

PM99XX Series

DIGITAL POWER METER USER'S MANUAL

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Preface

Thank you for purchasing a digital power meter. This manual contains instrument functions, operating procedures, etc. To ensure proper use of the instrument, please read the manual carefully before operating the instrument. Please keep the manual in order to be able to access the problem quickly.

Be careful:

- 1, the contents of this manual, such as different understanding, subject to the interpretation of the technical department of our company;
2. The contents described in this manual may not contain all the contents of the instrument. The company has the right to improve or alter the performance, function, appearance, accessories and packaging of the product without prior notice;
3. The copyright of this manual is owned by Zhongshan ZhongXiang Instrument Co., Ltd. no other company or individual may copy this manual.

Safety regulation

In the course of using this instrument, the following safety requirements must be observed and, if not used properly, the functions provided by the instrument may be impaired.

The following markings are used in this instrument:

 High voltage warning sign, operator shall refer to instruction manual to avoid personal injury or damage to equipment

 Switch on symbol

 Switch off symbol

Caveat

Do not operate in explosive atmospheres.

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

The use of any electrical instrument in this environment may cause safe damage.

Protection ground

Before turning on the power cord, make sure that the protective earth is connected to the motor. The grounding end of the instrument is the ground terminal of the power outlet.

Power supply

Make sure that the supply voltage matches the rated voltage before

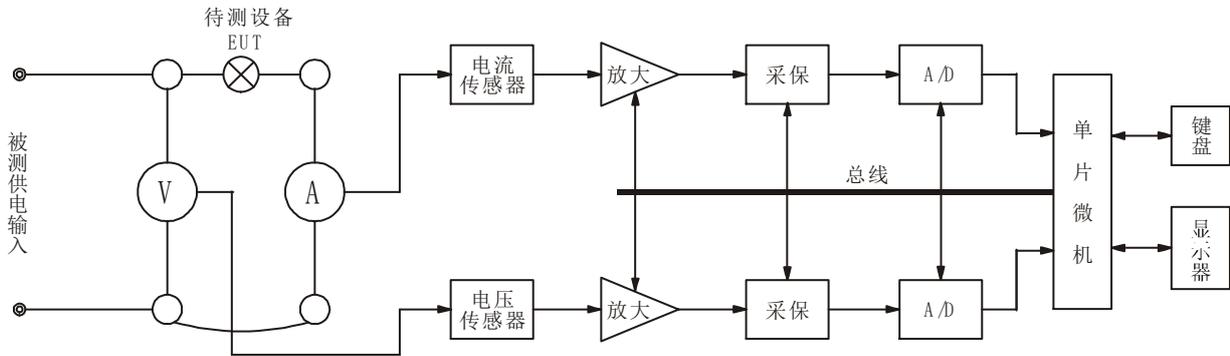
turning on the power.

Do not remove any shell parts of the instrument

In some places there is a high voltage, without any special permission to remove the instrument shell and remove any parts of the instrument.

Chapter 1 Fundamental

1、Schematic 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 sampled and transferred to the high-speed A / D converter. The input current is sampled by the sampling sensor, and then the current signal is converted into the voltage signal. After sampling, / D converter. Voltage and current input signal through the high-speed A / D conversion into the microcomputer, for data processing. At the same time the microcomputer automatically controls the range switch, and carries on the computation, the display and the input output control to the data.

2、Measuring principle

Voltage and current signals are sampled, amplified by the sample and hold to the high-speed A / D converter, A / D converter will convert the digital signal to the microcomputer, and through the integral method,

and then according to the following formula Voltage RMS (RMS), current RMS (RMS), active power (P) and power factor (PF).

$$U_{\text{RMS}} = \sqrt{\frac{1}{N} \sum_{i=1}^n U_i^2} \quad I_{\text{RMS}} = \sqrt{\frac{1}{N} \sum_{i=1}^n I_i^2}$$
$$P = \frac{1}{N} \sum_{i=1}^n (U_i * I_i) \quad \text{PF} = \frac{P}{U_{\text{RMS}} * I_{\text{RMS}}}$$

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

Chapter 2 Model selection

PM series of electrical parameters tester design using advanced 32-bit high-speed processor and dual 24-bit AD converter, with high precision, wide dynamic range, compact structure and other characteristics, is a new generation of digital electrical parameters measuring instrument, you can measure RMS voltage, current, active power, power factor, frequency.

Products meet the DB37 / T557-2005 digital electrical parameters measurement (test) instrument

Product selection instructions:

Parameters	Measuring range	V、A、W、Hz	PF	Audible alarm	MAXI V、MAXI A、VA、Var	RS-485/RS-232 (Optional)	Relay output (optional)	THD	DC
model									
PM9911	600V20A	√	√	√	√	√			
PM9912	600V20A	√	√	√	√	√			√
PM9913	600V/2A	√	√	√	√	√			
PM9915	600V20A	√	√	√					
PM9916	600V20A	√	√	√					√

Note: The instrument can be equipped with RS-232 / RS-485 communication function, part of the instrument can choose relay alarm output function, before ordering to be optional.

Chapter 3 Main technical parameters and indicators

1、 Measurement accuracy

PM9911 DIGITAL POWER METER

parameter	Measuring range	measurement accuracy	Resolution	Remarks
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)	0.1~1	± 0.1	0.001	The voltage is higher than 10% of the range Current value is higher than 1% range
Frequency (Hz)	45Hz/65 Hz	0.1% + reading	0.01 Hz	Voltage is higher than 10% range

PM9912 DIGITAL POWER METER

parameter	Measuring range	measurement accuracy	Resolution	Remarks
Voltage (V)	5V~600V	$\pm (0.4\% \text{ of reading} + 0.1 \text{ range})$	0.1V	Overload 1.2 times the range
Current (A)	1mA~5A/ 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)	0.1~1	± 0.1	0.001	The voltage is higher than 10% of the range Current value is

				higher than 1% range
Frequency (Hz)	45Hz/65 Hz	0.1% + reading	0.01 Hz	Voltage is higher than 10% range

PM9913 DIGITAL POWER METER

parameter	Measuring range	measurement accuracy	Resolution	Remarks
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~2 A	$\pm (0.4\% \text{ of reading} + 0.1 \text{ range})$	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)	0.1~1	± 0.1	0.001	The voltage is higher than 10% of the range Current value is higher than 1% range
Frequency (Hz)	45Hz/65 Hz	0.1% + reading	0.01 Hz	Voltage is higher than 10% range

2, the output mode: the voltage and current are floating input: the voltage input impedance of about $2M\Omega$; 1A are undercurrent input file impedance of about $10m\Omega$, other current input file resistance of about $1m\Omega$;

The maximum peak value of the measured signal: the voltage and current are 1.1 times the maximum range;

A / D conversion: the rate of about $8K / s$, 24, voltage, current sampling at the same time;

Display update: about 5 times / sec

Collection of power consumption: <5VA;

Instrument Weight: Gross Weight: 3KG Net Weight: 2.5KG

Instrument size: wide * high * deep: 213 * 104 * 470mm

3、 the working environment

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

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

4、 Security requirements

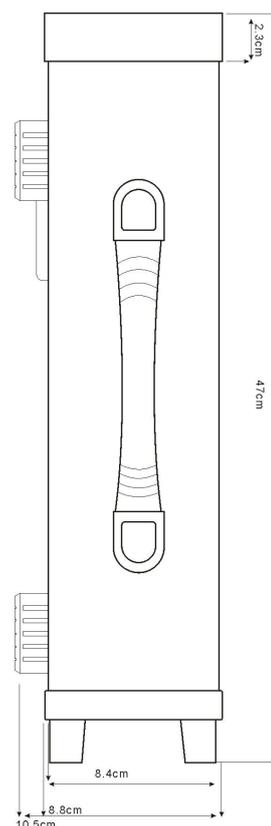
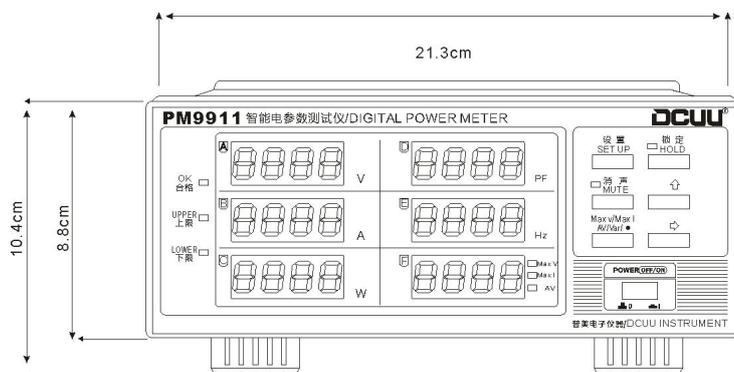
Insulation resistance: Insulation resistance between measuring terminal and power supply line is not less than 2 μmΩ;

Withstand voltage: between the measurement terminal and the power supply line can withstand 200V50Hz sine wave voltage;

For the definition of the above technical parameters, please refer to GB / T13978-2008

Multi-purpose table common technical parameters】

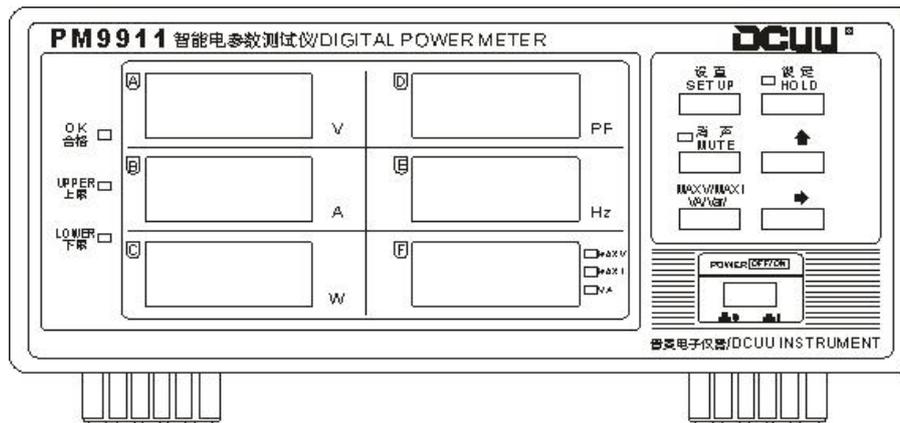
5、 Dimension drawing



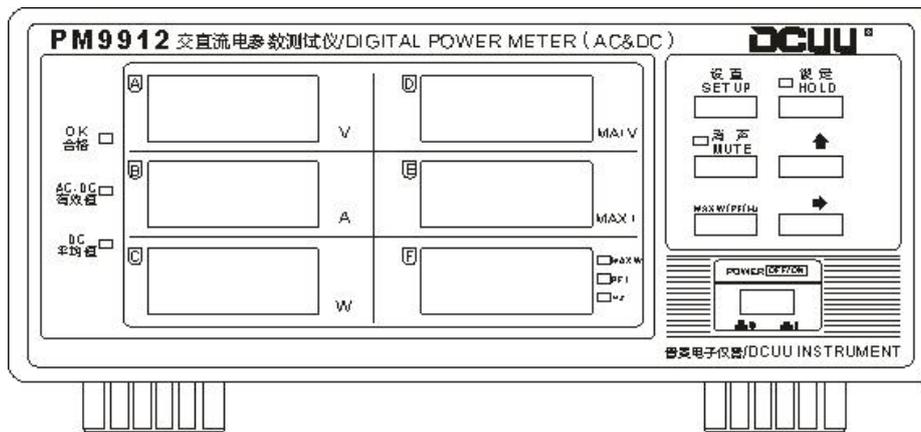
Chapter 4 Instrument instructions and operating methods

1、instrument front panel uses the operating instructions

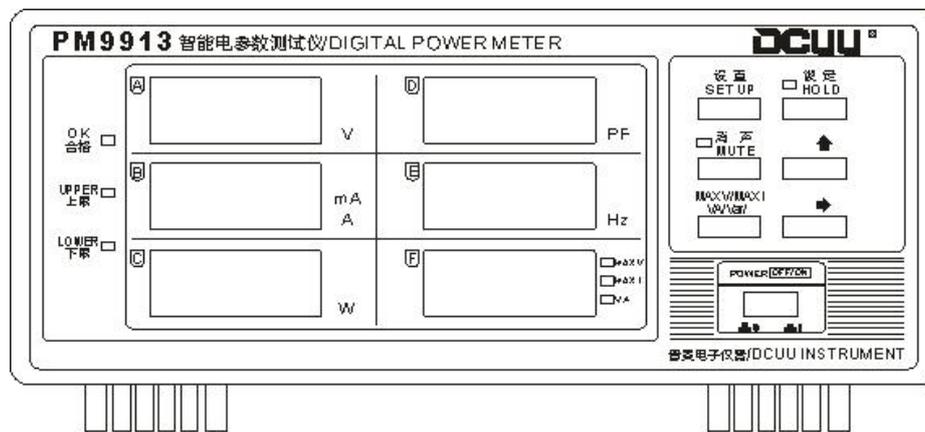
PM9911 front panel diagram



PM9912 front panel diagram



PM9913 front panel diagram



2、 Display window: Six windows can display the following parameters, respectively

Indicator light	parameter	unit
V	Voltage	V
A	Current	A
W	power	W
PF	Power factor	PF
Hz	frequency	Hz
MAX V	Maximum voltage	V
MAX I	Maximum current	A
VA	VA	W
Var	Var	W

3、 character and digit comparison table

This series of instruments using 7 digital display characters and data, commonly used data and character display table as shown below:

1.1 The following figure 10 characters All Arabic numerals Display style:



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



A b c d e f g h i j k l m n o p q r s t u v w x y z

4、 show the meaning of the characters control:

ERR: Indicates that the current value is an unqualified alarm mode

PASS: Indicates that the current value is a qualified alarm mode

Note: Press the (MUTE / Muffler) button for 5 seconds to automatically change the alarm mode

5、 Indicator status

5.1 function keys: including display selection, set, lock a total of three parts.

5.2 Display Select button: Used to toggle the window display.

./ conversion: MAX V, MAX I, VA, Var(When the indicator does not light when the Var)

5.3 lock button to keep the current test data is no longer updated on the display, but the communication data can not be locked;

5.4 Measuring AC / DC Mode Keys: Cycles for measurement mode AC + DC, DC (PM9912 only);

5.5 set the button: a total of four, for the instrument current, power, power factor, alarm delay parameter settings;

"Set / SET" to enter or exit the parameter setting state. After entering the parameter setting state, the window 1 displays the item to be set, the corresponding window displays the current parameter value, and press the button again to set the next page until Set the parameters after the exit and save the settings of the parameters;

"Convert" button: for other parameters flip display

"." Button: Changes the decimal point position of the current value of the setting parameter

" → " key: the right shift position, change the current parameter of the

current digital tube (flashing bit) position;

" ↑ " button: the cycle increases the value of the current flashing bit of the setting parameter;

6、Over the upper and lower limit set instructions:

Operation sequence	Display information	Set instructions	Remarks
"Set up" 1	A ---	Current alarm cap (0.0—20.0)	The current window flashes during alarm
"Set up" 2	A ---	Current alarm limit (0.0—20.0)	The current window flashes during alarm
"Set up" 3	P ---	Power alarm cap (0.0—6000)	The power window flashes when the alarm is on
"Set up" 4	P ---	Power alarm lower limit (0.0—6000)	The power window flashes when the alarm is on
"Set up" 5	PF ---	Alarm cap (0.000—1.000)	The power factor window flashes when the alarm is on
"Set up" 6	PF ---	Alarm cap (0.000—1.000)	The power factor window flashes when the alarm is on
"Set up" 7	DY	0~29	Unqualified delay time
"Set up" 8	DA	0~24	Daily hours of electricity

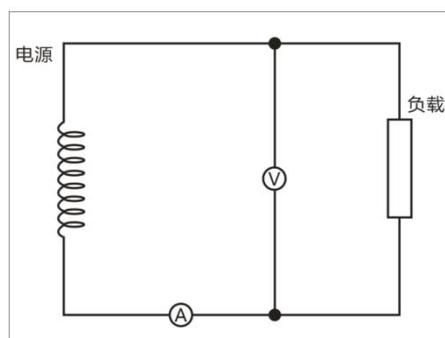
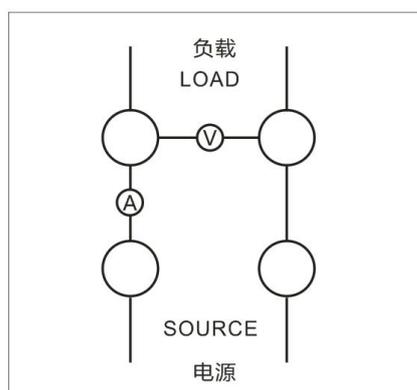
Chapter 5 Prepare before operation

Safe use:

Before using the instrument for the first time, you should read this manual carefully. Do not open the instrument case. Please contact our company or authorized agent of our company when internal inspection or commissioning is required.

Before the measured load is connected to the instrument, the load to be measured and the power supply of the instrument must be switched off.

The circuit connection of the measuring circuit is shown below



NOTE

Current measurement of high current or voltage or current contains high frequency components, wiring should pay special attention to the interference and noise problems may occur.

The wire should be shorted as short as possible.

Use thick wires as much as possible when measuring current.

Chapter 6 Packing List

1. Host	1
2. power cable	1
3. Product Manual	1
4. Product certification	1
5. Product warranty card	1
6. Matching communication software CD (order optional)	1
Note: RS485 communication does not contain communication software	
7. RS232 communication cable / RS485 communication cable (order optional)	1

