KP2021

electrosurgical analyzer instruction manual

Thank you very much for purchasing the high-frequency electrosurgical analyzer KP2021

About the instruction manual

This manual is for users who are using this instrument for the first time, and contains the product introduction, parameter settings, operation methods, maintenance and usage precautions.

To maximize the functionality of this device , please read and understand this manual carefully. If you have any questions or problems during use, please review this manual again for answers.

After reading, please keep this manual in a safe place for future reference. Also, be sure to take this manual with you when transporting or moving this device . If you discover any binding errors or missing pages in this manual, we will replace it free of charge. If you accidentally lose or soil this manual, we will also provide a replacement for a fee. In any case, please contact the place of purchase or us for assistance.

If there are any unclear or incomplete parts in this manual, please contact us and we will solve the problem for you as soon as possible.

The firmware version applicable to the product

electrosurgical analyzer product model KP-2021 .When inquiring about this instrument, please informFirmware version Factory numberSoftware version

Copyright and Distribution of This Manual

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The product specifications and the contents of the instruction manual will be modified without further notice.

@Dongguan Jingbang Machinery Technology Co., Ltd.

About safety signs

To ensure that you can use this machine safely and keep it in a safe state, we use the following symbols in the instruction manual and on the product body. We sincerely ask you to understand and be familiar with the meaning of each symbol and strictly comply with all safety requirements.

 This part involves high voltage exceeding 1000V. If accidentally touched, it may cause electric shock, resulting in death or serious injury. Therefore, if it is necessary to touch it, be sure to operate in a safe environment.

A caution icon is a visual warning symbol intended to alert users or observers to important information, potential risks, or operational instructions.

This symbol indicates areas where ignoring the symbol and improper operation could result in serious consequences, including personal injury or death. It is typically accompanied by a prominent warning icon, which may include an exclamation point, a skull, or a lightning bolt, visually conveying urgent and serious safety warnings. Be sure to follow these warnings to avoid potential hazards.

 The prohibited icon is usually a visual symbol with a clear warning function, used to inform people that certain behaviors or activities are clearly prohibited.

The ground terminal icon is commonly used to indicate the ground connection point in electrical equipment, which is critical to ensuring the safe operation of the equipment and the safety of personnel.

 The power plug icon is an important component that connects electrical equipment to the power socket. It is used to transmit electrical energy from the power grid to the equipment . This instrument contains two types of power sockets: one for supplying power to the instrument and the other for supplying power to the sample to be tested. Please pay attention to distinguish them.

 The power ON icon is usually used to indicate that the power is on or the device is in working state .

 The Power OFF icon is typically used to indicate that the power is off or the device is in the off state .

Some of the text descriptions in this manual

In this manual, the high-frequency electrosurgical analyzer KP2021 is referred to as the "high-frequency electrosurgical analyzer".

In this manual, the sample under test is referred to as "EUT"

In this manual, personal computers and workstations are referred to as "PCs".

In this manual, the differential current probe is referred to as a "current probe".

In this manual, the differential voltage probe is referred to as a "voltage probe".

Table of contents

1 Instrument appearance introduction

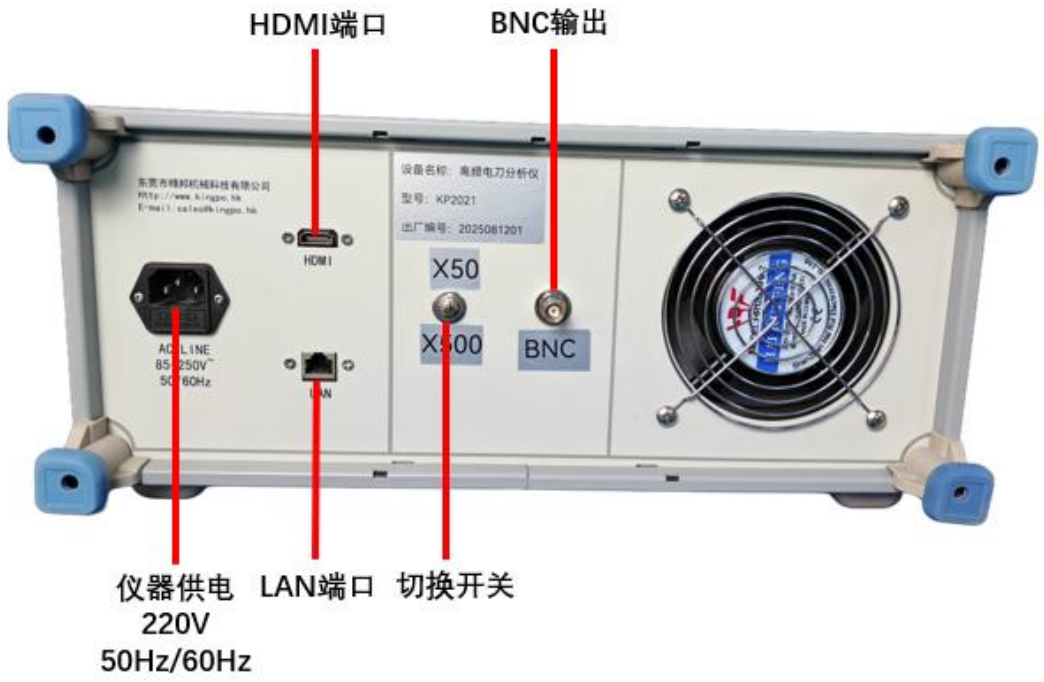
Front panel

The front panel includes: touch screen, power button, test port*4, USB port*1

serial number	name	Function
1	Power button	Turn on the power switch of the instrument and press it to turn on the power light.
2	USB	External mouse, keyboard, or other USB devices
3	touchscreen	Main interface for instrument operation
4	Electrode 1	electrode of the high-frequency electrosurgical unit
5	Electrode 2	electrode of the high-frequency electrosurgical unit
6	Grounding	Ground port, connected to the ground when measuring leakage current
7	High-frequency electrodes	High-frequency electrode port, used to measure high-frequency electrosurgical units (5-13.5MHz),

		to be upgraded and opened

rear panel



The rear panel includes: instrument power port, switch, BNC calibration port, HDMI port, LAN port

serial number	name	Function
1	HDMI port	Can be connected to an external HDMI monitor to expand the display
2	LAN port	Can be connected to an external network cable, the instrument can be remotely controlled

		through the external interface
3	Instrument power supply	The instrument power supply port can input voltage of 220VAC and frequency of 50Hz or 60Hz
4	BNC output	Calibration port, can be connected to an external oscilloscope to calibrate the probe output signal
5	Toggle switch	The magnification ratio of the probe can be set to 50 times and 500 times respectively

2 Technical Parameters

Performance parameters	**Technical indicators**
power	Range: 0-500W Resolution: 0.1W Accuracy: ≤50W: ±(5.0%×F+1)W; ＞50W：±5.0%
Voltage	Range: 0-5kV (peak -to-peak)
Current	Range: 2mA~2000mA RMS Resolution: 0.1 mA Accuracy: ±2.5 % of reading
High-frequency leakage current	Range: 2mA~500mA Resolution: 0.1 mA Accuracy: ±2.5 % of reading
bandwidth	30KHz-200MHz (measurement module bandwidth)
Load impedance	0-6400 ohms, step 1 ohm Accuracy: ±1% (>=50Ω) ±3% (＞= 10Ω&<50Ω)
Internal load rated power	Maximum 500W (rated load 500Ω)
Whether to support external load	yes
Whether to support pulse mode test	yes
Crest Factor	1.4—400
Oscilloscope output	500:1/50:1
Power distribution curve	The host screen displays the distribution curve and can be expanded with an external screen

REM Test	0-2000 ohms, step 1 ohm Accuracy: ±1% (>=50Ω) ±3% (>= 10Ω&<50Ω)
Automatic testing function	have
Physical parameters	Display: Full-color LCD 10-inch screen, supporting graphics, test curve display and magnification; Size: 500*450*220mm; Weight: 8Kg
Communication interface	Ethernet
Storage function	100G data storage
Display extended functions	HDMI can be expanded to large screen display

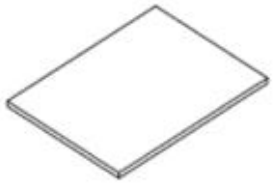
3 Setup and Usage Instructions

Accessories inspection

When you receive the product, please first check that all the enclosed items are included and inspect the product for any signs of damage during shipping. If you find any damage or missing parts, please contact the point of purchase or our company immediately. We recommend that you retain the original packaging materials for possible future shipping.

测试引线
(配鳄鱼夹)

保险丝
(10A)



使用说明书

电源线

Turn on the power

This device is a Safety Class 1 device (equipped with a protective conductor terminal) according to IEC standards. To prevent electric shock, be sure to ground it.

The machine is grounded through the ground wire of the power cord. Please make sure to plug the power plug into a grounded socket.

Turn on the power of the instrument

1. Turn off the Power button;
2. Confirm that the connected AC power cord meets the input rating of the machine. The input voltage is 220 VAC and the frequency is 50 Hz or 60 Hz.
3. Connect the power cord to the AC LINE socket on the rear panel and insert the power plug into a socket with a grounding pole.

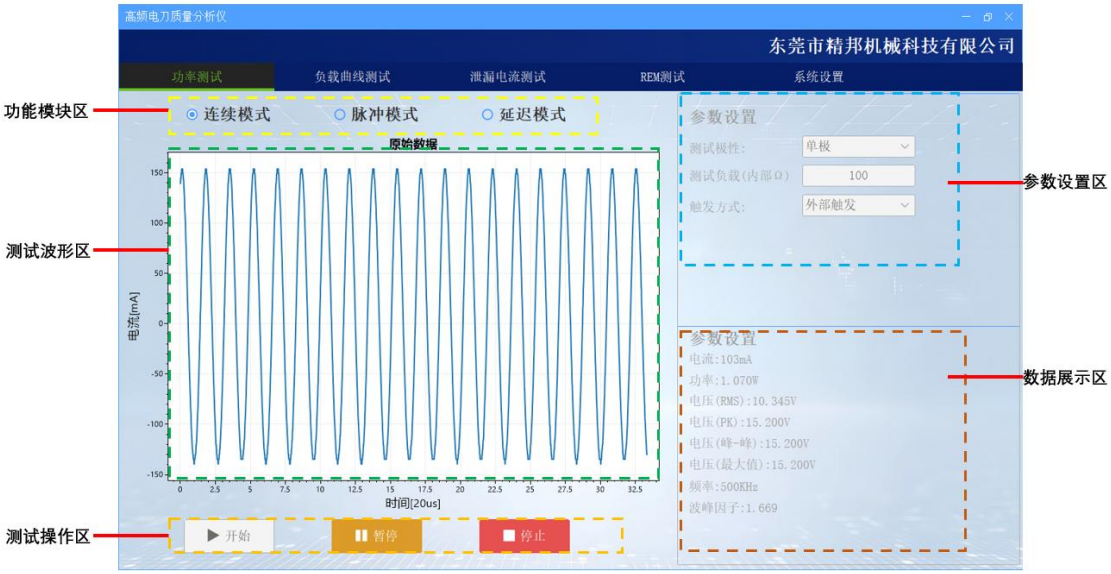
Disconnect the power supply

1. Please turn off the touch screen first;
2. Then press the power button to reset the power.

3. Basic Operations of the Instrument Interface

Interface composition

The software interface of the test instrument mainly consists of the following 5 functional areas



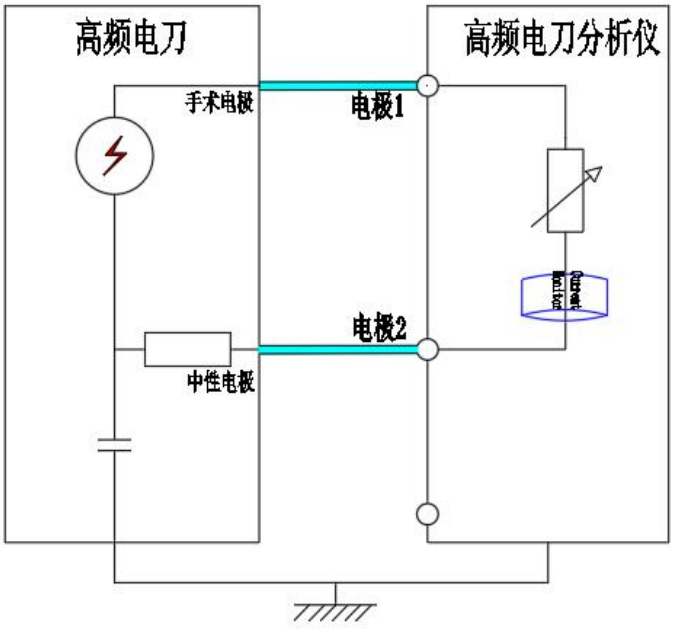
serial number	Region Name	Function
1	Functional module area	Switch between different test functions, including power test, load curve test, leakage current test, CMQ test and system parameter setting
2	Test waveform area	Can display the test waveform and intuitively display the waveform curve of the high-frequency electrosurgical knife output, which is convenient for analysis and observation
3	Test operation area	Contains test start, pause, and end function buttons
4	Parameter setting area	Different test parameters can be set according to different test functions
5	Data display area	Display the test results data

4. High-frequency electrosurgical unit power test

Connect the EUT

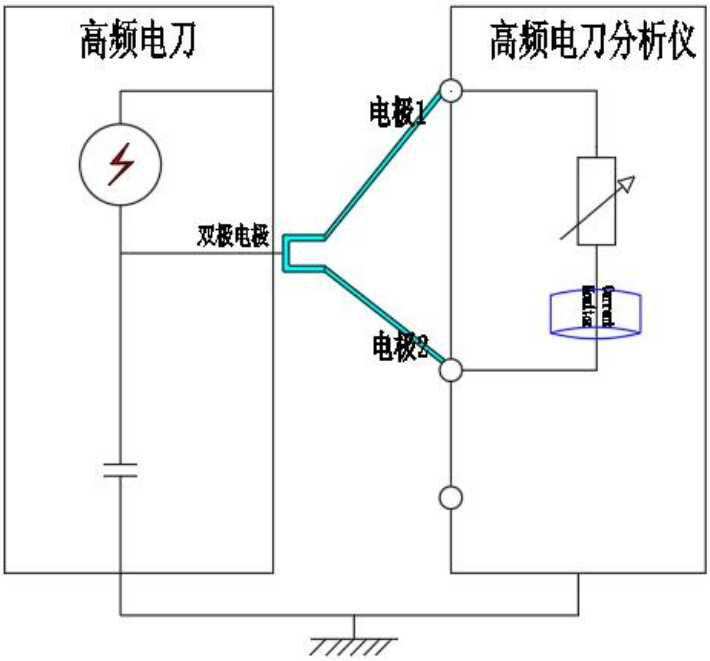
Monopole test:

Connect the surgical electrode of the high-frequency electrosurgical unit to the electrode 1 port, and connect the neutral electrode of the high-frequency electrosurgical unit to the electrode 2 port, as shown in the figure below:



Bipolar testing:

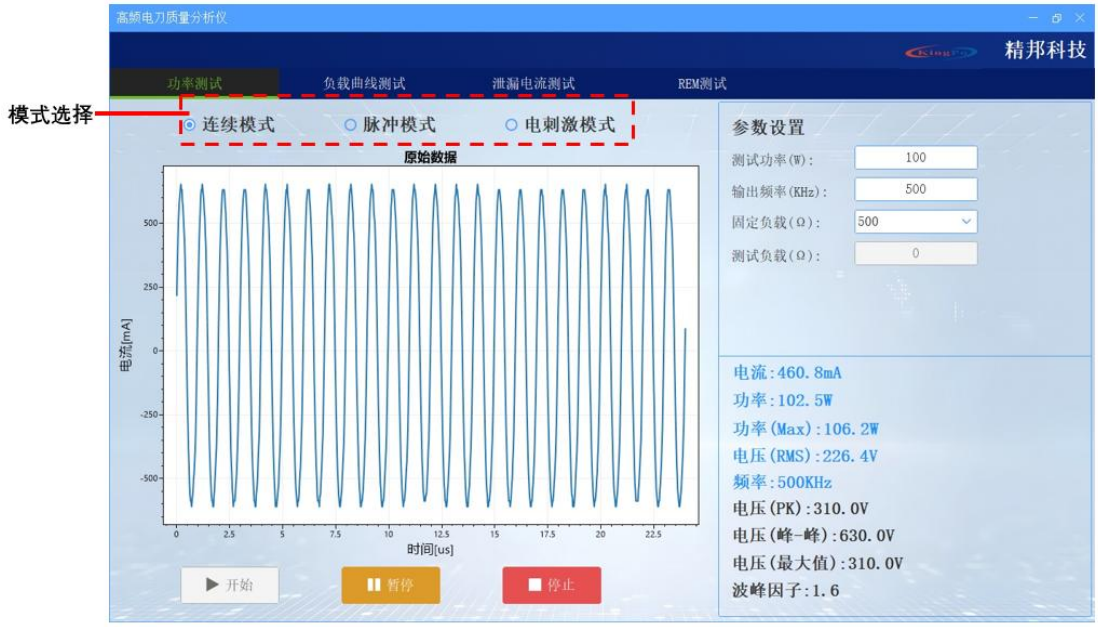
Connect the surgical electrode of the high-frequency electrosurgical unit to the electrode 1 port, and connect the neutral electrode of the high-frequency electrosurgical unit to the electrode 2 port, as shown in the figure below:



High-frequency electrosurgical units are highly dangerous devices, and the maximum voltage of some instruments can exceed 1KV. When making connections, the main connectors should not come into contact with human body parts or metal accessories. The included connecting wires are silicone pressure-resistant wires that can withstand voltages above 2KV. If users replace other cables, please ensure that the cables are capable of withstanding high voltages and are well grounded after installation.

Mode Selection

According to the usage scenario of the electrosurgical unit, the test modes are divided into "continuous mode", "pulse mode" and "electric stimulation mode". Among them, "continuous mode" is generally "electric cutting mode", "pulse mode" is generally "electric coagulation mode" or "mixed cutting mode", and "electric stimulation mode" tests the electric stimulation treatment mode of the electrosurgical unit. Different working modes require different test modes to be selected for testing, otherwise the test cannot be completed.

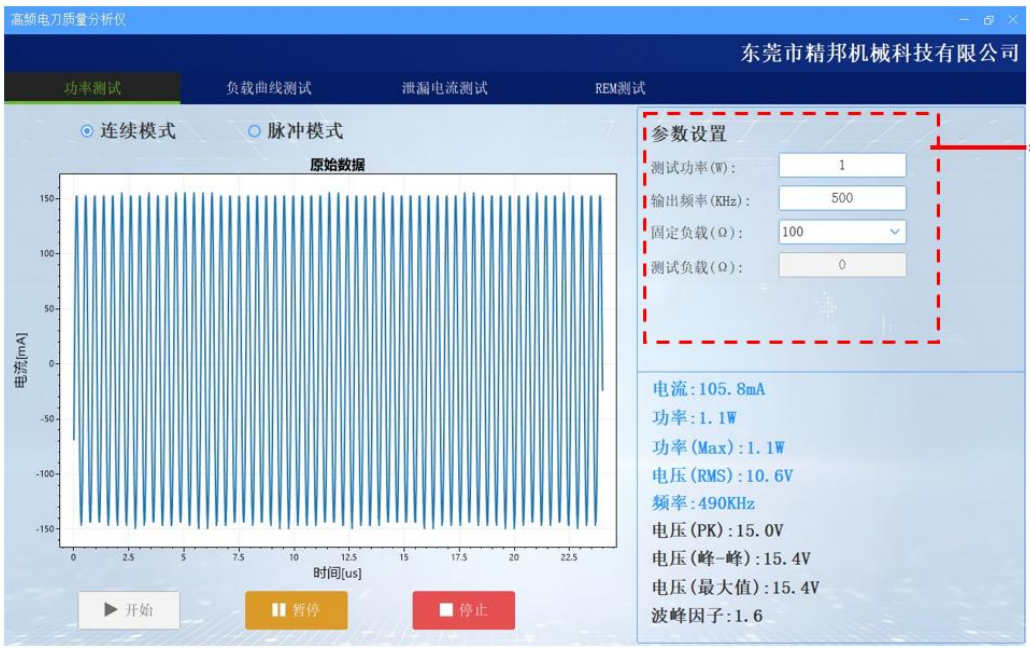


serial number	model	Function
1	Continuous mode	The high-frequency signal of the electrosurgical knife is continuously output
2	Pulse Mode	The high-frequency signal pulse output of the electric knife, the pulse modulation wave frequency is in the range of 1~100KHz
3	Electrical stimulation mode	Electrosurgery therapy test

Parameter settings

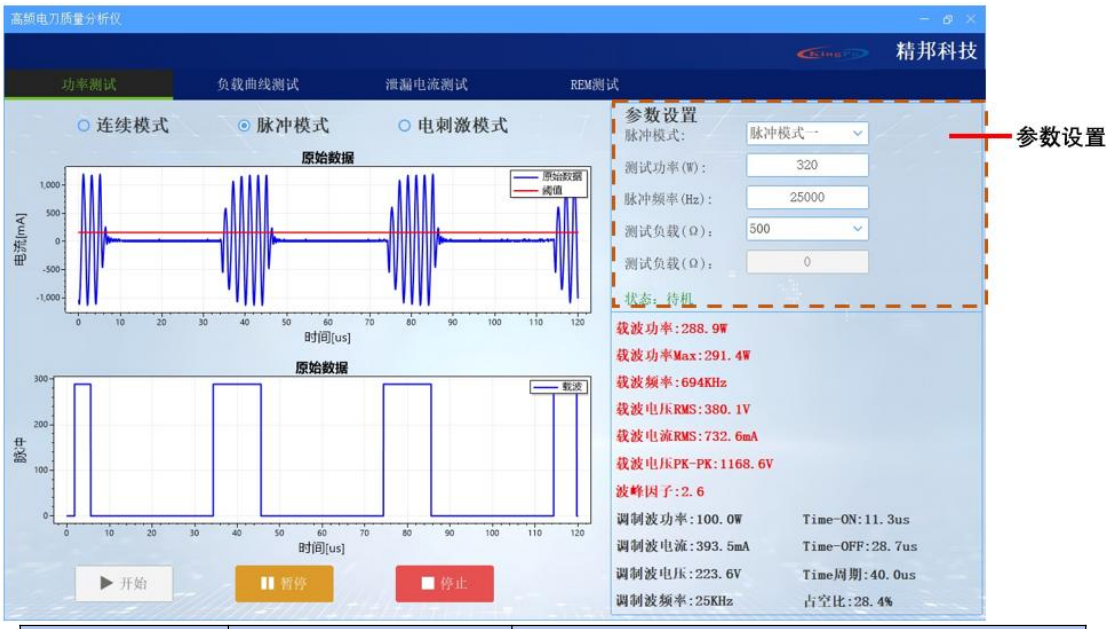
According to different test modes, the corresponding parameter settings are also different. The following introduces the parameter settings according to the distinction of modes.

Continuous mode:



serial number	parameter	Function
1	Test power	Set the nominal output power of the electrosurgical unit
2	Output frequency (KHz)	Set the nominal output frequency of the electrosurgical unit
3	Fixed load	Commonly used loads can be selected from the list
4	Test Load	Customizable load size

Pulse Mode:



serial number	parameter	Function
1	Pulse Mode	Pulse mode 1 : only one valid pulse signal Pulse mode 2: There are two valid pulse signals

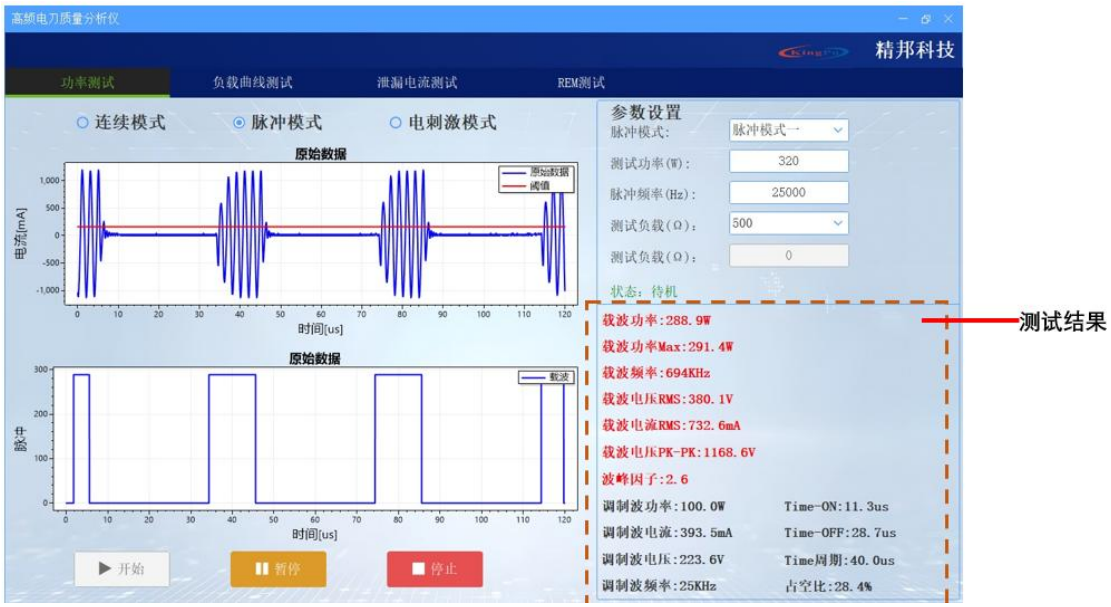
		Pulse mode three: There are three valid pulse signals
2	Test power	Set the nominal output power of the electrosurgical unit
3	Test Load	Set the load size to be tested, setting range: 0-2000 Ω
4	Pulse frequency (Hz)	Set the pulse modulation frequency for electrosurgical unit calibration

Electrical stimulation mode:

serial number	parameter	Function
1	Test voltage	Set the nominal output voltage of the electrosurgical unit
2	Test Load	Set the load size to be tested, setting range: 0-2000 Ω
3	Pulse frequency (Hz)	Set the pulse modulation frequency for electrosurgical unit calibration

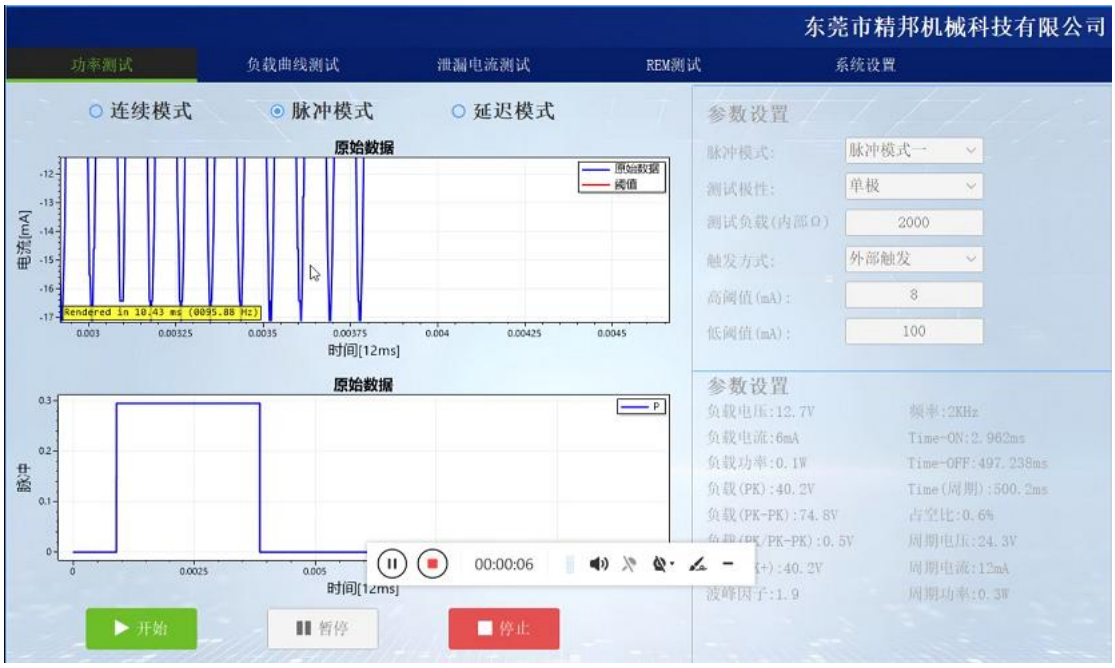
Start testing

According to the above connection method, confirm the cable connection, then set the corresponding values and selections according to the parameters, click "Start" to test, and the test results will be displayed in real time in the data display area.



Pause test

After starting the test, click "Pause" to pause the test. The test data will stay at the data results at the pause time, and the waveform will also stay at the signal at the pause time. You can zoom in or out on the waveform graph to view the details of the waveform.



Stop testing

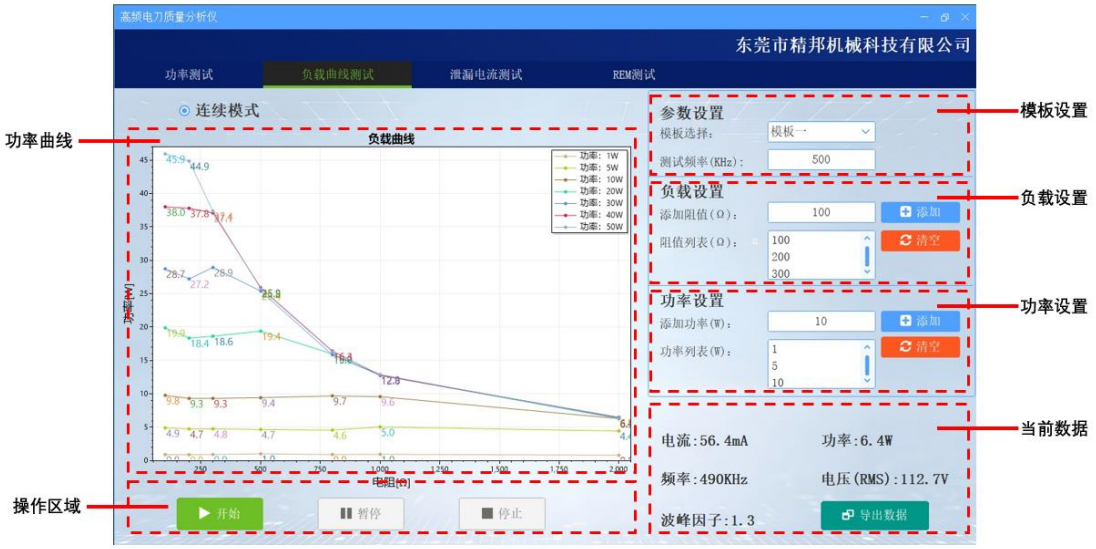
Click "Stop" to stop the test, and the test data will be retained at the time of stopping. After clicking "Start", the test waveform curve and test results will be cleared and the test will start again.

5. Load power curve test

High-frequency electrosurgical units are highly dangerous devices, and the maximum voltage of some instruments can exceed 1KV. When making connections, the main connectors should not come into contact with human body parts or metal accessories. The included connecting wires are silicone pressure-resistant wires that can withstand voltages above 2KV. If users replace other cables, please ensure that the cables are capable of withstanding high voltages and are well grounded after installation.

Connect the EUT

Connecting the EUT is the same as that described in Chapter 4 "High-Frequency Electrosurgical Unit Power Test".



Template Selection

You can set commonly used test templates. After selecting a template, the load setting and power setting can display the content in the template and perform tests according to the parameters set in the template.

You can also select custom mode and add test parameters in load settings and power settings.

Load Settings

serial number	model	Function

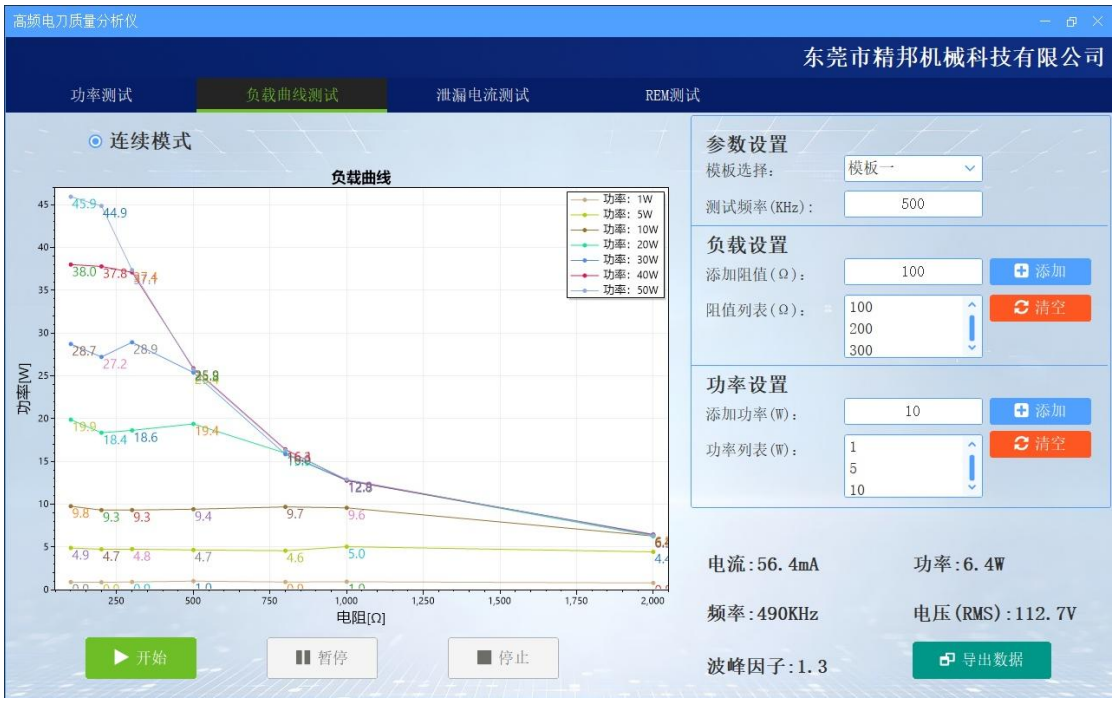
1	Adding a load	Add the load resistance value to be tested
2	Load List	Load list after adding multiple load resistance values

Power settings

serial number	model	Function
1	Add power	Add the load power size to be tested
2	Power List	Power list after adding multiple load powers

Start testing

According to the above connection method, confirm the cable connection, then set the corresponding values and selections according to the parameters, click "Start" to test, and the test results will be displayed in real time in the data display area.



End of test

Click "Stop" to stop the test, and the test data will be retained at the time of stopping. After clicking "Start", the test waveform curve and test results will be cleared and the test will start again.

Save test results

Click the "Export Data" button on the menu bar to save the load test curve as an Excel spreadsheet and a graphical curve, as shown below. Rename the file. This

device can save 100G of storage space.

6. High-frequency electrosurgical unit leakage current test

High-frequency electrosurgical units are highly dangerous devices, and the maximum voltage of some instruments can exceed 1KV. When making connections, the main connectors should not come into contact with human body parts or metal accessories. The included connecting wires are silicone pressure-resistant wires that can withstand voltages above 2KV. If users replace other cables, please ensure that the cables are capable of withstanding high voltages and are well grounded after installation.

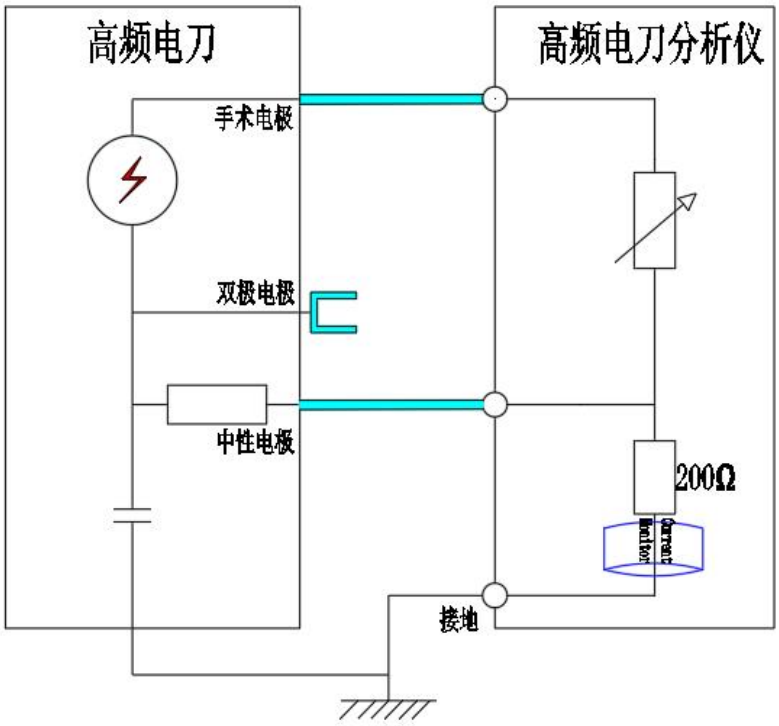
Connect the EUT

Depending on the test network, cables need to be connected according to the network mode, as shown below:

Neutral electrode leakage current measurement

Effectively ground the electrosurgical knife to be tested and the test instrument, then connect the surgical electrode of the electrosurgical knife to the electrode 1 port and the ground port to the ground;

When the neutral electrode is referenced to ground, connect the high-frequency electrosurgical unit to the high-frequency electrosurgical unit tester as shown below. Set the high-frequency electrosurgical unit output to maximum. Measure the high-frequency leakage current flowing from the neutral electrode through a 200 Ω non-inductive resistor to ground. Maintaining the same test conditions, repeat the measurement three times. The maximum value is the high-frequency leakage current of the neutral electrode.

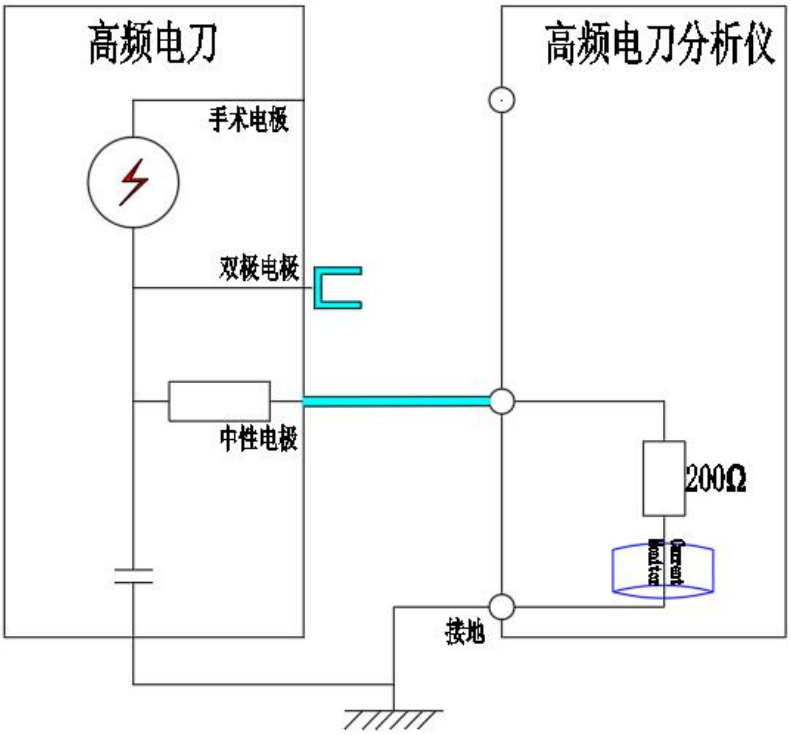


Leakage current measurement when the neutral electrode is isolated from the ground

Ground the electrosurgical unit to be tested and the test instrument effectively, and then connect the neutral electrode of the electrosurgical unit to electrode 2.

Port, ground port ground;

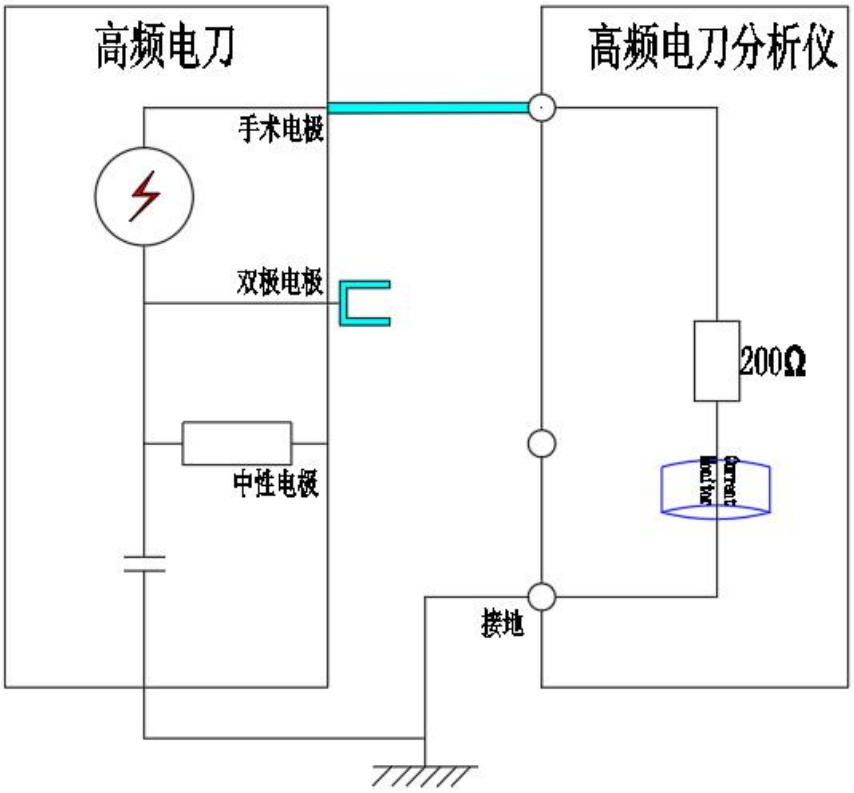
When the neutral electrode is isolated from the ground, connect the high-frequency electrosurgical unit and the high-frequency electrosurgical unit tester according to the figure below. Set the high-frequency electrosurgical unit output to the maximum, measure the high-frequency leakage current flowing from the neutral electrode through the 200 Ω non-inductive resistor to the ground, keep the test conditions unchanged, repeat the measurement three times, and take the maximum value as the high-frequency leakage current of the neutral electrode.



Surgical electrode leakage current

Effectively ground the electrosurgical knife to be tested and the test instrument, then connect the surgical electrode of the electrosurgical knife to the electrode 1 port and the ground port to the ground;

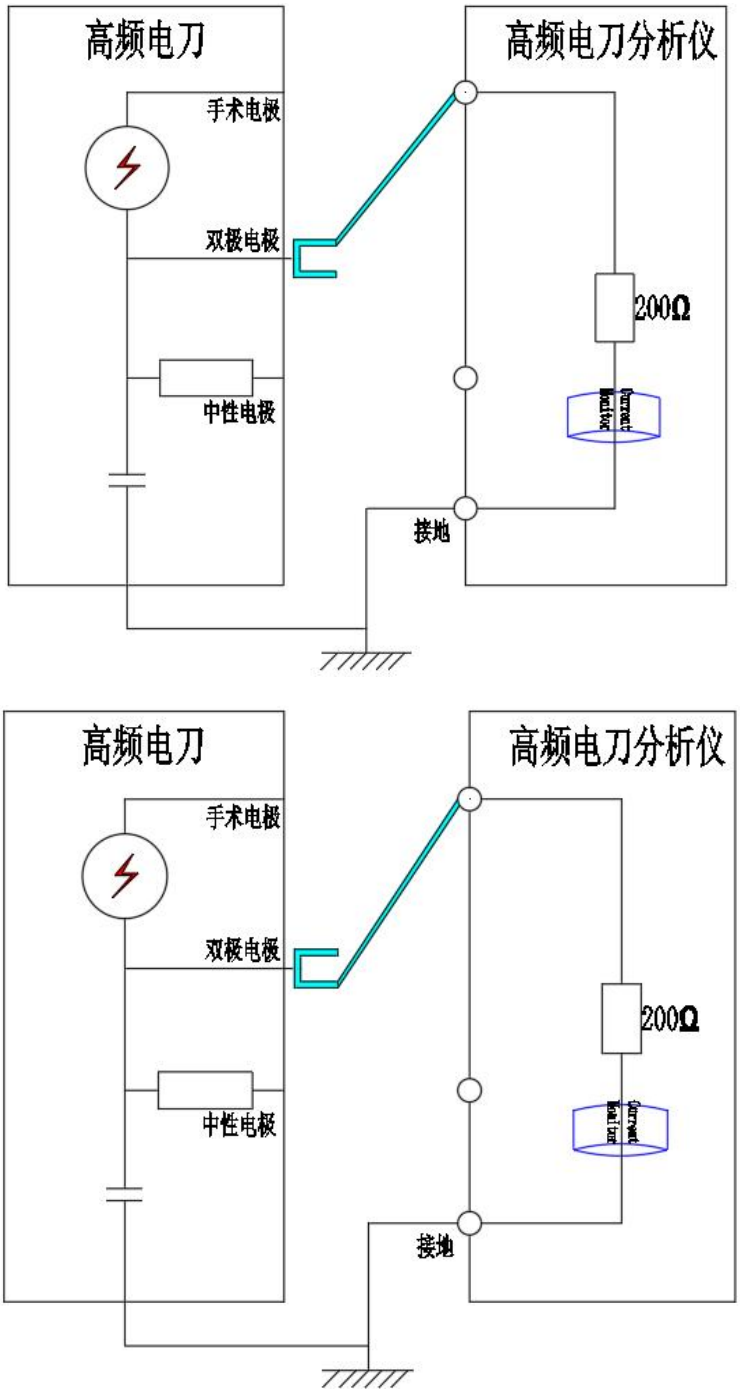
Connect the high-frequency electrosurgical unit to the high-frequency electrosurgical unit tester as shown below. Set the high-frequency electrosurgical unit output to maximum. Measure the high-frequency leakage current flowing from the surgical electrode through a 200Ω non-inductive resistor to ground. Maintaining the same test conditions, repeat the measurement three times. The maximum value is the high-frequency leakage current of the neutral electrode.



Bipolar electrode high-frequency leakage current

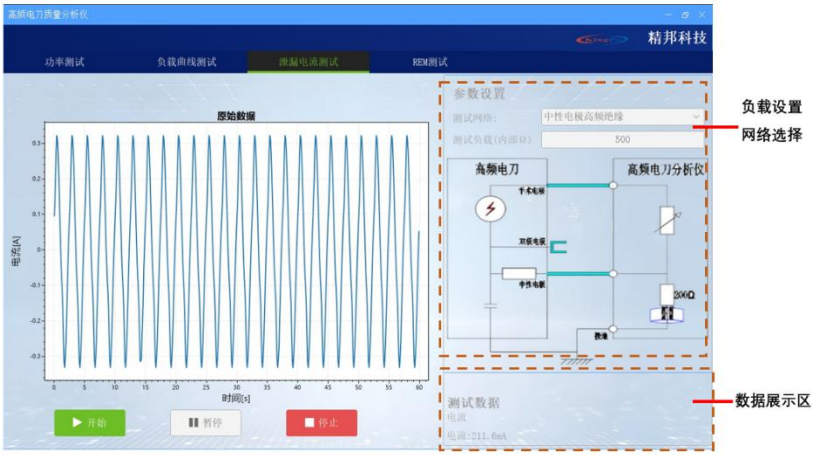
Effectively ground the electrosurgical unit to be tested and the test instrument, then connect one end of the bipolar electrode of the electrosurgical unit to the electrode 1 port and the ground port to ground;

Connect the high-frequency electrosurgery unit to the high-frequency electrosurgery unit tester as shown below. Set the high-frequency electrosurgery unit output to maximum, and measure the high-frequency leakage current flowing through the 200Ω non-inductive resistor to ground at the two output electrodes of the bipolar electrode. Keep the test conditions unchanged, and repeat the measurement three times. The maximum value is the high-frequency leakage current of the bipolar electrode.



Parameter settings

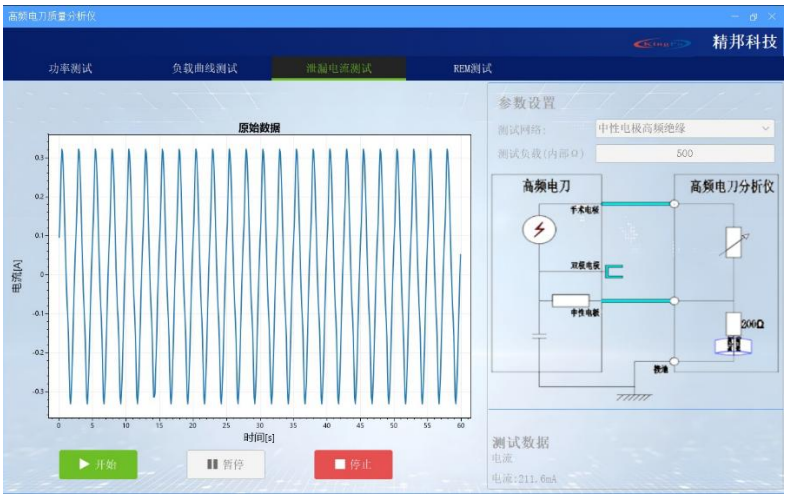
According to different test modes, the corresponding parameter settings are also different. The parameter settings are shown in the figure below



serial number	parameter	Function
1	Test Network	Choose different test networks according to test requirements
2	Test Load	Set the load size to be tested

Start testing

According to the above connection method, confirm the cable connection, then set the corresponding values and selections according to the parameters, click "Start" to test, and the test results will be displayed in real time in the data display area.



Pause test

After starting the test, click "Pause" to pause the test. The test data will stay at the data results at the pause time, and the waveform will also stay at the signal at the pause time. You can zoom in or out on the waveform graph to view the details of the waveform.

End of test

Click "Stop" to stop the test, and the test data will be retained at the time of stopping. After clicking "Start", the test waveform curve and test results will be cleared and the test will start again.

7. REM/CMQ Test

Connect the EUT

Connect the surgical electrode and neutral electrode of the high-frequency electrosurgical unit to the two ports of electrode 1 and electrode 2 on the instrument respectively, as shown in the figure below.

Parameter settings

Open the software, switch the test page to the "REM test" page, set the load size on the interface, or you can quickly select the load size

serial number	parameter	Function

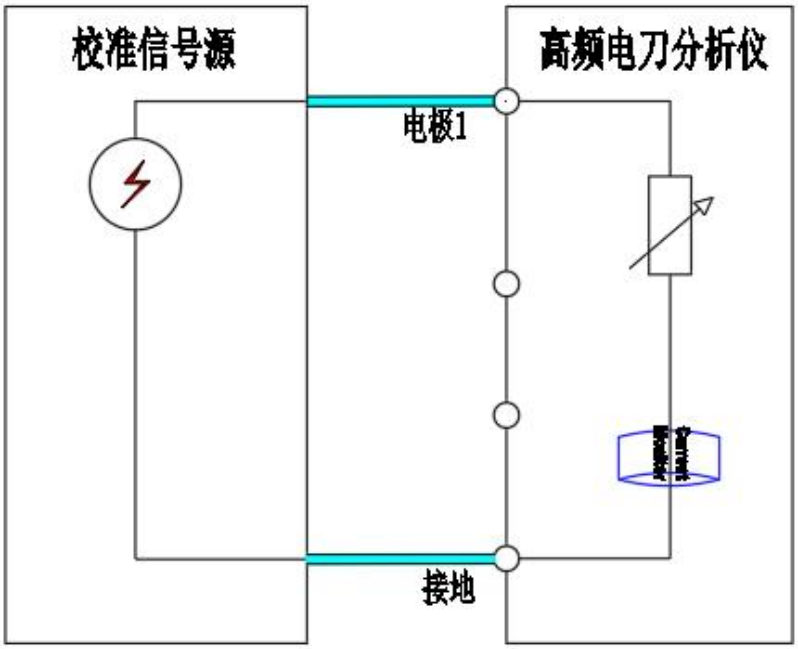
1	0 Ω	Short-circuit between two CMQ ports
2	+ ∞ Ω	Between two CMQ ports, open
3	Test Load	Set the load size to be tested, setting range: 0-2000 Ω

8. Instrument calibration

The instrument has a built-in instrument calibration function. Switch to the "Instrument Calibration" interface, which is divided into three calibration interfaces: high-frequency leakage current calibration, AC power and current calibration, and load resistance accuracy.

High-frequency leakage current calibration

Environment setup: Connect the standard calibration source to the electrode 1 port and the ground interface respectively, and switch the software to the high-frequency leakage current test interface; set the output current on the calibration device and read the displayed value on the instrument interface;

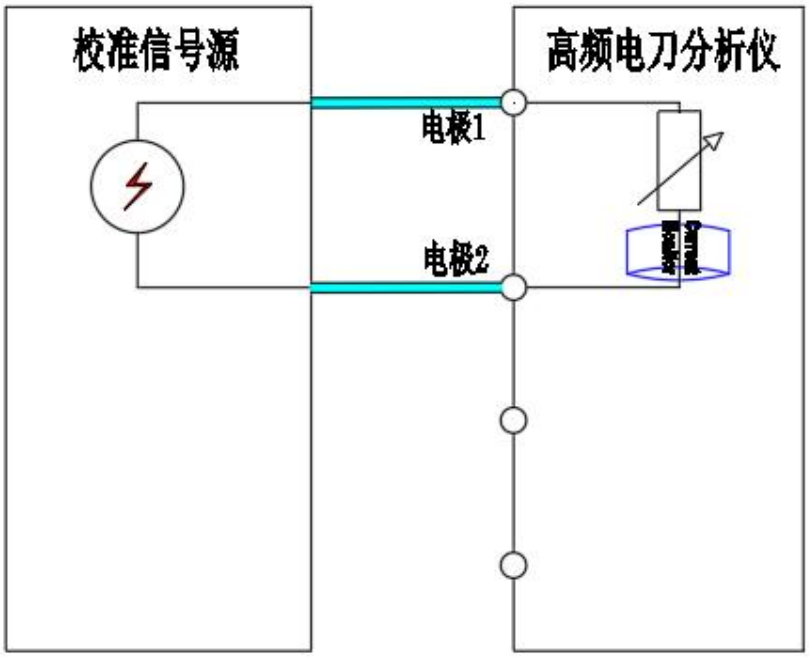


高频漏电流校准

AC power and current calibration

Environment setup: Connect the standard calibration source to the electrode 1 and electrode 2 interfaces respectively, and switch the software to power test - continuous mode; on the calibration device, set the output current and power, and read

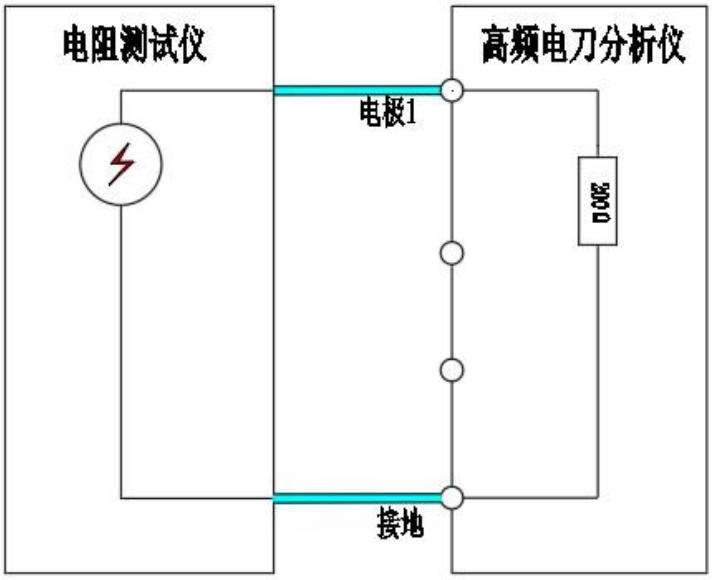
the displayed values on the instrument interface;



交流功率及电流校准

200Ω fixed resistance accuracy

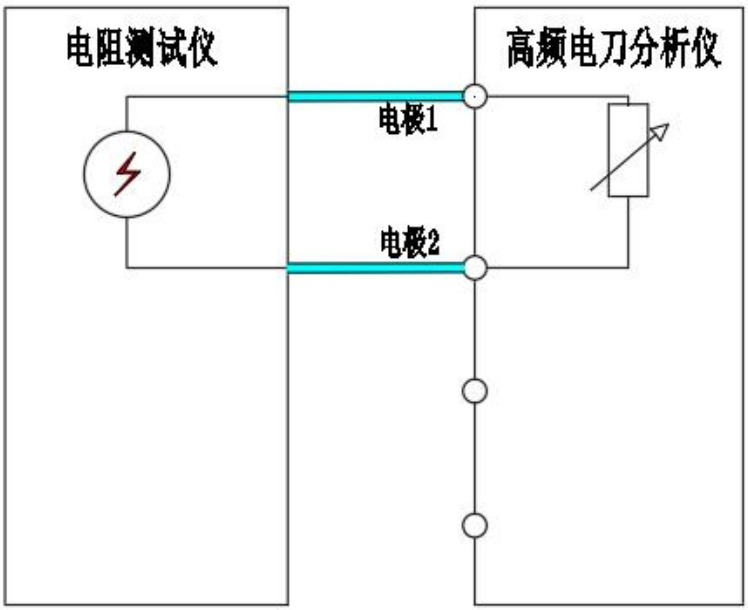
Environment setup: Connect the standard calibration source to electrode 1 and the ground interface respectively. Switch the software to the high-frequency leakage current test interface and select the surgical electrode leakage current test item. Use a multimeter to test the resistance value.



固定电阻校准

Variable load resistance accuracy

Environment setup: Connect the standard calibration source to the electrode 1 and electrode 2 interfaces respectively. Switch the software to the power test---continuous test interface. In the test load, set different resistance values. Use a multimeter to test the resistance.



可变电阻校准

产品装箱单

Factory number	KP2021	Date of manufacture	2 02 5 . 7 .2 2	
Category	name	quantity	unit	Remark
Host	High -frequency electrosurgical analyzer	1	tower	
Random Accessories	power cord	1	root	
	High voltage test line	3	strip	
	BNC cable	1	root	
Follow machine Funding material	Product Instructions	1	share	
	Warranty card	1	share	In the instruction manual
	Packing List	1	share	In the instruction manual

☆The contents listed in this packing list refer to the equipment and materials that should be included in the packaging box, and do not include optional components. If you have selected other optional components, please check them carefully when purchasing the machine. Thank you.

产品保修卡

Dear users:

Hello! Thank you for purchasing our products.

In the future, we will provide you with excellent after-sales service and try our best to ensure that your problems are solved in a timely manner.

In order to protect your legal rights and interests and relieve your worries, our company hereby makes the following explanation to you:

1. The product is guaranteed to be qualified after unpacking. If serious quality problems are found within one week of purchase (based on the invoice date) or receipt, a free replacement can be provided after confirmation by our technical department or authorized dealers.

2. Please keep the manual properly and contact the warranty (maintenance) department. The product is under free warranty for one year (excluding wearing parts). After one year, we provide paid service and long-term technical support.

3. When the product fails, please record the failure phenomenon and parameters

in detail, and fax (or call) to our service department, which will reply you within 24 hours and confirm the subsequent service process .

Supplier: Dongguan Jingbang Machinery Technology Co., Ltd.	Production date : 2025.7.22
Product Name Model: KP 2021	Factory serial number:

Maintenance records

Repair date	Fault description	Treatment	Maintenance Worker