

# **ITECH Control Software PV7900 User Manual**

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PV7900 Pro

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### NOTE

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# Chapter1 Brief Introduction

## 1.1 Software Introduction

PV7900 Pro is a user-friendly and practicable control software designed by Itech Electronic Co., Ltd. It can work with IT7900 regenerative grid simulator. This software allows users to control the computer to achieve all the operations on the front panel of the power supply, providing users with great convenience when conducting remote operations. This software supports RS232, USB, GPIB and LAN interface communication.

PV7900 Pro software is a way to remote operation of the instrument. For the introduction and understanding of the function of the instrument, refer to the corresponding user manual.

## 1.2 Preparation before operation

The software can support IT7900 Regenerative Grid Simulator. You need to confirm the firmware version number of the IT7900 power supply before connecting, the firmware version need to be **Software Version:000.001.038**.

This software supports interfaces like USB, RS232, GPIB and LAN. Before using the software, the user needs to connect the device to computer by communication interface first, and input the communication interface parameter to software interface. Please refer to 1.4 Configuring Interface of Device for the detailed information.

## 1.3 PV7900 Initial Interface

Double-click the desktop icon to run PV7900 software. The software will initialize in about 2 seconds, and then the below interface will appear.



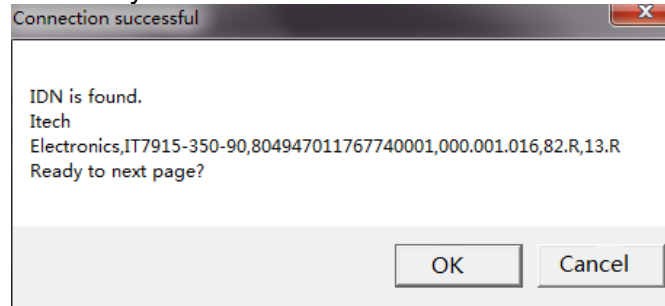
The interface is described as follows:

- Communication

Select the communication interface between the software and the device.

- About  
Check PV7900 Pro information, such as name and version number.
- Scan  
Scan communication interfaces for the device.
- Enter

When you first enter the main operation interface of the software, click **[Enter]**, the following interface will appear to prompt the information about the connected instrument. This screenshot is just for example, please refer to actually information.



#### NOTE

If you do not connect the device to PC, the software will enter the DEMO mode. In DEMO mode, all functions can be simulated.

## 1.4 Configuring Interface of Device

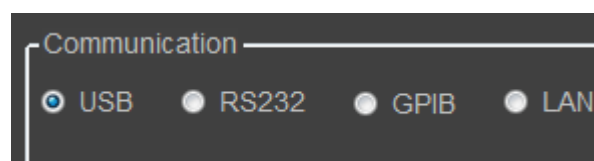
PV7900 Pro software is installed in PC and interacts with matching hardware devices via different communication interfaces. This software supports interfaces like USB, RS232, GPIB and LAN. (At the time of start-up scan, RS232 scans at Baud rate of 9,600 by default). The user needs to connect the device to the computer. During hardware setting, select a hardware interface compatible with the one connected to the device, and set interface parameters based on different interface types.

### Precondition

1. Before configuring hardware, you need to check whether the device communication method is consistent with the realistic application or not.  
The detailed steps refer to corresponding User Manual of device.
2. Connect the power supply and PC by communication cable.

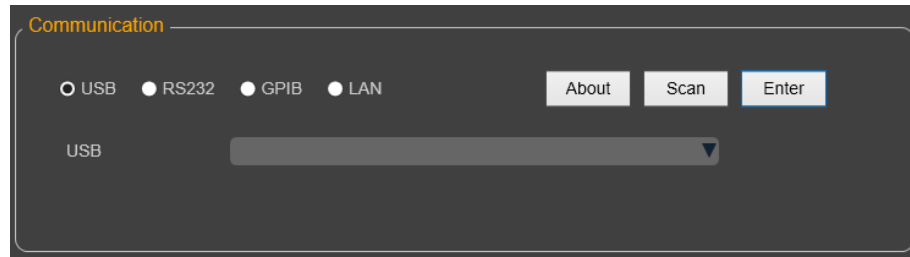
### Operation steps

1. Select the required hardware interface type on the initial interface.

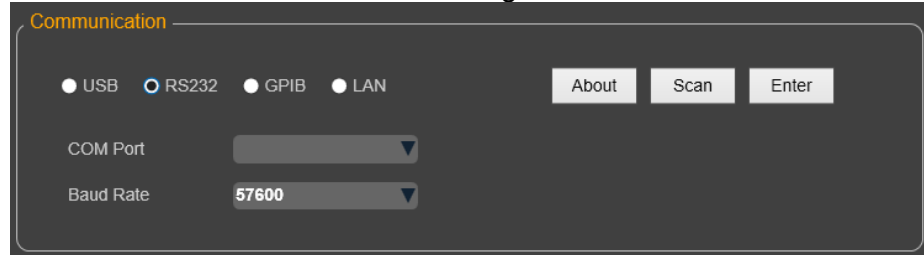


2. After selecting the device interface, configure interface parameters at bottom. Click **[Scan]**.

- USB Interface Parameter Configuration



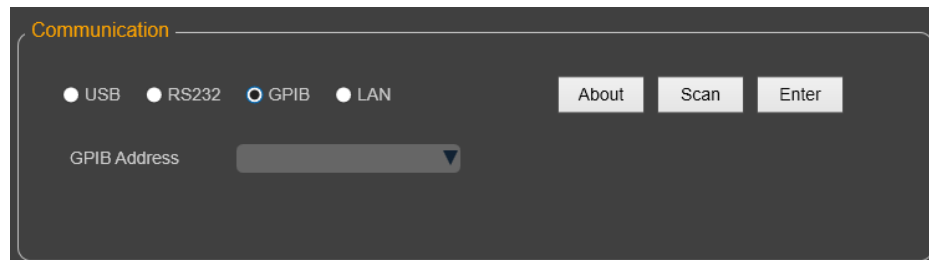
- RS232 Interface Parameter Configuration



COM Port: to select serial interface, i.e., the serial interface number occupied by RS232 communication cable interface.

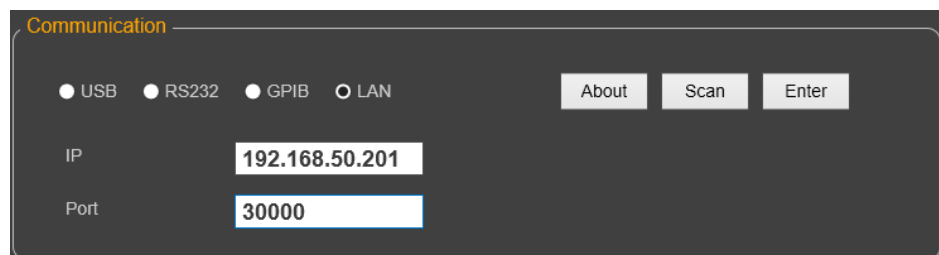
Baud Rate: Baud rate must be configured consistently with those in menu setup.

- GPIB Interface Parameter Configuration



GPIB Address: Set GPIB address of device.

- LAN Interface Parameter Configuration



IP: Set LAN IP address of device.

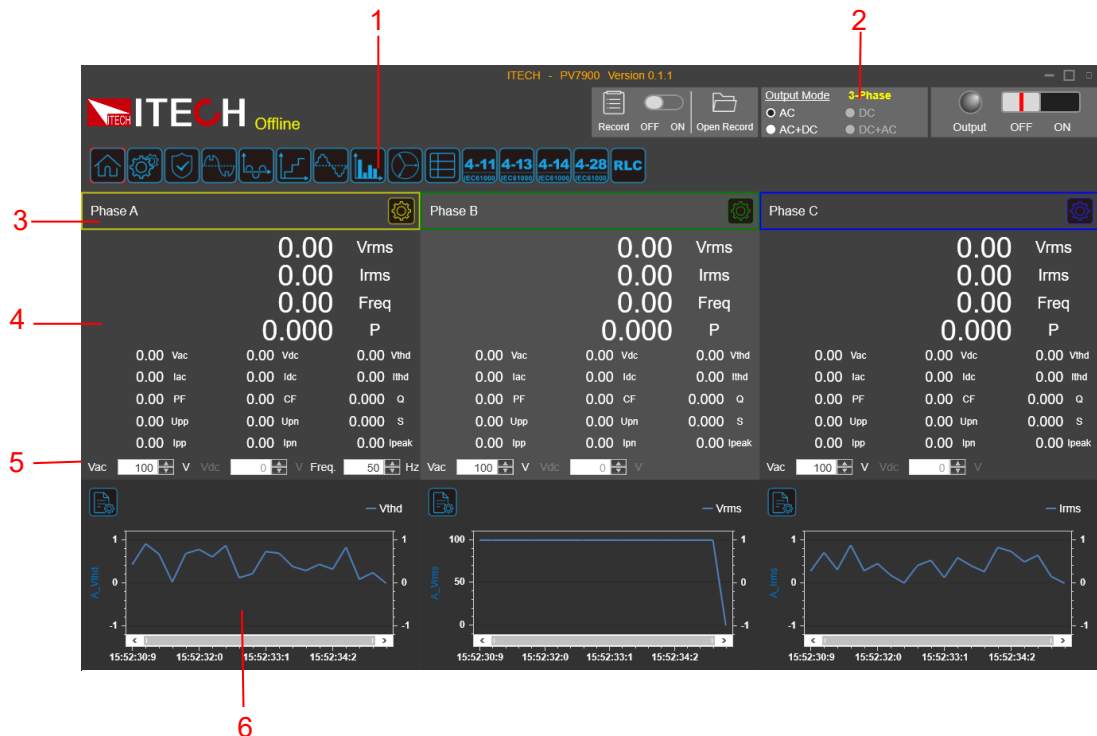
Port: Set Socket port of device, the default value is 30000.

## Chapter2 Basic Operation

The PV7900 Pro software control interface is simple and intuitive. The main interface function modules are clearly divided. Users can click different function icon to complete corresponding operations.

### 2.1 Overview of Main Interface

The main interface of PV7900 Pro software is introduced as follows:



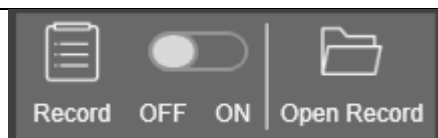
1. Function bar: The user can directly click the button to enter the corresponding operation interface.
2. Output Mode/Phase Mode/Output control area: The user can click the button to switch the state.
3. Phase parameter setting area: click the wheel, display the configuration.
4. Measurement data display area
5. Output parameter setting area
6. Tendency chart display area

### 2.2 Save the measurement data

To save related test parameters as .csv file to Report folder of software installation on the computer.

Click the ON/OFF button right of Record to start saving data.

click Open Report button to open the report file path directly.



## 2.3 Switch the Output Mode and Phase Mode

The IT7900 series instruments are available in single-phase, three-phase, reverse and multi-channel modes.

In different output modes, you can choose different Phase modes.

1-Phase, Reverse and Multichannel support: AC/DC/AC+DC/DC+AC.

3-Phase mode supports AC and AC+DC.



The Phase mode can be set in the system menu.

## 2.3 Turn ON/Turn OFF Output

You can control the output state of the instrument by clicking the ON or OFF button on the software panel. Click ON button, Output state lights up, indicating that the present Output is ON, and the measurements will display the voltage, current or power value. Click the OFF button again, the Output status light is OFF, indicating that the present Output is OFF, and the instrument interface displays the OFF indicator.



OFF state

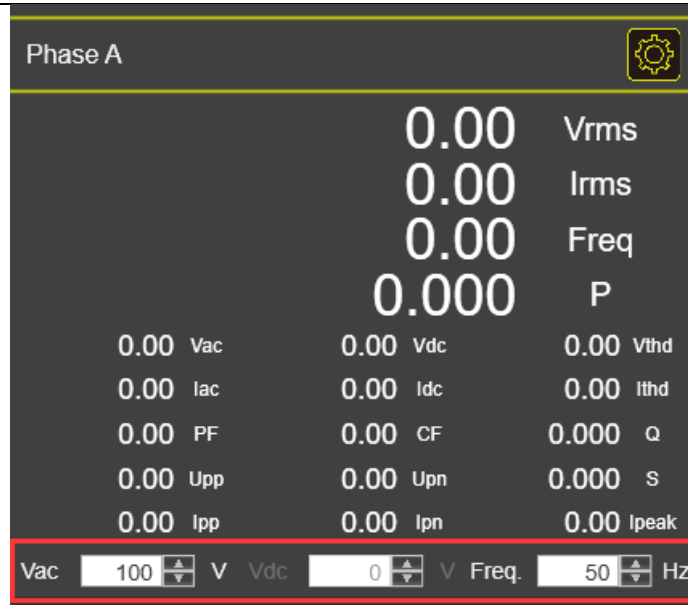
ON state

When the output is on state, the Sweep, List, IEC and RLC function are disabled.

## 2.5 Setting the Output Parameters

Three areas are displayed on the main interface, corresponding to the output setting parameters and output measurement parameters of three phases respectively. In 1-phase and Reverse modes, only Phase A interface is available; in 3-phase and multichannel modes, ABC Phase and CH1/CH2/CH3 channel available.

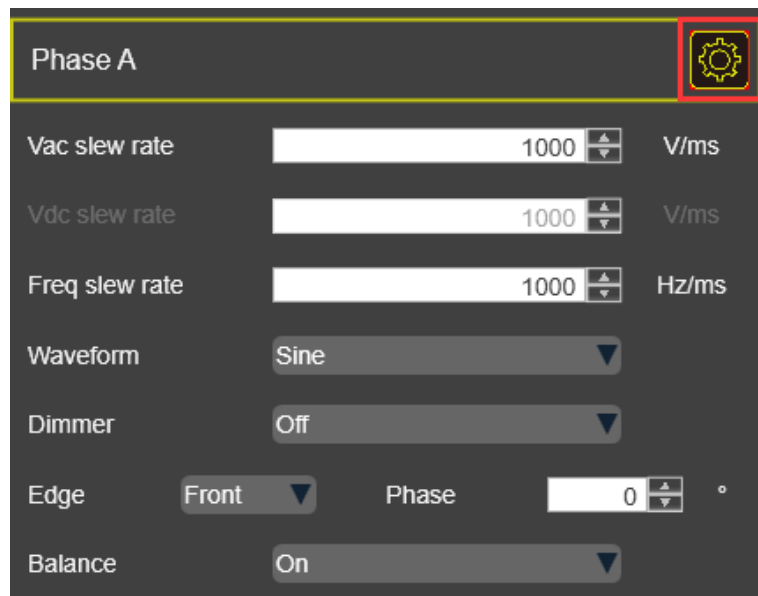
Take Phase A as an example to introduce parameter setting, as shown in the figure below. Output voltage and output frequency can be set in the red box area. In AC+DC mode, both Vac and Vdc can be set.



Vac: Output AC voltage setting      Vdc: Output DC voltage setting

Freq.: Output frequency

Click the wheel behind Phase A, set the voltage slew rate, waveform, Dimmer, Balance control and so on.



Vac slew rate: AC voltage slew rate.

Vdc slew rate: DC voltage slew rate

Freq slew rate: Frequency slew rate

Waveform: Select the output waveform

Dimmer: Dimmer function switch

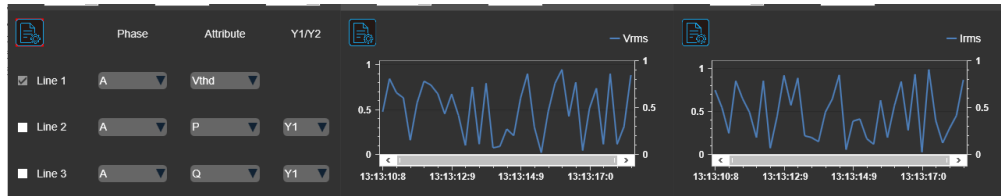
Edge: Select the front and back edge of the waveform

Phase: phase control, range from 0-180°

Balance: Balance control in 3-phase mode

## 2.6 User-defined Tendency Chart

The tendency chart is displayed on the home screen. You can customize the curve displayed in the tendency chart.



Line1/Line2/Line3: The curve that needs to be displayed, maximum of three curves can be displayed.

Phase: Select the Phase A B C.

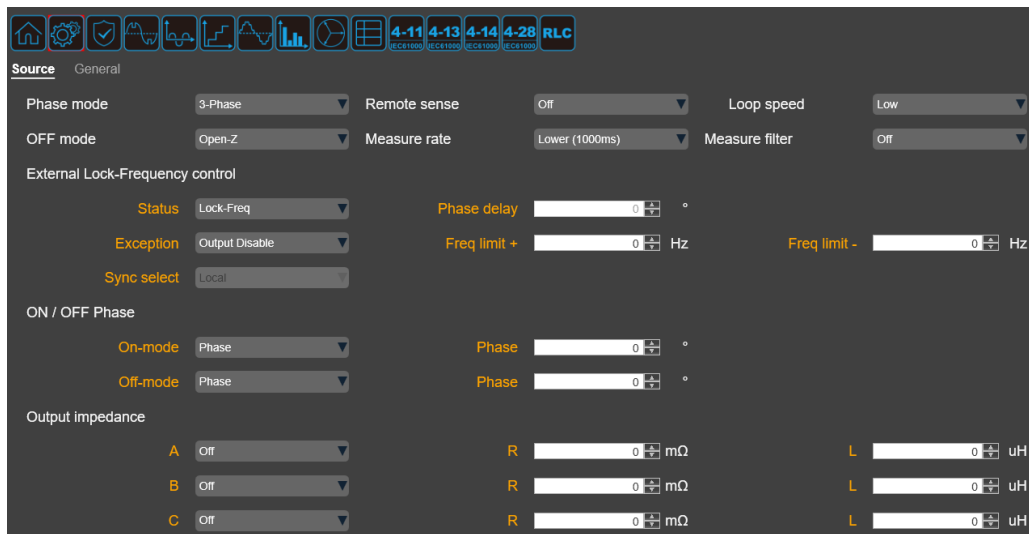
Attribute: Select the measurement attribute.

Y1/Y2: Y1 indicates the ordinate on the left and Y2 indicates the ordinate on the right.

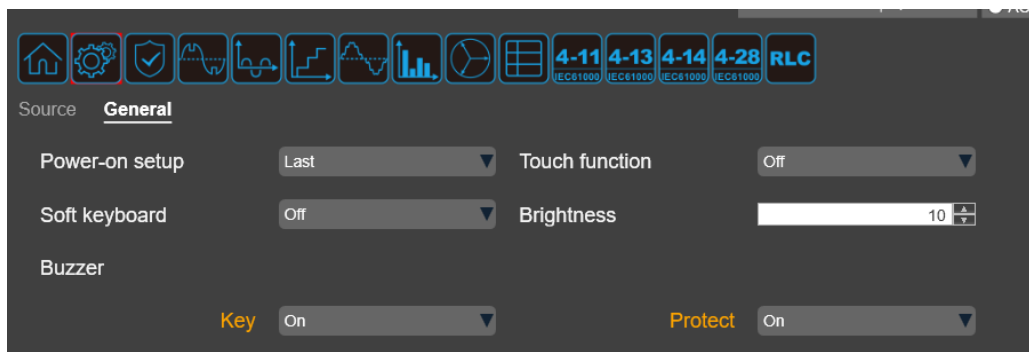
## 2.7 Setting the System Parameters

It's used to configure the system setting. For detailed parameters description, please refer to the corresponding parameter introduction in the user manual.

System setting about Source interface:

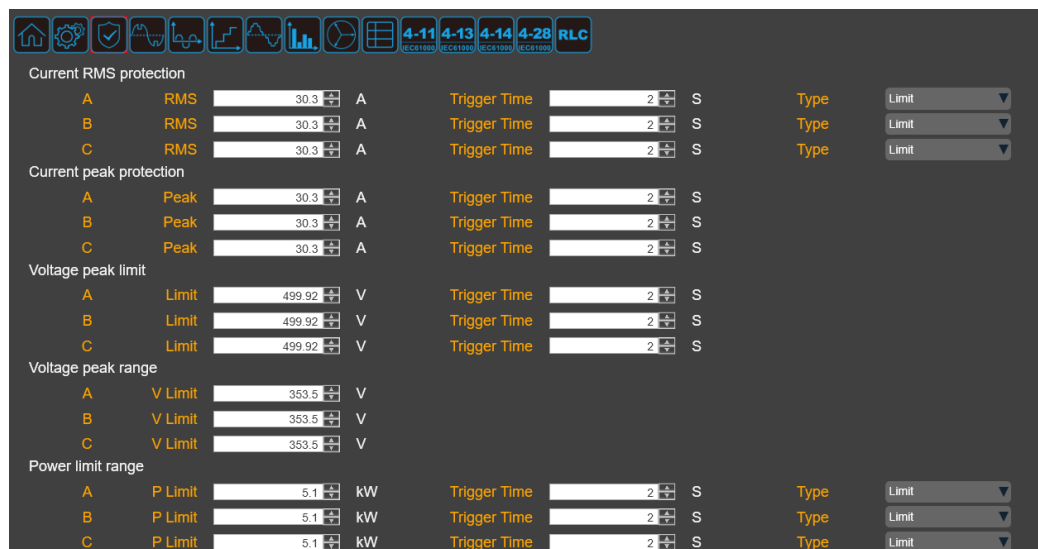


General setting interface:



## 2.8 Setting the Protection Parameter

Users can set the protection function in the protection interface: overcurrent protection (Current RMS protection, Current peak protection), voltage limit protection and over-temperature protection (OTP).

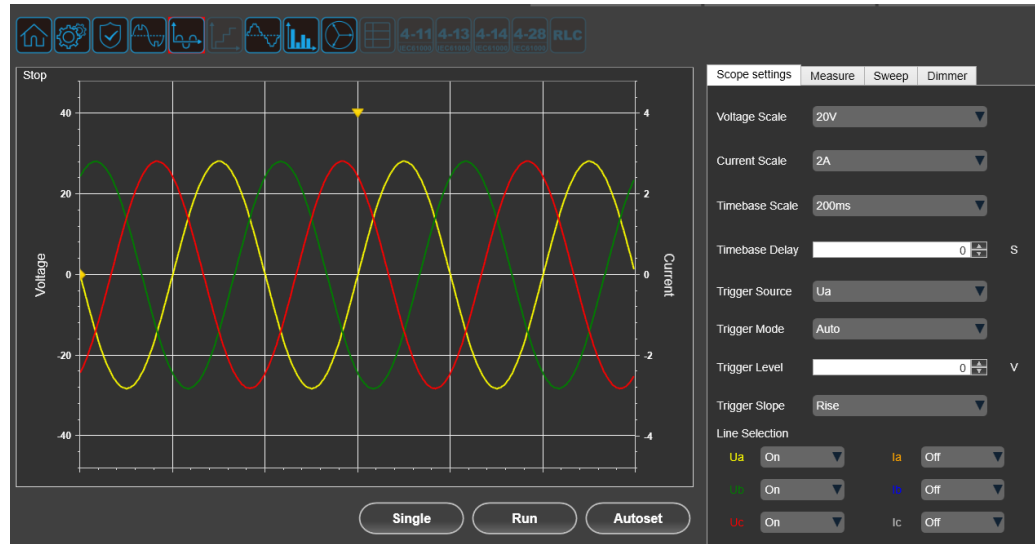


Protection Type	Phase	Parameter	Value	Unit	Trigger Time	Unit	Type
Current RMS protection	A	RMS	30.3	A	2	S	Limit
	B	RMS	30.3	A	2	S	Limit
	C	RMS	30.3	A	2	S	Limit
Current peak protection	A	Peak	30.3	A	2	S	
	B	Peak	30.3	A	2	S	
	C	Peak	30.3	A	2	S	
Voltage peak limit	A	Limit	499.92	V	2	S	
	B	Limit	499.92	V	2	S	
	C	Limit	499.92	V	2	S	
Voltage peak range	A	V Limit	353.5	V			
	B	V Limit	353.5	V			
	C	V Limit	353.5	V			
Power limit range	A	P Limit	5.1	kW	2	S	Limit
	B	P Limit	5.1	kW	2	S	Limit
	C	P Limit	5.1	kW	2	S	Limit

For detailed parameters description, please refer to the corresponding parameter introduction in the user manual.

## Chapter3 Oscilloscope Display

PV7900 Pro software has the function to display the waveform based on sampling data. Press Scope and enter the Oscilloscope interface. The user can choose to display or hide the voltage and current waveform. Only the necessary waveform is displayed, which can facilitate observation. The waveform display interface includes the vertical axis and horizontal axis.



**Single:** Single measurement key: when single measurement is enabled in the Stop status, the stop status is enabled again after one measurement based on the current data updating rate, the instrument immediately restarts one measurement and then enters the Stop status.

**Run/Stop:** press the corresponding soft key to run or stop the waveform status.

**Autoset:** Automatically adjusts the scale of the appropriate vertical axis.

**Scope settings:**

- Voltage Scale: Adjust voltage range
- Current Scale: Adjust current range
- Timebase Scale: Adjust time base range
- Timebase Delay: Time base delay time
- Trigger Source: Select trigger source, Voltage/Current and rise edge or fall edge can be select.
- Trigger Mode: Auto and Normal can be select.
- Trigger Level: The trigger level refers to the level which the trigger slope passes through.
- Trigger Slope: The slope refers to the change of the signal from low level to high level (rising edge) or from high level to low level (falling edge). The slope used as a trigger condition is referred to as the trigger slope.
- Line Selection: choose to display or hide the voltage and current waveform.

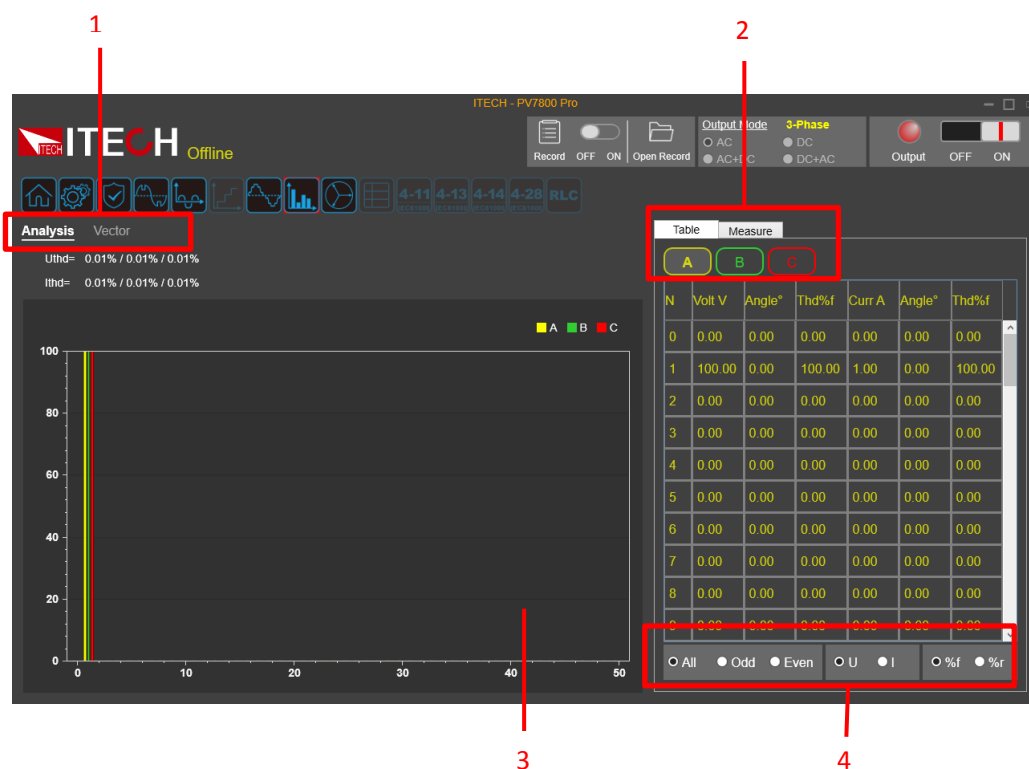
Measure: display the output measurements. The parameters refer to main interface.

Sweep: Sweep function, for details refer to the Sweep function.

Dimmer: Dimmer function, for details refer to the main interface.

## Chapter4 Harmonic Measurement

Click Harmonics or Vector and enter to the interface of harmonic measurement.



1: Harmonic measurement data display mode, Analysis mode and Vector mode.

2: Select the harmonic measurement or output measurement

Table: display harmonic measurement

Measure: display output measurement

A/B/C: select phase

3: Harmonic measurement data display area

4: Harmonic parameter attribute

U/I: Select the voltage/current harmonic

All/Odd/Even: Select the Odd/Even/All

%r/%f: Distortion factor calculation formula

# Chapter5 Configuration Arbitrary Waveform

## 5.1 Setting of Surge/Sag Configuration

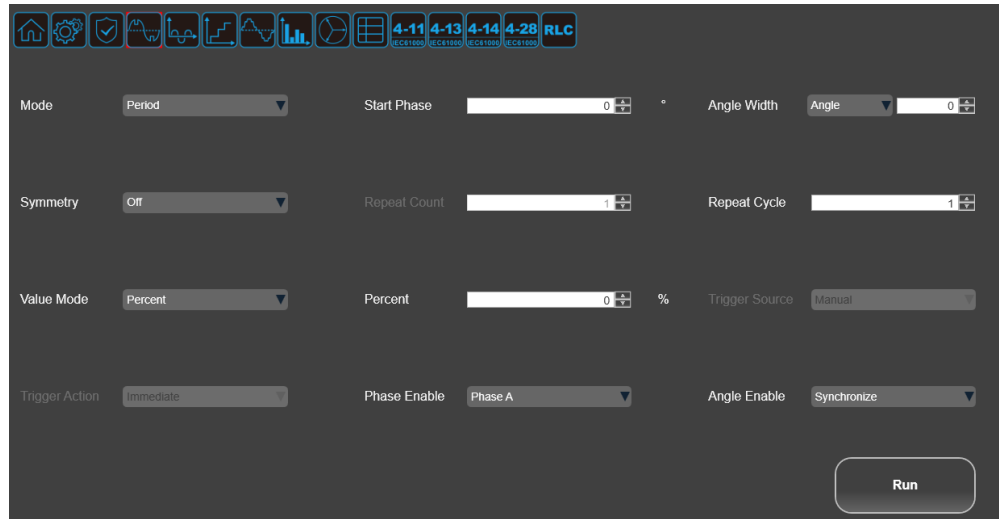
IT7900 provides surge/sag simulation. The user can add surge/sag to simulate abnormal voltage fluctuation on the basis of output wave, and test usage of the DUT under this circumstance.

Surge/sag can be added to any waveform, and can be added to List and Sweep output waveform.

The Surge/Sag function is not supported in multi-channel mode.

When the Sweep or List mode is selected, the Angle Width can only be set to Angle, not time.

Setting the parameter and click the Run to execute the simulate abnormal voltage fluctuation.



Parameter	Description
Mode	surge/sag executing mode. Trig: Trigger mode. Execute the surge/sag after receiving the trigger signal. Period: Period mode. Execute the surge/sag based on the period.
Start angle	Set the start phase angle of the surge/sag when the mode is trigger mode.
Angle width	Set the period of the surge/sag. Angle: Angle width, start angle=30 degree, Angle width=30 degree, then, the waveform will execute surge/sag at 30 to 60 degree. Time: Time width, Freq=50Hz, Time=10ms, then, the waveform will execute surge/sag half a cycle.
Symmetry	Whether to produce symmetrical surge/sag waves. If Start angle + Angle width > 180°, this setting is Off state.

Repeat count	repeat count of surge/sag waves.
Period count	<p>Number of cycles to generate surge/sag waves. This parameter is meaningful only in Period mode.</p> <p>This setting is used in combination with Repeat count, for example, if <b>Repeat count</b> is set to 5 and <b>Period count</b> is set to 10, five surge/sag waves occur in every 10 cycles.</p>
Value Mode	<p>Value select:</p> <p>Percent: Set the percentage of the surge/sag amplitude to AC signal amplitude (RMS).</p> <p>Setting: Set the value of the surge/sag amplitude.</p>
Trigger Source	Select trigger source
Trigger Action	<p>Immediate: Executing the surge/sag immediately.</p> <p>Phase: Executing the surge/sag at specific phase.</p>
Phase Enable	<p>Phase A/Phase B/Phase A&amp;B/Phase B&amp;C/Phase A&amp;C/PhaseA&amp;B&amp;C:</p> <p>Select the phase information where the surge/sag occurs. (displays under 3-phase mode)</p>
Angle Enable	<p>Synchronize: Each of the three phases executes surge/sag at the same time.</p> <p>Specify Phase: Each of the three phases executes surge/sag at the specified phase. (displays under 3-phase mode)</p>

## 5.2 Sweep Function

The Sweep function is used to test efficiency of power supply and capture the voltage and frequency at the maximum power point. The voltage and frequency of power may be altered in the form of step ladder by setting the initial voltage, final voltage, step voltage, initial frequency, final frequency, step frequency and one-step time. Sweep function is not applicable under DC mode and DCAC mode.

Parameter	Explain
Start voltage	Set the starting voltage.
Stop voltage	Set the ending voltage.
Step Voltage	Set the step voltage.
Start freq	Set the starting frequency.
Stop freq	Set the ending frequency.
Step freq	Set the step frequency.
Step time	Set the step time.
Repeat Count	扫描循环次数。
Waveform	Select sweep waveform Sine Square Sawtooth Triangle Trapezoid DST1-30: built-in 30 THD waveforms
Mode	Set the sweep mode. Time: Time Sweep Mode Trigger: Trigger mode
Trigger Source	Select the Trigger source: Manual BUS Trigger1 Trigger2
Priority	Priority setup Volt-Priority Freq-priority Volt&Freq

Parameter	Explain
Finish state	Set the running state after the sweep execution is finished: <ul style="list-style-type: none"> <li>• off: Directly turn off the output after the execution is finished;</li> <li>• Last: Keep the last waveform unchanged after the execution is finished.</li> </ul> Normal: return to normal mode after the sweep execution is finished.

## 5.3 List Function

Click List, enter to list function interface.

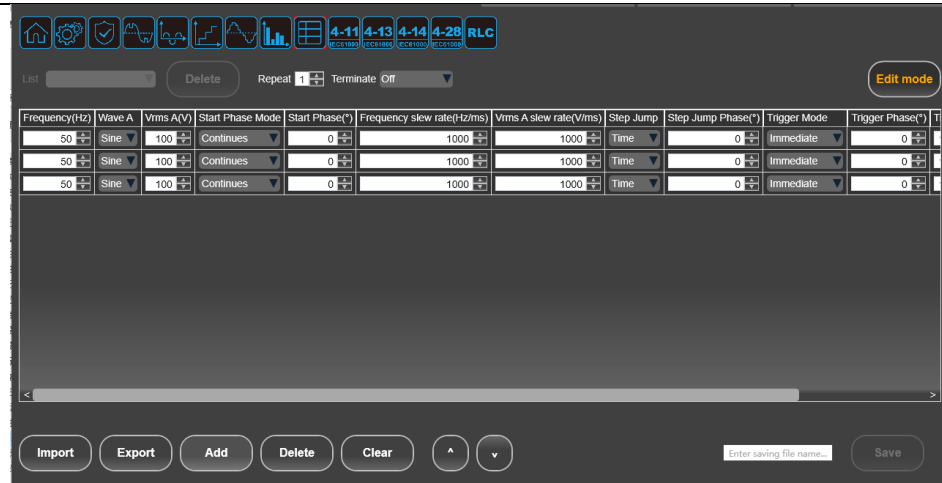


### Run List File

1. After entering the List interface, the software will read the List file saved inside the instrument.
2. Select an existing List file from the drop-down List box corresponding to List in the upper left.
3. Click Run button to executing the list file.  
Click Delete button to delete the select list file.  
Click Export button and save the list file to PC.

### Create a new List file

1. Enter to List interface and click Edit mode button.



Repeat: Edit the cycles of the List file.

Jump: Step number of a loop jump. For example, if this parameter is set to 2, the next loop will skip the previous two steps and start from Step 3. The minimum value is 0, that is, all the steps are not skipped in the next loop.

Terminate: Set the final waveform, with the following options available:

- Off: directly off the output after operation.
- Normal: return to normal after operation.
- Last: keep the last waveform output unchanged after operation.

Import: Import the exported file into the software again.

Export: Export the selected List file to a computer for saving.

Add: Add a step

Delete: Delete the select step

Clear: Clear all of step

^ v: Re-order the steps.

2. Click Add button, create a new step.

Setting the list step parameter

3. Input the list file name in **Enter saving file name...** area and press Save.



#### NOTE

If you do not connect the device to PC, the software will enter the DEMO mode. In DEMO mode, the list file cannot be saved.

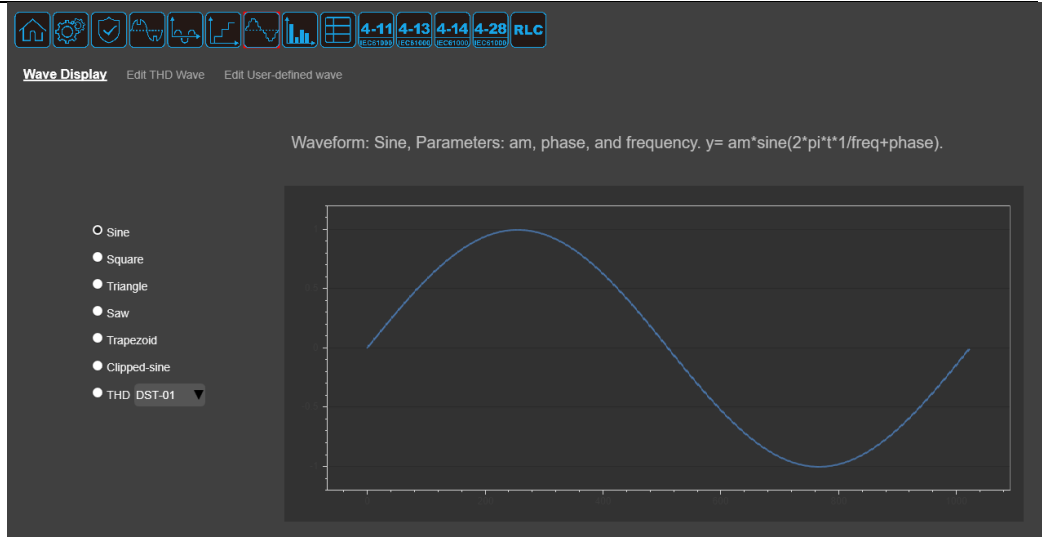
## 5.4 User-defined Waveform

Click Waveform, enter the user-defined waveform interface.

you can customize waveform curves and save them locally as output waveform options. This User-defined waveform can be used as a normal output waveform or as a wave option for sweep waveform, Surge/Sag waveform, and LIST waveform.

### Wave Display

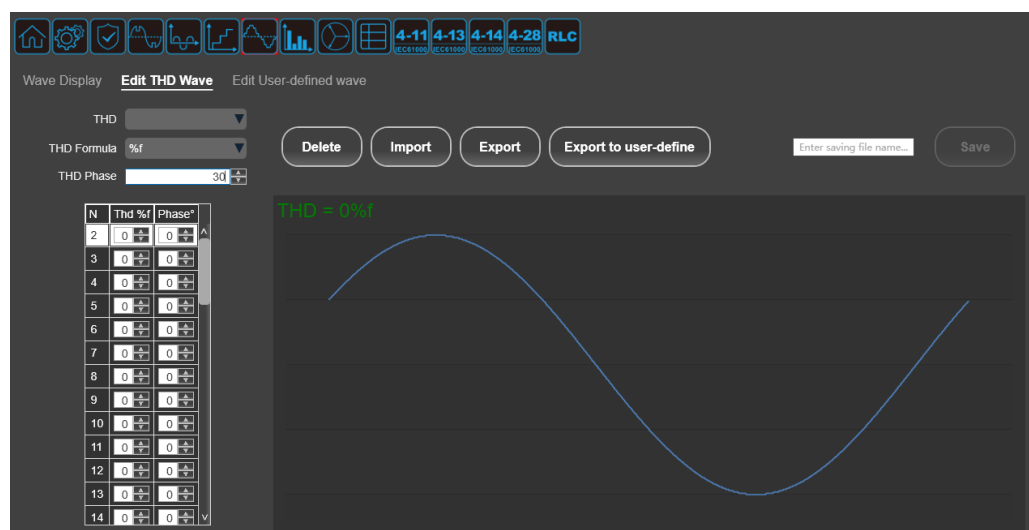
In Wave Display interface, user can select the waveform and observe it.



### Edit THD Wave:

The distorted waveform can simulate voltage harmonic wave in the circuit. The user can set the level of the output voltage waveform deviation and test the DUT.

User-defined THD waveforms are shown as below.



THD: THD waveform file name.

THD formula: Distortion factor calculation formula.

THD Phase: THD fundamental Phase angle.

Import: Import the exported file into the software again.

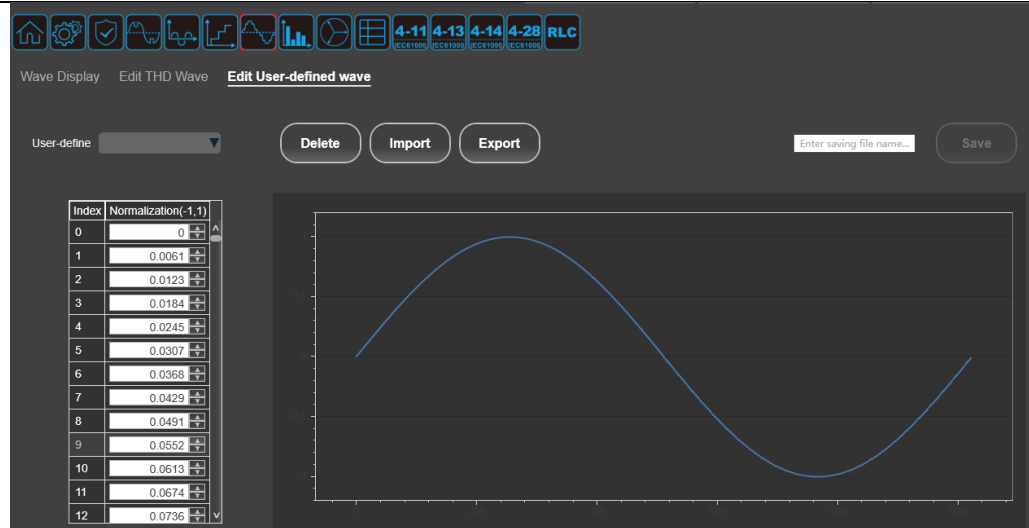
Export: Export the selected waveform file to a computer for saving.

Export to user-define: Export the selected THD waveform file to User-defined wave.

Save: Save the THD wave.

### Edit User-defined Wave

Users can edit 1024 data points to customize a waveform. This User-defined waveform can be used as a normal output waveform.



User define: user-defined file name

Delete: Delete the user-defined file.

Import: Import the exported file into the software again.

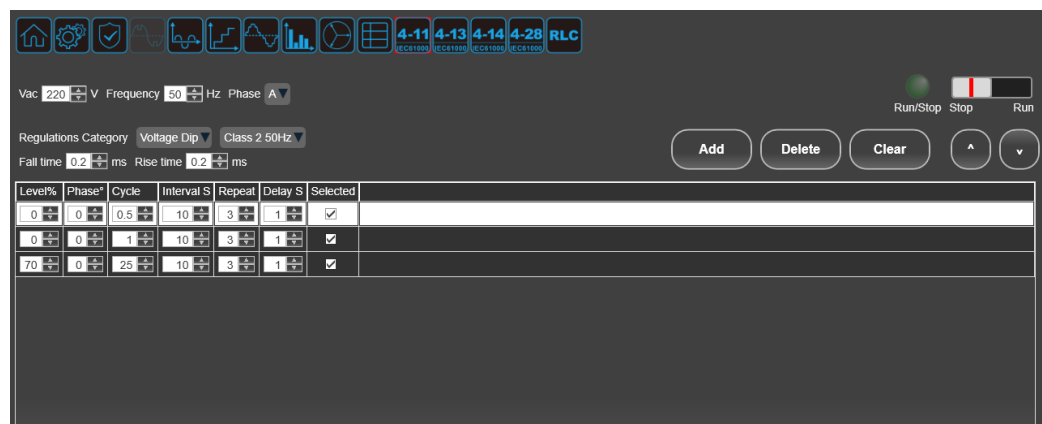
Export: Export the selected waveform file to a computer for saving.

Save: Save the user-define wave.

## 5.5 Standard IEC Regulations

IT7900 series instrument provide standard test curves in accordance with IEC 61000-4-11/4-13/4-14/4-28 regulations. It can be invoked directly by the user when testing IEC compliance tests.

### IEC 61000-4-11



Vac: Output voltage

Frequency: Output frequency

Phase: If phase A is selected, the regulatory waveform only occurs on phase A.

Regulations Category: Test items defined by standard regulations. The three projects are divided into several sub-projects according to the requirements defined by regulations, and customers select them according to the level of needs.

Fall time: Falling time

Rise time: Rising time

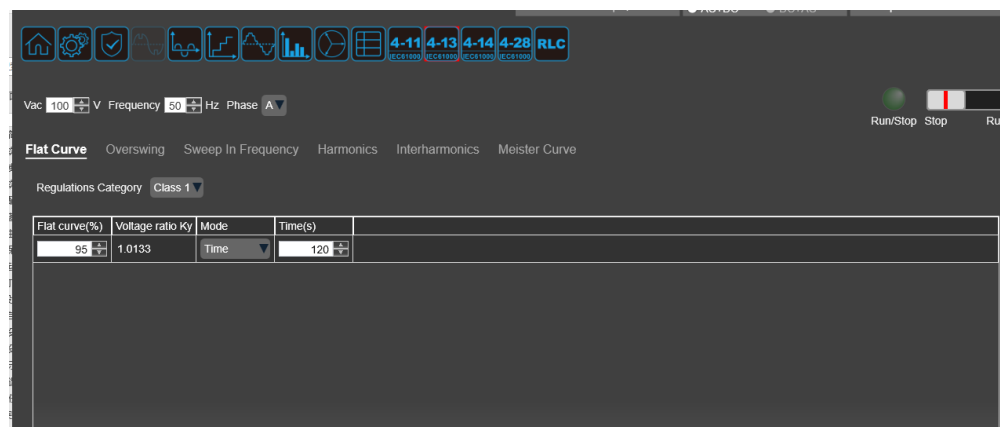
Add: Add a new step

Delete: Delete the select step

Clear: Clear all of step

^ v: Re-order the steps.

## IEC 61000-4-13



Vac: Output voltage

Frequency: Output frequency

Phase: If phase A is selected, the regulatory waveform only occurs on phase A.

Flat Curve

Overswing: Harmonic combination test over swing

Sweep in Frequency

Harmonics

Inter harmonics

Meister curve

Regulations Category: Test items defined by standard regulations. The three projects are divided into several sub-projects according to the requirements defined by regulations, and customers select them according to the level of needs.

Add: Add a new step

Delete: Delete the select step

Clear: Clear all of step

^ v: Re-order the steps.

## IEC 61000-4-14



Level%	$\Delta U$	Repeat	Delay S	Selected
Un 0 %Un	$\pm 8$	3	60	<input checked="" type="checkbox"/>
Un -10 %Un	$+ 8$	3	60	<input checked="" type="checkbox"/>
Un 10 %Un	$- 8$	3	60	<input checked="" type="checkbox"/>

Vac: Output voltage

Frequency: Output frequency

Phase: If phase A is selected, the regulatory waveform only occurs on phase A.

Regulations Category: Test items defined by standard regulations. The three projects are divided into several sub-projects according to the requirements defined by regulations, and customers select them according to the level of needs.

Repetition period

Duration time

Add: Add a new step

Delete: Delete the select step

Clear: Clear all of step

^ v: Re-order the steps.

## IEC 61000-4-28



$\Delta U/1$	$t_p$ s	Repeat	Delay S	Selected
3	10	3	60	<input checked="" type="checkbox"/>
-3	10	3	60	<input checked="" type="checkbox"/>

Vac: Output voltage

Frequency: Output frequency

Phase: If phase A is selected, the regulatory waveform only occurs on phase A.

Regulations Category: Test items defined by standard regulations. The three projects are divided into several sub-projects according to the requirements defined by regulations, and customers select them according to the level of needs.

Add: Add a new step

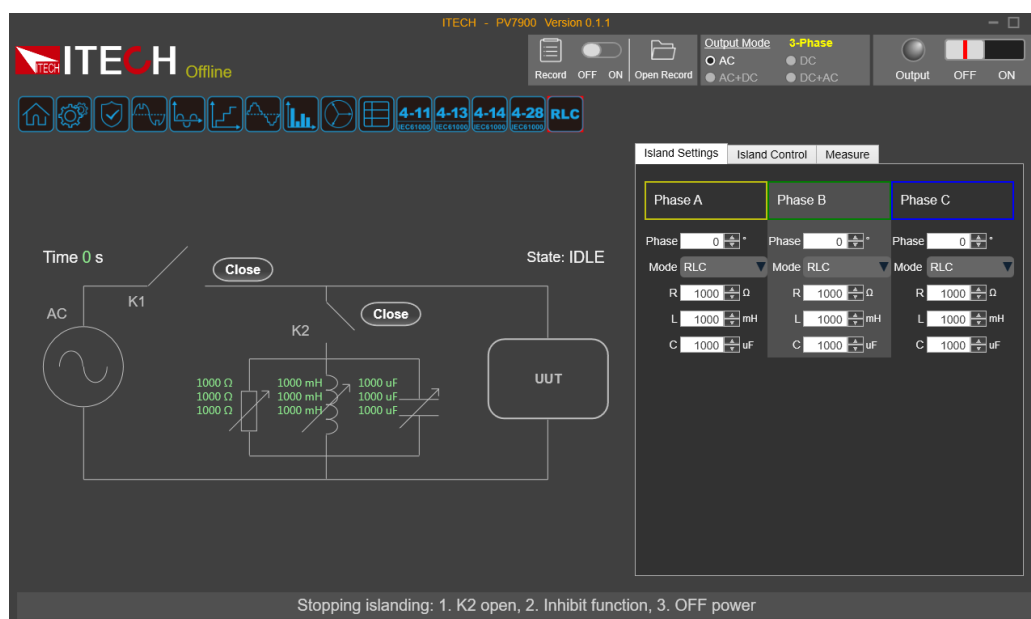
Delete: Delete the select step

Clear: Clear all of step

^v: Re-order the steps.

## 5.6 RLC Anti-islanding Test Mode

The IT7900 series provide a professional anti-islanding test mode. Users can adjust RLC parameters or configure the parameters of active power and reactive power to simulate islanding status between inverter and load when the main network is off, and verify the anti-islanding protection response time.



In the wiring schematic diagram on the left side of the screen, K1 and K2 switches can be controlled, and the right side is divided into three tabs for setting respectively:

**Island Setting:** configure the parameters of active power(P), reactive power  $Q_L$  and  $Q_C$ .

**Island Control:** The setting of judgment conditions for the anti-islanding. You can select IO signal or input parameters.

**Measure:** display output measurement

For details about the RLC function and how to use it, see IT7900 user manual.



## Connect with us

Thank you for purchasing ITECH products. Any questions, pls. feel free to let us know.

