PSM Series
AC/DC Standard Meter
User Manual
V1.7

Founded in 2017, Shenzhen Hangzhi Precision Electronics Co., Ltd. is a technology-leading enterprise dedicated to the development, production, sales and customization of high-precision current transducers and measuring instruments. We will strive to build a well-known brand of precision current transducers and precision instruments in the DC field, and become a leading international leader in precision electronics in the field of DC systems.

Based on multi-faceted technology integration and innovation, Shenzhen Hangzhi Precision Electronics Co., Ltd. has developed the industry's first high-precision digital current transducer and an analog current transducer featuring high precision, low costs, low zero drift and low temperature drift. This series of products reduces industry costs, improves industry efficiency, enhances user experience, and creates value for customers. The company's products have won many achievements in the national innovation and entrepreneurial competition, and won wide attention and support from all walks of life.

As a company with strong sense of responsibility and mission, we adhere to multi-point zero-flux technology-led approach, with client-oriented service and customized products, and improve the operating quality by successfully capital financing. We are making our efforts to build an innovative sharing enterprise.

HANGZHI

Table of content

1 Preface

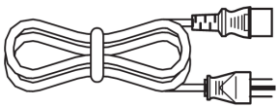
Thank you for choosing Hangzhi's "PSM Series AC/DC Standard Meter". In order to make full and lasting use of this product, please keep the manual properly. The PSM series AC/DC standard meter is referred as "this instrument" below.

1.1 Packing Checklist

When this instrument is delivered to you, please check if any abnormalities or damages occur during transportation before using it. In particular, please pay attention to accessories, panel, keys and other items. In case of damage or failure to work, please contact the agent or Hangzhi service center.

Please keep the packaging material for delivery properly for future transportation.

Please make sure that the contents of the packing are correct.

Packing checklist			
Item	Product photo	Specifications	Description
□ This instrument		See Part 3	AC/DC standard meter
□ User manual (This manual)		Soft copy or hard copy	To describe the operational method, specifications, etc.
□ Power line		1.5m/3*0.75 mm^2 Rated voltage：250V Rated current：10A	For power supply
□ Voltage test line		1m/0.8mm^2 Rated voltage：CATIII 1000V/CATIV 600V Rated current：10A	To measure the voltage input signal

□ Small current test line		1m/0.8 mm2 Rated current：10A	To test small current input signal
□ Power pulse line		1m/5*0.3mm2	To connect power pulse input/output interface, clock pulse input interface

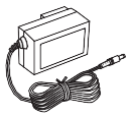
Remarks：

1) This instrument has been programmed when it was manufactured, and the latest version can be downloaded from the homepage of our company
2) Instructions for use in other languages are available at our website：http://www.hangzhicn.cn/

1.2 Accessories

This instrument has the following options (to be sold separately). Please contact the agent or sales center if you need purchase.

Option list			
Item	Product photo	Specifications	Description
□ USB to RS232 connection line		1.8m/USB2.0/RS232	It can be used to transfer PC interface from USB2.0 to RS232
□ RS232 connection line		2m/3*0.3mm2 DB9 Female to female/23 connection line	It can be used to connect between RS232 and communication interface of this device.
□ USB to RS485 connection line		1.5m/USB2.0/RS485	It can be used to transfer PC interface from USB2.0 to RS485.

□ RS485 connection line		0.1m/2*0.3mm2 DB9 Female to female	It can be used to connect between RS485 and communication interface of this device.
□ USB extension line		2.0m/USB2.0/ Male to male	It can be used for LCD screen program upgrade.
□ AC adapter		For overseas usage	Power adapter for different countries

1.3 About safety

The instrument is designed and tested in accordance with IEC61010 safety specifications, and is shipped in a safe state. In addition, failure to comply with the instructions may damage the functions provided by the instrument to ensure safety. Before using this instrument, please read carefully the following safety-related matters.

⚠Danger

If wrong method is used, it may lead to personal accident and instrument failure. Read the instructions carefully and operate after fully understanding the contents.

⚠Warning

It includes electrical hazards such as electric shock, heating, fire and arc discharge caused by short circuit. Personnel who first use electrical measuring instruments should use them under the supervision of senior electrical measuring personnel.

1.4 About label

This manual classifies and marks the severity and risk levels of risks as follows.

⚠ Danger	A dangerous situation that is highly likely to cause death or serious injury to the operator is described.
⚠ Warning	Situations that are likely to result in death or serious injury to the operator are described.
⚠ Note	Conditions that may result in minor injury to the operator or expected damage or malfunction of the instrument are described.
Important matters	Information or content regarding operations and maintenance work that must be known in advance are described
	An indication of high voltage hazard is used to warn the risk of shock, burns and even death from electric shock due to neglection in safety confirmation or misuse
	Prohibited behavior is indicated.
	The "mandatory" matter which must be performed is indicated.

Symbol on the instrument

	To indicated caution or danger. When the symbol is displayed on the instrument, please refer to the corresponding position in the instruction manual.
	To indicate the ground terminal.
	To denote direct current (DC)
	To denote alternate current (AC)。
	To denote power “ON”.
	To denote power “OFF”.

Symbols related to standard

	Marking of regulations on the abandonment of electrical and electronic equipment (WEEE Directive) in EU countries.
	Consistent with the restrictions shown in the EC Ministerial Council Directive (EC Directive).

1.5 About measurement safety level

In order to use the measuring instrument safely, IEC61010 classifies the measurement into three safety levels of CAT II to CAT IV according to the places of use.

⚠ Danger

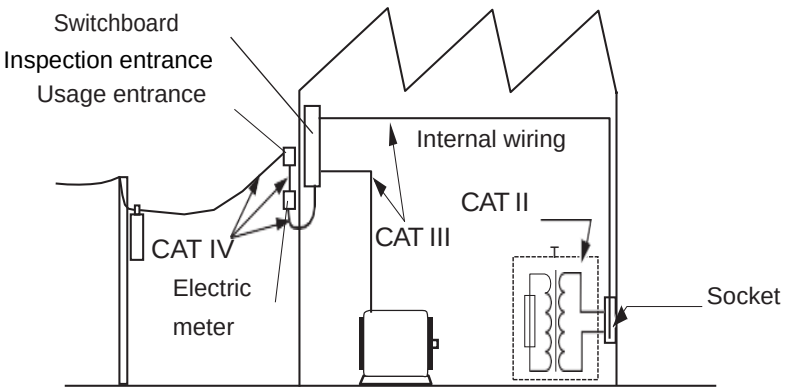
■ Using a measuring instrument with a small classification level in a large numerical level may cause major accidents, so please avoid this situation absolutely

■ Using a measuring instrument without a classification mark to measure CAT II to CAT IV may lead to major accidents, so please avoid this situation absolutely

This instrument is suitable for CAT III 1000 V.

CAT Ⅱ：The primary side circuit of an instrument (movable tool, household appliance, etc.) with a power cord that connects to the outlet, when the socket is directly measured.

CAT Ⅲ：Measuring the primary side circuit of an instrument (fixed device) that is directly powered from the switchboard, and the circuit from the switchboard to the outlet.



1.6 Precautions for use

In order to use the instrument safely and make full use of its functions, please observe the following precautions.

1.6.1 Inspection before use

⚠Warning

•If the test cable or the instrument is damaged, it may cause electric shock. Be sure to do the following checks before using it

•Before using it, please confirm that there are no problems caused by storage and transportation, and use it after checking and confirming the operation. If it is confirmed to be faulty, please contact the agent or the company after-sales center.

•The outer surface of the power cord damage or exposure may cause an electric shock or short circuit accident. Please do not use, and contact your dealer or company after-sales center

•The outer skin of the cable damage or metal exposure may cause short circuit or electric shock. Please replace with a device that is not damaged.

•Check whether the instrument is damaged. If it is damaged, please send it for repair.

•When the power is turned on and the start button is lit red, the power cord may be broken or a malfunction occur inside the instrument. Please send it for repair.

•After the end of the test (displaying the company LOGO), if the main measurement function screen is not displayed, a malfunction may occur inside the instrument. Please send it for repair.

1.6.2 Placement environment

⚠ Warning

Please do not place the instrument in the following places, otherwise it will cause malfunction or accident of the instrument.

- Direct sunlight or high temperature places
- Locations where corrosive gases and explosive gases are generated
- Places where strong electromagnetic waves are generated or near charged objects
- Close to induction heating device (high frequency induction heating device, IH induction cooker, etc.)

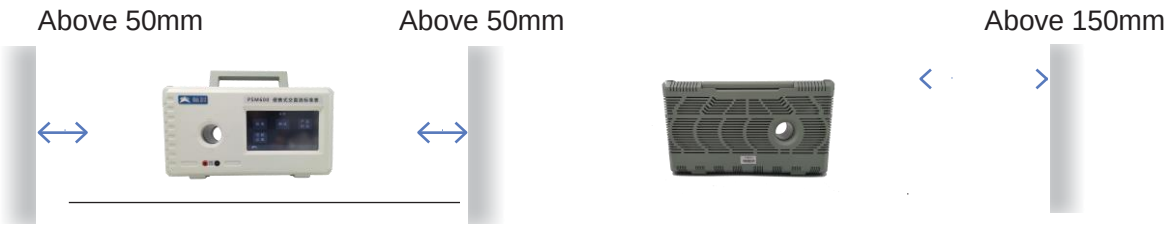
- Locations where mechanical vibrations are frequent
- Locations affected by water, oil, chemicals and solvents
- Wet, dew condensation
- A place with a lot of dust

1.6.3 Placement method

⚠ Warning

Please do not place on unstable pedestals or in inclined places. Otherwise, personal injury or malfunction of the main unit may occur due to falling or tipping over.

- Place the bottom side down.
- In order to prevent the temperature of the instrument from rising, please be sure to keep a specified distance from the surroundings when placing it.



The means to cut off the power supply of this instrument is to unplug the power cord. In case of emergency, the power cord can be unplugged to cut off the power supply immediately, so please make sure that there is enough space for operation.

1.6.4 Use of the instrument

⚠Danger

To prevent an electric shock, never remove the main unit casing, since there are high voltage and high temperature parts inside.

⚠Note

In order to prevent damage to the instrument, please avoid vibration and collision during handling and use, and pay attention to collisions caused by falling.

1.6.5 Before connecting the power cord

⚠Warning

To avoid electric shock and to ensure the safety of this instrument, please connect the supplied power cord to a three-phase outlet.

1.6.6 Before connecting the test cable

⚠Danger

Be sure to connect the test cable to the secondary side of the circuit breaker. Even if a short circuit occurs on the secondary side of the circuit breaker, the short circuit current is cut by the circuit breaker. The current capacity on the primary side is very large, and in the event of a short circuit accident, damage to the instrument or equipment may occur.

⚠Warning

To avoid electric shock and short circuit accidents, please use the specified test cable.

1.6.7 Before turning on the power

⚠Warning

Before turning on the power, please confirm whether the power voltage listed on the power connection of the instrument and the one you are using are consistent.
Using the power supply voltage outside the specified range may cause instrument damaged or an electrical accident.

⚠Note

Do not use UPS and DC-AC inverters with square wave or approximate sine wave output to drive this instrument to avoid damage to this instrument.

1.6.8 Before measurement

When measuring voltage

⚠Danger

• The maximum in-phase voltage of the voltage measurement terminal is as follows.

CAT II：AC/DC 300 V

Without measurement classification：AC/DC 800 V

Exceedance of this voltage may cause damage to the instrument or cause personal injury.

• The maximum input voltage of the voltage measurement terminal is DC 1000 V, 1100 V peak。

When the voltage exceeds 800V, it can be measured only when the object to be tested is insulated from the ground. Exceedance of this voltage may cause damage to the instrument or personal injury.

•To prevent an electric shock, do not use the test cable tip to avoid short circuit in the voltage-applied circuit.

1.6.9 Before connecting the communication cable

⚠Note

When connecting or removing the communication cable, please be sure to turn off the power of the instrument and the connected device. Failure to do so may result in false action or malfunction.

2 Summary

2.1 Product summary

PSM series AC/DC standard meter is a new generation of standard meter produced by our company. The product adopts a new software and hardware design, which can simultaneously measure single-phase AC and DC voltage, current, frequency, phase, active power, reactive power, inspecting power, power factor, active energy, and reactive energy etc., at the same time, high-order harmonic distortion (up to 63 harmonics) can be measured. It can be widely used in metrology research institutes, government inspection agencies and other metrology fields for the metrological verification of single-phase AC and DC voltmeters, ammeters, electric energy meters and power meters. The module complies with national metrological verification procedures and industry standards as follows:

- Metrological verification regulations

《JJG 842-2017 Electronic DC energy meter》
《JJG 597-2005 AC energy meter verification device》
《JJG 566-2012 Electronic AC energy meter》

2.2 Product characteristics

- To measure single-phase AC and DC voltage, current, frequency, phase, active power, reactive power, inspecting power, power factor, active energy, and reactive energy etc.
- To detect power error and daily timing error
- To perform electric energy test
- To record curve in real time U(t), I(t), P(t), E(t)
- Ripple test can be performed to detect AC ripple below 1 kHz
- To measure the stability of single-phase AC and DC voltage, current and power
- To measure the distortion of voltage and current, perform 2~63 harmonic analysis, display real-time harmonic components, harmonic content, harmonic distortion, etc.
- Equipped with energy pulse input interface which can be used for real-time verification of various active energy meters, reactive energy meters, etc.
- Equipped with standard energy pulse output interface for automatic setting of pulse constant
- Equipped with RS232, RS485 and CAN communication interfaces, so that it can communicate directly with PC
- Built-in high-precision temperature and humidity sensor for easy correction of environmental temperature and humidity error
- Multi-range can be switched automatically for voltage and current, and 120% of measuring range limit can be reached
- Equipped with product program online upgrade function

2.3 Product composition

Front

1	Company logo	Company logo
2	Product model	The model and name of the corresponding product
3	Current measuring hole	Perforation in the specified direction when measuring large currents
4	Small current measuring terminal block	Terminals that are directly inserted during small current measurement, with red terminals connected to current input, and black terminals connected to current output.
5	Display area	For user interaction, display measurement data, parameter settings, etc.

Back

6	Product serial number	The unique serial number of the product
7	Vents	For body cooling

Left

8	DB9 interface	Used for RS232, RS485, CAN communication
9	USB interface	Used for display program upgrade
10	Aviation interface	For pulse input and output
11	Manufacturing nameplate	For management purpose, please don't peel off.
12	Ground terminal	Used to connect to the ground when using this instrument

Right

13	Voltage measurement terminal	Terminals that are directly inserted during voltage measurement, with red terminals connected to positive voltage, and black terminals connected to negative voltage.
14	Power input and main power switch	To connect power and for ON/OFF of the main power
15	Fan hole	For body cooling

3 Product selection guide and technical parameters

3.1 Product selection

PSM series product selection		
	PSM600	**PSM1000**
AC voltage measurement	1V~707V	
AC current measurement	200mA~424A	400mA~707A
DC voltage measurement	1V~1000V	
DC current measurement	200mA~600A	400mA~1000A
AC accuracy	0.05%	
DC accuracy	0.02%	

3.2 Technical parameters

PSM series technical parameter			
		PSM600	**PSM1000**
AC voltage measurement	Measuring limit	35V, 71V, 141V, 354V, 707V	
	Measuring range	(0~110%)RG	
	Accuracy	±0.05%RD (20V≤U≤707V) ±0.1%RD (1V≤U≤20V)	
	Resolution	0.01%RG	
AC current measurement	Measuring limit	200mA, 8A, 17A, 42A, 85A, 170A, 424A	400mA, 14A, 28A, 71A, 141A, 354A, 707A
	Measuring range	(0~110%)RG	
	Accuracy	±0.05%RD(200mA≤I≤424A)	±0.05%RD(400mA≤I≤707A)
	Resolution	0.01%RG	
DC voltage measurement	Measuring limit	10V, 20V, 50V, 100V, 200V, 500V, 1000V	
	Measuring range	(0~110%)RG	

	Accuracy	±0.02%RD(10V≤U≤1000V) ±0.05%RD(1V≤U≤10V)	
	Resolution	0.005%RG	
AC voltage measurement	Measuring limit	200mA, 12A, 24A, 60A, 120A, 240A, 600A	400mA, 40A, 100A, 200A, 400A, 1000A
	Measuring range	(0~110%)RG	
	Accuracy	±0.02%RD(200mA≤I≤600A)	±0.02%RD(400mA≤I≤1000A)
	Resolution	0.005%RG	
Power measurement	AC power measuring accuracy	±0.05%RD(20V≤U≤707V, 200mA≤I≤424A)	±0.05%RD(20V≤U≤707V, 400mA≤I≤707A)
	DC power measuring accuracy	±0.02%RD(10V≤U≤1000V, 200mA≤I≤600A)	±0.02%RD(10V≤U≤1000V, 400mA≤I≤1000A)
Electric energy measurement	AC Electric energy measuring accuracy	±0.05%RD(20V≤U≤707V, 200mA≤I≤424A)	±0.05%RD(20V≤U≤707V, 400mA≤I≤707A)
	DC Electric energy measuring accuracy	±0.02%RD(10V≤U≤1000V, 200mA≤I≤600A)	±0.02%RD(10V≤U≤1000V, 400mA≤I≤1000A)
Phase measurement	Measuring range	0.00°~359.99°	
	Accuracy	±0.02°(20V≤U≤707V, 200mA≤I≤424A)	±0.02°(20V≤U≤707V, 400mA≤I≤707A)
	Resolution	0.001°	
Frequency measurement	Measuring range	40Hz~70Hz	
	Accuracy	±0.01Hz	
	Resolution	0.001Hz	
Ripple measurement	Accuracy	±0.05%RG	
	Bandwidth	≤1kHz	

Power pulse output	Power pulse output parameter (r/kwh) can be set from 1 to 2,000,000,000, and the maximum pulse frequency is 160kHz. The power pulse is a TTL/CMOS compatible level output with a load capacity greater than 20 mA. The default pulse output frequency is 0.2Hz~160KHz.	
Power pulse input	The calibration of the energy meter pulse constant (r/kWh) is set from 1 to 2,000,000,000. The setting range of the check circle is from 1 to 999,999,999. The maximum received pulse frequency is 50 kHz	
Daily timing pulse input	Clock frequency (Hz) setting range is from 0.01 to 50,000.00. The setting range of the check circle is from 1 to 999,999,999. The maximum received pulse frequency is 50kHz。	
Other parameters	Working power voltage range	AC85V～265V，50/60Hz
	Power consumption	<30VA
	Preheat time	≤30 minutes
	Working temperature	10℃～35℃
	Relative humidity	≤85%，Non-corrosive gas
	Dimensions	Around 373mm×211.5mm×131.5mm(Length× Width× Depth)(No protrusions)
	Weight	1.5kg

Remarks：

1. Measuring range automatically switched
2. RD-Reading value，RG-Range value

4 Instructions for use

4.1 Steps

1) Place the instrument
2) Check before measurement
3) Connect the power cord
4) Connect the test cable
5) Turn on the power
6) Start measuring
7) Record data
8) Measurement completed

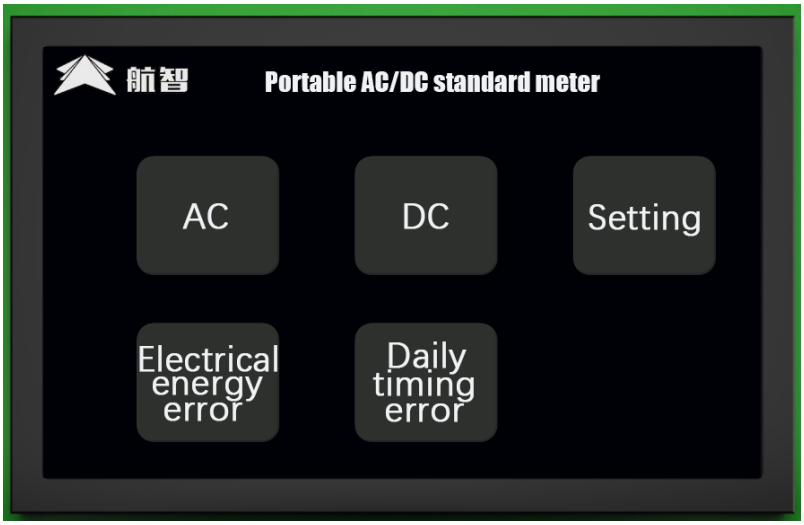
4.2 Instructions of interface

4.2.1 Boot interface

The boot interface is displayed within 1-2 seconds after the power is turned on, and the boot interface is as shown below.

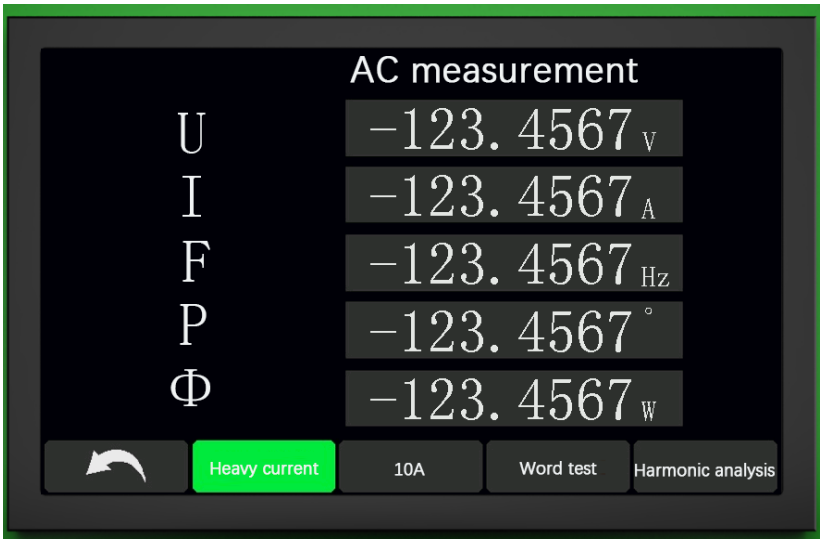
4.2.2 Main interface

After the boot screen, the main screen as shown below will appear. The main interface has a total of 5 buttons, which are AC, DC, settings, electrical energy error and daily timing error.



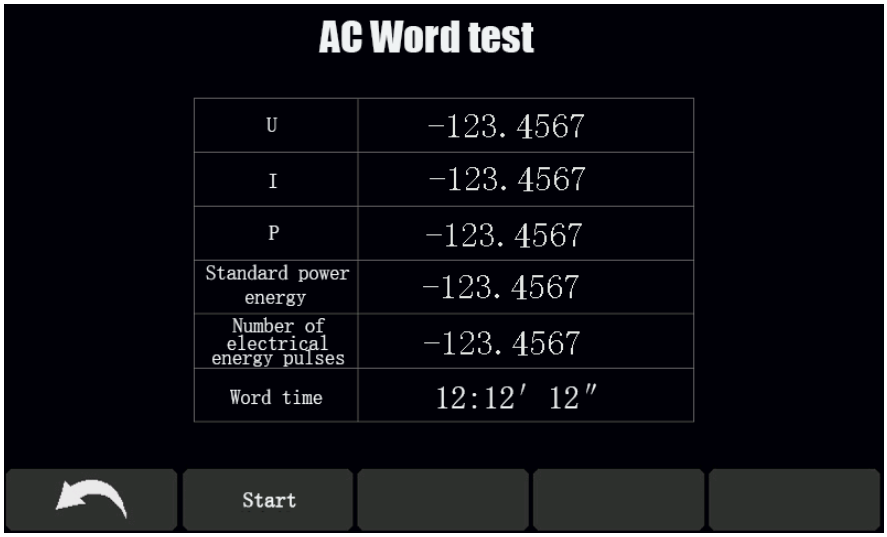
4.2.3 AC measurement interface

After clicking the “AC” button on the main interface, the AC measurement interface as shown below will appear. The AC interface can display voltage, current, frequency, phase, and active power.

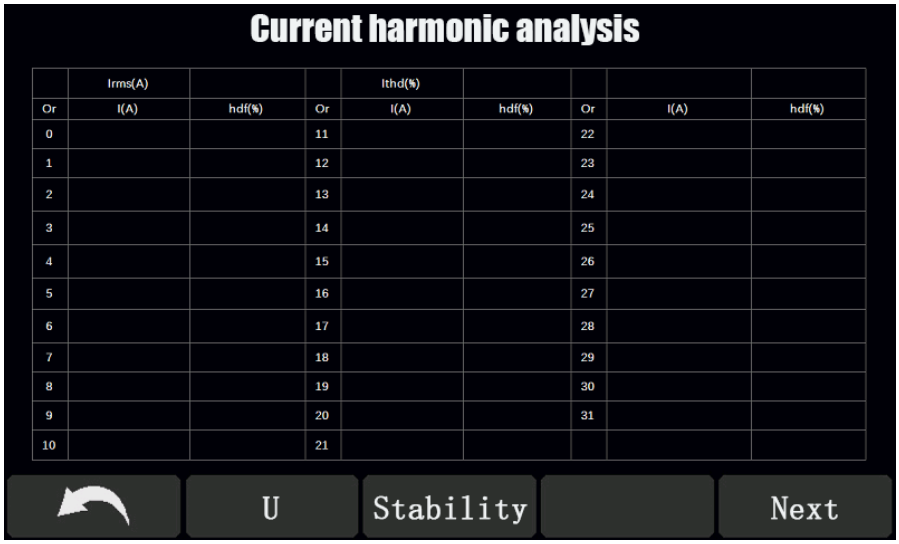


Click “Heavy current” or “10A” to select corresponding gear while “Heavy current” can be used in direct perforation measurement, "10A" can be used when accessing 10A small current.

Click the "Word test" to enter the AC word test interface.

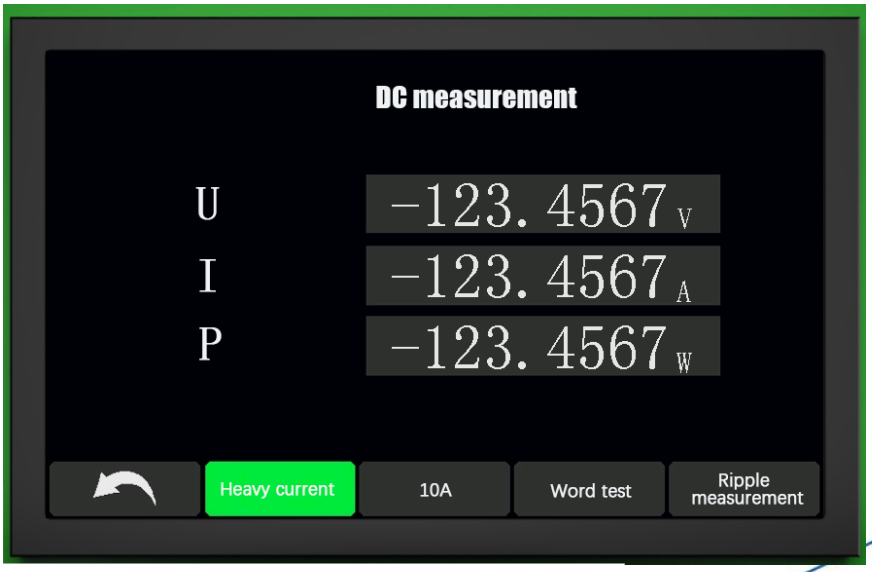


Click “Harmonic analysis” to enter harmonic analysis interface.

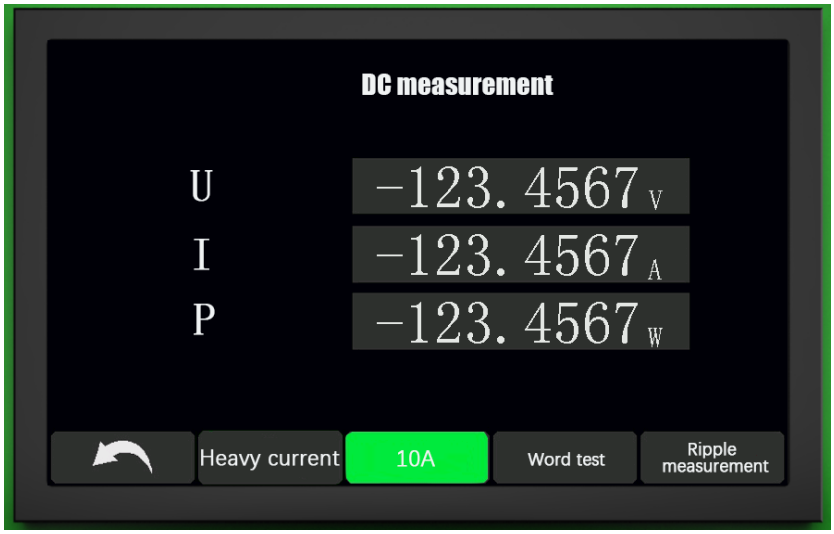


4.2.4 DC measurement interface

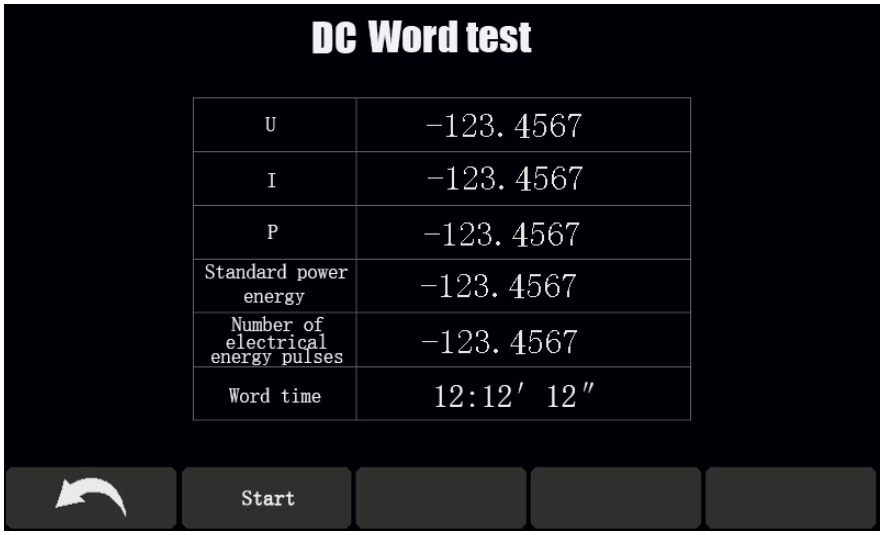
After clicking the “DC” button on the main interface, the DC measurement interface as shown below will appear. The DC interface can display voltage, current and power.



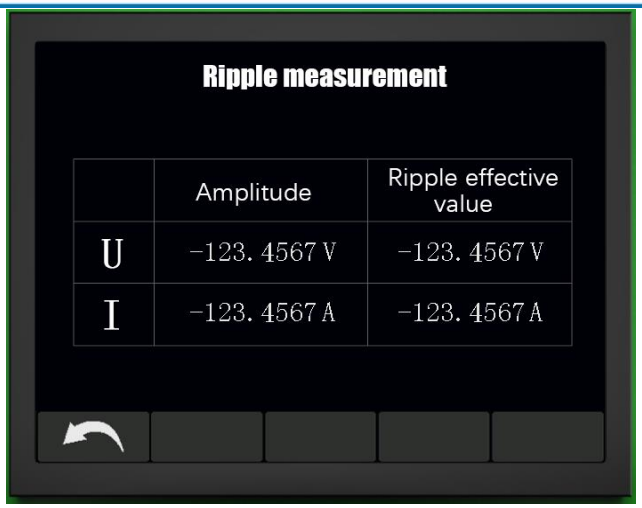
Click “Heavy current” or “10A” to select corresponding gear while “Heavy current” can be used in direct perforation measurement, "10A" can be used when accessing 10A small current.



Click the "Word test" to enter the DC word test interface.

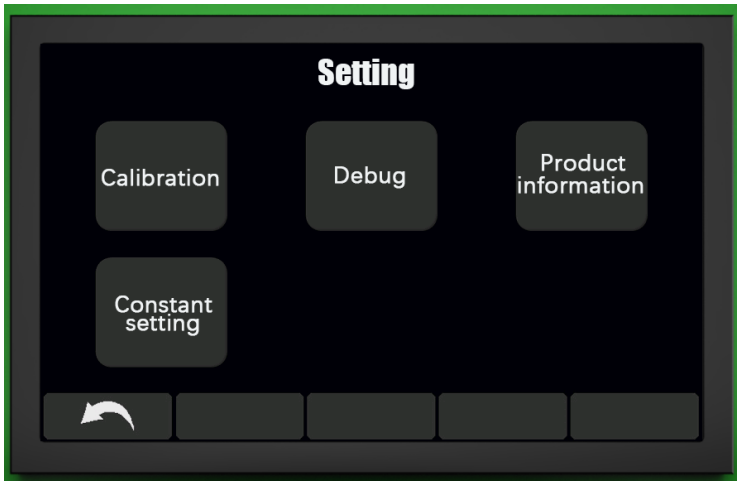


Click the "Ripple measurement" to enter the ripple measurement interface.



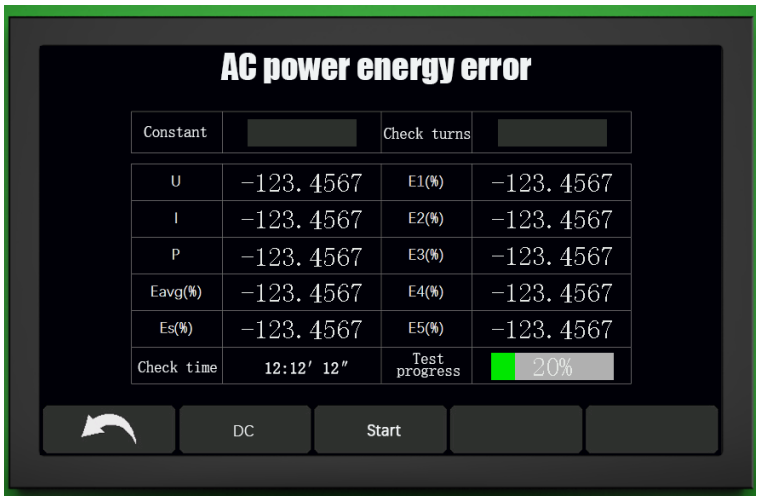
4.2.5 Setting interface

Click “Setting” to enter setting interface as shown below. In the setting interface, you can use calibration function and view information such as software version etc.

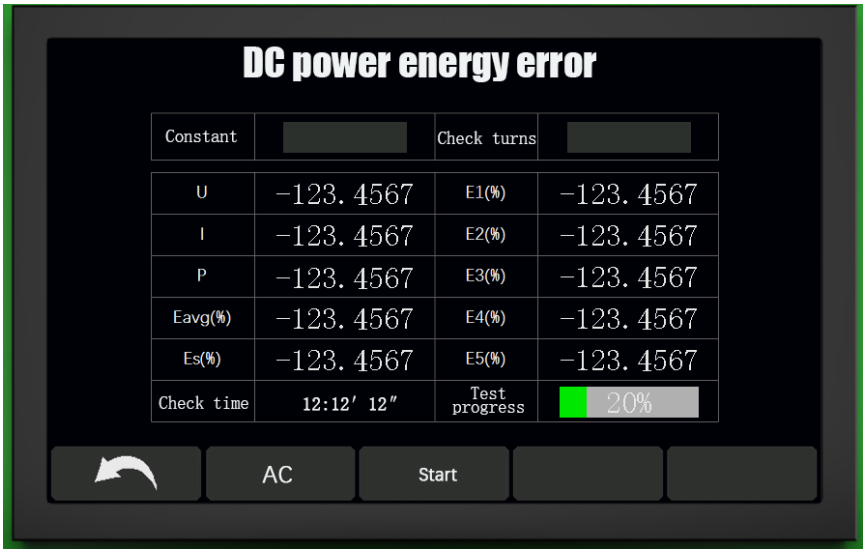


4.2.6 Power energy error

Click “Power energy error” to enter power energy error interface.



Click “DC” to enter DC power energy error interface.

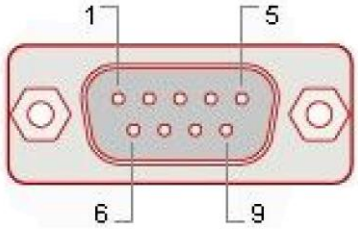


4.2.7 Daily timing error interface

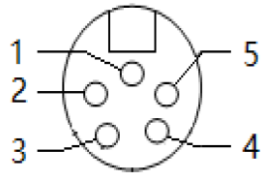
Click “Daily timing error interface” to enter daily timing error interface interface.

5 Connector information

5.1 DB9 terminal definition (DB9 male)

Pin	Definition	Description	Connector picture
1	RS485_B	RS485 communication B	
2	RS232_RX	RS232 transmission	
3	RS232_TX	RS232 reception	
4	RS485_A	RS485 communication A	
5	GND	RS485/RS232 isolated	
6	CAN_L	CAN communication L	
7	CAN_G	CAN communication isolation	
8	CAN_H	CAN communication H	
9	N.C	Not connected	

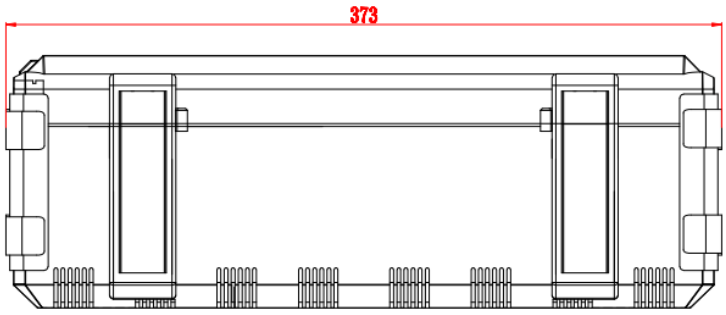
5.2 Aviation terminal definition

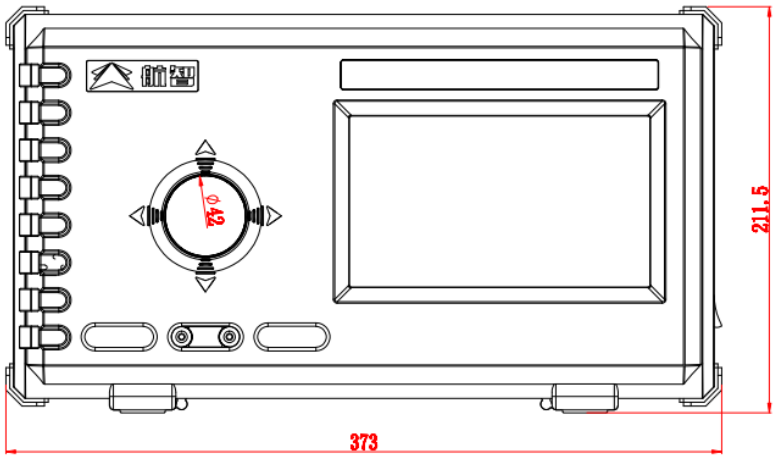
Pin	Definition	Connection line color	Description	Connector picture
1	+5V	Red	For power supply	
2	PULSE_OUT_CH1	Green	Output channel 1, power pulse	
3	PULSE_IN_CH1	Yellow	Input channel 1, power pulse / Daily timing frequency	
4	PULSE_IN_CH2	White	Not used	
5	GND	Black	Ground	

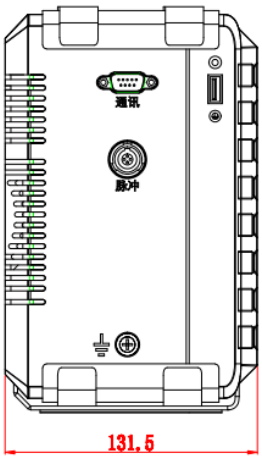
Note: The +5V power supply is the module that supplies power to external passive devices.

6 Dimensions

Unit：mm, if not specified, the dimensional deviation is ±2mm or 1%, whichever is greater.







7 Maintenance and service

Warning

Please do not modify, disassemble or repair the instrument. Failure to do so may result in fire, electric shock, or personal injury.

7.1 Calibration and repair

• The calibration period varies depending on the customer's usage or environment. It is recommended to determine the calibration period based on the customer's usage or environment, and commission our company to make regular corrections.
• When commissioning our company to perform calibration or repair of the instrument, the settings will be restored to the initial state.

7.2 Instrument transportation

• For safe transportation of the product, please use the box and cushioning material at the time of purchase. If the package is damaged/deformed and the cushioning material is flattened, please do not use it and contact the dealer or the service center.
• If the original package and cushioning materials are not used during transportation and lead to damage, the repair costs will be incurred even if the product is within warranty period.
• When sealing the instrument, be sure to unplug the cable from the unit.
• Be careful not to drop the instrument or subject to severe collisions during transport.

7.3 Replacement of parts and life

• Parts used in the product may experience performance degradation due to years of use.
• Regular replacement is recommended for long-term use of the instrument.
• Please contact your dealer or company service center for replacement.

7.4 Cleaning

When removing the dirt from the instrument and options, wipe it off with a soft cloth dampened with a small amount of water or a mild detergent. Wipe the display area gently with a soft, dry cloth.

7.5 Frequently Asked Questions

If it is confirmed that there is a fault, please check the following items. If there is no matching item, please contact the agent or the company service center.

No.	Item	Please check		Possible reason → Action
1-1	The power is not turned on (nothing	Start button	Not lit (extinguish	The power is not turned on (nothing is displayed)

	is displayed)	color	ed)	
1-2	Cannot perform touch panel operation	Icon display	Display number icon	Cannot perform touch panel operation
1-3	PC cannot be displayed.			PC cannot be displayed.

Attachment 1 Communication agreement

Please refer to《HZP communication agreement》.

Attachment 2 PSM600 pulse constant comparison table

600A DC energy pulse constant comparison table (automatic)

		10V	20V	50V	100V	200V	500V	1000V
Small current	0.2A	9.00×10^{10}	4.50×10^{10}	1.80×10^{10}	9.00×10^{9}	4.50×10^{9}	1.80×10^{9}	9.00×10^{8}
	0.4A	4.50×10^{10}	2.25×10^{10}	9.00×10^{9}	4.50×10^{9}	2.25×10^{9}	9.00×10^{8}	4.50×10^{8}
	1A	1.80×10^{10}	9.00×10^{9}	3.60×10^{9}	1.80×10^{9}	9.00×10^{8}	3.60×10^{8}	1.80×10^{8}
	2A	9.00×10^{9}	4.50×10^{9}	1.80×10^{9}	9.00×10^{8}	4.50×10^{8}	1.80×10^{8}	9.00×10^{7}
	4A	4.50×10^{9}	2.25×10^{9}	9.00×10^{8}	4.50×10^{8}	2.25×10^{8}	9.00×10^{7}	4.50×10^{7}
	10A	1.80×10^{9}	9.00×10^{8}	3.60×10^{8}	1.80×10^{8}	9.00×10^{7}	3.60×10^{7}	1.80×10^{7}
Heavy current	12A	1.50×10^{9}	7.50×10^{8}	3.00×10^{8}	1.50×10^{8}	7.50×10^{7}	3.00×10^{7}	1.50×10^{7}
	24A	7.50×10^{8}	3.75×10^{8}	1.50×10^{8}	7.50×10^{7}	3.75×10^{7}	1.50×10^{7}	7.50×10^{6}
	60A	3.00×10^{8}	1.50×10^{8}	6.00×10^{7}	3.00×10^{7}	1.50×10^{7}	6.00×10^{6}	3.00×10^{6}
	120A	1.50×10^{8}	7.50×10^{7}	3.00×10^{7}	1.50×10^{7}	7.50×10^{6}	3.00×10^{6}	1.50×10^{6}
	240A	7.50×10^{7}	3.75×10^{7}	1.50×10^{7}	7.50×10^{6}	3.75×10^{6}	1.50×10^{6}	7.50×10^{5}
	600A	3.00×10^{7}	1.50×10^{7}	6.00×10^{6}	3.00×10^{6}	1.50×10^{6}	6.00×10^{5}	3.00×10^{5}

424A AC energy pulse constant comparison table (automatic)

		7V	14V	35V	71V	141V	354V	707V
Small current	0.13A	1.92×10^{11}	9.60×10^{10}	3.84×10^{10}	1.92×10^{10}	9.60×10^{9}	3.84×10^{9}	1.92×10^{9}
	0.28A	9.00×10^{10}	4.50×10^{10}	1.80×10^{10}	9.00×10^{9}	4.50×10^{9}	1.80×10^{9}	9.00×10^{8}
	0.7A	3.60×10^{10}	1.80×10^{10}	7.20×10^{9}	3.60×10^{9}	1.80×10^{9}	7.20×10^{8}	3.60×10^{8}
	1.4A	1.80×10^{10}	9.50×10^{9}	3.60×10^{9}	1.80×10^{9}	9.50×10^{8}	3.60×10^{8}	1.80×10^{8}
	2.8A	9.00×10^{9}	4.50×10^{9}	1.80×10^{9}	9.00×10^{8}	4.50×10^{8}	1.80×10^{8}	9.00×10^{7}
	7A	3.60×10^{9}	1.80×10^{9}	7.20×10^{8}	3.60×10^{8}	1.80×10^{8}	7.20×10^{7}	3.60×10^{7}
Heavy current	8A	3.20×10^{9}	1.60×10^{9}	6.40×10^{8}	3.20×10^{8}	1.60×10^{8}	6.40×10^{7}	3.20×10^{7}
	17A	1.50×10^{9}	7.50×10^{8}	3.00×10^{8}	1.50×10^{8}	7.50×10^{7}	3.00×10^{7}	1.50×10^{7}
	42A	6.00×10^{8}	3.00×10^{8}	1.20×10^{8}	6.00×10^{7}	3.00×10^{7}	1.20×10^{7}	6.00×10^{6}
	85A	3.20×10^{8}	1.60×10^{8}	6.40×10^{7}	3.20×10^{7}	1.60×10^{7}	6.40×10^{6}	3.20×10^{6}
	170A	1.50×10^{8}	7.50×10^{7}	3.00×10^{7}	1.50×10^{7}	7.50×10^{6}	3.00×10^{6}	1.50×10^{6}
	424A	6.00×10^{7}	3.00×10^{7}	1.20×10^{7}	6.00×10^{6}	3.00×10^{6}	1.20×10^{6}	6.00×10^{5}

Attachment 3 PSM1000 pulse constant comparison table

1000A DC energy pulse constant comparison table (automatic)

		10V	20V	50V	100V	200V	500V	1000V
Small current	0.3A	6.00×10^{10}	3.00×10^{10}	1.20×10^{10}	6.00×10^{9}	3.00×10^{9}	1.20×10^{9}	6.00×10^{8}
	0.6A	3.00×10^{10}	1.50×10^{10}	6.00×10^{9}	3.00×10^{9}	1.50×10^{9}	6.00×10^{8}	3.00×10^{8}
	1.5A	1.20×10^{10}	6.00×10^{9}	2.40×10^{9}	1.20×10^{9}	6.00×10^{8}	2.40×10^{8}	1.20×10^{8}
	3A	6.00×10^{9}	3.00×10^{9}	1.20×10^{9}	6.00×10^{8}	3.00×10^{8}	1.20×10^{8}	6.00×10^{7}
	6A	3.00×10^{9}	1.50×10^{9}	6.00×10^{8}	3.00×10^{8}	1.50×10^{8}	6.00×10^{7}	3.00×10^{7}
	15A	1.20×10^{9}	6.00×10^{8}	2.40×10^{8}	1.20×10^{8}	6.00×10^{7}	2.40×10^{7}	1.20×10^{7}
	16.7A	1.00×10^{9}	5.40×10^{8}	2.10×10^{8}	1.00×10^{8}	5.40×10^{7}	2.10×10^{7}	1.00×10^{7}
Heavy current	18A	1.00×10^{9}	5.00×10^{8}	2.00×10^{8}	1.00×10^{8}	5.00×10^{7}	2.00×10^{7}	1.00×10^{7}
	36A	5.00×10^{8}	2.50×10^{8}	1.00×10^{8}	5.00×10^{7}	2.50×10^{7}	1.00×10^{7}	5.00×10^{6}
	90A	2.00×10^{8}	1.00×10^{8}	4.00×10^{7}	2.00×10^{7}	1.00×10^{7}	4.00×10^{6}	2.00×10^{6}
	180A	1.00×10^{9}	5.00×10^{7}	2.00×10^{7}	1.00×10^{7}	5.00×10^{6}	2.00×10^{6}	1.00×10^{6}
	360A	5.00×10^{7}	2.50×10^{7}	1.00×10^{7}	5.00×10^{6}	2.50×10^{6}	1.00×10^{6}	5.00×10^{5}
	900A	2.00×10^{7}	1.00×10^{7}	4.00×10^{6}	2.00×10^{6}	1.00×10^{6}	4.00×10^{5}	2.00×10^{5}
	1000A	1.80×10^{7}	9.00×10^{6}	3.60×10^{6}	1.80×10^{6}	9.00×10^{5}	3.60×10^{5}	1.80×10^{5}

707A AC energy pulse constant comparison table (automatic)

		7V	14V	35V	71V	141V	354V	707V
Small current	0.2A	1.20×10^{11}	6.00×10^{10}	2.40×10^{10}	1.20×10^{10}	6.00×10^{9}	2.40×10^{9}	1.20×10^{9}
	0.4A	6.00×10^{10}	3.00×10^{10}	1.20×10^{10}	6.00×10^{9}	3.00×10^{9}	1.20×10^{9}	6.00×10^{8}
	1A	2.40×10^{10}	1.20×10^{10}	4.80×10^{9}	2.40×10^{9}	1.20×10^{9}	4.80×10^{8}	2.40×10^{8}
	2A	1.20×10^{10}	6.00×10^{9}	2.40×10^{9}	1.20×10^{9}	6.00×10^{8}	2.40×10^{8}	1.20×10^{7}
	4.2A	6.00×10^{9}	3.00×10^{9}	1.20×10^{9}	6.00×10^{8}	3.00×10^{8}	1.20×10^{8}	6.00×10^{7}
	10A	2.40×10^{9}	1.20×10^{9}	4.80×10^{8}	2.40×10^{8}	1.20×10^{8}	4.80×10^{7}	2.40×10^{7}
	12A	2.10×10^{9}	1.00×10^{9}	4.30×10^{8}	2.10×10^{8}	1.00×10^{8}	4.30×10^{7}	2.10×10^{7}
Heavy current	13A	2.00×10^{9}	1.00×10^{9}	4.00×10^{8}	2.00×10^{8}	1.00×10^{8}	4.00×10^{7}	2.00×10^{7}
	25A	1.00×10^{9}	5.00×10^{8}	2.00×10^{8}	1.00×10^{8}	5.00×10^{7}	2.00×10^{7}	1.00×10^{7}
	64A	4.00×10^{8}	2.00×10^{8}	8.00×10^{7}	4.00×10^{7}	2.00×10^{7}	8.00×10^{6}	4.00×10^{6}
	127A	2.00×10^{8}	1.00×10^{8}	4.00×10^{7}	2.00×10^{7}	1.00×10^{7}	4.00×10^{6}	2.00×10^{6}
	255A	1.00×10^{8}	5.00×10^{7}	2.00×10^{7}	1.00×10^{7}	5.00×10^{6}	2.00×10^{6}	1.00×10^{6}
	636A	4.00×10^{7}	2.00×10^{7}	8.00×10^{6}	4.00×10^{6}	2.00×10^{6}	8.00×10^{5}	4.00×10^{5}
	707A	3.60×10^{7}	1.80×10^{7}	7.20×10^{6}	3.60×10^{6}	1.80×10^{6}	7.20×10^{5}	3.60×10^{5}