VERSION NO.: 2207

Eastron

Single Phase AC/DC Intelligent Multi-function Power Meter

USER MANUAL



E02Z

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1、Product Introduction

1.1 Reference standards
Reference standards:
GB/T 17883 Class 0.2S and 0.5S Static AC Active Electricity meter
GB/T 17882 Level 2 and Level 3 Static AC Reactive Electricity meter
DL/T 614 Multifunctional Energy Meter
Executive standards:
GB/T 22264.1 Installed Digital Display Electrical Measuring Instruments – Part 1: Fixed
Yihe General Requirements
GB/T 22264.2 Installed Digital Display Electrical Measuring Instruments - Part 2: Electrical
Special requirements for ammeters and Voltmeter
GB/T 22264.3 Installed digital display electrical measuring instruments - Part 3: Power
Special requirements for rate meters and reactive power meters
GB/T 22264.4 Installed digital display electrical measuring instruments - Part 4: Frequency
Special requirements for rate meters
GB/T 22264.5 Installed Digital Display Electrical Measuring Instruments - Part 5: Phase
Special requirements for bit meters and power factor meters
GB/T 22264.7 Installed digital display electrical measuring instruments - Part 7: Multiple
Special requirements for functional instruments
GB/T 22264.8 Installed digital display electrical measuring instruments - Part 8: Introduction
Recommended test methods
1.2 Product Overview
Single phase intelligent power instruments are designed for power systems, industrial and mining enterprises, and public facilities
Designed for the needs of intelligent power monitoring and energy metering in applications such as smart buildings,
It can measure all common power parameters in single-phase power grid with high precision: single-phase voltage
Single phase current, active power, reactive power, apparent power, frequency, power
Factor, Single-phase electric power, switching value input monitoring, with communication interface and switch
Functions such as quantity output control and electric energy pulse output.
Single phase intelligent power instruments have multiple expansion function modules to choose from: 1Communication interface, 1–channel switch output, local or remote switch signal monitoring and control output function ("remote signaling" and "remote control" functions), 2–channel switch input 1 circuit of electric energy pulse output function.

Single-phase intelligent power instruments have extremely high cost-effectiveness and can directly replace
Standard power transmitters, measuring indicating instruments, energy metering instruments, and related auxiliary equipment
Auxiliary unit. As an advanced intelligent and digital front-end collection element for power grids
Components have been widely used in various control systems, SCADA systems, and energy management departments
Central automation, substation automation, distribution network automation, community power monitoring, industrial
In automation, intelligent buildings, intelligent distribution boards, switchgear, with installation party
Convenient, simple wiring, convenient maintenance, small engineering quantity, and programmable input on site
Parameters, capable of completing communication software for different PLCs and industrial control computers in the industry
Networking.

2、Function Introduction (see Table 1)

Table 1

Measurement function		notes
real-time	Single AC/DC voltage	basic function
	Single AC/DC current	
	Single-phase AC power	
	frequency	
	Single phase power factor	
Energy Measurement	Single phase AC active electrical energy	
	Single phase AC reactive energy	
electric energy pulse	Passive dry node	Extended functionality
Switching input	Passive dry node	
Switching Output	AC250V 3A remote control/alarm	
communicate	RS485 interface MODBUS-RTU protocol	

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3、Technical parameters (see Table 2)

Table 2

Item			parameter
	Connection		single phase
INPUT	voltage	range	AC：100V、380V, DC：2V、20V、200V、600V
		overload	Continuous: 1.2 times Instantaneous: 2 times
		consumption	＜ 1VA (per phase)
	current	range	AC：1A、5A；DC：1A、5A、75mV
		overload	Continuous: 1.2 times Instantaneous: 2 times
		consumption	＜ 1VA (per phase)
	frequency		(45～65) Hz
power supply			AC220V、AC85～265V、DC100～300V ≤5VA
electric energy pulse			Passive optocoupler collector output Fixed pulse width 80mS ± 20%
communicate			RS485 communication interface, physical layer isolation MODBUS-RTU protocol that meets international standards Communication speed 1200~9600 Verification methods N81, E81, 081
Switching Output			Programmable remote control/alarm switch output Capacity 3A/250VAC, 3A/30VDC Programmable alarm power or remote control method
Switching input			Telemetry switch input measurement, passive dry node input Programmable associated alarm output
Measurement level			Electric quantity: 0.5, frequency: ± 0.2Hz Active energy: 0.5, reactive energy: 1.0
Display method			LED Display,LCD Display
environment			Working temperature: -10~+45 ℃ Storage temperature: -25~+55 ℃ Relative humidity: ＜ 85% RH
Security			Insulation: input, power supply and output terminals have a resistance to the shell greater than 100M Ω
protection grade			Front panel Ip52

4、Installation and wiring

4. 1 Panel Size (mm): 48 × 48 Hole size (mm): 45 ×45
Depth of cabinet entry (mm): 92 (see Figure 1)

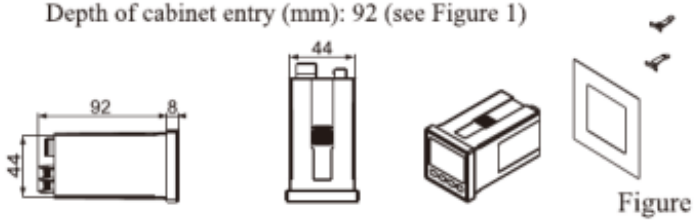


Figure 1

4. 2 Panel Size (mm): 96 × 48 Hole size (mm): 92 × 92
Depth of cabinet entry (mm): 80 (see Figure 2)

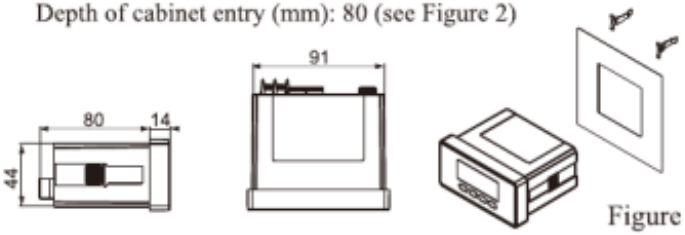


Figure 2

4. 3 Panel Size (mm): 72 × 72 Hole size (mm): 67 × 67
Depth of cabinet entry (mm): 71 (see Figure 3)

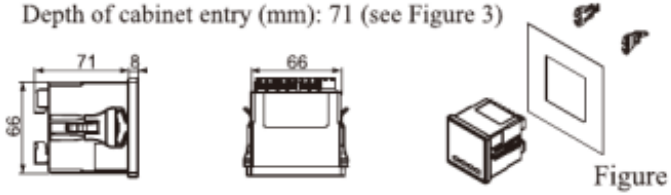


Figure 3

4. 4 Panel Size (mm): 80 × 80 hole size (mm): 76 × 76
Depth of cabinet entry (mm): 71 (see Figure 2)

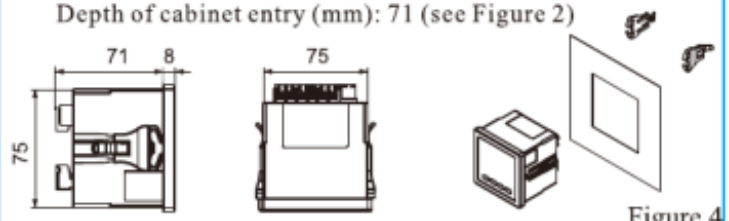


Figure 4

4. 5 Panel Size (mm): 96 × 96 Hole size (mm): 91 × 91
Depth of cabinet entry (mm): 60 (see Figure 4)

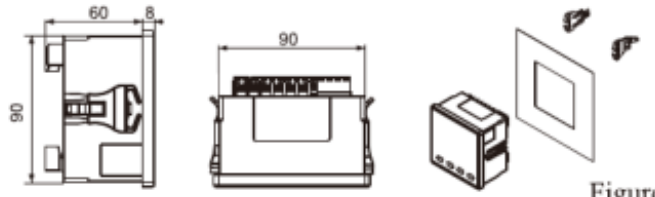


Figure 5

4. 5 Functional description of wiring terminals (see Table 3)

Table 3

power supply	1, 2	AC220V、AC85～265V、 DC100～300V ≤5VA
current signal	4, 5	4 is the current input terminal
voltages	11, 14	11 is the high end of voltage 14 is the low end of the voltage
Switching Output	15-18	2-way switch output
electric energy pulse	47，48，	47 is the positive end of the passive output, Positive terminal of external power supply
RS485	58, 59	Respectively A and B
Switching input	70-72	2-way switch input, 70 is the common terminal

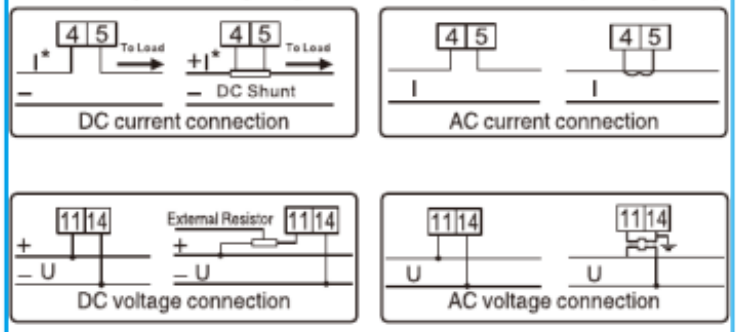
Instructions for use

(a) 1 and 2 are auxiliary power sources for instrument operation, please ensure that the power supply is suitable for this series of products is designed to prevent damage to the product.

(b) 4 represents the incoming terminal of the current transformer, and the terminal marked with " * " represents the incoming terminal of the current.

4 6 Wiring

The following is a wiring diagram of the basic functions (see Figure 5)



The specific wiring method shall be based on the product's random wiring diagram

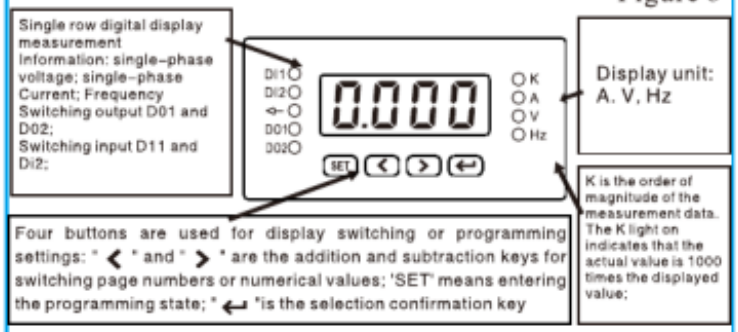
Figure 5

5、Panel Description and Measurement Information Display

If there is no relevant information during display switching (or if the relevant display information does not work), it indicates that the model does not have this part of functionality.

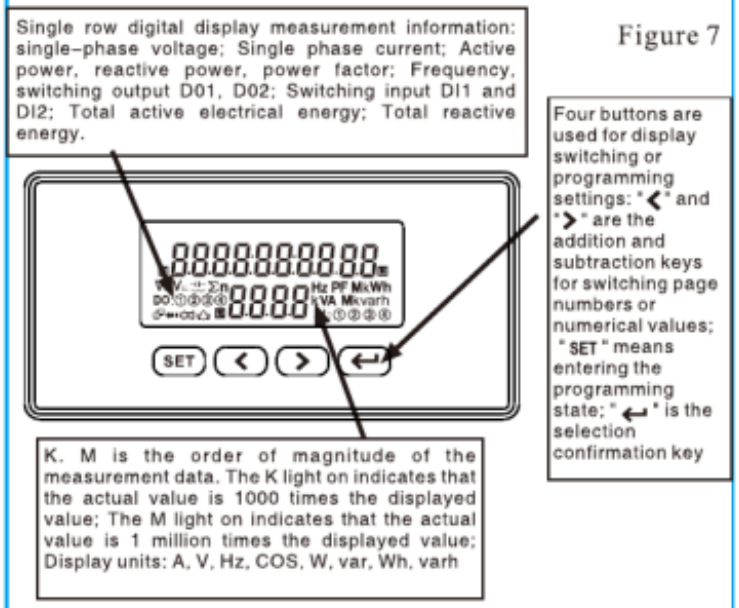
5.1 LED Nixie tube display (see Figure 6)

Figure 6



5.2 LCD display (see Figure 7)

Figure 7



5. 3Page display content (see Table 4)

Table 4

Page	Content	Description
DISP=1 Voltage, Positive active energy		Displayed Separately Voltage=220.0V Positive Active Energy=0.05kWh
DISP=2 Current, Negative active energy		Displayed Separately Current=5.000A Negative Active Energy=0.05kWh
DISP=3 Frequency, Positive reactive energy		Displayed Separately Frequency=50.00Hz Positive Reactive Energy=0.05kvarh
DISP=4 Power factor, Negative reactive energy		Displayed Separately Power Factor=1.000PF Negative Reactive Energy=0.05kvarh
DISP=5 Active power		Active power=1100W

Page	Content	Description
DISP=6 Reactive power		Reactive power=1100var

6、Programming Operations

In programming mode, the digital display interface adopts a hierarchical menu structure,
The instrument provides a single row digital display: (see Figure 7)
The first level is the first level of menu information;
The second level is the second level menu information;
The third level is the third level of menu information.
For example, as shown in Figure 8: Level 1: INPT signal input, Level 2:
CT current ratio
Level 3: 5 current CT value, set to current specification
CT value=25/5A=5.



Figure 8

The organizational structure of the digital display interface menu is as follows, and users can customize it according to their actual situation

Select the appropriate setting parameters. (See Table 5)

Table 5

Tier 1	Tier 2	Tier 3	describe
System settings SET	Page Display DISP	0000–0006	The default DISP value of the single function instrument panel is 00010000, indicating automatic cycle display mode
	Brightness/backlight display time DISL	0001–0003 or 0000–0120	0001~0003 are LED tube brightness adjustment 0000~0120 is the LCD backlight display holding time (0000 is the backlight always on)
	Electric energy reset CLr.E	****	
Signal input INPT	Voltage ratio PT	1 ~ 9999	PT value=primary/secondary value of transformer
	Current ratio CT	1 ~ 9999	CT value=primary/secondary value of transformer
communication CONL	address SN	1 ~ 247	Instrument address range: 1~247
	Communication speed BAUD	0001 ~ 0004	0001 is 1200; 0002 is 2400; 0003 is 4800; 0004 is 9600;
	Communication check bit DATA	0000 ~ 0002	0000:E,8,1; 0001:0,8,1; 0002:N,8,1;
Switching quantity output setting DO–i (i is 1–2)	Select an alarm item or close the alarm (See 8.2 Switching Value Output for details)	Set alarm items Specific threshold values for	Select the alarm item and set the corresponding threshold value (when the alarm item is a switch quantity, there is no need to set the threshold value). Once the alarm adjustment is met, the switch output is conductive.

Note: The above menu items are all functional menu items. If users find that some menu items in the menu are missing or not as shown in the above table during use It works, indicating that the product selected by the user does not support this feature.

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6. 1 Programming steps (see Figure 9)

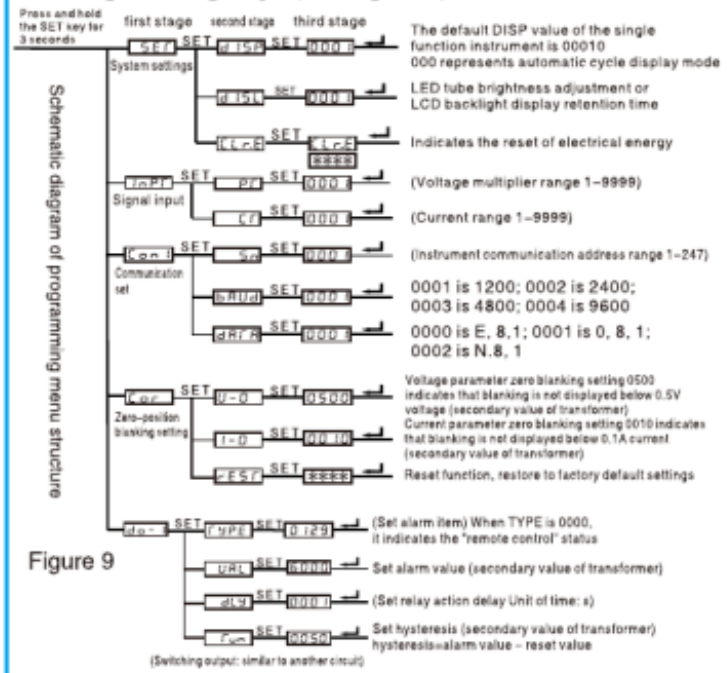


Figure 9

Operating instructions:

(a) After changing the data (or options) of the third level menu, press " ↵ "
The key must be pushed back to the second level menu to take effect.

(b) The wiring method can be modified according to the actual on–site wiring method.

(c) In general, the label behind the instrument already indicates the class of the instrument
Type parameters, users can also reprogram and set the instrument according to actual needs.

(d) When changing values, use the " < " and " > " keys to increase or decrease
Small, shift through the "SET" key.

6.2 Example of alarm setting:

Single phase AC Ammeter AC200/5 (CT=40), primary current of transformer is required
When the current value is greater than 160A, there is a high alarm, and the relay action delay time is 10 seconds
The reset current of the electrical appliance is 150A, which means the hysteresis is 10A.

① Set alarm selection TYPE;



Note: Refer to Table 8 on page 15 for the selection of TYPE alarm types

② Set the alarm value to 160A;



Note: The UAL alarm value is set according to the secondary setting of the transformer, and the conversion method is:

$$UAL=\frac{\text{Alarm Value}}{CT}=\frac{160}{40}=4.000A$$

③ Set the relay action delay time to 10 seconds;



④ Set the hysteresis of 10A;



Note: The TUN value is set according to the secondary setting of the transformer, and the conversion method is:

$$TUN=\frac{\text{alarm value}-\text{reset value}}{CT}=\frac{160-150}{40}=0.250A$$

7、Function output

7.1 Electricity metering and pulse output
This series of instruments displays primary electrical energy with a pulse constant of 8000 imp/kwh.
7.2 Switching value part:
This series of instruments provides 2-way switch input function and 2-way switch output power
Yes, the 2-way switch input adopts the dry node resistance switch signal input method
The meter is equipped with a 12V working power supply internally and does not require external power supply. When externally connected
Wait, after the instrument switch input module DI collects the connection information, it is displayed as 1;

When external disconnection occurs, it is collected as disconnected through the instrument switch input module DI
The open message is displayed as 0.
The switch input module can not only collect and display local switch information, but also
Remote transmission function can be achieved through the digital interface RS485 of the instrument, namely "remote
Message function;
The on-off output function of the 2-way optocoupler relay can be used for various alarm situations
Output functions such as alarm indication and protection control. When the switch output is valid,
The switch output is conductive and displayed as 1. When the switch output is turned off, the switch value
The output is turned off and displayed as 0.
7.2.1 Electrical parameters:
Input DI: Connect resistance R<5000 Ω; Switching resistance>100K Ω
Output DO: AC 250V, 3A
7.2.2 Registers: (see Table 6)
DI0 information register (address 33): This register represents 12 switch inputs
And the status information of the 4-way switch output

Table 6

DIO register	BIT 15	BIT 14	BIT 13	BIT 12	standby	standby	standby	standby	standby	standby	standby	standby	BIT 3	BIT 2	standby	standby
Corresponding switch port	Di1	Di2	Di3	Di4	standby	standby	standby	standby	standby	standby	standby	standby	D01	D02	standby	standby
reset	0	0	0	0	standby	standby	standby	standby	standby	standby	standby	standby	0	0	standby	standby

The lower 4 bits of the DI0 information register (BIT3, BIT2, BIT1, BIT0) are the switch output status information. If the register content is 000000 000101, it indicates that the switch output ports 2 and 4 are conducting; 1. 3-way is off; The upper 12 bits of the DI0 information register (BIT15-BIT4) are the switch input status information. If the register content is 11010000000000, it indicates that the input ports 1, 2

4 channels for conduction; Other channels are interrupted. All DI0 information is displayed on the instrument panel
It can be displayed on the screen. Each switch alarm output parameter uses DOSI3 connections
Continued address space for storage. If the first route uses addresses 10, 11, 12 (BY
TE2, BYTE1, BYTEO). The word with the lowest address
Section (address 10) stores the parameters of the alarm output object, such as the low alarm parameter of U
1. The high alarm parameter is 129; 0 represents remote control mode. The other two bytes (address
11. 12) is an alarm threshold crossing parameter. The other way is similar to this. Corresponding address space
Please refer to the list. (See Table 7)

Table 7

project	variable	Meaning: DO i (BYTE2, BYTE1, BYTE0)
Switch output 1	DO1	BYTE2 (1–255), alarm items, 1–26 correspond to the corresponding 26 low measurement battery alarms in the battery address; 129–154, which is greater than 28, represents the corresponding high alarm, and 0 represents the retention method. For detailed information, please refer to the comparison table of switch output electricity parameters (see Table 8). BYTE10 (1~9999), alarm limit parameter, data format is the same as power information, pay attention to the meaning of Decimal separator.
Switch output 2	DO2	

7.2.3 Application examples:
A. Switch input function:
The switch module has a 2-channel switch input acquisition function. After collecting the input signal, the instrument panel displays its "on 1" or "off 0" information for local monitoring of the switch signal. Switch the instrument to the switch information display state, and the indicator light on "DI" will be on. The information of the switch information register (D10) can be transmitted to a remote computer terminal through the RS485 digital interface of the instrument.
B. Switch output function:
Remote control function: By writing control information to the DIO information register through the upper computer, it can control the on-off of four switch output ports, and write 1 corresponding port to conduct

Write 0 corresponding to port shutdown. If a binary number of 10110000 is written, it indicates that one, three, and four output ports are connected, and three are disconnected. This function cannot be used simultaneously with another limit exceeding alarm output function of the switch output module. To use the remote control function, the power object parameter needs to be set to 0.
Another function of the switch output module is to output out of limit alarms. Set the range of electrical parameters. When the measured electrical parameters exceed the set range, the corresponding switch output port is in a conductive state, and the corresponding position on the panel displays 1. When the signal returns to the parameter range, the display changes to 0.

Table 8

project	Switching output project TYPE	
	Corresponding parameters (Low alarm)	Corresponding parameters (High alarm)
U(Voltage)	1	129
I(Current)	7	135
P(Active power)	13	141
Q(Reactive power)	17	145
PF(Power factor)	21	149
S(Apparent power)	25	153
F(Frequency)	26	154
Linkage (closed)		157
Linkage (disconnection)		158

Factory default setting for switching value: Switching value output is calculated based on the secondary value of the transformer
Current: TYPE is 135, UAL is 5000; 5000 corresponds to secondary side current 5A
Voltage: TYPE is 129, UAL is 2400; 2400 corresponds to a secondary side voltage of 240.0V
Power: TYPE is 141, UAL is 1100; 1100 corresponds to a secondary power value of 1100W
Power factor: TYPE is 149, UAL is 1000; 1000 corresponds to a secondary power factor value of 1.000
Frequency: TYPE is 154, UAL is 5000; 5000 corresponds to a secondary frequency value of 50.00HZ
Note: When TYPE is set to 0000, it indicates the "remote control" status

8、Common problems and solutions

8.1 About Communication
● Instrument does not send back data
Answer: First, ensure that the communication setting information of the instrument, such as slave address, Baud, and calibration method, is consistent with the requirements of the upper computer; If there is no data return for the communication of multiple instruments on site, check whether the connection of the field communication bus is accurate and reliable, and whether the RS485 converter is normal. If only a single or a few instruments have abnormal communication, the corresponding communication lines should also be checked. Testing can be done by modifying the address of the slave computer for abnormal and normal instrument changes, eliminating or confirming software issues with the upper computer, or by exchanging the installation location of abnormal and normal instruments to test, eliminate or confirm instrument faults.
● Inaccurate instrument feedback data
Answer: The communication data open to customers for this series of instruments include primary grid float data and secondary grid int/long data. Please carefully read the instructions on data storage addresses and formats in the communication address table and ensure that they are converted according to the corresponding data formats.
8.2 Inaccurate measurement of U, I, P, etc
Answer: Firstly, it is necessary to ensure that the correct voltage and current signals have been connected to the instrument. A multimeter can be used to measure the voltage signal, and if necessary

Use a clamp meter to measure the current signal. Secondly, ensure that the connection of the signal line is correct,
For example, the homonymous end of the current signal (i.e. the incoming end), as well as the phase sequence of each phase
Is there an error. Additionally, it should be noted that the electricity displayed on the instrument is from the primary power grid
If the multiplier of the voltage and current transformer set in the table is consistent with the actual use
Inconsistent sensor magnification can also lead to inaccurate display of instrument power. Intrameter electricity
The range of the piezoelectric current is not allowed to be modified after leaving the factory.
8.3 Instrument does not light up
Answer: Ensure that a suitable auxiliary power supply (see product label) has been added
The auxiliary power terminal of the instrument may exceed the specified range of auxiliary power voltage
It will damage the instrument and cannot be restored. A multimeter can be used to measure assistance
The voltage value of the power supply. If the power supply voltage is normal and there is no display on the instrument
To consider powering off and re powering on, if the instrument still cannot display normally, please contact
Our company's technical service department.
8.4 Instrument does not respond to any operation
Answer: Press the "SET" " < " " > " " ↵ " button on the instrument keyboard
If there is no response from the meter and the instrument cannot return to normal after attempting to power off and then re power on
Please contact our company's technical service department.
8.5 Other abnormal situations
Answer: Please contact our company's technical service department in a timely manner, and the user should provide a detailed description
On site situation, our company's technical personnel will analyze the possibility based on on-site feedback
The reason for this. If the problem cannot be solved through communication, our company will arrange it as soon as possible
Technicians come to the site to handle the problem.

9、 Transportation and storage

9.1 The transportation and storage of instruments should be in accordance with Chapter 4 of GB/T 25480–2010 "Basic Environmental Conditions and Test Methods for Transportation and Storage of Instruments and Meters". The storage environment temperature should be between –25 ℃ and+50 ℃, with a relative humidity not exceeding 85%, and the harmful substances in the air should not be sufficient to cause corrosion of the instruments.

9.2 The product should be stored in the warehouse and placed on a shelf with a stacking height of no more than 6 boxes. After unpacking, the stacking height of a single packaged product should not exceed 10.

9.3 Please do not power on the meter and contact the supplier as soon as possible when there are obvious signs of damage to the casing caused by severe impact or falling from a height during transportation, use, and installation.

10、 Company commitment

10.1 Within 24 months from the date of production of the product, if the customer's normal storage, transportation, maintenance, and use, and the company's seal is intact and not removed, and the product cannot be used normally due to manufacturing issues, the "three guarantees" service shall be provided.