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Handbook

ABDT-LD Electromagnetic Flowmeter

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CONTENTS

I. Product Characteristics, Use and Scope of Application

1.1 Overview

ABDT-LD series intelligent electromagnetic flow meter is a relatively mature liquid measurement instrument for measuring the volume flow of conductivity liquid (conductivity ⩾5μs/cm) and slurry in the closed pipelines, suitable for the flow measurement of various acid solutions,alkali solutions,and salt solutions,clear water, sea water,sewage water, and food grade liquid and so on. It is widely used in industrial production process control, energy measurement, environmental protection and sewage treatment etc.. It can output (4~20) mA current signal, pulse signal and RS485 communication etc.. It is coupled with the display, recording instrument, accumulation operator or regulator for detection, calculation, adjustment and control of flow.

1.2 Characteristics

ABDT-LD series electromagnetic flow meter has the following characteristics:

● It is not affected by changes in fluid density, viscosity, temperature, pressure and electrical conductivity. The linear measurement principles can achieve high precision measurements;

● No flow parts in measuring pipe, small pressure loss and low straight pipe section requirement;

● The nominal diameter DN6-DN2000 covers a wide range,lining and electrodes that meet the requirements of measuring a variety of conductive fluids;

● The converter adopts programmable low frequency rectangular wave excitation, which improves the stability of flow measurement and small power loss;

● The converter adopts a 16-bit embedded microprocessor with full digital processing, fast operation speed, strong interference resistance, reliable measurement, high accuracy and flow measurement range up to 1500:1;

● High definition backlight LCD display, full English character menu operation, easy to use, easy operation, easy to learn and easy to understand;

- RS485 digital communication signal output;
- It has the conductivity measurement function, which can determine whether the pipe of the sensor is fully filled, and has the self-inspection and self-diagnosis function;
- There are multiple alarm functions,such as empty pipe alarm,excitation alarm,upper and lower limited alarm;
- It uses SMD devices and surface mounting (SMT) technology with high circuit reliability;
- It can be used for the corresponding explosion-proof occasions.

1.3 Use environmental conditions

Ambient temperature: sensor (-25~+60)℃; converter (-10~+60)℃

Relative humidity: (5~85)%RH, without condensation

1.4 Working conditions

Maximum fluid temperature: integrated type	≤70℃
Separated type: PTFE lining	≤80℃
Polyneoprene lining	≤65℃
High temperature rubber	≤120℃
Polyurethane rubber lining	≤60℃
PFA lining	≤150℃
F46 lining	≤110℃

Fluid conductivity:≥ 5uS/cm

II. Product Composition and Type

2.1 Product composition

The electromagnetic flow meter consists of two parts: electromagnetic flow converter and electromagnetic flow sensor. The split type also requires a special two-layer shielded cable to connect the converter and sensor.

2.2 Product type

The ABDT-LD series electromagnetic flow meter is divided into two structural forms: integrated type and split type. It can be used in the specified explosion-proof places.

The sensor is available with electrodes of seven different materials and a lining of six different materials.

III. Technical Performance Indicators of the Product

1. Execution standard: JB/T9248-2015

2. Maximum flow speed: 15m/s

3. Nominal general diameter: DN15, 20, 25, 32, 40, 50, 65, 80, 100, 150, 200, 250, 300, 350, 400, 450, 500, 600,700,800,1000,1200,1400,1600,2000

4. Accuracy: 0.5%

5. Nominal pressure: (1.0, 1.6, 2.5, 4.0) MPa, Other specifications and standards may be subject to the user requirements.

6. Materials: electrode form and material

Electrode form can be divided into standard type, scraper type, removable type and the grounding electrode.

The electrode and grounding electrode materials are 7 kinds of 316L stainless steel, harden alloy B, harden alloy C, titanium, tantalum, platinum alloy, stainless steel coated with tungsten carbide.

Flange material: carbon steel, stainless steel (optional).

Grounding ring material: stainless steel.

7. Shell protection

IP65

IP68 is limited to the separated type sensors and excluding explosion proof structures.

8. Explosion-proof standards

Explosion-proof grade: ExdmbIIC T6 Gb.

9. Connection cable: Split type electromagnetic flow meter, sensor and converter are connected by signal cable and the longest cable length should be less than 100m. The

company provides free 10m cable with the meter.Insufficient parts shall be ordered.

10. Converter performance

Power supply: single-phase AC power 220V ± 10%,AC110V,50Hz, power is less than 20W; DC power supply DC24V,DC12V,DC3.6 battery.

Converter display and programming operation: 4 film keys can set all parameters and can also program the converter by using foreign receiver or PC machine (RS485), high definition backlight LCD display, empty pipe detection and self-diagnosis function.

Digital communication: RS485, MODBUS and REMOTE, with lightning protection.

Output signal

Current output: two-way circuit, full isolation (4-20)mA; load resistance: (4-20)mA , (0-750) Ω .

Frequency output: forward and reverse flow output, the upper limit of output frequency can be set in the range of (1-5000) HZ. Transistor collector is with photoelectric isolation output in both directions. The external power supply is not more than 35V, and the maximum collector current is 250mA when it is turned on.

Pulse output: forward and reverse flow output, output pulse up to 5000cp/s. Pulse equivalents are 0.001L-1.0m³/cp. Pulse width is automatically set to 20ms or square wave. Open collector output of transistor with photoelectric isolation. The external power supply is not more than 35V, and the maximum collector current is 250mA when it is turned on.

Flow direction indication output: this flow meter can measure fluid flow in positive and negative direction. The direction of the fluid flow can also be judged.High level of output + 10V for displaying forward flow, and low level of 0V for reverse fluid flow output.

Alarm output: two transistor collector open circuit alarm output with photoelectric isolation. The external power supply is not more than 35V, and the maximum collector current is 250mA when it is turned on.

Alarm state: fluid air pipe, excitation line break, flow over limit.

Damping time: 0s-100s, optional

IV. Product Appearance Size and Installation Size

4.1 Converter appearance size, see Figure 1 (a) and (b) in mm

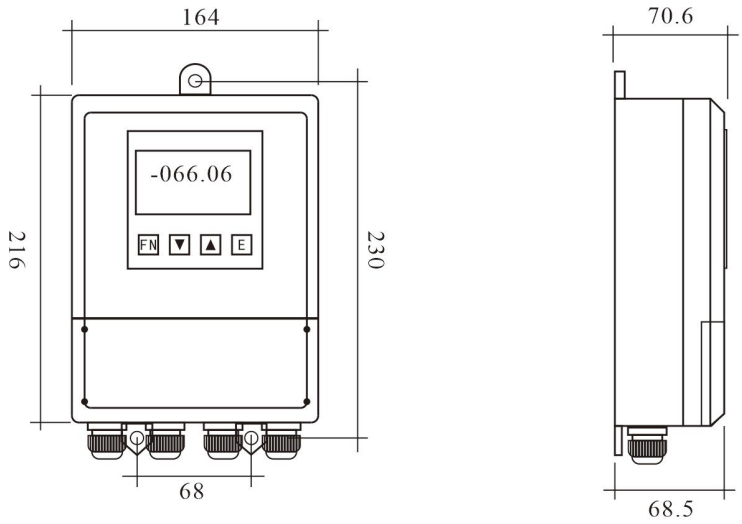


Figure 1 (a). Square converter shape

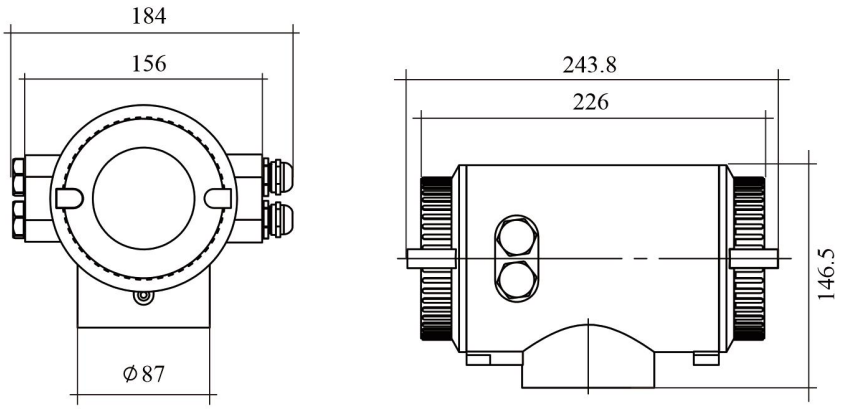


Figure 1 (b). Circular converter shape

4.2 Appearance and installation size of the sensor, see Figure 2

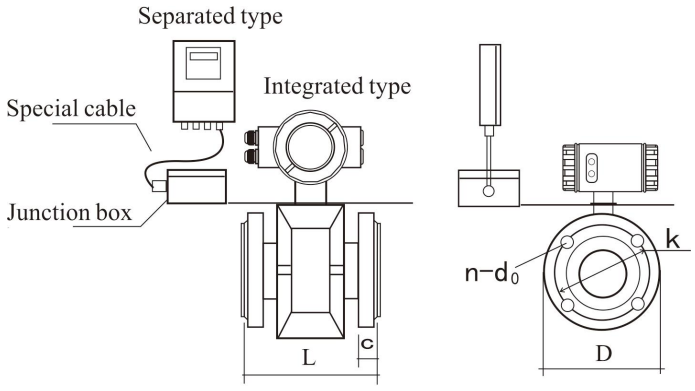


Figure 2

Nominal diameter DN	L (mm)	D (mm)	K (mm)	d (mm)	n (mm)	C (mm)	Nominal pressure PN
10	200	90	60	14	4	14	1.6MPa
15	200	95	65	14	4	14	
20	200	105	75	14	4	16	
25	200	115	85	14	4	16	
32	200	140	100	18	4	18	
40	200	150	110	18	4	18	
50	200	165	125	18	4	20	
65	200	185	145	18	8	20	
80	200	200	160	18	8	20	
100	250	220	180	18	8	22	
125	250	250	210	18	8	22	
150	300	285	240	22	8	24	
200	350	340	295	22	12	26	
250	450	405	355	26	12	29	
300	500	460	410	26	12	32	
350	500	520	470	26	16	35	
400	600	580	525	30	16	38	
450	600	640	585	30	20	42	
500	600	715	650	33	20	46	
600	600	840	770	36	20	52	

For flange dimensions of other pressure ratings, refer to (GB/T9124.1-2019), (HG/T20592-2009).

4.3 Product Code for Type Selection

Electromagnetic Flowmeter Specification Model

ABDT-LD	a	b	c	d	e	f	g	h	i	j

a	Instrument	LD	XXXmm
b	Nominal pressure	10	1.0MPa
		16	1.6MPa
		25	2.5MPa
		40	4.0MPa
c	Lining material	1	PTFE
		2	Rubber
		3	Polyurethane rubber
		4	F46
		5	PFA with mesh
		6	F46 with mesh
		7	Nitrile rubber
d	Electrode material	1	316L
		2	Hastelloy B
		3	Hastelloy C
		4	Ti
		5	Latinumiridium-Alloy
		6	Ta
		7	Tungsten Carbide
e	Case protection	1	IP65
		2	Sensor IP68+Converter IP65
		3	IP67
		4	IP68
f	Ex-mark	0	None
		1	ExdmbIIC T6 Gb Unibody
		2	ExdmbIIC T6 Gb Split-type
g	Accessories	0	None
		1	Grounding Electrode
		2	Grounding Flange
		3	Inlet Protection Flange
		4	Electrode Scraper
h	Structure	Er	Separated type
		Eh	Integratde type
i	Power Supply	1	AC 220V±10%
		2	DC 24V
		3	DC 3.6V
		4	DC 12V
		5	AC 110V
j	Converter type	1	Standard
		2	Low Conductivity type
		3	Slurry type
		4	Filling type
		5	Dual-power Supply type
		6	Battery Power Remote type
		7	BTU type(Paired PT1000)

V. Converter Menu Structure and Parameter Settings

5.1 LCD display and keyboard definition (see Figure 3)

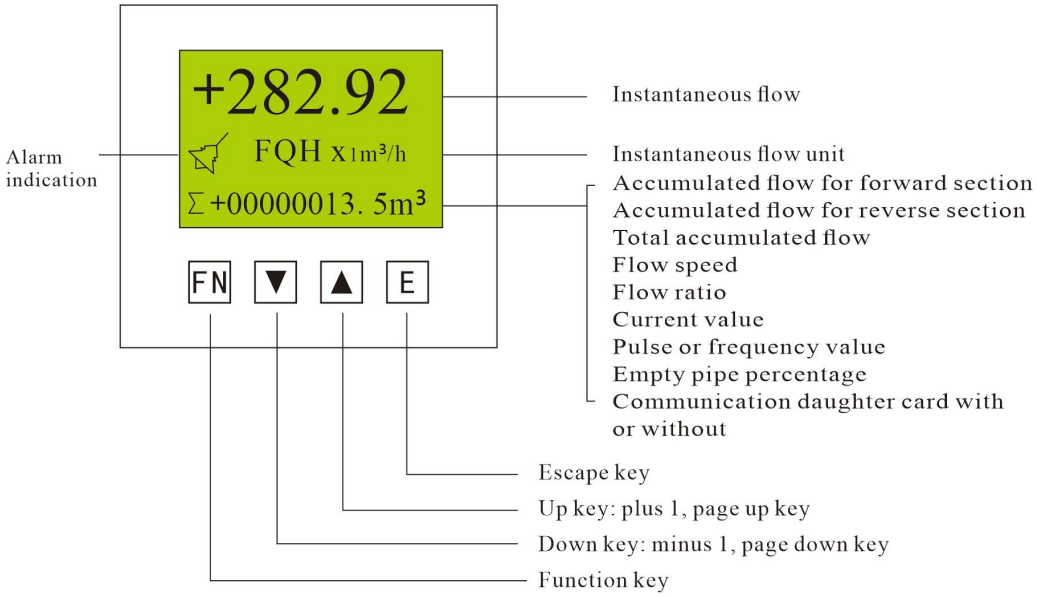


Figure 3 Common split type

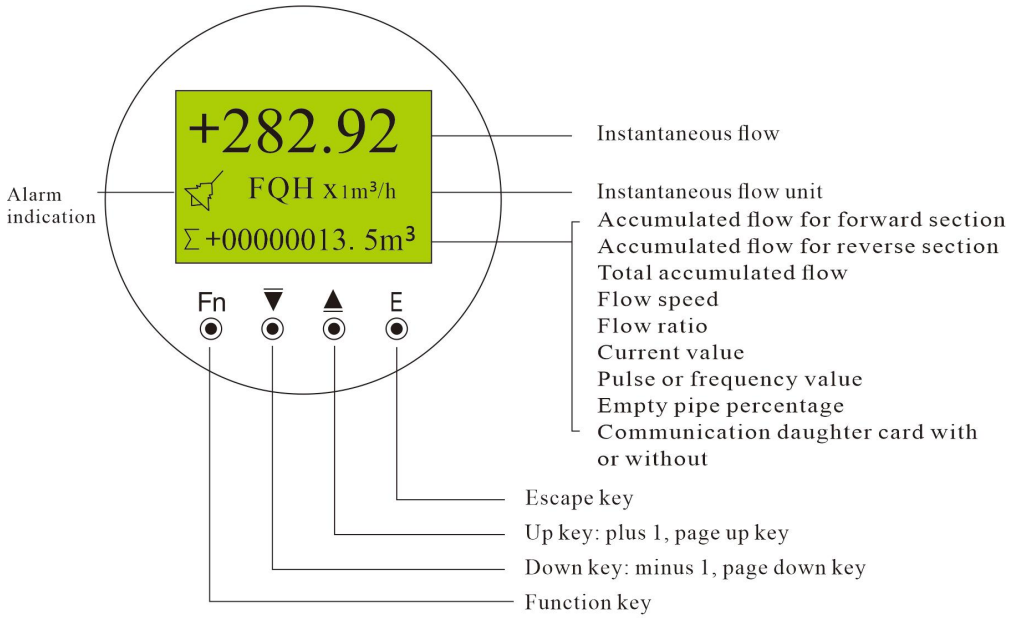


Figure 3a
Normal integrated type/integrated battery-powered type

5.2 Key button function

5.2.1 Common split type and common integrated type(see Figure 3 and Figure 3a)

The instrument has four keys, namely function key, down key, up key and exit key.

1.Up key: Add 1 number at the cursor to select the screen upward display content.

2.Down key: subtract 1 at the cursor and select the screen downward display content.

3.Function key + down key: cursor moves left / lower LCD contrast (at the main interface).

4.Function key + up key: cursor moves right / increase LCD contrast (at the main interface).

5.Function key + exit key: enter the password input screen from the automatic measurement status; confirm the password input; enter the sub-menu; save parameters.

6.Exit key: return to the superior sub-menu; press for more than two seconds to release the automatic measurement state.

5.2.2 Integrated battery-powered type(see Figure 3a)

The instrument has four keys, namely function key, down key, up key and exit key.

1. Up key: Add 1 number at the cursor to select the screen upward display content.
2. Down key: Subtract 1 at the cursor and select the screen downward display content.
3. Function key: Enter the password input screen from the automatic measurement status; enter the sub-menu; Shift; "Enter" option key.
4. Exit key: Return to the superior sub-menu; When saving parameters, turn on the "Enter" and "Cancel"options;press for more than two seconds to release the automatic measurement state; "Cancel" option key.

Press the "Fn" function key to enter the password input interface, enter the password, press the "E" key to enter the confirm password interface, and press the "Fn" function key to enter the parameter setting interface.

On the parameter interface, press the "exit" button once, and then press the function key to confirm that the parameters can be saved.

5.3 Password

The instrument design has multilevel passwords.Level 1 password can modify the password value; level 2 password can modify the current level password and view level 1

password value; The factory values for the level 1,2 passwords are "10000" and "40000" respectively.

To modify the parameter setting of the instrument, it is necessary to make the instrument enter the parameter setting state from the measuring state, and enter the menu with the password to carry out the operation of the corresponding password level, and press the “exit key” to return to the main screen.

5.4 Instrument menu

The list of instrument menu is shown below.

Level 1 menu	Level 2 menu	Level 3 menu
Parameter settings	Measured pipe caliber	3mm~3200mm ±0~±99mm Calibration can be finely tuned.
	Damping time setting	0~99seconds
	Flow unit	L/h,L/min,L/s,m^3/h,m^3/min,m/s,t/h,t/min,t/s, kg/h,kg/min,kg/s,GPH,GPM,GPS,BBL/m,BBL/h, CF/s,CF/m,CF/h,AF/m,AF/h
	Flow decimal bit settings	Automatic, manual; manually set the instantaneous flow to 0~3 decimal points.
	Flow accumulation unit	0.001m^3,0.01m^3,0.1m^3,1m^3,0.001L,0.01L, 0.1L,1L,1t,1kg,1GAL,1 10^1m^3,1 10^2m^3,1 10^3m^3,1BBL,1CF,0.001AF,0.01AF,0.1AF,1AF
	Instrument range	Setting
	Excitation frequency	1/4,1/8,1/16 power frequency
	Excitation current	100%,55%
	Fluid density	Setting
Function settings	Measurement direction selection	Forward, reverse
	Reverse measurement allowing	Allow, prohibit
	Reverse output allowing	Allow, prohibit
	One-click zero allowing	Allow, prohibit
	Small signal excision	Allow, prohibit
	Small signal excision point	Setting
	Peak inhibition time	Setting
	Peak suppression threshold	Setting
	Peak inhibition enabling	Allow, prohibit
	Strong steady flow allowing	Allow, prohibit

	Strong steady flow coefficient	Setting
	Excitation alarm allowing	Allow, prohibit
	Empty traffic alarm allowing	Allow, prohibit
	Empty traffic alarm threshold	Setting
	Upper limit alarm allowing	Allow, prohibit
	Upper limit alarm threshold	Setting
	Lower limit alarm allowing	Allow, prohibit
	Lower limit alarm threshold	Setting
Communication settings	MODBUS communication settings	Communication address settings
		Communication response delay
		Communication baud rate settings
		Communication check bit settings
Output settings	Pulse output type	Pulse, frequency
	Maximum pulse width enabling	Allow, prohibit
	Current full fine-tuning	Setting
	Current zero point fine-tuning	Setting
	Pulse polarity	Positive, negative
	Pulse unit equivalent	Unit L, which can be set between 0.001L~10000.000L.
	Pulse width settings	Optional automatic or manual mode, which can be set.
	Frequency output range	0~10000Hz
Diagnosis test	4-20mA output test	Simulation current output
	Flow speed test	Flow state in the simulation pipeline (frequency, pulse and current output)
	Pulse output test	Simulation pulse output
	Frequency output test	Simulation frequency output
Record query	Start-stop recording	Check
	Cumulative flow daily record	Check
	Cumulative flow monthly record	Check
System settings	Software version	Display the current flow meter software version number.
	Factory data reset	Restore the factory parameter settings.
	Save the factory settings	Save the parameters set at the factory.
	LCD contrast settings	Setting
	LCD backlight switch settings	Open and close
	LCD backlight off time	Can be set to 1, 5, 10, 30 and 60 minutes, press any key backlight on.
	The record is clear.	Clear record.
	Forward total preposition	Setting

	Reverse total preposition	Setting	
	The total amount of accumulated calculation is zero.	Cumulative traffic is zero.	
	Password display	Show level 1,2 and 3 password values.	
	Password settings	Set the level 1,2, and 3 password values.	
	System date setting	Set the system date	
	System time setting	Set the system time	
	Sensor factory date settings	Set up and display the sensor factory date.	
	Sensor factory number	Set up and display the sensor factory number.	
	Factory date of instrument	Set up and display the converter factory date.	
	Instrument product number	Set up and display the converter factory number.	
	Last calibration date	Set and display the calibration date.	
	Last maintenance date	Set and display the maintenance date.	
Calibration settings	Traffic zero correction	Setting	
	Automatic zero correction	Allow, prohibit	
	Automatic correction time	Setting	
	Sensor coefficient	Setting	
	Sensor coefficient calculation	Enter the standard flow, automatically calculate and save the sensor coefficient.	
	Converter normalisation coefficient	Setting	
	Flow linear corrections allowing	Allow, prohibit	
	Flow linear correction point	Setting	
	Flow linear correction value	Setting	
	Flow segment correction settings	Traffic correction unit	m^3/h, m^3/min, m^3/s, kg/h, kg/min, kg/s, t/h, t/min, t/s, GPH, m/s, L/h, L/min, L/s
		Traffic correction point1	Setting
		Standard traffic1	Setting
		Traffic correction point2	Setting
		Standard traffic2	Setting
		Traffic correction point3	Setting

		Standard traffic3	Setting
		Traffic correction point4	Setting
		Standard traffic4	Setting
		Traffic correction point5	Setting
		Standard traffic5	Setting
	Flow segment correction allowing	Allow, prohibit; when it is allowed, sub-menus in traffic correction settings can take effect.	

Note: Some parameters of the battery-powered model are not displayed due to functional limitations.

Detailed parameter description

5.5 Parameter settings

1. Measured pipe caliber

Electromagnetic flow meter converter supporting sensor diameter scope: (3～3200)mm.

At the same time, caliber fine-tuning can be set for non-general caliber or caliber error is large.Example, 50 -01 mm (49 mm) 50 + 01mm (51 mm).

2. The damping time setting

Long measurement damping time can improve the stability of instrument flow display and output signal, which is suitable for the total cumulative pulsation flow measurement. Short measurement damping time appears as fast measurement response speed and it is suitable for production process control. The measured damping time can be arbitrarily set at 1-99.

3. Flow unit

Select the flow display unit in the parameters, and the instrument flow display unit is: L/s, L/min, L/h, m^3/s, m^3/min, m^3/h etc..Users can select an appropriate flow display unit according to the process requirements and usage habits.

4. Flow decimal bit settings

Set the instantaneous flow decimal display digits and it is divided into automatic setting and manual setting.

*Under the automatic setting state, the instantaneous flow decimal number is automatically selected according to the caliber size;

*Under the manual setting state, the instantaneous flow decimal digits are set according to the user setting, and the 0,1,2,3 decimal digits can be set;

The user can set it according to different application conditions and different measurement scales.

5. Flow integrating unit

The converter display is a 9-bit counter with a maximum allowable count value of 999999999. Use integrating unit in L, m^3 (liter, cubic meter).

The flow integrating equivalent is： 0.001L, 0.010L, 0.100L, 1.000L, 0.001m^3, 0.010m^3, 0.100m^3, 1.000m^3 etc.;

6. Instrument range

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

* Percentage values = (Flow measurement / instrument range)* 100 %;

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

* Current output value= (Flow measurement / instrument range)* (Current full range value-Basic point)+ Basic point;

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

7. Excitation frequency

8. Excitation current;

9. Fluid density

5.6 Function settings

1. Measurement direction selection

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

2. Reverse measurement allowing

The user chooses to allow or prohibit it.

When the reverse output allows the parameter to be set in the "allowed" state, the converter measures and displays the fluid flow in real time as long as the fluid flow, and the flow value is negative.When the reverse measurement allows the parameter to be set at "forbidden", if the fluid flows backwards, the flow displays the data as "0".

3. Reverse output allowing

The user chooses to allow or prohibit it.

When the reverse output allows the parameters to be set in the "allowed" state, the converter outputs the pulse and current at the flow value as long as the fluid flows.When the reverse output allows the parameters to be set at the "forbidden", if the fluid flow in reverse, the converter output pulse is "0" and the current output is the signal 4mA.

4. Allow excision display

The user chooses to allow or prohibit it.

When the allowed excision display parameter is set in the "allowed" state, the flow rate is removed when the percentage flow rate is less than or equal to the small signal excision point, and it is displayed as "0".When the allowed excision display parameters are set at "Off," no excision is performed regardless of the percentage flow.

Allow excision display(Battery-powered type)

When the allowed excision display parameter is set in the "forbidden" state, the flow rate is removed when the percentage flow rate is less than or equal to the small signal excision point, and it is displayed as "0".When the allowed excision display parameters are set at "allowed" state, no excision is performed regardless of the percentage flow.

5. Small signal excision point

The small signal excision point setting is indicated by the percentage flow of the range.When the small signal is excised, the display of flow rate, flow rate and percentage display and signal output are excised simultaneously.

6. Strong steady flow allowing

The user chooses to allow or prohibit it.

7. Strong steady flow coefficient

Setting.

8. The excitation alarm allowing

The user chooses to allow or prohibit it.

9. Empty traffic alarm allowing

The user chooses to allow or prohibit it.

The converter has an empty traffic control detection function without additional electrodes.If the user chooses to allow the empty traffic control alarm, the instrument can detect an empty traffic control state when the fluid in the pipeline is below the empty traffic control measurement threshold.After the empty traffic control state is detected, the instrument analog output and digital output are signal as zero, and the instrument flow appears as zero.

10. Traffic control alarm threshold

In the case of a full fluid pipe (with or without the flow rate), the user can adjust the empty traffic control alarm threshold according to the "empty traffic control ratio" data of the measurement page.

11. The upper limit alarm allowing

The user chooses to allow or prohibit it.

12. The upper limit alarm threshold

The upper limit alarm value is calculated as the percentage of range, the parameter is numerical, and the user sets a value between 0% and 199.9%.The instrument shall meet the alarm conditions in its operation, and the instrument will output the alarm signal.

13. The lower limit alarm allowing

The user chooses to allow or prohibit it.

14. The lower limit alarm threshold：

Same as upper limit alarm threshold

5.7 Communication settings

MODBUS communication Settings

(1) Communication address settings

Refer to the communication address of this table with optional range: 01-99 and 0 reserved.

(2) Communication baud rate setting

Selection range of meter communication baud rate： 300,600,1200,2400,4800,9600, 19200,38400.

(3) Communication check bit setting

It can be set to no-calibration, odd and even calibration.

5.8 Output settings

1. Pulse output type

The pulse output mode has two choices: frequency output and pulse output:

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

* Frequency value= (Flow measurement / Instrument range)*Frequency full range value；

* Pulse output: The pulse output is a rectangular wave pulse string. Each pulse indicates that the pipeline flows through a flow equivalent, and the pulse equivalent is selected through the "pulse unit equivalent" parameter.Pulse output mode is mostly used for total accumulation, which is generally connected with the integrating instrument.

2. Pulse unit equivalent

Pulse unit equivalent refers to the flow value represented by a pulse, with a pulse equivalent selection range ranging from 0.001 L to 20,000 L.

Note: under the same flow, the pulse equivalent is small, the output pulse frequency is high and the cumulative flow error is small.

3. Pulse width

Set the pulse width of the instrument pulse output in ms.Users can make any settings between 0.1 ms and 100 ms, depending on the application status.

4. Frequency output range

The instrument frequency output range corresponds to the upper limit of the flow measurement, or 100% of the percent flow.The frequency output upper limit can be set in any range from 1 to 10,000 Hz.

5.9 Diagnosis tests

1. 4-20mA output test

2. Flow speed test

3. Pulse output test

4. Frequency output test

5.10 Record Inquiry (Host with power-down record, special customization required)

1.Start-stop record

The start/stop record can record the time of power supply and power failure of the meter. Flowmeter can save and display 50 groups of the latest converter history start-stop records.The user can rotate through the key display; start-stop time format for the"year - month-day hours: minutes".

2.Cumulative flow daily record

Accumulated flow daily record can record the accumulated flow of the flowmeter every day. The recording time is 0:00 every day. The meter can save and display 60 groups of the latest converter cumulative amount of daily records, the user can rotate through the key display; date format for the "year-month-day".

3. Cumulative flow monthly record

The cumulative flow monthly record allows you to record the accumulated flow of the

meter for each month. Record time for the first of each month 0:00. The meter can save and display 36 sets of the latest converter cumulative flow monthly records, the user can cycle through the display by pressing the key; date format is “year-month-day”.

5.11 System settings

1. Software revision

Display the software version number of the current flow meter.

2. Factory data reset

3. Save the factory settings

4. LCD contrast settings

5. LCD backlight switch settings

The LCD backlight switch is set the state of the LCD backlight, which can choose to always turn on or turn off regularly; if the choice is always open, the LCD backlight will always be in a long and bright state, and the system will choose the menu when the LCD backlight turns off, and the backlight will be turned off after a certain time delay.

It is recommended that users use the regular shutdown setting, which is conducive to the extension of the LCD life.

6. LCD backlight off time

The LCD backlight turn-off time is used to set the LCD backlight. The backlight is turned off for a certain time after the delay without button operation.

7. Record clearance

8. Forward total preposition

The forward total preposition set can change the value of the positive cumulative total amount, which is mainly used for instrument maintenance and instrument replacement.

The user enters with a level 2 password and can modify the accumulated flow for forward section (Σ +), and the accumulated flow cannot exceed the maximum value counted by the counter (999999999).

9. Reverse total preposition

The reverse total preposition setting can change the value of the reverse cumulative

total amount, which is mainly used for instrument maintenance and instrument replacement.

The user enters with a level 2 password and can modify the accumulated flow for forward section (Σ-), and the accumulated flow cannot exceed the maximum value calculated by the counter (999999999).

10. The total amount of integrating is zero.

11. Password display

Users can use the advanced password to query the password value of the low-level password.

12. Password settings

Users can use the new passwords at each level to set the new passwords at the current level separately.

13.System date settings(Host with power-down record, special customization required)

14.System time settings(Host with power-down record, special customization required)

15. Sensor factory date

16. Sensor factory number

17. Factory date of instrument

18. Instrument product number

19. Last calibration date

20. Last maintenance date

5.12 Calibration settings

1. Traffic zero correction：

Zero point correction shall ensure that the sensor tube is filled with fluid and that the fluid is stationary.Flow zero point is indicated by the flow rate in mm/s.

Converter flow zero-point correction is shown as follows：

± ○ ○ ○ ○ ○mm/s
FS = ±○ ○ ○ ○ ○mm/s

* Downlink display: FS represents the actual measurement value of the instrument zero

point;

* Uplink display: flow rate zero correction value;

* Note: FS is the actual measurement value of the instrument and it is not affected by the zero point correction value. During the use process, the zero point correction value is only required to be adjusted to the same size as the FS in the opposite direction.

The corrected value of flow zero is the supporting constant value of the sensor and shall be recorded in the sensor record sheet and the sensor sign.The sensor zero value is a flow velocity value in mm/s with the opposite of the corrected value.

2. Automatic zero-point correction: Allow or prohibited

3. Automatic correction time: The time of zero point correction value can be set within 10 to 99 seconds.

4. Sensor coefficient

Sensor coefficient: that is, the complete calibration coefficient of the electromagnetic flow meter.This coefficient is obtained from real labels and labeled on the sensor sign.The user must place this coefficient in the converter parameter table.

5. Sensor coefficient calculation

It is used to automatically calculate the complete machine calibration coefficient (sensor coefficient).Please enter the standard flow when using it, and save it (function key + exit key).For example, at the calibration, the local flow is 9m^3 /h (shown in real time in the last line), the standard flow is 10 m^3 /h; enter 10 m^3 /h in the main screen, which can be saved.

6. Flow line correction allowing

7. Flow linear correction point

8. Flow linear correction value

9. Flow segment correction settings

Flow correction unit：

Set the flow correction point unit, optional m^3 /h, m^3 /min, m^3 /s, kg/h, kg/min, kg/s, t/h, t/min, t/s, GPH, m/s, L/h, L/min, L/s.

Flow correction point 1　　Standard flow 1

Flow correction point 2　　Standard flow 2

Flow correction point 3 Standard flow 3

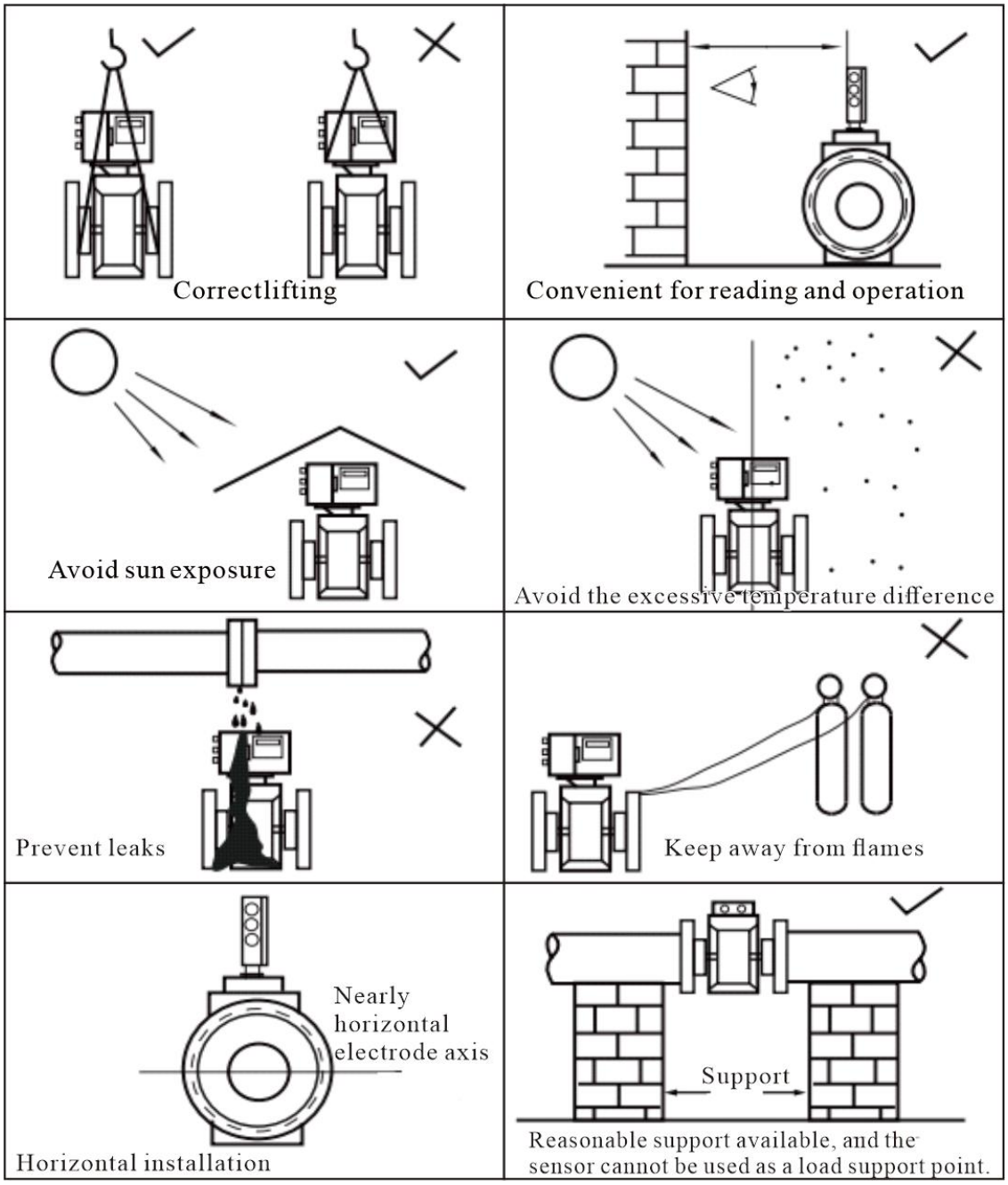
Flow correction point 4 Standard flow 4

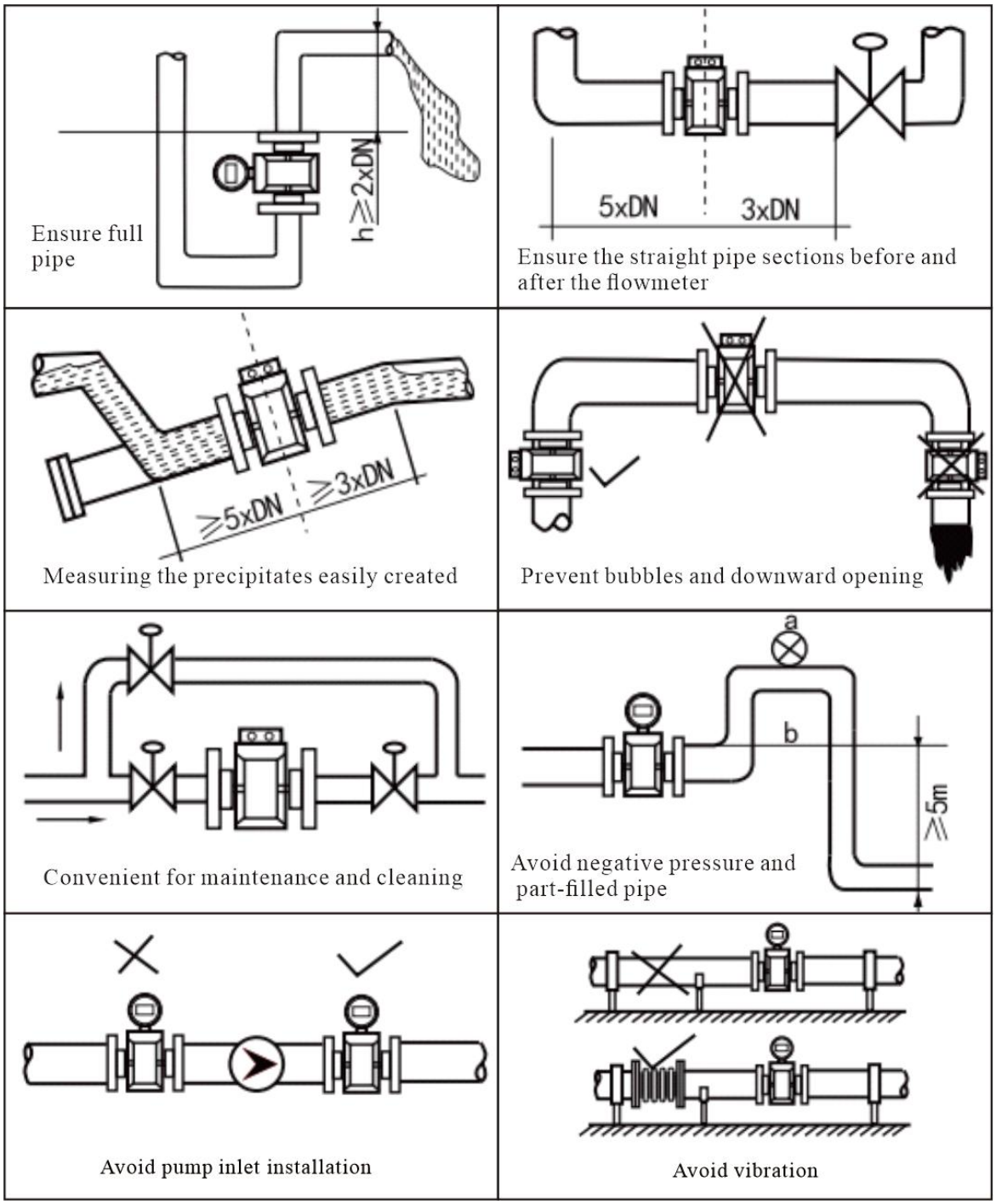
Flow correction point 5 Standard flow 5

10. Flow segment correction allowing

The user chooses to allow or prohibit it.The sub-menu in the allowed flow correction settings can only take effect.

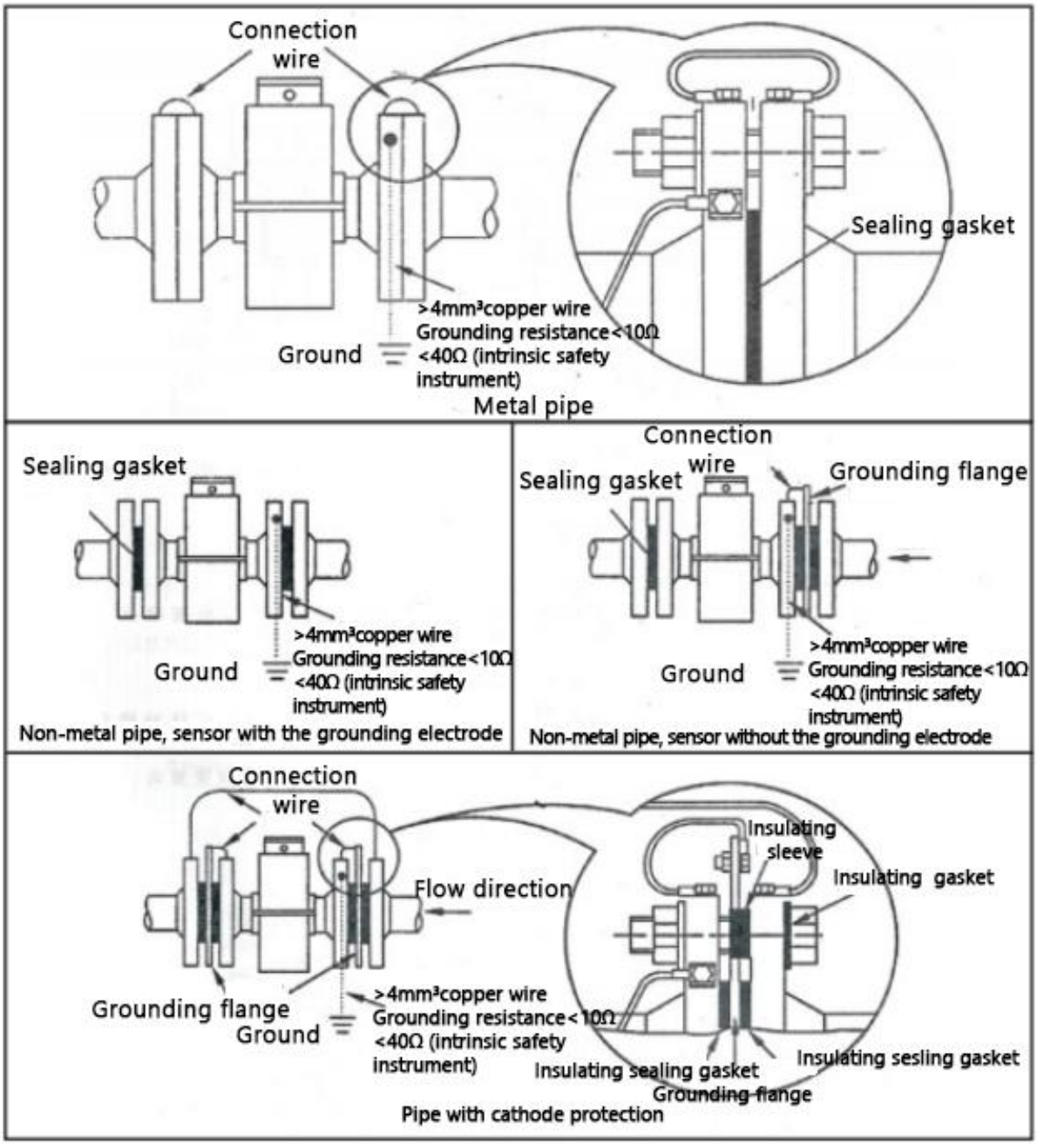
VI. Flowmeter Installation Diagram (shows as Figure 4)




Ensure full pipe
h≥2xDN
5xDN
3xDN
Ensure the straight pipe sections before and after the flowmeter
≥5xDN
≥3xDN
Measuring the precipitates easily created
Prevent bubbles and downward opening
Convenient for maintenance and cleaning
a
b
≥5m
Avoid negative pressure and part-filled pipe
Avoid pump inlet installation
Avoid vibration

VII. Electrical Wiring

7.1 See the grounding for flow meter and pipeline in Figure 5



7.2 Split converter wiring diagram and signal definition(Figure 6, Figure 6a，Figure 6b，Figure 6c)

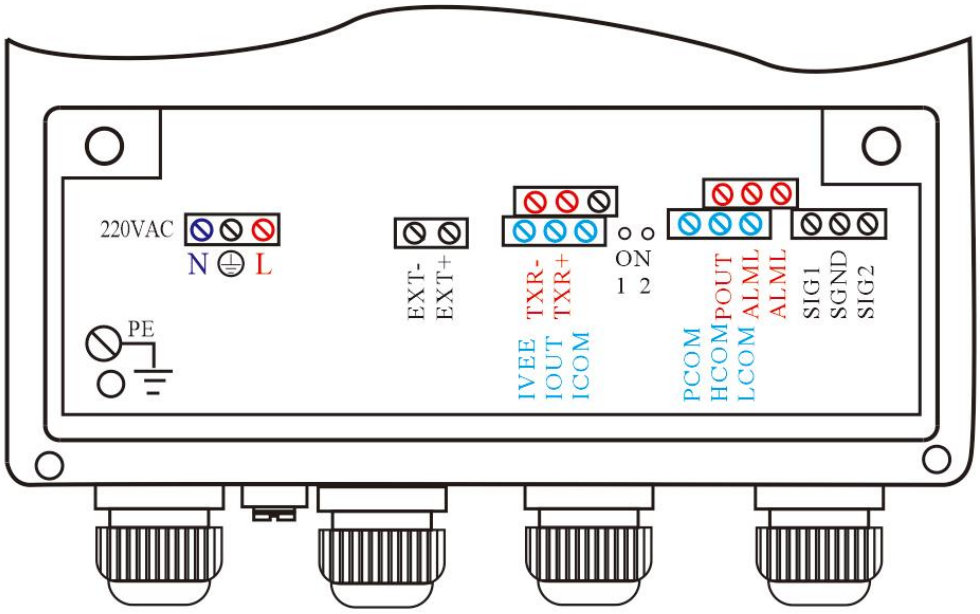


Figure 6:Square meter (220V)terminal block diagram

The signs for square flowmeter terminals are as follows:

L	220V (Live wire)	Power supply
N	220V (Neutral wire)	
SIG1	Signal 1	Connected to sensor
SGND	Signal ground	
SIG2	Signal 2	
EXT+	Excitation current +	
EXT-	Excitation current −	
IVEE	Power supply for current output	Current output
IOUT	Current output (+)	
ICOM	Current output ground (-)	
POUT	Frequency (pulse) output (+)	Frequency or pulse output
PCOM	Frequency (pulse) output ground (-)	
TXR+	Communication input (RS485+)	Communication interface
TXR-	Communication input (RS485-)	

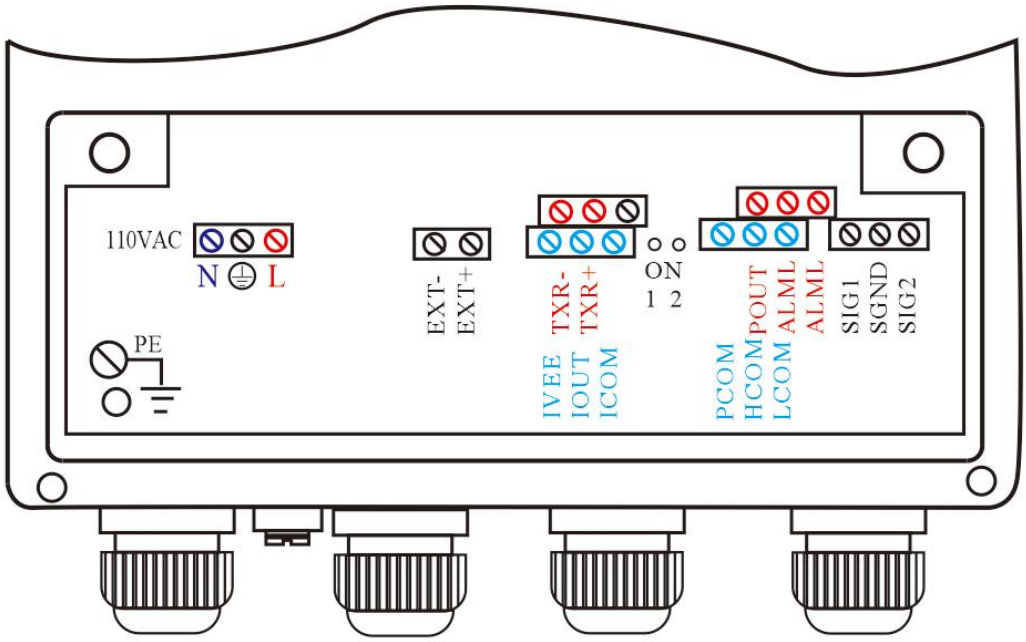


Figure 6a: Square meter (110V) terminal block diagram

The signs for square flowmeter terminals are as follows:

L	110V (Live wire)	Power supply
N	110V (Neutral wire)	
SIG1	Signal 1	Connected to sensor
SGND	Signal ground	
SIG2	Signal 2	
EXT+	Excitation current +	
EXT-	Excitation current −	
IVEE	Power supply for current output	Current output
IOUT	Current output (+)	
ICOM	Current output ground (-)	
POUT	Frequency (pulse) output (+)	Frequency or pulse output
PCOM	Frequency (pulse) output ground (-)	
TXR+	Communication input (RS485+)	Communication interface
TXR-	Communication input (RS485-)	

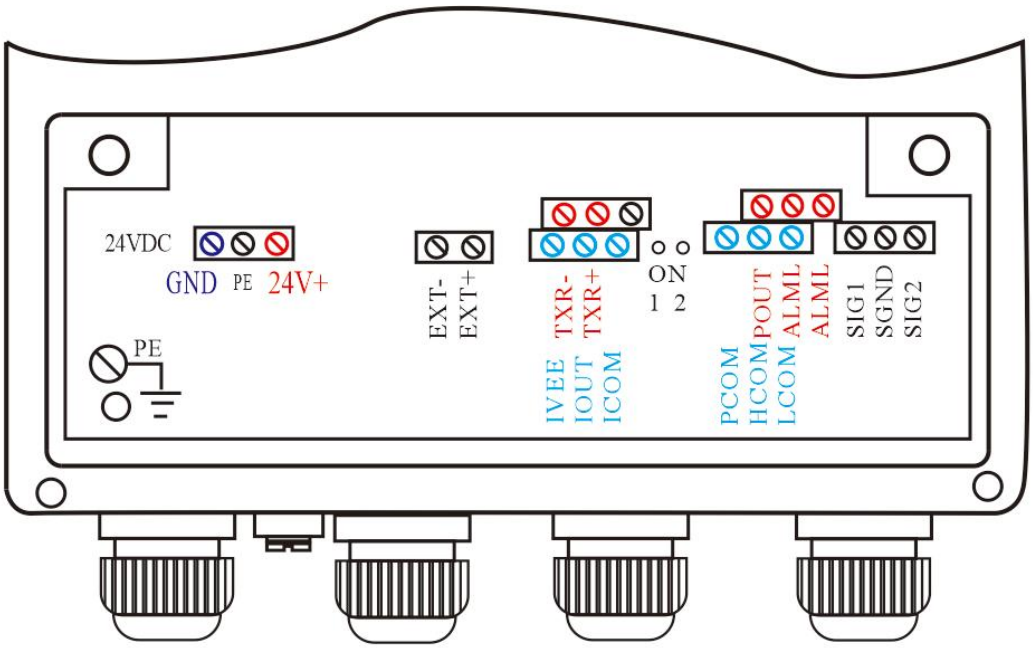


Figure 6b: Square meter (24V) terminal block diagram

The signs for square flowmeter terminals are as follows:

24V+	24V Power supply positive	Power supply
GND	24V Power supply negative	
SIG1	Signal 1	Connected to sensor
SGND	Signal ground	
SIG2	Signal 2	
EXT+	Excitation current +	
EXT-	Excitation current −	
IVEE	Power supply for current output	Current output
IOUT	Current output (+)	
ICOM	Current output ground (-)	
POUT	Frequency (pulse) output (+)	Frequency or pulse output
PCOM	Frequency (pulse) output ground (-)	
TXR+	Communication input (RS485+)	Communication interface
TXR-	Communication input (RS485-)	

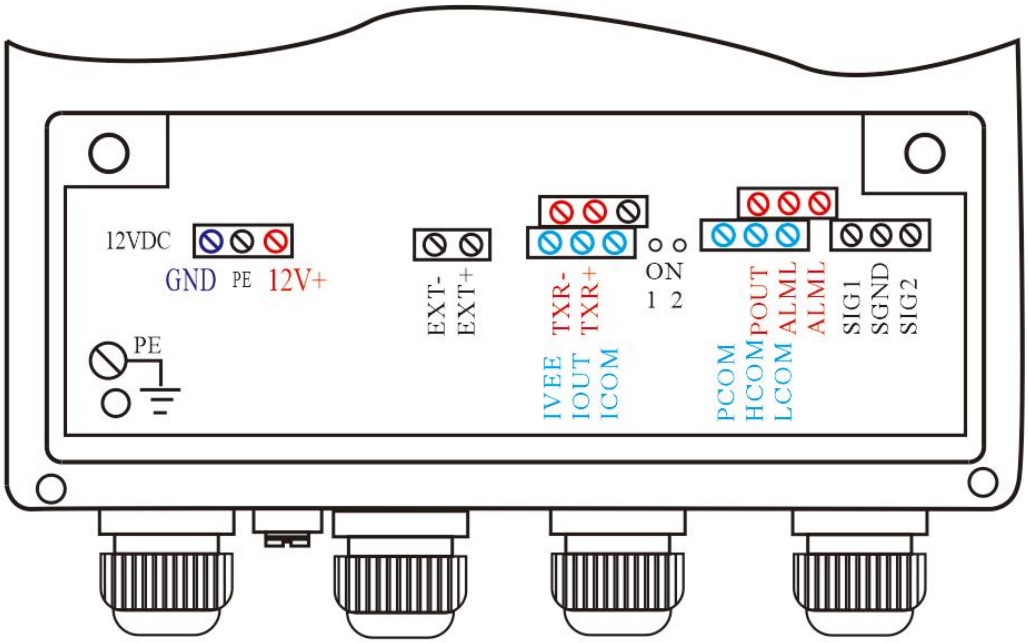


Figure 6c: Square meter (12V) terminal block diagram

The signs for square flowmeter terminals are as follows:

12V+	12V Power supply positive	Power supply
GND	12V Power supply negative	
SIG1	Signal 1	Connected to sensor
SGND	Signal ground	
SIG2	Signal 2	
EXT+	Excitation current +	
EXT-	Excitation current −	
IVEE	Power supply for current output	Current output
IOUT	Current output (+)	
ICOM	Current output ground (-)	
POUT	Frequency (pulse) output (+)	Frequency or pulse output
PCOM	Frequency (pulse) output ground (-)	
TXR+	Communication input (RS485+)	Communication interface
TXR-	Communication input (RS485-)	

7.3 Integrated converter wiring diagram and signal definition(Figure 7, Figure 7a，Figure 7b, Figure 7c)

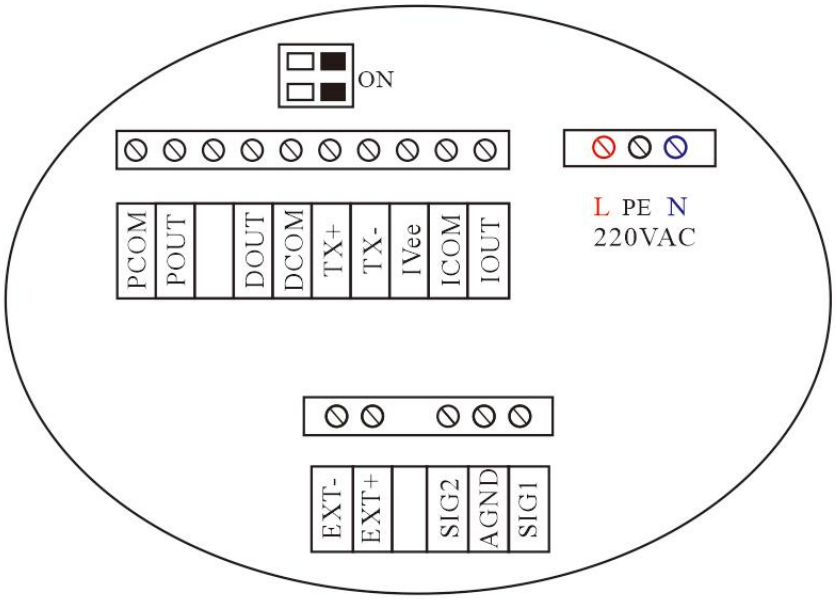


Figure 7 : Round meter (220V) terminal block diagram

The signs for round meter terminals are as follows:

L	220V (Live wire)	Power supply
N	220V (Neutral wire)	
SIG1	Signal 1	Connected to sensor
AGND	Signal ground	
SIG2	Signal 2	
EXT+	Excitation current +	
EXT-	Excitation current −	
IVEE	Power supply for current output	Current output
IOUT	Current output (+)	
ICOM	Current output ground (-)	
POUT	Frequency (pulse) output (+)	Frequency or pulse output
PCOM	Frequency (pulse) output ground (-)	
TX+	Communication input (RS485+)	Communication interface
TX-	Communication input (RS485-)	

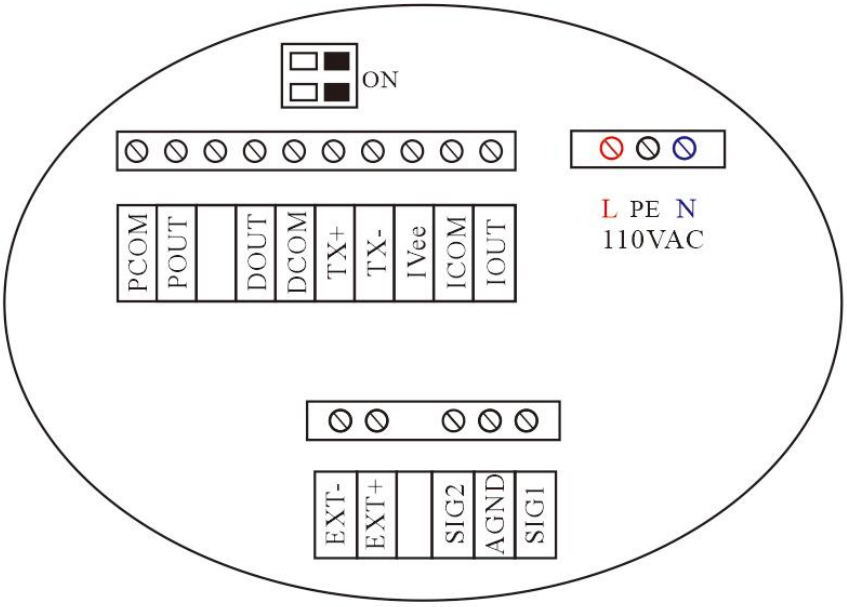


Figure 7a: Round meter (110V) terminal block diagram

The signs for round meter terminals are as follows:

L	110V (Live wire)	Power supply
N	110V (Neutral wire)	
SIG1	Signal 1	Connected to sensor
AGND	Signal ground	
SIG2	Signal 2	
EXT+	Excitation current +	
EXT-	Excitation current −	
IVEE	Power supply for current output	Current output
IOUT	Current output (+)	
ICOM	Current output ground (-)	
POUT	Frequency (pulse) output (+)	Frequency or pulse output
PCOM	Frequency (pulse) output ground (-)	
TX+	Communication input (RS485+)	Communication interface
TX-	Communication input (RS485-)	

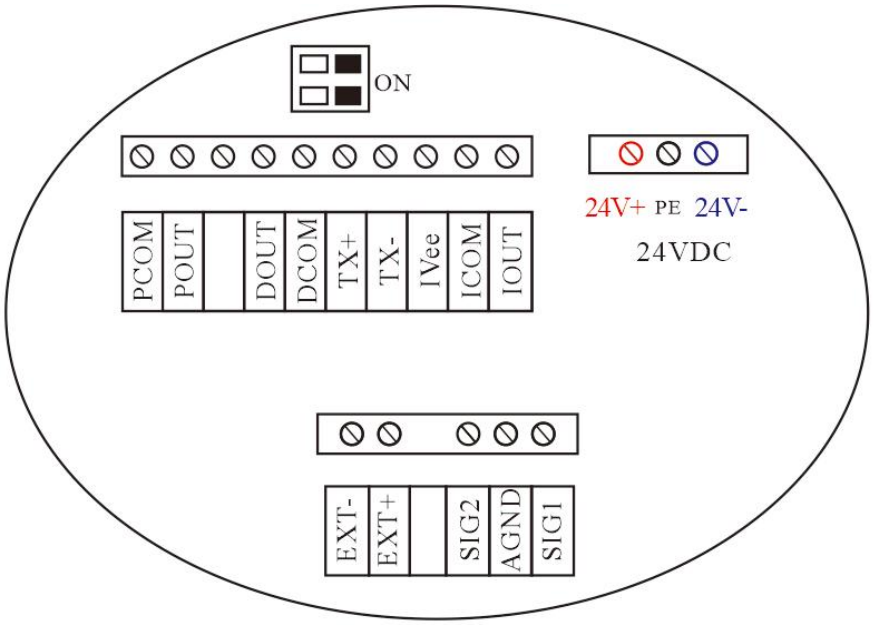


Figure 7b: Round meter (24V) terminal block diagram

The signs for round meter terminals are as follows:

24V+	24V Power supply positive	Power supply
24V-	24V Power supply negative	
SIG1	Signal 1	Connected to sensor
AGND	Signal ground	
SIG2	Signal 2	
EXT+	Excitation current +	
EXT-	Excitation current −	
IVEE	Power supply for current output	Current output
IOUT	Current output (+)	
ICOM	Current output ground (-)	
POUT	Frequency (pulse) output (+)	Frequency or pulse output
PCOM	Frequency (pulse) output ground (-)	
TX+	Communication input (RS485+)	Communication interface
TX-	Communication input (RS485-)	

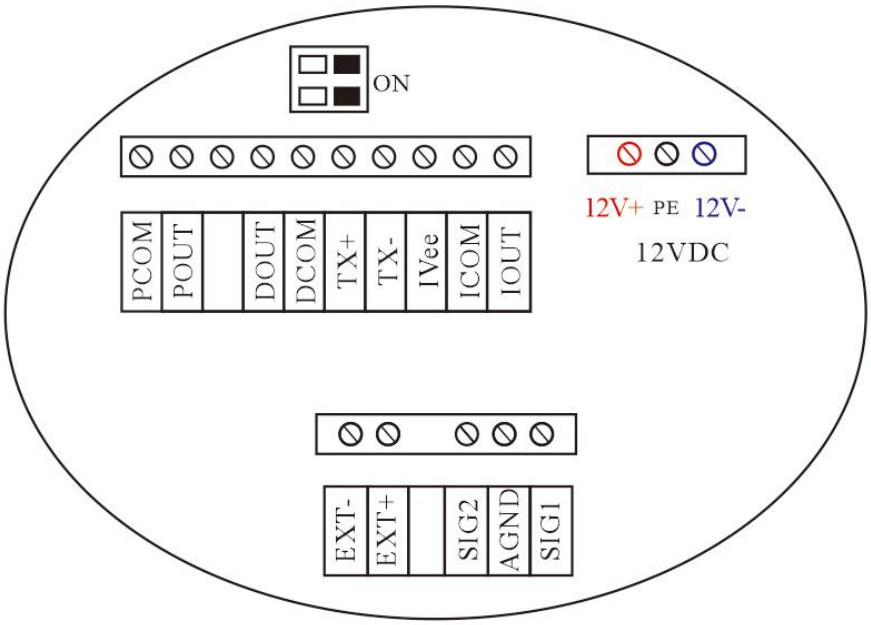


Figure 7c: Round meter (12V) terminal block diagram

The signs for round meter terminals are as follows:

12V+	12V Power supply positive	Power supply
12V-	12V Power supply negative	
SIG1	Signal 1	Connected to sensor
AGND	Signal ground	
SIG2	Signal 2	
EXT+	Excitation current +	
EXT-	Excitation current −	
IVEE	Power supply for current output	Current output
IOUT	Current output (+)	
ICOM	Current output ground (-)	
POUT	Frequency (pulse) output (+)	Frequency or pulse output
PCOM	Frequency (pulse) output ground (-)	
TX+	Communication input (RS485+)	Communication interface
TX-	Communication input (RS485-)	

7.4 Integrated battery converter wiring diagram and signal definitions (Figure 8)

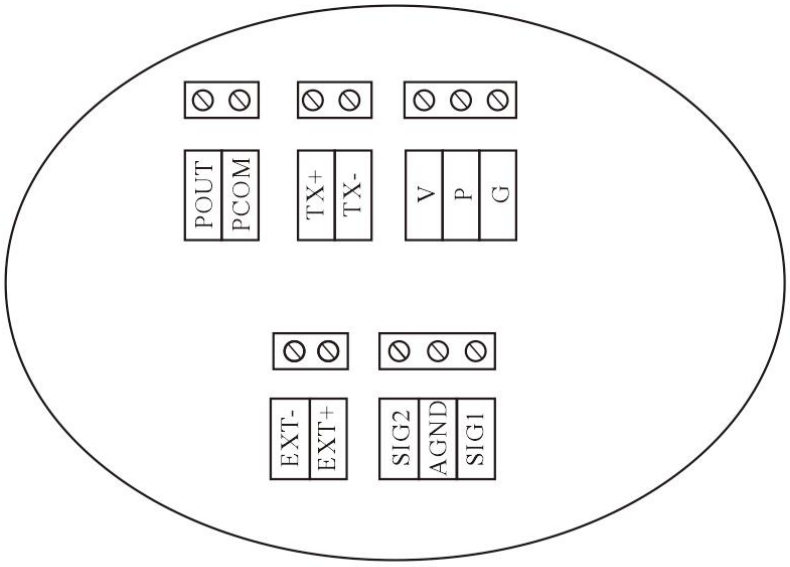


Figure 8: Round meter (3.6V) terminal block diagram

The signs for round meter terminals are as follows:

SIG1	Signal 1	Connected to sensor
AGND	Signal ground	
SIG2	Signal 2	
EXT+	Excitation current +	
EXT-	Excitation current –	
POUT	Frequency (pulse) output (+)	Frequency or pulse output
PCOM	Frequency (pulse) output ground (-)	
POWER	Front panel dip switch	Battery switch (ON at 0N)

7.5 Frequency pulse output interface

Frequency output and pulse output share a common set of terminals POUT(P+) and PCOM(P-). Select frequency or pulse output from the menu. Frequency/pulse output supports three output modes.

7.5.1 Output mode 1: OC door passive output, it is connected to pull resistance on the user side (Figure 9)

The two-bit dial code of the split converter (the red dial switch in the wiring cavity) are dialed out (OFF position), and the integrated terminal board are dialed down (OFF position).

POUT(P+) Output frequency / pulse signal

The external power supply V+ can be 5V/12V/24V, pull resistance R resistance range of (2-10) K.

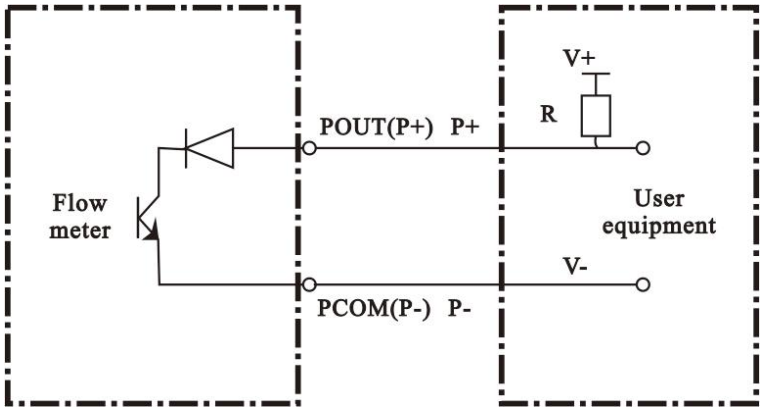


Figure 9

7.5.2 Output mode 2: passive output of OC door, user-side pull-down resistance (Figure 10)

The two-bit dial switch of the integrated converter (red dial switch in the wiring cavity) dials out (OFF), and the split board dial switch dials down (OFF position).

PCOM(P-)output frequency / pulse signal.

POUT(P+)directly connected to the external power supply V+.

This pattern is often seen in the combined system of flow meter and PLC.

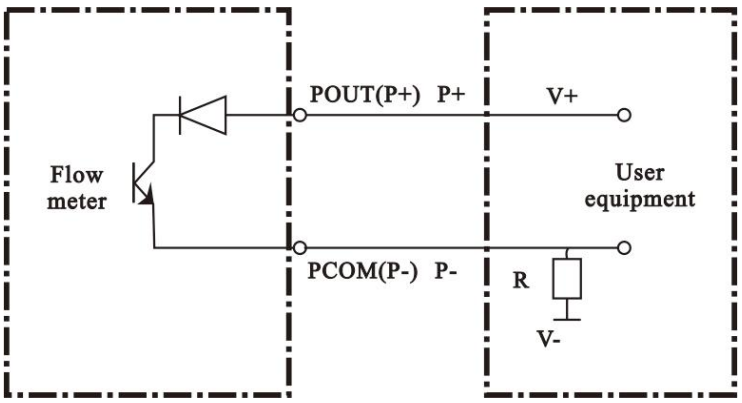


Figure 10

7.5.3 Output mode 3: gate 0C active output (Figure 11)

Both dip switches (red dip switches in the wiring cavity) of the one-piece converter are turned inward (0N position), and both dip switches of the split terminal block are turned upward (0N position).

POUT(P+) is connected to the frequency/pulse output signal (+).

PCOM(P-) connects to frequency/pulse output signal (-).

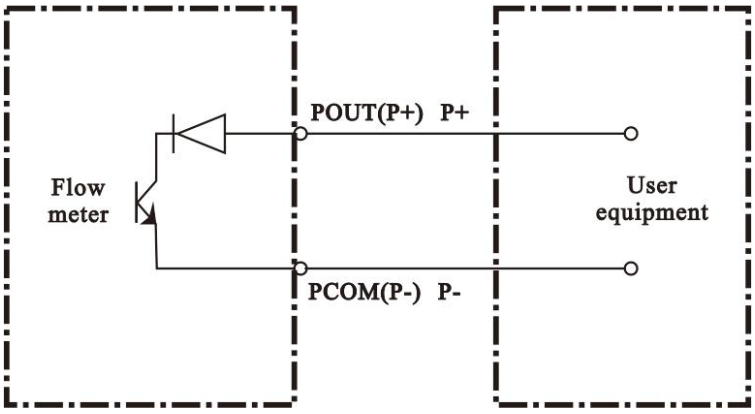


Figure 11

7.6 Current output interface

The current output is designed with a high-precision and large-scale integrated circuit chip, without zero-point and full-degree calibration. The output is stable and reliable, with good interoperability and temperature stability.

The current output has three terminals, IOUT (I+), ICOM (I-), and IVee, supporting two current output modes: two-line active current output and two-line passive current output.

7.6.1 Output mode 1: Two-line active current output (Figure 12)

Terminal terminals are IOUT (I +) and ICOM (I-)

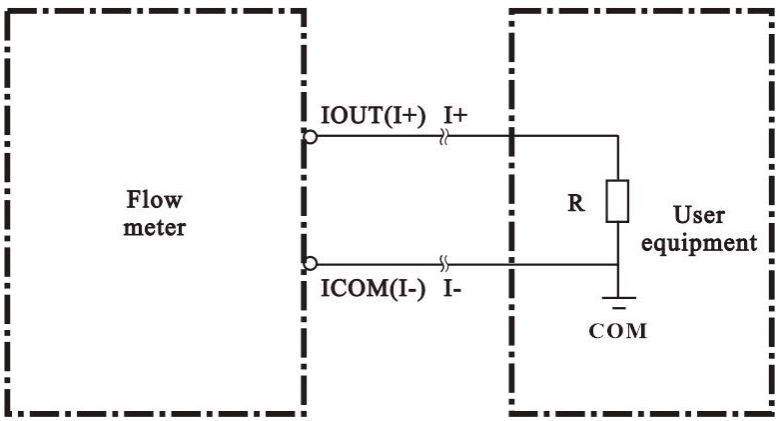


Figure 12

7.6.2 Output mode 2: Two-line system of passive current output (Figure 13)

The terminals are IOUT (I +) and IVee

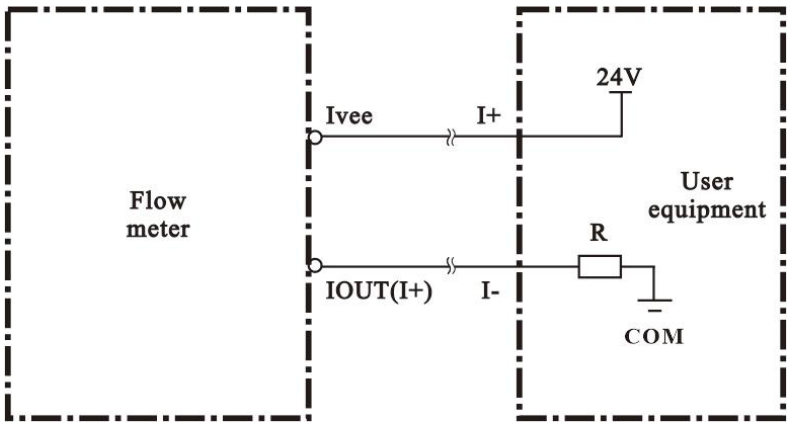


Figure 13

VIII. Self-diagnostic Information and Fault Processing

8.1 Self-diagnostic information

The printed circuit board of the electromagnetic flow converter adopts surface welding technology, which is not serviceable for the user, so the user cannot open the converter shell.

The intelligent converter has a self-diagnostic function. In addition to power and hardware circuit failures, faults in general applications can correctly give alarm information. This information prompts at the top right of the display that the "!" Identification, in the measurement state, turn over the page, and show the fault content is as follows:

Flow Normal.

Excitation Alarm

Empty Pipe Alarm

8.2 Fault processing

8.2.1 No display of the flow meter

A. Check if the power supply is turned on;

B. Check that the power fuse is intact;

C. Check whether the power supply voltage meets the requirements;

D.Check whether the display contrast can be adjusted and whether the adjusted value is appropriate;

E. If the first 3 items (A, B and C) above are normal and the item D display contrast can not be adjusted, please return to the converter for repair.

8.2.2 Excitation alarm (SYS)

A. Whether the excitation wiring EXT+ and EXT-are open.

B. Whether the total excitation coil resistance of the sensor is less than 150Ω;

C. If both of A and B are normal, the converter fails.

8.2.3 Empty pipe alarm(FGP)

A. Check fluid is full of sensor measuring tubes or not;

B. Input the converter signal to terminals SIC1, SIC2 and SICCND at a short point. If the "Empty Pipe Alarm" prompt is removed, the normal converter is possible. The measured fluid conductivity is low or the empty pipe threshold and the empty pipe range are not set correctly;

C. Check if the signal connection is correct;

D. Check the sensor electrodes for normal conditions.

① Bring the flow to zero and the observation shows that the conductance ratio should be less than 100%.

② In the case of flow rate, the measurement resistance of terminals SIG1 and SIG2 to SIG GND shall be less than 20K (for the medium as the water measurement value. It is best to measure with a pointer multimeter and see charge and discharge in the measurement process).

8.2.4 HIAL (FQH)

The HIAL indicates that both the output current and the output frequency (or pulse) are over the limit. Changing the flow range can cancel the HIAL.

8.2.5 LOAL (FQL)

The LOAL indicates that both the output current and the output frequency (or pulse) are over the limit. Reducing the flow range can remove the LOAL.

8.2.6 Incorrect system settings

Intelligent judgment has been made and prompted in the flow range setting, flow product calculation unit setting and pulse equivalent setting, so as to easily modify the setting.

8.2.7 Inaccurate flow measured

A. Whether the measured fluid is full of sensor measuring tubes;

B. Whether the signal cable is connected normally;

C. Check whether the sensor coefficient is set normally according to the sensor sign and the factory verification certificate.

IX. Supply in Full Sets

The electromagnetic flow meter shall be supplied according to the order contract.

The documents include: one instruction manual, one product certificate and one packing list.

X. Transportation and Storage

To prevent damage to the instrument during operation, keep the manufacturer packing before arriving at the installation site. During storage, the storage site shall meet the following conditions:

A. Rain-proof and moisture-proof;

B. Mechanical vibration is small and avoid shock;

C. Temperature range -20~+ 60℃, with humidity not greater than 80%.

XI. Operation

The following inspections shall be carried out before commissioning:

A. Check whether the flow meter has damage during transportation and installation;

B. Whether the supply voltage is consistent with the nameplate voltage;

C. Check whether the instrument is connected correctly.

Open the pipe valve after inspection to fill the liquid, and attention should be paid to eliminate leakage and residual gas in the system. Then turn on the instrument power supply, and the general flow meter can warm up for 10 minutes.

If there is any problem in operation, you can handle the fault according to the self-diagnosis results of flow meter converter in No.9. If the instrument cannot work well, please contact our company in time.

Contact

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