

PM99 series

Intelligent electrical parameter measuring instrument

User Manual

DIGITAL POWER METER USER'S MANUAL

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Preface

Thank you for purchasing [Pumei/DCUU] Smart electrical parameter tester (digital power meter,DIGITAL

POWER METER), this product manual contains instrument functions, operating procedures, etc., for confirmation

To ensure the correct use of this instrument, please read the manual carefully before operating the instrument. Please keep your hands properly

So that you can quickly refer to it when you encounter problems.

Notice:

1. If you have a different understanding of the content of this manual, take the interpretation of the company' s technical department as

allow;

2. The content described in this manual may not include all the content of the instrument, our company

Have the right to improve or change the performance, function, appearance, accessories, packaging, etc. of the product,

Without notice

3. The copyright of this manual belongs to Zhongzhongshan Zhongxiang Instrument Co., Ltd., any other public

Companies or individuals shall not plagiarize this manual.

The contents of this manual are subject to change without notice.

Safety regulations

You must pay attention to the following safety regulations during all the processes of using this instrument. If you don't

Reasonable use, the functions provided by the instrument may be impaired.

The following marks are used in this instrument:



High voltage warning symbol, in order to avoid personal injury or damage to the instrument, the operator

should refer to the manual



Switch on symbol



Switch off symbol

warn

Do not operate in an explosive environment.

Do not use the instrument where flammable and explosive materials are placed.

Using any electrical equipment in this environment may cause safety hazards.

Protective ground

Before turning on the power cord, make sure that the protective ground wire is connected to prevent the motor. The ground terminal of this instrument is

The ground terminal of the power socket.

Power supply

Before turning on the power, make sure that the voltage of the power supply matches the rated voltage.

Do not remove any part of the housing of the instrument

Some places have high voltage, and it is strictly forbidden to remove the instrument shell and disassemble without special permission

Any part of the instrument.

Chapter 1 Basic Principles

1. Principle block diagram

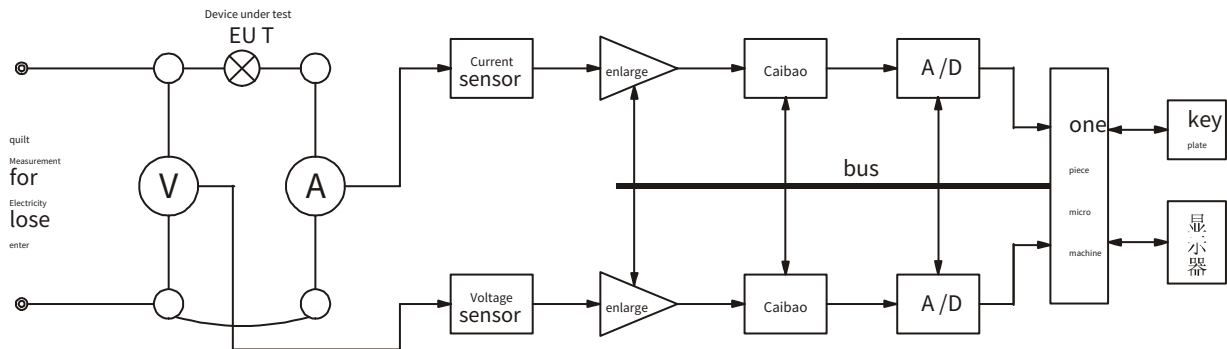


figure 1 Principle block diagram

The instrument is mainly composed of input (voltage, current input), microcomputer, display and interface parts. In the voltage input circuit, the input voltage is sampled by the sampling sensor, and then sent to the high-speed A/D converter after being sampled and held; the input current is sampled by the sampling sensor, and then the current signal is converted into a voltage signal, which is sent to the high-speed A/D after being sampled and held /D converter. The voltage and current input signals are sent to the microcomputer after high-speed A/D conversion for data processing. At the same time, the microcomputer automatically controls the range switching, and performs calculation, display and input and output control of the data.

2. Measuring principle

The voltage and current signals are sampled, amplified, and then sent to the high-speed A/D converter through the sample holder. The A/D converter sends the converted digital signal to the microcomputer, and through the integration method, it is obtained according to the following formula The true effective value of voltage (U_{RMS}), the true effective value of current (I_{RMS}), active power (P) and power factor (PF).

$$U_{RMS} = \sqrt{\frac{1}{N} \sum_{i=1}^N U_i^2} \quad I_{RMS} = \sqrt{\frac{1}{N} \sum_{i=1}^N I_i^2}$$

$$P = \frac{1}{N} \sum_{i=1}^N (U_i \cdot I_i) \quad PF = \frac{P}{U_{RMS} \cdot I_{RMS}}$$

Where N is the number of sampling points in a week, U_i , I_i is the instantaneous sampling point of voltage and current.

Chapter 2 Model Selection

PM The design of the series electrical parameter tester adopts advanced 32 High-speed processor and dual-socket twenty four

Bit AD The converter has the characteristics of high precision, wide dynamic range, compact structure and dexterity. It is

A new generation of digital electrical parameter measuring instrument can measure the effective value of voltage, current, active power,

Power factor, frequency.

The product complies with DB37/T557-2005 digital electrical parameter measurement (test) instrument

Test principle:

The effective voltage value is: $U_{rms} = (\int_0^T V^2(t) dt / T)^{1/2}$ The DC component of the voltage is: $U_{dc} = \int_0^T V(t) dt / T$

The voltage AC component is: $U_{dac} = (U_{rms}^2 - U_{dc}^2)^{1/2}$ The effective current value is: $I_{rms} = (\int_0^T I^2(t) dt / T)^{1/2}$

The DC component of the current is: $I_{dc} = \int_0^T I(t) dt / T$ The AC component of the current is: $I_{ac} = (I_{rms}^2 - I_{dc}^2)^{1/2}$

The active power is: $P = \int_0^T V(t) \cdot I(t) dt / T$ The power factor is: $PF: P / (U_{rms} \cdot I_{rms})$

Product selection instructions

parameter model	Measuring range	Voltage, Current, power Power, factor frequency	Sound and light Call the police Electricity quantity	accumulation Type B	Peak voltage, Peak current, RS-485/RS- Active power, 232 (optional) Reactive power	Relay Output (select match)	Harmonic DC
PM9911	600V20A	√	√	√	√	√	
PM9912	600V20A	√	√	√	√	√	√
PM9913	600V/2A	√	√	√	√	√	
PM9915 (A/B)	600V/20A	√	√	√	Selection Type B	√	√
PM9916 (A/B)	600V/20A	√	√	√	Selection Type B	√	√

Note: RS-232/RS-485 communication function is optional for the instruments, and some instruments can choose relays

The alarm output function needs to be selected before ordering.

Chapter 3 Main Technical Parameters and Indicators

1.measurement accuracy

PM9911 measurement accuracy

parameter	Measuring range	measurement accuracy	Distinguish Rate	Remark
Voltage	5V~600V	$\pm(0.4\% \text{ of reading} + 0.1 \text{ range})$	0.1V	Overload 1.2 times the range
Current	5mA~20A	$\pm(0.4\% \text{ of reading} + 0.1 \text{ range})$	0.00 1A	Overload 1.2 times the range
power	$U \cdot I \cdot PF$	$PF > 0.5 \pm(0.4\% \text{ reading} + 0.1 \text{ Range})$ $PF < 0.5 \pm(0.6\% \text{ reading} + 0.1 \text{ Range})$	0.1W	
Power factor	0.1~2	± 0.1	0.00 1	Voltage value is higher than 10% of range Current value is higher than 1% of range
frequency	45Hz~65Hz	0.1%*reading	0.01 Hz	Voltage is higher than 10% of range

PM9912 measurement accuracy

parameter	Measuring range	measurement accuracy	Distinguish Rate	Remark
Voltage	1V~300V	$\pm(0.4\% \text{ of reading} + 0.1 \text{ range})$	0.1V	Overload 1.2 times the range
Current	1mA~5A/5mA ~20A	$\pm(0.4\% \text{ of reading} + 0.1 \text{ range})$	0.00 1A	Overload 1.2 times the range
power	$U \cdot I \cdot PF$	$PF > 0.5 \pm(0.4\% \text{ of reading} + 0.1 \text{ range})$ $PF < 0.5 \pm(0.6\% \text{ of reading} + 0.1 \text{ range})$	0.1W	
Power factor	0.1~2	± 0.1	0.00 1	Voltage value is higher than 10% of range Current value is higher than 1% of range
frequency	45Hz/65Hz	0.1%*reading	0.01 Hz	Voltage is higher than 10% of range

PM9913 measurement accuracy

parameter	Measurement range Encircle	measurement accuracy	Resolution	Remark
Voltage	5V~600V	$\pm(0.4\% \text{ of reading} + 0.1 \text{ range})$	0.1V	Overload 1.2 times the range
Current	0.5mA~5A	$\pm(0.4\% \text{ of reading} + 0.1 \text{ range})$	0.001A	Overload 1.2 times the range
power	$U \cdot I \cdot PF$	$PF > 0.5 \pm (0.4\% \text{ of reading} + 0.1 \text{ range})$ $PF < 0.5 \pm (0.6\% \text{ of reading} + 0.1 \text{ range})$	0.1W	
Power factor	0.1~2	± 0.1	0.001	The voltage value is higher than 10% Range The current value is higher than 1% Procedure
frequency	45Hz/65Hz	0.1%*reading	0.01Hz	Voltage higher than 10% Procedure

PM9915A/B measurement accuracy

parameter	Measuring range	measurement accuracy	Distinguish Rate	Remark
Voltage (V)	5V~600V	$\pm(0.4\% \text{ of reading} + 0.1 \text{ range})$	0.1V	Overload 1.2 times the range
Current (A)	5mA~20A	$\pm(0.4\% \text{ of reading} + 0.1 \text{ range})$	0.001A	Overload 1.2 times the range
Power (W)	$U \cdot I \cdot PF$	$PF > 0.5 \pm (0.4\% \text{ of reading} + 0.1 \text{ range})$ $PF < 0.5 \pm (0.6\% \text{ of reading} + 0.1 \text{ range})$	0.1W	
Power factor (PF)	0.1~2	± 0.1	0.001	Voltage value is higher than 10% of range Current value is higher than 1% of range
frequency	45Hz/65Hz	0.1%*reading	0.01Hz	Voltage is higher than 10% of range

PM9916A/B measurement accuracy

parameter	Measuring range	measurement accuracy	Distinguish Rate	Remark
Voltage (V)	5V~600V	$\pm(0.4\% \text{ of reading} + 0.1 \text{ range})$	0.1V	Overload 1.2 times the range
Current (A)	0.5mA~20A	$\pm(0.4\% \text{ of reading} + 0.1 \text{ range})$	0.00 1A	Overload 1.2 times the range
Power (W)	$U \cdot I \cdot PF$	$PF > 0.5 \pm(0.4\% \text{ of reading} + 0.1 \text{ range})$ $PF < 0.5 \pm(0.6\% \text{ of reading} + 0.1 \text{ range})$	0.1W	
Power factor (PF)	0.1~2	± 0.1	0.00 1	Voltage value is higher than 10% of range Current value is higher than 1% of range
frequency	45Hz/65Hz	0.1%*reading	0.01 Hz	Voltage is higher than 10% of range

2. Output mode: both voltage and current are floating input: voltage input impedance is about 2M Ω ; 1A

The impedance of the dark current input file is about 10m Ω , and the impedance of other current input files is about 1m Ω ;

Maximum peak value of measurement signal: both voltage and current are 1.1 times of the maximum range;

A/D conversion: The rate is about 8K/sec, 24 bits, and the voltage and current are sampled at the same time;

Display update: about 5 seconds/time

Power consumption: <5VA;

Meter weight: gross weight: 3KG Net weight: 2.5KG

Instrument size: width * height * depth: 213*104*470mm

3. Working environment

Atmospheric pressure: (86~106) Kpa; temperature (0~40) °C; relative humidity: $\leq 85\%RH$

Instrument working power: AC (85~265) V/50/60Hz or DC (100~300V)

4. Safety requirements

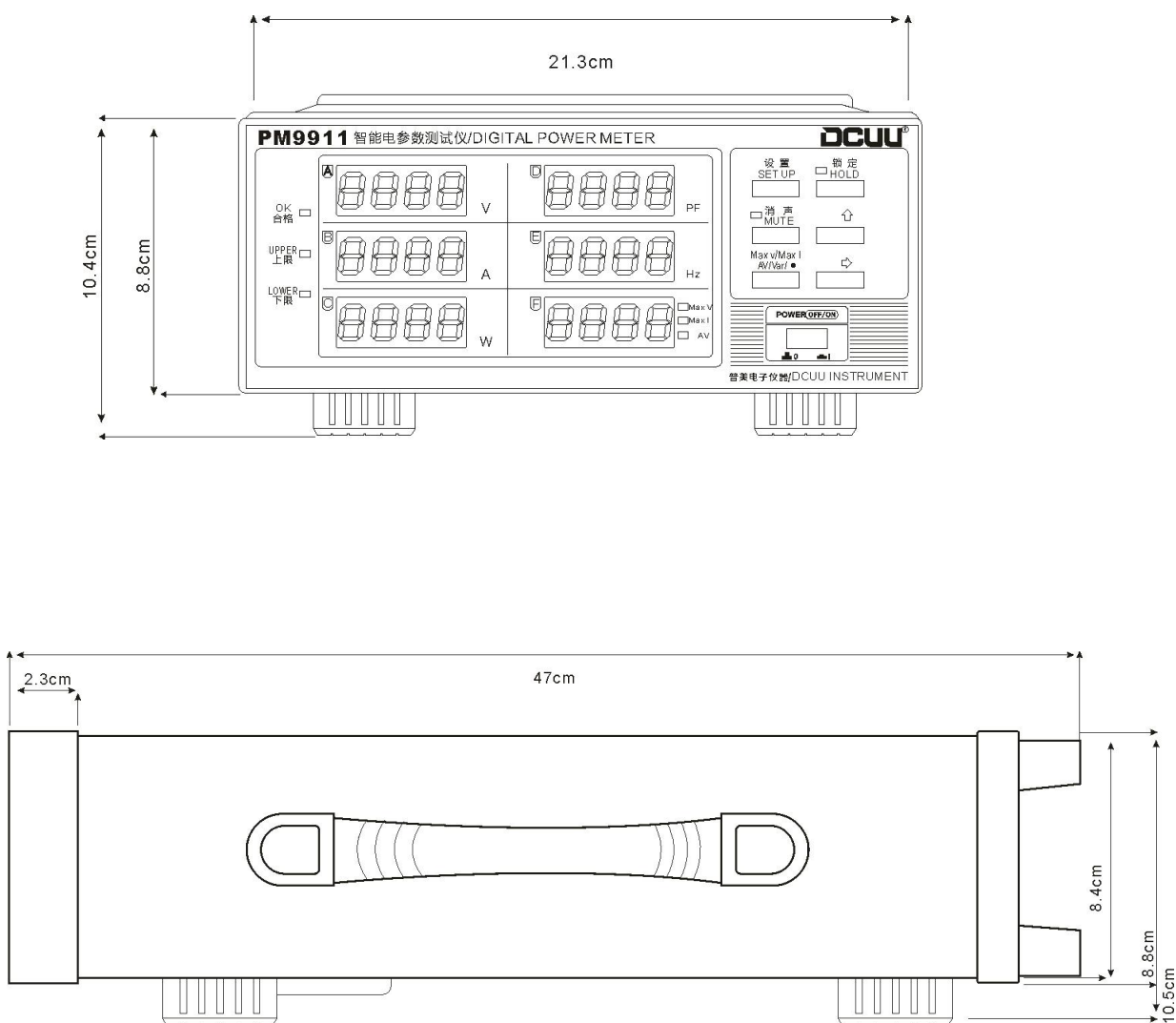
Insulation resistance: the insulation resistance between the measuring terminal and the power cord is not less than 2M Ω ;

Withstand voltage: 200V50Hz sine wave voltage can withstand between the measuring terminal and the power cord;

For the definitions used in the description of the above technical parameters, please refer to GB/T13978-2008 [number

Multimeter general technical parameters]

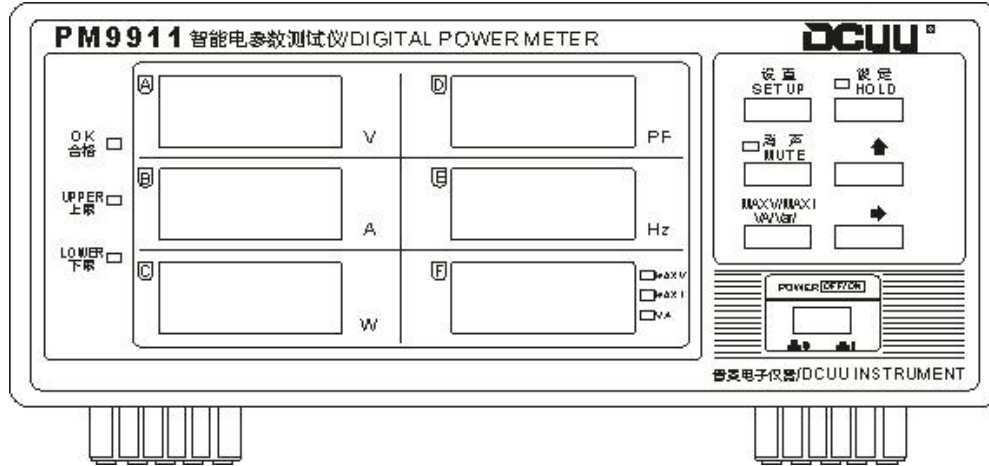
5,Dimensions



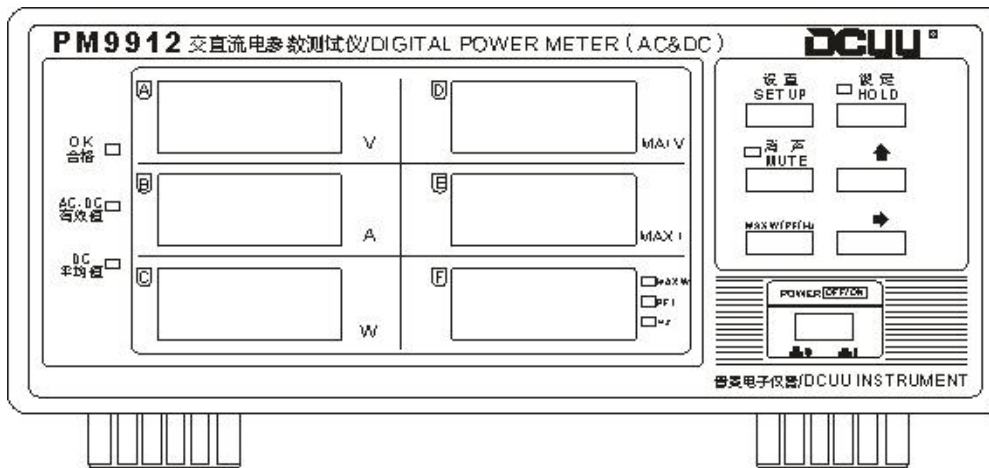
Chapter 4 Instruction and Setting Method of Instrument

1. Instructions for using the front panel of the instrument

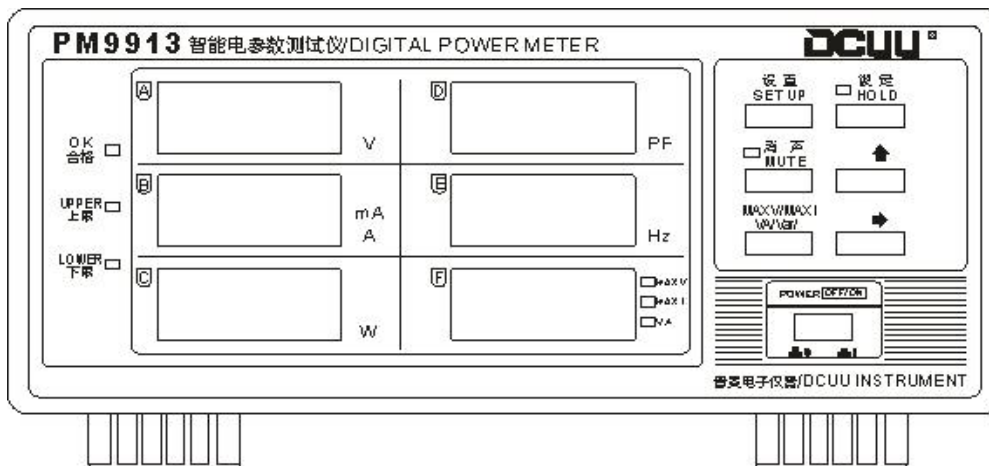
PM9911 Front panel diagram



PM9912 Front panel



PM9913 Front panel



PM9915A/B Front panel diagram



PM9916A/B Front panel diagram



1. Display window: the following parameters can be displayed respectively

Indicator light	parameter	unit
V	Voltage	volt
A	Current	ampere
W	power	watt
PF	Power factor	
Hz	frequency	hertz
KWH	Electric energy	KWh
MAX V	Maximum voltage	volt
MAX I	Maximum current	ampere
VA	inspecting power	watt
Var	Reactive power	watt
Time	time	Minutes and seconds

2. Characters and numbers comparison table

This series of instruments uses a 7-segment digital tube to display characters and data. The comparison table of common data and character display is shown in the figure below:

1.1 The display style of all Arabic numerals with 10 characters in the figure below:

1.2 The following figure shows the display style of all English letters of 26 characters:

A bcdefg

hi

jklmnopqrst

uvwxyz

3. Comparison of the meaning of the displayed characters:

FAIL: Prompt that the current value is unqualified alarm mode

PASS: Prompt that the current value is the qualified alarm mode

Note: Long press the (MUTE/Mute) button for 5 seconds to automatically switch the alarm mode

4. Indicator status:

Indicator light	illustrate	Remark
OK	Alarm status indicator	When qualified, flashes continuously
UPPER	Alarm status indicator	When qualified, the upper limit is exceeded and flashes continuously
LOWER	Alarm status indicator	When unqualified, the lower limit is exceeded and flashes continuously
DC	The current is the DC component measurement mode Mode	Can measure the value of the DC component in the signal
AC+DC	Currently in full component mode	Can measure the effective value of DC superimposed AC signal
HOLD	Show hold	Lock the current measurement value and use it to display the value
MUTE	Mute mode	When the measured value exceeds the upper and lower limits or prompts close Qualified or unqualified
MAX V	Current peak voltage	Keep the maximum value continuously
MAX I	Current peak current	Keep the maximum value continuously
VA	inspecting power	Current current grid consumption pattern
Var	Reactive power	Power loss of the product to the grid
Time	time	Record electric energy time
KWH	Electric energy	Calculate product power consumption

5. Description of parameter setting:

5.1 Function keys: including three parts: display selection, setting, and lock.

5.2 Display selection button: used to switch the display content of the window.

↑ /Start: start of electric energy accumulation timing

→ /stop: stop the electric energy timer

./Conversion: switching time, electrical energy, power, power factor, frequency

clear: electrical energy and time clear

MAX V, MAX I, VA, Var peak voltage, peak current, active power, reactive power switching

5.3 The lock button keeps the current test data no longer updated on the display, but the communication data cannot be locked;

5.4 Measurement AC/DC mode button: used to switch the measurement mode AC+DC, DC cyclically (PM9912 only);

5.5 Setting function: 4 in total, used to set the current, power, power factor and alarm delay parameters of the instrument;

"Settings/SET" enters or exits the parameter setting state. After entering the parameter setting state, window 1 displays the current item to be set, and the corresponding window displays the current parameter value. Press this button again to enter the next page of setting until After setting each parameter, exit and save the parameter set this time;

"Conversion" button: used for page turning display of other parameters

"." button: change the decimal point position of the current value of the set parameter. "→" button: cyclically shift to the right

to change the current digital tube (flashing digit) position of the set parameter; "↑" button: cyclically increase the current

flashing digit of the set parameter The value of

6.Setting instructions for exceeding the upper and lower limits:

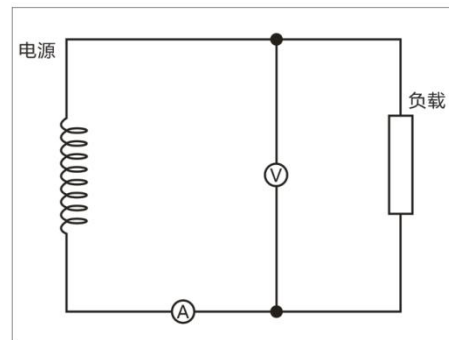
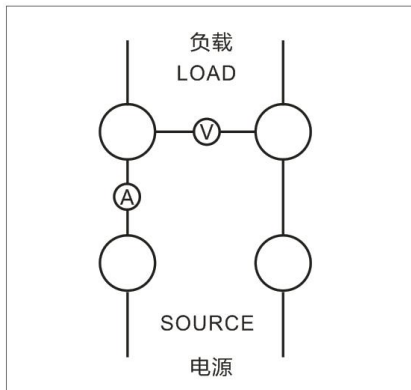
Operation sequence	Display information	Setting instructions	Remark
"Settings" 1	A ---	Current alarm upper limit (0.0-20.0)	Current window flashes when alarming
"Settings" 2	A ---	Lower limit of current alarm (0.0-20.0)	Current window flashes when alarming
"Settings" 3	P ---	Power alarm upper limit (0.0-6000)	Power window flashes when alarming
"Settings" 4	P ---	Power alarm lower limit (0.0-6000)	Power window flashes when alarming
"Settings" 5	PF ---	Upper alarm limit (0.000—1.000)	The power factor window flashes when alarming
"Settings" 6	PF ---	Upper alarm limit (0.000—1.000)	The power factor window flashes when alarming
"Settings" 7	DY	0~29	Unqualified delay time
"Settings" 8			

Chapter 5 Preparation before Operation

Safe use:

Before using the instrument for the first time, you should read this manual carefully. Do not open the casing of the instrument. When the instrument really needs internal inspection or debugging, please contact our company or our authorized agent.

Before connecting the load under test with the instrument, the power supply of the load under test and the instrument must be cut off. The circuit connection of the measuring circuit is as shown in the figure below



Notice

The current measurement of large current or the voltage or current contains high-frequency components. Pay special attention to the

Can cause mutual interference and noise problems.

The wires should be as short as possible.

Use thick wires as much as possible when measuring current.

Chapter 6 Packing List

1. Host	1 set
2. Power cord	1
3. Product manual	1 serving
4. Product qualification certificate	1 piece
5. Product warranty card	1 piece
6. Supporting communication software CD (order optional)	1 piece
Note: RS485 communication does not include communication software	
7. RS232 communication line/RS485 communication line (order option)	1