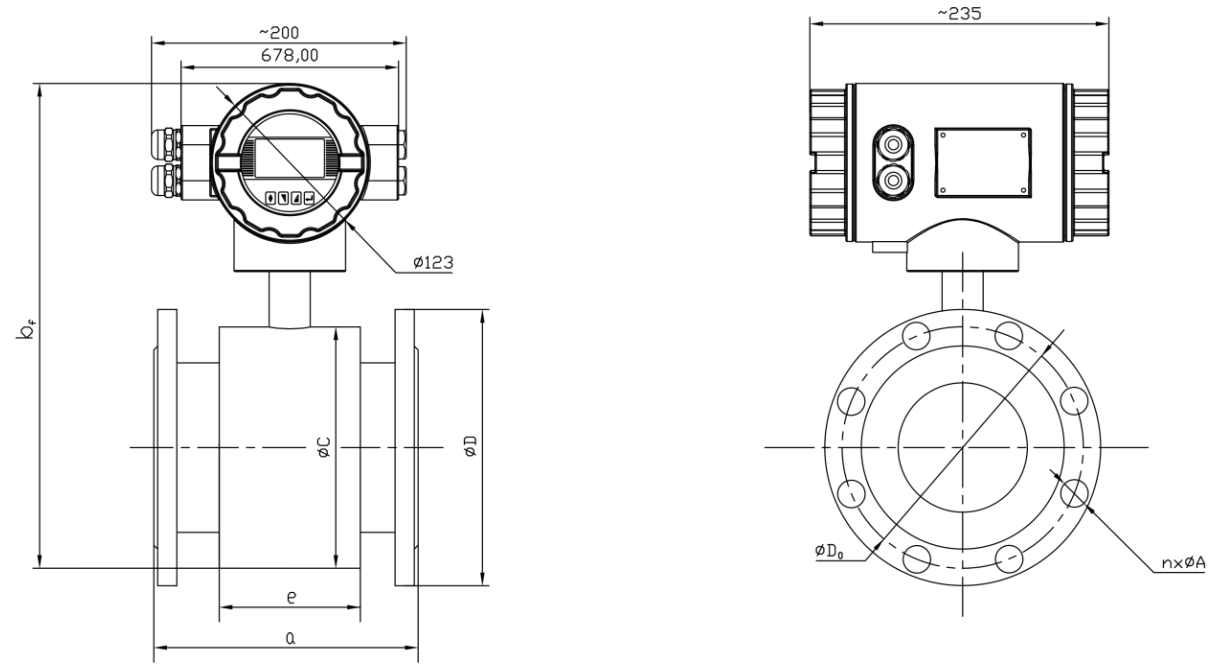
Measuring the tube	stainless steel	gauge outfit	Film casting aluminum
Power Supply Voltage			
The first power supply mode is 220VAC			
The second power supply mode is 24VDC			
Output signal: 4 ~ 20 mA current output, pulse output, RS-485 (custom protocol) Hart, Profibus-DP, RS-485 (ModBus protocol)		Number of electrodes: 3 Flow direction: positive and reverse	
Flow rate range: 0.5 m/s ~5m / s		Ambient temperature: -25~60℃	
Electrical interface: M201.5		Storage temperature: -40~60℃	
Explosion-proof grade: ExdIICT6Gb		Relative humidity: 5~90%	
Protection level: IP65, IP67, IP68		Alarm (often open): air traffic control, excitation, upper and lower limits	

Flow range of electromagnetic flowmeter (in m³ / h)				
bore	Traffic lower limit	Traffic upper limit	Extended lower limit	Extended upper limit
10	0.1	1.4	0.06	2.8
15	0.3	3.2	0.1	6.4
20	0.6	5.7	0.2	11.3
25	0.9	8.8	0.4	17.7
32	1.4	14	0.6	28.9
40	2.3	23	0.9	45.2
50	3.5	35	1.4	70.7
65	6	60	2.4	119
80	9	90	3.6	181
100	14	141	6	283
125	22	221	9	442
150	32	318	13	636
200	57	565	23	1130
250	88	883	35	1766
300	127	1272	51	2543
350	173	1731	69	3462
400	226	2261	90	4522
450	286	2861	114	5723
500	353	3533	141	7065
600	509	5087	203	10174
700	692	6924	277	13847
800	904	9043	362	18086
900	1145	11445	458	22891
1000	1413	14130	565	28260
1200	2035	20347	814	40694
1400	2769	27695	1108	55390
1600	3617	36173	1447	72346
1800	4578	45781	1831	91562
2000	5652	56520	2261	113040
2200	6839	68389	2736	136778

3.2 Size table chart



DN10-20



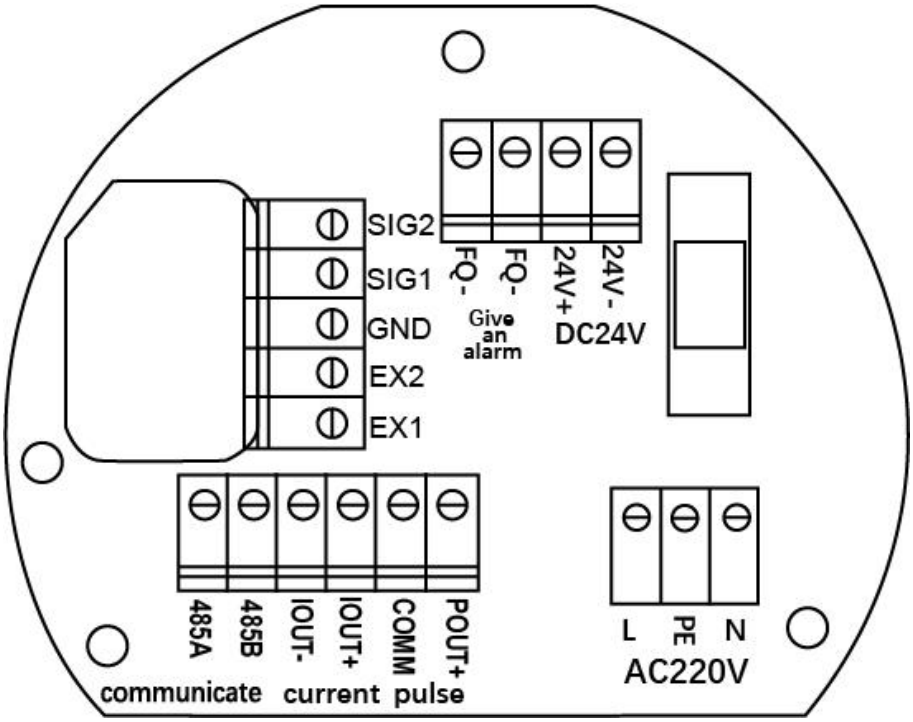
DN25-2200

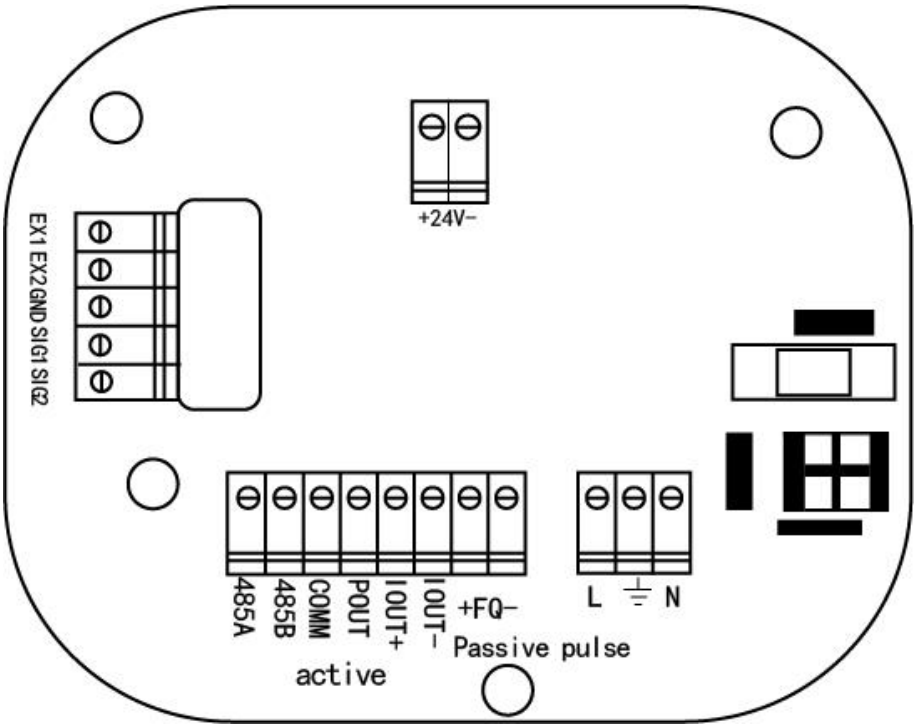
Flat flange type sensor connection size and connection flange mounting size (mm)

DN	Rated pressure (MPa)	Instrument dimensions (mm)				Flanged connection size (mm)		
		a	bf	c	e	D	Do	nx A
10	4.0	150	310	107	92	90	60	4X14
15	4.0	200	310	107	92	95	65	4X14
20	4.0	200	310	107	92	105	75	4X14
25	4.0	200	314	107	92	115	85	4X14
32	4.0	200	336	126	90	140	100	4X18
40	4.0	200	348	140	90	150	110	4X18
50	4.0	200	356	140	90	165	125	4X18
65	1.6	200	376	160	90	185	145	4X18
80	1.6	200	383	160	90	200	160	8X18
100	1.6	250	403	180	130	220	180	8X18
125	1.6	250	432	208	130	250	210	8X18
150	1.6	300	463	234	152	285	240	8X22
200	1.0	350	521	296	192	340	295	8X22
250	1.0	400	573	344	248	395	350	12X22
300	1.0	500	623	394	282	445	400	12X22
350	1.0	600	680	449	316	505	460	16X22
400	1.0	600	735	499	376	565	515	16X26
450	1.0	600	786	551	376	615	565	20X26
500	1.0	600	840	603	400	670	620	20X26
600	1.0	600	945	703	400	780	725	20X30
700	1.0	700	1098	895	545	895	840	24X30
800	1.0	800	1218	1015	580	1015	950	24X33
900	1.0	900	1318	1115	690	1115	1050	28X33
1000	1.0	1000	1433	1230	750	1230	1160	28X36
1200	0.6	1200	1608	1405	1206	1405	1340	32X33
1400	0.6	1400	1833	1630	1406	1630	1560	36X36
1600	0.6	1600	2033	1830	1606	1830	1760	40X36
1800	0.6	1800	2248	2045	1806	2045	1970	44X39
2000	0.6	2000	2468	2265	2006	2265	2180	48X42
2200	0.25	2200	2608	2405	2206	2405	2315	52X45

4. Wiring instructions and wiring

.1 4 Layout diagram of one-type terminal

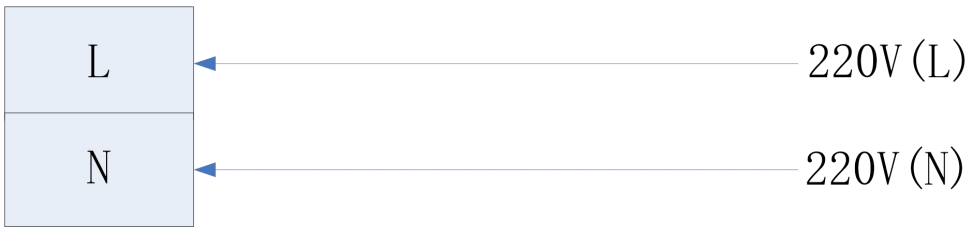




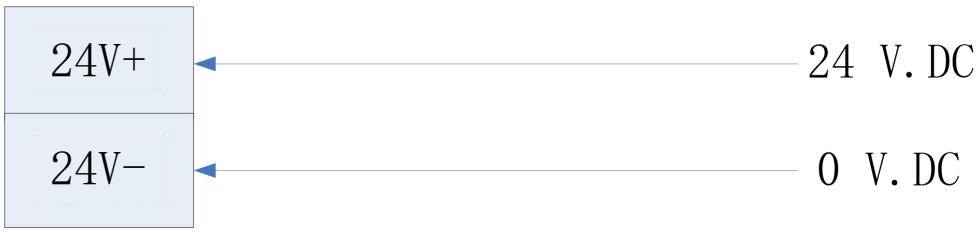
4.2 Description of the wiring terminal

Terminal identification	function	explain
L:	A 220V AC power supply input	Can be connected to a AC 36V to AC 260V power supply
N:	A 220V AC power supply input	
24V+:	DC 24V input positive pole	The input error of 24V power supply is not greater than 5%, otherwise the measurement error may be larger
24V -:	DC 24V input negative electrode	
EX 1 :	excitation coil	Some products of the terminal to red and black double line out
EX 2 :		
IOUT+:	4-20ma current output is positive (active isolation)	The output load is not greater than 600 Ω, otherwise the analog output accuracy is reduced
IOUT -:	4-20ma current output is negative (active isolation)	
POUT:	Frequency (pulse) output	The frequency mode sets the frequency range not greater than 5 Khz
COMM:	Frequency (pulse) output ground	
485A:	RS 485 Communication A	
485B:	RS 485 Communication B	
GND:	Signal ground	Some products are led by gray 2 red and white two-core wire and shielding wire, the shielding layer is GND, red is SIG 1, white is SIG 2
SIG 1 :	Connect electrode signal 1	
SIG 2 :	Connect electrode signal 2	
+FQH-	Upper and lower limit alarm output (passive)	

4.3 Schematic diagram of power supply wiring



The 220V AC power supply

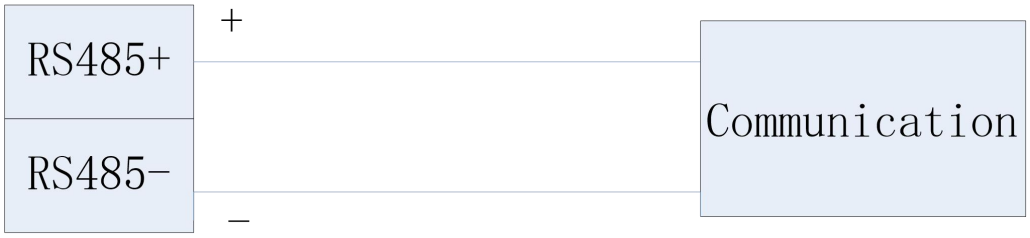


The 24V DC power supply

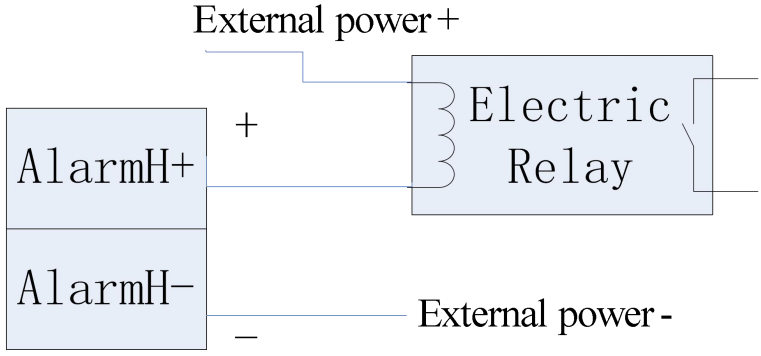
4.4 4-20 mA current output wiring diagram (no external power supply required)

4.5 Diagram of pulse output wiring (no external power supply is required)

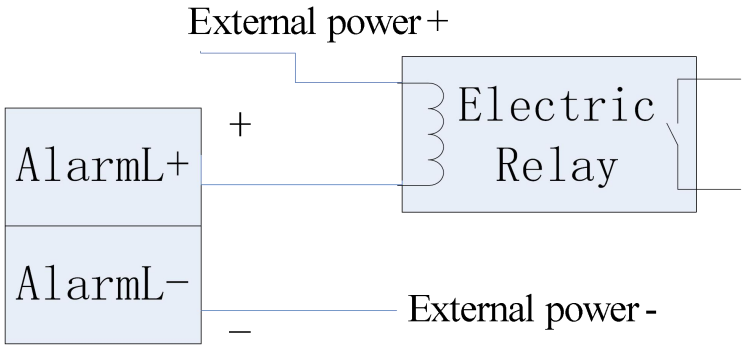
4.6 Outdiagram of RS 485



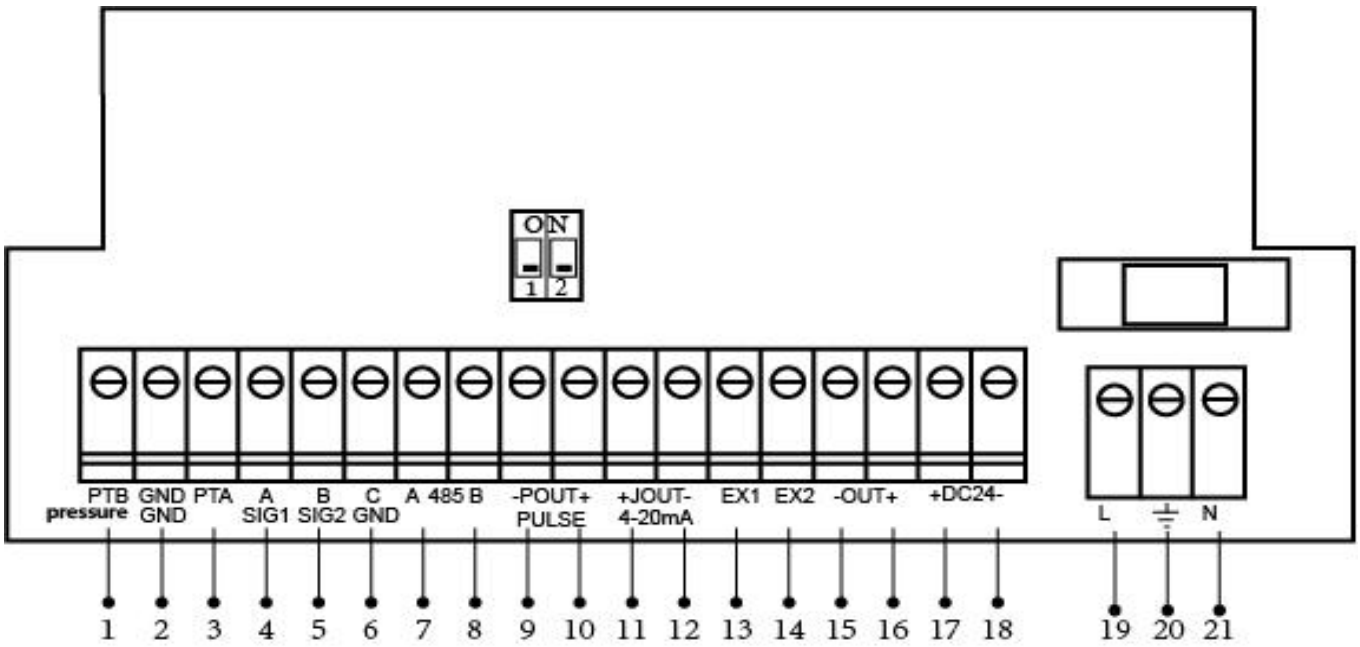
4.7 Diagram of high alarm output wiring (external power supply required)



4.8 Diagram of Low Alarm Output Wiring (requiring external power supply)



4.9 Body-type wiring instructions



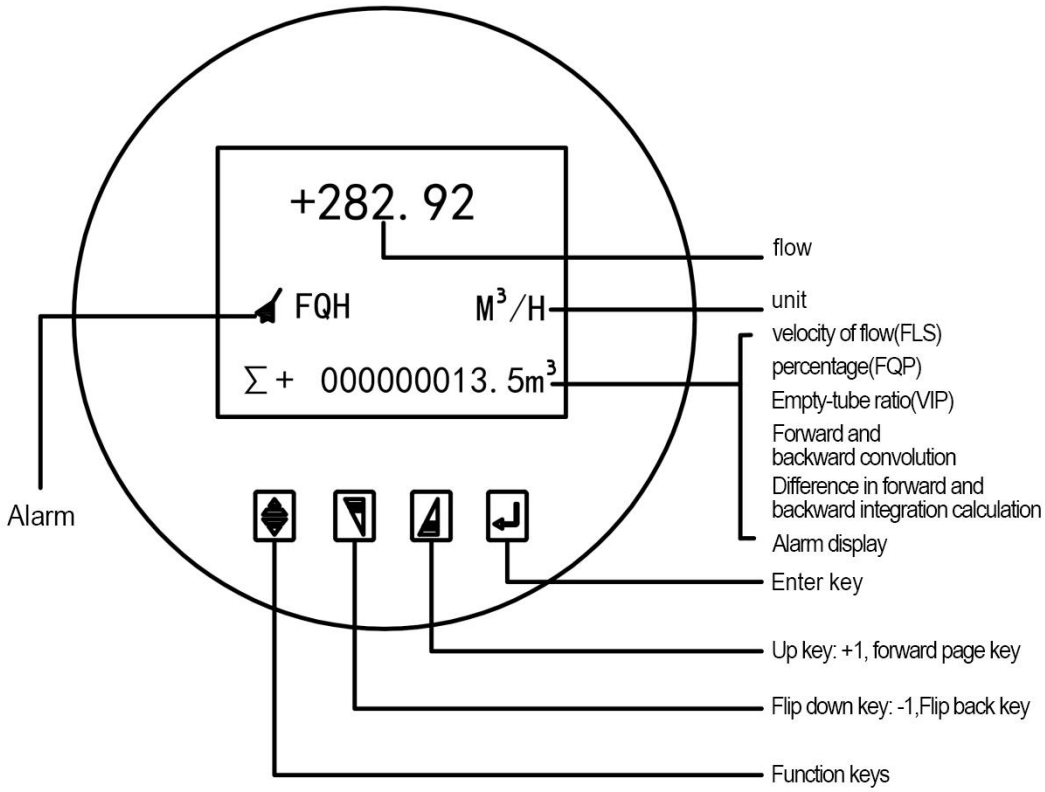
marking	function	remarks
L	AC 85 to 265 V power supply	L supplies the power for the A C 220V
N	AC 85 to 265 V power supply	N supplies the power for the A C 220V
EX1	Connect to one end of the sensor coil	Provide excitation
EX2	Connect to the other end of the sensor coil	Provide excitation
OUT+	Alarm Output +	Alarm output, recommended to 24VDC intermediate relay, load current 30 mA
OUT-	Alarm Output-	
IOUT +	4~20mA output +	The current output is active, do not need or cannot supply 24V power to the current output terminal, and the load resistance is 500 Ω
IOUT -	4~20mA output-	
DC24+	24V current +	When 24V DC power supply is selected

DC24-	24V current-	
POUT +	Frequency or pulse output +	The frequency or pulse output is active, and the load current is 30 mA
POUT -	Frequency or Pulse output-	
485A	RS485 output +	RS485 output
485B	RS485 output-	
SIG1	signal wire A	The signal line and the ground wire of the sensor
GND	Signal ground	
SIG2	signal wire B	
pressure +	4-20 mA pressure signal +	Customized payment with pressure signal is required
pressure-	The 4-20 mA pressure signal-	

5. Operations and settings

When the instrument is powered on, it automatically enters 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.

5.1 Key-press operation instructions



5.1.1 Function keys:

This key is used together, and it is not used alone,

Use 1: In the measurement interface, after holding down the function key, press the OK key to enter the parameter setting.

Use 2: After pressing the function key in the interface requiring input value, press the flip key (the third key) to move the modified cursor to the right, or press the function key, and press the flip key (the second key) to move the modified cursor to the left.

5.1.2 Down key:

Use 1: measurement interface Use the switch screen to display the content and view the corresponding data

Use 2: In the parameter selection interface, you can switch to the corresponding setting item

Use 3: within the corresponding setting item, if the parameter is a preset fixed value, the corresponding predetermined value can be selected;

Use 4: in the specific items of the parameter setting internal or parameter password input interface, reset password input interface, if you need to set the custom value, can make the cursor selection bit between 0~9, minus 1 switch;

Use 5: Set the internal or parameter password input interface and zero password input interface in the specific items of the parameter setting. If you need to set the custom value, you can modify the cursor position with the function key (refer to the function key 2).

5.1.3 Top key:

Use 1: In the measurement interface, use the switching screen to display the content and view the response data;

Use 2: in the parameter selection interface, you can switch to the corresponding setting items;

When the reverse output allows parameters are set in the "allowed" state, the measurement interface can measure the forward flow and reverse flow of flow, and only the forward flow.

Use 3: within the corresponding setting item, if the parameter is a preset fixed value, the corresponding predetermined value can be selected;

Use 4: in the specific items of the parameter setting internal or parameter password input interface, reset password input interface, if you need to set the custom value, can make the cursor selection bit between 0~9, minus 1 switch;

Use 5: Set internal or parameter password input interface and reset password input interface in the specific items of parameter setting. If you need to set custom values, you can modify the cursor position with the function key (refer to the function key 2);

Use 6: in the parameter setting interface, press this key to switch to the total amount reset interface;

5.1.4 Determination key:

Use 1: Use the function key (refer to the function key 1);

Use 2: In the parameter password input interface, press the determination key to enter the corresponding setting interface (correct password input). After completing the parameter selection interface and the parameter modification interface, press the function key to return to the project name interface and save the parameters;

Use 3: After completing the parameter setting, in the name interface, long press the OK key to return to the measurement interface;

Use 4: press the OK key in the measurement interface for more than 6 seconds to enter the fast automatic calibration zero interface;

5.2 The converter can set the items as shown in the figure shown below

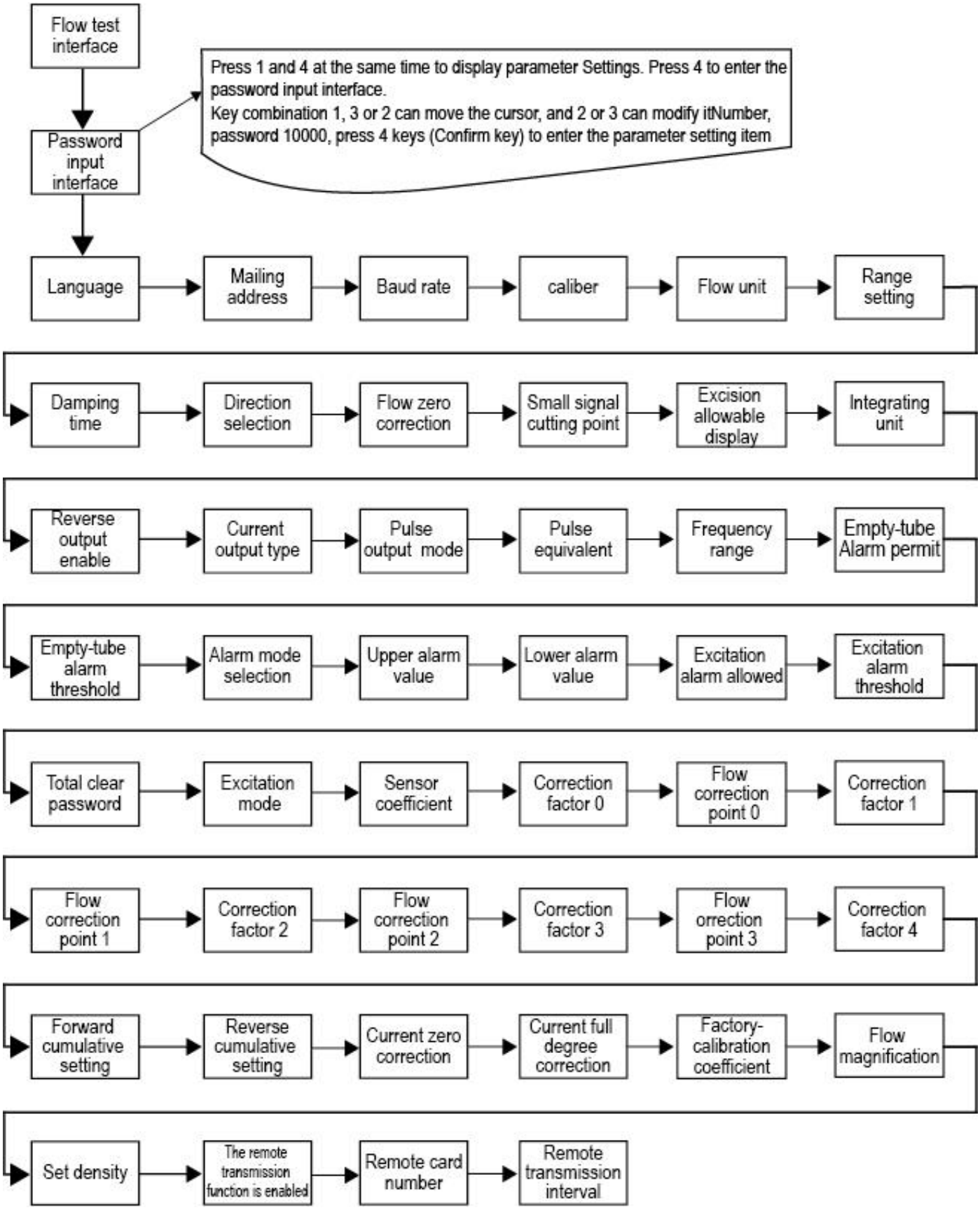


Figure 5.2 The converter can set the items

5.3 Detailed description of the setting items

Parameter number	Parameter text	Set the way	Parameter range	Password level
1	language	select	Chinese, English	1
2	Instrument communication address	Number	0～99	1
3	Instrument communication speed	select	300～38400	1
4	Measure the diameter of the pipe	select	3～3000	1
5	flux unit	select	L/h、L/m、L/s、m^3/h、m^3/m、m^3/s	1
6	Instrument range setting	Number	0～99999	1
7	The damping time was measured	select	1～64	1
8	Flow direction selection	select	Forward, reverse	1
9	Traffic zero correction	Number	0～ ±9999	1
10	Small signal resection point	Number	0～599.99%	1
11	Allow excision to show	select	Allow / Prohibit	1
12	Flow product calculation unit	select	0.001m^3～1m^3、0.001L～1L、	1
13	Reverse output allows	select	Allow, prohibit	1
14	Current output type	select	0～10mA /4～20mA	1
15	Pulse output mode	select	Frequency / pulse	1
16	Pulse unit equivalent	select	0.001m^3～1m^3、0.001L～1L、	1
17	Frequency output range	select	1～ 5999 Hz	1
18	Air traffic control alarm allows	select	Allowed / prohibited	1
19	Air traffic control alarm threshold	Number	59999	1
20	Alert mode selection	select	Pulse output, upper limit alarm, lower limit alarm	1
21	The upper limit alarm allows	select	Allowed / prohibited	1
22	Upper limit alarm value	Number	000.0～ 599.99 %	1

23	The lower limit alarm allows	select	Allowed / prohibited	1
24	Lower limit alarm value	Number	000.0 ~ 599.99 %	1
25	Exciting magnetic alarm allows	select	Allowed / prohibited	1
26	Excitation alarm threshold	Number	0000-9999	1
27	Total zero password	Number	0-99999	2
28	Sensor encoding of 1	User Settings	Year, month (0-99999)	2
29	Sensor code of 2	User Settings	Product Number (0-99999)	2
30	Excitation method selection	select	Mode 1,2, and 3	2
31	Sensor system value	Number	0.0000 ~ 5.9999	2
32	Correction coefficient 0	Number	0.0000 ~ 2.0000	2
33	Traffic correction point 0	Number	00.0~10.0 (flow rate)	2
34	Correction coefficient 1	Number	0.0000 ~ 2.0000	2
35	Traffic correction point 1	Number	00.0~10.0 (flow rate)	2
36	Correction coefficient 2	Number	0.0000 ~ 2.0000	2
37	Traffic correction point 2	Number	00.0~10.0 (flow rate)	2
38	Correction coefficient 3	Number	0.0000 ~ 2.0000	2
39	Traffic correction point 3	Number	00.0~10.0 (flow rate)	2
40	Correction coefficient 4	Number	0.0000 ~ 2.0000	2
41	Positive cumulative setting	Can modify	0 ~ 999999999	2
42	Reverse cumulative setting	Can modify	0 ~ 999999999	2

Continue to receive the table above

Parameter number	Parameter text	Set the way	Parameter range	Password level
43	Current zero correction	Number	0.0000 ~ 1.9999	2
44	Current full correction	Number	0.0000 ~ 3.9999	2
45	Factory calibration coefficient	Number	0.0000 ~ 5.9999	2
46	Set the density	Number	0 ~ 59999	2
47	Distance transmission interval time	Number	5~1440	2

5.4 Details of the parameter terms

5.4.1 Language

Electromagnetic converter has both Chinese and English languages, the user can choose to operate.

5.4.2 Instrument communication address

Refers to the multi-machine communication, the mailing address of this table, optional range: 01 ~ 254 address, 0 address reserved.

5.4.3 Instrument communication speed

Selection range of port rate for instrument communication: 2400,4800,9600 and 19200.

5.4.4 Measure the pipe diameter

Sensor diameter range of electromagnetic flowmeter converter: 3 ~ 3000 mm (the parameter is the preset standard value, direct selection).

5.4.5 Flow unit

Select the flow display unit in the parameters, the instrument flow display unit is: L/s, L / m, L/h, m3/s, m3 / m, m3/h users can select a suitable flow display unit according to the process requirements and use habits.

5.4.6 Instrument range setting

Instrument range setting means that the upper flow value is determined, and the lower flow value of the meter is automatically set to "0". Therefore, the instrument range setting determines the instrument range range range, which also determines the corresponding relationship between instrument percentage display, instrument frequency output, instrument current output and flow rate:

Instrument percentage display value = (flow value measurement value / instrument range range) * 100%;

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

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

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

5.4.7 Measure the damping time

The long measurement filter time can improve the stability of the instrument flow display and the output signal, which is suitable for the total cumulative pulsation flow measurement. The short measurement filtering time is the fast measurement response speed, which is suitable for production process control. The filter time was measured in a selection manner, generally at 8 or 16.

5.4.8 Flow direction selection

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

5.4.9 Flow rate zero correction

The zero correction shall be ensured that the sensor tube is filled with fluid and the fluid is stationary. The flow zero is expressed by the flow rate in mm/s;

The converter flow zero correction is shown as follows:

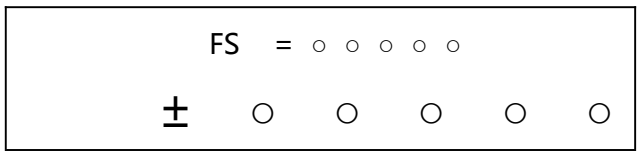


Figure 5.3 Zero point correction diagram of converter flow

Up display: FS represents zero measurement of instrument; downward display: zero setting of flow rate;

When FS is not 0, adjust set to make FS = 0. Note: If the downlink setting value is changed, the FS value changes accordingly. The default zero setting point is 1000.

The set value of the flow zero is the matching constant value of the sensor, which shall be recorded in the record sheet and sensor label of the sensor.

Note: Press the confirmation button in the measurement interface for more than 6 seconds, and you can enter the one-key calibration zero point interface. After selecting "Yes", the system will automatically calibrate the zero point (in order to ensure the accurate zero point calibration, please ensure that the sensor is in the full tube without flow rate);

5.4.10, and the small signal excision point

The small signal excision point setting is represented by percent flow of range. When the flow is less than the range * small signal resection point, the flow is excised, directly showing zero.

5.4.11 Perlowed resection display:

When setting small signal resection, the setting value of small signal resection point can be effective only when set to "Allow", and the setting of small signal resection point cannot be effective when setting "forbidden".

5.4.12, the unit of flow product calculation

The calculation units are L and m3 (liters, cubic meters).

The flow product equivalent is: 0.001L, 0.010L, 0.100L, and 1.000L

0.001m3、 0.010m3、 0.100m3、 1.000m3 ;

Note: When the volume unit of the flow rate is cubic meter (m3) to liter (L), the pulse equivalent will automatically follow the volume unit change.

5.4.13 Reverse output allows for the function

When the reverse output allows parameters are set in the "allowed" state, the measurement interface can measure the forward flow and reverse flow of flow, and only the forward flow.

5.4.14, Current output type

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

5.4.15, Pulse output mode

There are two modes of pulse output: 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 range) * Frequency full range value;

● Pulse output mode: the pulse output is a rectangular wave pulse string, each pulse represents the pipeline flowing through a flow equivalent, the pulse equivalent is selected

by the following "pulse equivalent unit" parameter. The pulse output mode is used for total accumulation, which is generally connected with the calculation instrument.

The frequency output and pulse output have active 24V and passive output. The user can select through the jump cap next to the terminal. See specific Section 4.2.5.

5.4.16, pulse equivalent unit

Pulse unit equivalent refers to the flow value represented by a pulse. The selection range of instrument pulse equivalent is: Table 4

pulse equivalency	flow value	pulse equivalency	flow value
1	0.001L/cp	5	0.001m³/cp
2	0.01L/cp	6	0.01m³/cp
3	0.1L/cp	7	0.1m³/cp
4	1.0L/cp	8	1.0m³/cp

The unit of pulse equivalent shall be consistent with the cumulative flow unit (L or m^3). At the same flow rate, the output pulse frequency is high, but not more than 500 pulses per second for the pulse to be reliably detected.

5.4.17, and the frequency output range

The instrument frequency output range corresponds to the upper flow measurement limit, or 100% of the percent flow rate. The frequency output upper limit can be set arbitrarily in the range of 1 to 5000 Hz.

5.4.18, Air traffic control alarm is allowed

The converter has an air tube detection function and no need for additional electrodes. If the user chooses to allow an alarm, the instrument can detect an ATstate when the fluid in the pipeline is lower than the measuring electrode. After the air traffic control state is detected, the instrument analog output and digital output are set as signal zero, and the instrument flow is displayed as zero.

5.4.19, air traffic control alarm threshold

In general, the air traffic alarm threshold has been set when the instrument leaves the factory, but if the field traffic alarm is abnormal, the user can also adjust the alarm value of the flow meter to make the alarm normally.

5.4.20, selection of alarm mode

Three optional methods: upper limit alarm, lower limit alarm, and pulse output. The upper limit alarm or the lower limit alarm should be set in conjunction with the upper alarm value (5.4.21) and the lower limit alarm value (5.4.22). All three settings are output through the "+ FQH-" terminals. Factory default pulse output.

5.4.21, upper limit alarm value

The upper limit alarm value is calculated as the percentage of the range. This parameter is set by numerical value, and the user sets a numerical value between 0% and 199.9%. Meet the alarm condition, the instrument will output alarm signal (electronic switch of FQH terminal). Factory default is 0.1%.

5.4.22, lower limit alarm value

With the upper limit alarm. Factory default is 100%.

5.4.23 Excitation alarm

Select allowed, with the excitation alarm function, select prohibit, cancel the excitation alarm function.

5.4.24, the excitation alarm threshold value

Set value. When the Coil value of the measurement interface is less than the set value, the system will prompt "excitation alarm", greater than the set value, the system will prompt "excitation alarm", greater than the set value, prompt the excitation is normal. The factory default value is 1300.

5.4.25, total zero clearance password

Users can set the password with or above the third level, and then set the password within the total reset.

5.4.26, Sensor coefficient value

Sensor coefficient: that is, the overall calibration coefficient of the electromagnetic flowmeter. The coefficient is obtained from the real mark, and steel printed on the sensor plate. The user must place this coefficient in the converter parameter table.

5.4.27, Selection of excitation mode

The electromagnetic converter provides three choices of excitation frequency: 1 / 16 power frequency (mode 1), 1 / 20 power frequency (mode 2), and 1 / 25 power frequency (mode 3). Small diameter sensor excitation system has small inductance, 1 / 16 power frequency should be selected. Large diameter sensor excitation system inductance, users can only choose 1 / 20 power frequency or 1 / 25 power frequency. In use, select excitation mode 1, if the instrument flow rate is too high, then select mode 2 or mode 3. Note: in which excitation mode of calibration, it must work in which excitation mode.

5.4.28 Description of nonlinear correction function (combination of correction point and correction coefficient)

The nonlinear correction function, in principle, is used for the linear adjustment below the small flow rate (0.5 m/s). This function is designed with 5 segment corrections, divided into 4 flow points and 5 correction coefficients. The flow rate corresponding to the correction point must meet: 0 <correction point 0(0.0m/s) <correction point 1(1.0m/s) <correction point 2(2.0m/s) <correction point 3(5.0m/s).(The default flow rate is in parentheses) and each correction coefficient is 1.0000.

The correction calculation is corrected on the original sensor flow coefficient curve, so the sensor coefficient should be marked first. According to the sensor nonlinearity of the correction coefficient. If the coefficient is set properly, no recalibration is required. Note: The correction function is turned off when the correction point 0 is set to 0 m/s, otherwise the function is turned on.

Where The original flow rate is the real standard flow rate, and the corrected flow rate is called the corrected flow rate. The modified calculation formula is as follows:

In the interval of 0 <original flow rate <correction point 0;
Correction flow rate = correction coefficient 0 original flow;
At the correction point 0 <original flow rate <correction point 1 interval;
Correction flow rate = correction coefficient 1 original flow;
At the correction point 1 <the original flow rate <the correction point 2 interval;
Correction flow rate = correction coefficient 2 original flow;
In the correction point 2 <the original flow correction point 3 interval;
Correction flow rate = correction coefficient 3 original flow;
At the correction point 3 <the original flow interval;
Correction flow rate = correction coefficient 4 original flow;

Note: When setting the correction point:

0 <correction point 0 <correction point 1 <correction point 2 <correction point 3

The median value of the correction coefficient is 1.0000, and the coefficient greater than 1 corrects the flow higher, and the coefficient less than 1 corrects the flow lower.

5.4.29, positive cumulative setting

Forward cumulative setting can change the value of positive cumulative total amount (Σ +), which is mainly used for instrument maintenance and instrument replacement.

5.4.30, reverse cumulative setting

Reverse cumulants can be modified (Σ -).

5.4.31, current zero point correction

The current output of the converter is adjusted so that the current output is 0mA or 4 mA.

5.4.32, current full degree correction

The current output of the converter is adjusted full to ensure that the current output is 10mA or 20 mA.

5.4.33, the factory calibration coefficient

This coefficient is the special coefficient of the converter manufacturer, with which the converter manufacturer normalizes the electromagnetic converter measurement circuit system to ensure that all the electromagnetic converter interchangeability reaches 0.1%.

5.4.34 Density setting

Set the density of the sensor flowing through the fluid;

In 5.4.35, the remote transmission function is turned on

For the "enable" and "prohibit" to support the remote transmission function, which needs to be installed with NB-Iot module or GPRS module, and needs to be powered on again after setting.

The use of GPRS and NB module needs the corresponding program support. After GPRS is opened, the host surface will have "network signal" and network state indication.

The communication protocol for the remote transmission function of the device is Modbus protocol. For the specific protocol analysis, please refer to the Communication Protocol document.

5.4.36 Remote pass IP (GPRS) / Remote pass Card Number (NB-Iot)

In the GPRS function program, the IP address and port number of the server can be set. The default is the server address of the company, and users can modify their own service address and port according to their own needs.

The NB-Iot function program is only convenient to record the remote transmission module card number, the manufacturer setting, the user does not need to modify.

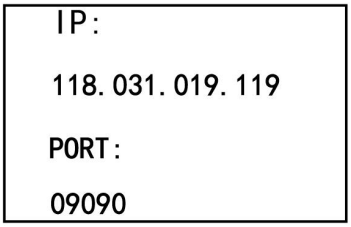


Figure 5.4, port and IP address modification

5.4.37 Setting of the remote transmission time interval

If the instrument is transmitted through wireless NB-Iot or GPRS, the upload time can be set in minutes (NB-Iot) or seconds (GPRS). If NB-Iot is used, the minimum interval time is set to 5min, which is more than 30min. If the data update frequency is high, it is recommended to use GPRS remote transmission, allowing a minimum time interval of 2 seconds.(Less than 100MB of data traffic at 1 minute interval per year)

Note: Our company has a wireless platform, which can allocate the account and password, provide the website, and users can log in to view the instrument data.

Six, installation

6.1 How to install it

The correct selection of electromagnetic flowmeter is the prerequisite to ensure the good use of electromagnetic flowmeter. What kind of electromagnetic flowmeter should be decided according to the physical and chemical properties of the tested liquid medium. Important factors to be considered: electromagnetic flowmeter diameter (DN), flow range (maximum flow, minimum flow), lining material, electrode material, output signal.

6.1.1 Selection of the installation site

In order to ensure the reliable and stable operation of the electromagnetic flowmeter, the following requirements should be noted when selecting the installation position:

(1) Try to avoid ferromagnetic objects and equipment with strong electromagnetic field (large motor, large transformer, etc.), so as not to avoid the magnetic field affecting the working magnetic field and flow signal of the sensor.

(2) should be installed as far as possible, should not be installed in wet, water place.

(3) Should try to avoid the sun and rain, avoid the ambient temperature higher than 50C and relative humidity greater than 95%.

(4) There should be ample space near the flowmeter for easy installation and maintenance.

(5) Electromagnetic flowmeter should be installed at the back end of the pump, never installed on the suction side, the valve should be installed on the downstream side of the flowmeter.

6.2 Sensors are installed in the process pipeline

(1) The plugging pipe must be fully filled with the medium at any time, that is, the electromagnetic flowmeter can not work normally under the condition of dissatisfaction of the pipe or air traffic control. When the medium is dissatisfied with the pipe, the method of raising the height of the outlet pipe after the flowmeter can fill the pipe to avoid the dissatisfied pipe and gas attached to the electrode.

(2) A vacuum in the pipeline will damage the lining of the flowmeter, so special attention should be paid to it.

(3) The positive direction of the flow should be consistent with the positive direction indicated by the arrow on the flowmeter.

(4) The flowmeter can be installed on straight pipes or on horizontal or inclined pipes, but the dry horizontal state at the center line of the two electrodes is required.

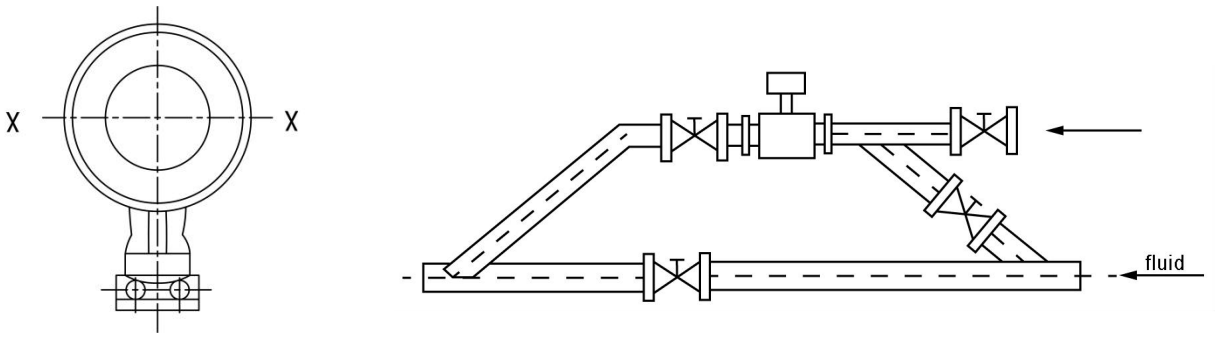
(5) For liquid and solid two-phase fluid, it is best to use vertical installation, so that the measured medium flows from bottom to top, can make the flow gauge lining wear evenly, prolong the service life.

(6) Ensure that there is sufficient space near the pipe flange for installation and maintenance.

(7) If the measuring pipe has vibration, there should be fixed supports on both sides of the flowmeter.

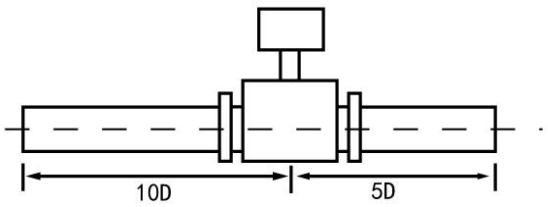
(8) If the measurement medium is heavily polluted liquid, the flowmeter body shall be installed in the bypass pipeline, and it can be emptied and cleaned without disrupting the process operation.

(9) When installing the flowmeter of PTFE lining, the bolts connecting the two flanges should be tightened evenly, otherwise it is easy to crush the PFE lining, and it is best to use the torque wrench.



6.3 Length of the straight pipe section at the inlet outlet

The inlet linear pipe section is at least 10 XDN long, it is recommended to be 15 XDN long, and the outlet pipe is at least 5 XDN long (DN is the inner diameter of the measuring pipe). The distance is calculated from the electrode axis z.



To improve the influence of vortex and flow field distortion, increase the length of inlet and outlet straight pipe section or install rectifier. On the upstream side of the flowmeter, if there are valves, elbows, three-way water pump and other spoiler, the front straight pipe section should be greater than.

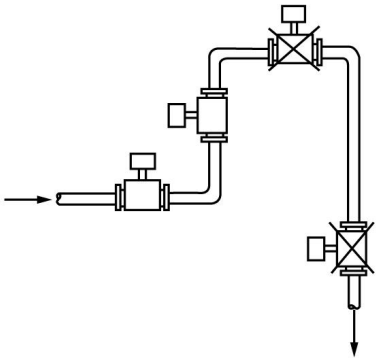
To improve the influence of vortex and flow field distortion, increase the length of inlet and outlet straight pipe section or install rectifier. On the upstream side of the flowmeter, if there are valves, elbow, water pump and other spoiler, the front straight pipe section should be greater than 20DN.

Usually a zero setting is not required. However, for the inspection, the zero flow rate should be established in the measuring pipe fully filled with the medium, so the stop valve should be installed downstream of the flowmeter.

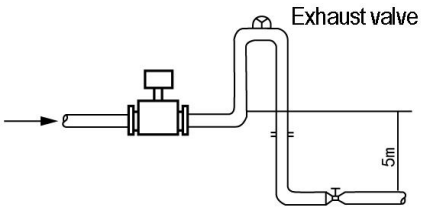
When measuring the mixing medium of different liquids, the distance between the mixing point and the flowmeter should be at least 30DN length, otherwise the display may be unstable.

6.4 Installation recommendations

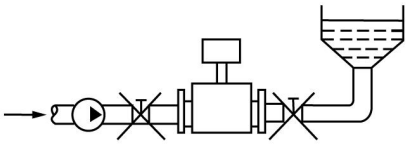
To avoid measurement errors caused by the attached gas and damage to the PTFE and rubber lining caused by vacuum, install the flowmeter at the locations shown below:



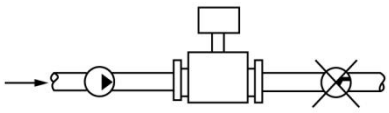
★ Should be installed in the lower and vertical pipe to avoid Mounted at the highest and vertical down point of the pipe



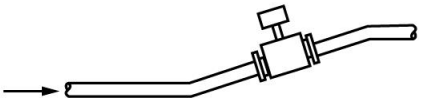
★ If the pipe drop exceeds 5m, install the exhaust valve downstream of the flowmeter



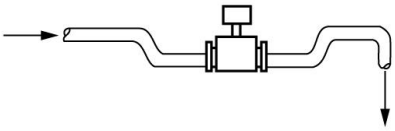
★ Control valves or cut-off valves shall be installed downstream of the meter, not upstream of the meter



★ The flowmeter must not be installed at the inlet of the pump, but should be installed at the outlet of the pump

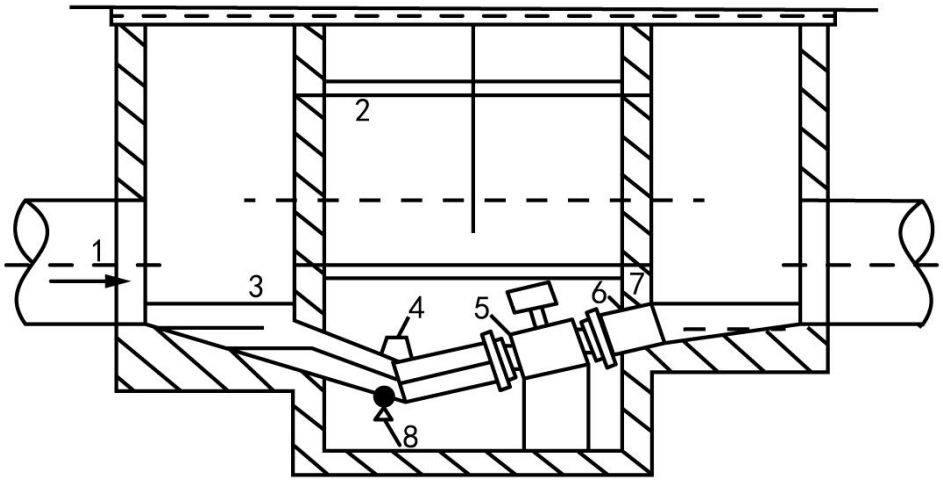


★ Horizontal pipe shall be installed at the slight rise of the pipe



★ The pipe installed at the openings shall be installed at the lower part of the pipe

Install the flowmeter in the measuring well			
1. The entrance	2. Split pipe	3. Entrance gate	4. Clean the mouth
5. Flow meter	6. Short tube	Export	8. Emission valve



七、Common troubleshooting

phenomenon	processing method
The flow is unstable	1. Confirm whether the installation position of the sensor meets the requirements and ensure the full pipe status; 2. Check whether the excitation line and the signal line of the converter are correctly connected; 3. In the case of no flow in the full tube, check whether there is a zero point change. If there is a zero point, reference 5.4.9 calibration zero point; 4. If there is no problem with the above three items, please contact the after-sales personnel.
4~20 The current has no output, or the output is wrong	1. Confirm whether there is a problem in the lower connection line and whether the positive and negative lines are connected 2. Confirm the power supply mode of the converter. If it is a DC 24V power supply, please make sure that the dial switch near the wiring terminal is at the ON position 3. If 24V power supply, there is current output, but unstable, please use AC 220V power supply (turn off the code switch) to test for normal 4. If the current output is wrong and the flow rate is not equal, please check whether the set range (refer to 5.4.6) matches the receiving equipment setting 5. If there are still problems after confirming the above items, please contact the after-sales personnel
Communication was unsuccessful	1. Confirm the lower wiring and whether AB is connected 2. Enter the parameter setting to view the mailing address and port rate, and confirm that the communication target is consistent 3. Confirm the power supply mode of the converter. If it is a DC 24V power supply, please make sure that the dial switch near the wiring terminal is at the ON position 4. If there is a scrambled problem in communication, try to connect the converter with the direct GND of the communication target equipment
Not turned on (black screen)	1. Check whether the power supply is normal 2. Confirm whether the operation indication is flashing normally, the split is on the upper left side of the wiring terminal, and one is near the lower part of the LCD screen. If the indicator light flashes normally, check the LCD screen connection (some products are connected, and some products are pin connected) 3. Power off, confirm whether the fuse is burned. If it is burned out, please check the power supply, replace the fuse, and then power on 4, the equipment supports DC24V and AC220 double power supply, one power supply mode is not started, try to replace the other power supply; 5. If there are still problems after confirming the above items, please contact the after-sales personnel
The screen flashes without boot	1. The equipment supports DC24V and AC220 double power supply, and try to replace another power supply; 2. Check the excitation wire, whether there is a short circuit to the shell

	3. If there are still problems after confirming the above items, please contact the after-sales personnel
No pulse	1. Check whether the pulse wiring is correct, 2. Ensure that the receiving equipment can receive active pulses 3. If the pulse measurement is inaccurate, refer to 5.4.16 to set the pulse equivalent 4. If there are still problems after confirming the above items, please contact the after-sales personnel