

IT9000 Control Software

PV3600 User Manual

Notices

© Itech Electronic, Co., Ltd. 2020

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior permission and written consent from Itech Electronic, Co., Ltd. as governed by international copyright laws.

Manual Part Number

IT9000-PV3600

Revision

1st Edition: March.26, 2020

Itech Electronic, Co., Ltd.

Trademarks

Pentium is U.S. registered trademarks of Intel Corporation.

Microsoft, Visual Studio, Windows and MS Windows are registered trademarks of Microsoft Corporation in the United States and/or other countries and regions.

Warranty

The materials contained in this document are provided “as is”, and is subject to change, without prior notice, in future editions. Further, to the maximum extent permitted by applicable laws, ITECH disclaims all warrants, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. ITECH shall not be held liable for errors or for incidental or indirect damages in connection with the furnishing, use or application of this document or of any information contained herein. Should ITECH and the user enter into a separate written agreement with warranty terms covering the materials in this document that conflict with these terms, the warranty terms in the separate agreement shall prevail.

Technology Licenses

The hardware and/or software described herein are furnished under a license and may be used or copied only in accordance with the terms of such license.

Restricted Rights Legend

Restricted permissions of the U.S. government. Permissions for software and technical data which are authorized to the U.S. Government only include those for custom provision to end users. ITECH provides this customary commercial license in software and technical data pursuant to FAR 12.211 (Technical Data) and 12.212 (Computer Software) and, for the Department of Defense, DFARS 252.227-7015 (Technical Data – Commercial Items) and DFARS 227.7202-3 (Rights in Commercial Computer Software or Computer Software Documentation)

Safety Notices

CAUTION

A CAUTION sign denotes a hazard. It calls attention to an operating procedure or practice that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

WARNING

A WARNING sign denotes a hazard. It calls attention to an operating procedure or practice that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.



NOTE

A NOTE sign denotes important hint. It calls attention to tips or supplementary information that is essential for users to refer to.

Content

Chapter1	Brief Introduction	1
1.1	Software Introduction.....	1
1.2	Initial Interface Introduction	1
Chapter2	Basic Operation	3
2.1	Hardware Configuration.....	3
2.1.1	Interface Introduction	3
2.1.2	Configure Hardware Information	4
2.1.3	Configure Communication Interface of Device	5
2.1.4	Parallel and Synchronization Configuration.....	7
2.2	Multiple Devices	9
2.3	Data Setting and Saving.....	11
2.4	Data Query	12
Chapter3	Power Control Interface	14
3.1	Introduction of Control Interface	14
3.2	Configuration Function	15
3.3	Setting Voltage or Current Value	17
3.4	Program Function	18
3.5	List Function	21
3.6	Battery Test Function	23
3.7	Battery Emulator	25
3.8	Curve Zoom In and Translation	26
Chapter4	Load Control Interface	28
4.1	Introduction of Control Interface	28
4.2	SystemSetup	29
4.3	Setting Voltage or Current Value	31
4.5	Program Function	32
4.6	GO/NG	34
4.7	List	36
4.8	Battery Test.....	39
3.8	Curve Zoom In and Translation	40

Chapter1 Brief Introduction

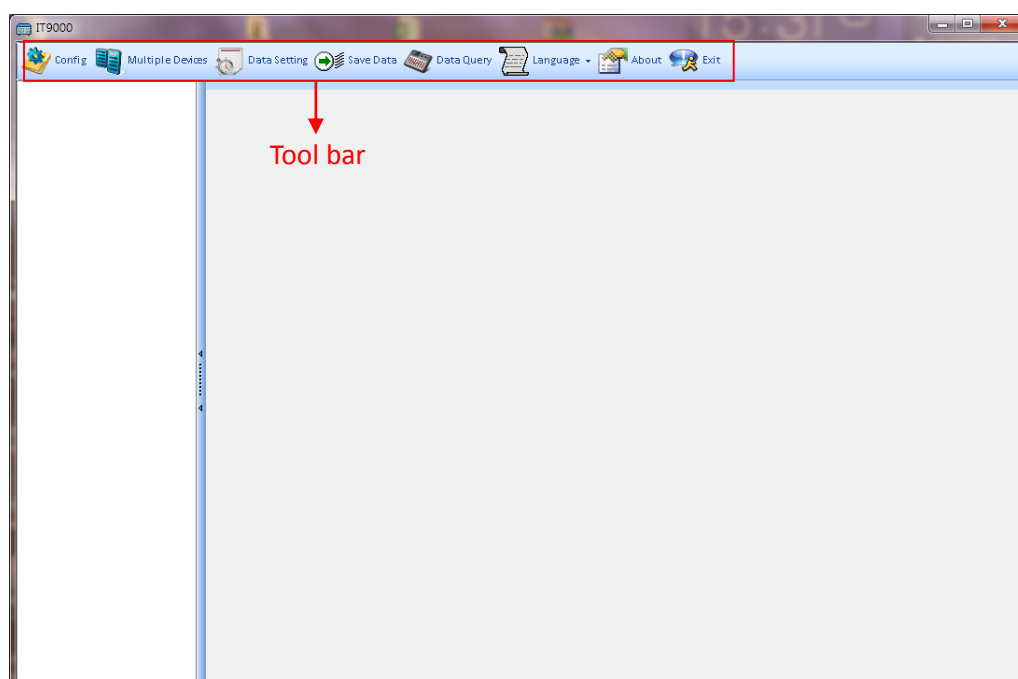
1.1 Software Introduction

IT9000 series software is a kind of easy-to-use and practicable control software designed by Itech Electronic Co., Ltd. It can work with hundreds of Itech power supplies, electronic loads, internal resistance testers, temperature recorders, power meters, and more.

Using IT9000-PV3600 software you can make it simple to connect multiple IT-M3600 series power supplies with no programming, rapidly configure the most commonly used controls and measurements and record and view multiple measurements simultaneously. In addition, you can analyze results with built-in data export function in computer.

1.2 Initial Interface Introduction

When you run IT9000 software for the first time, the default UI language is English. You can click **[Language]** to set the desired language if needed.



The descriptions of each item in the tool bar are as follows.

- **Config**
Configuration function, to configure hardware information for the device controlled by IT9000 software, including device alias, device interface and interface parameter, and to configure sub-devices (e.g., channels) for each device.
- **Multiple Devices**
Multiple devices, to select multiple devices connected to IT9000 and control them in the same interface.
- **Data Setting**
Data setting, mainly to select numeric field to be saved, device alias and

save interval before data saving.

- **Save Data**

Data saving, mainly to save current test data. Before data saving, please set data at first.

- **Date Query**

Data query, to open the data file saved before.

- **Language**

To select software language version, including Simplified Chinese, Chinese-traditional and English.

- **About**

To list related information of software, including Company website.

- **Exit**

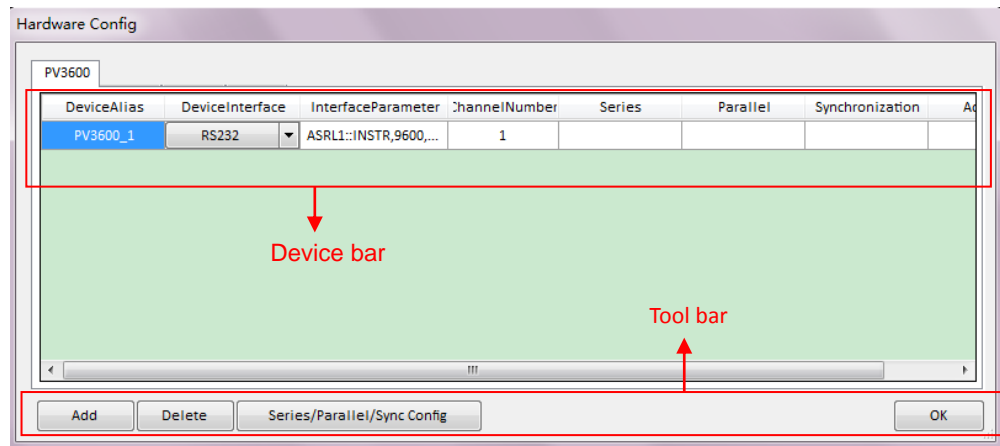
To exit IT9000 software.

Chapter2 Basic Operation

2.1 Hardware Configuration

2.1.1 Interface Introduction

The hardware configuration interface of IT9000 software is as shown below.



- The parameters in “Device bar” are described as follows.
 - ◆ Device Alias: the alias of a device, used to distinguish devices of the same model.
 - ◆ Device Interface: drop-down options include RS232, GPIB, USB and Ethernet.
 - ◆ Interface Parameter: the interface parameter corresponding to device interface.
 - ◆ Channel Number: to set the channel number of sub-device. The user needs to set on the software based on the corresponding channel number displayed when the device is powered on. If wrong channel number is configured, the device will buzz.
 - ◆ Series: to display series configuration name in series connection of devices.
 - ◆ Parallel: to display parallel configuration name in parallel connection of devices.
 - ◆ Synchronization: to display synchronization configuration name in synchronization of devices.
 - ◆ Address: to set load communication address (used for devices with frame format protocol).
- The main function in tool bar are described as follow.
 - ◆ Add: to add hardware device.
 - ◆ Delete: to delete specific device.
 - ◆ Series/Parallel/sync Config: to configure multiple devices to series connection, parallel connection or synchronization operation.
 - ◆ OK: to confirm hardware configuration information.

2.1.2 Configure Hardware Information

This function enables the user to create new hardware information or modify existing hardware device information. Detailed operation steps will be given below taking creation of new device information as example.

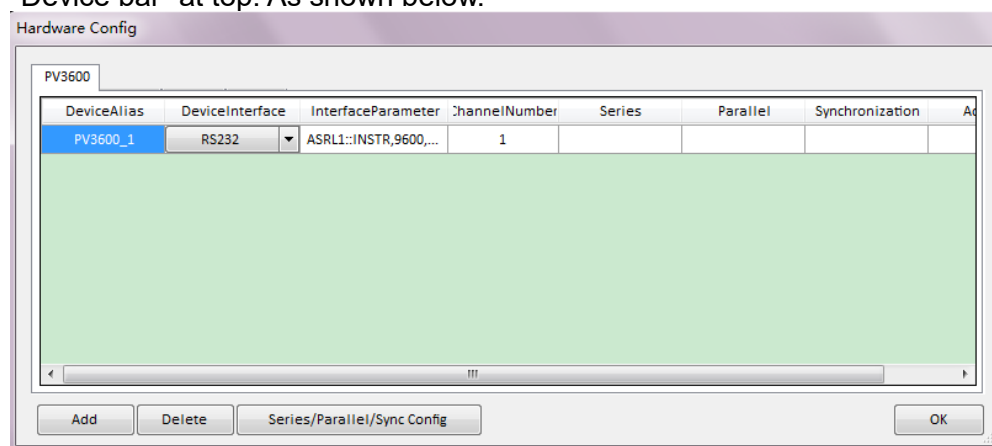
Preparation

IT9000 software supports RS232, USB, GPIB and Ethernet serial port communication. The user need to connect the device and computer installing IT9000 software via communication interfaces at first.

1. Before configuring hardware information, ensure that the communication in the device side is consistent with that of the software side.
The methods for querying the communication mode and parameters are as follows:
 - a) Power on the device.
 - b) Press the **[Shift] + [Save]** (System) keys to enter the system menu interface.
 - c) Select Comm and press **[Enter]**. The parameter becomes to be edited.
The interface will automatically display the corresponding interfaces information according to the actual assembled communication board.
 - d) Use left or right arrow keys or rotate the knob to adjust the communication method to be consistent with actual application and press **[Enter]** to confirm.
2. Connect the device and computer using communication cables.

Procedures

1. Run IT9000 software and click **[Config]**.
2. Click **[Add]** button in the configuration interface and display the currently added hardware device information and default parameter of device in the "Device bar" at top. As shown below.



To change default parameter of hardware device (e.g., device interface, interface parameter and channel number), you may click the parameter for change.

- Device Alias: double click to edit device alias.
- Device Interface: to select from the drop-down box.
- Interface Parameter: double click to configure in the Configure Dialog. For details, refer to Section 2.1.3 "Configure Communication Interface of Device".

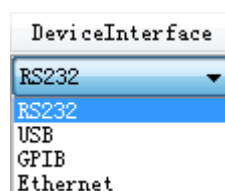
- Channel Number: set the channel number of sub-device. The channel number is changeable.
3. Click [OK] to save the configuration information of current hardware device. At this time, the device name (device alias @ channel number) will be displayed at top left of the interface. To pop up the Control Interface, you need to double click the Device Name.

2.1.3 Configure Communication Interface of Device

IT9000 software is installed in PC and interacts with matching hardware devices via different communication interfaces. This software supports interfaces like USB, RS232, GPIB and Ethernet interface. When configuring the hardware device, configure different interface types based on actual needs and set corresponding interface parameters for different interfaces.

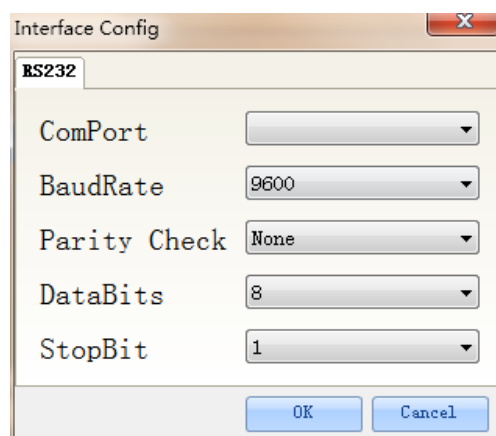
Operation steps

1. Select the device interface corresponding to the hardware device to be edited from the Hardware Configuration Interface, and select the interface type from the drop-down list.



2. After selecting the device interface, double click corresponding "Interface Parameter" column. The system will pop up "Interface Configuration" window.

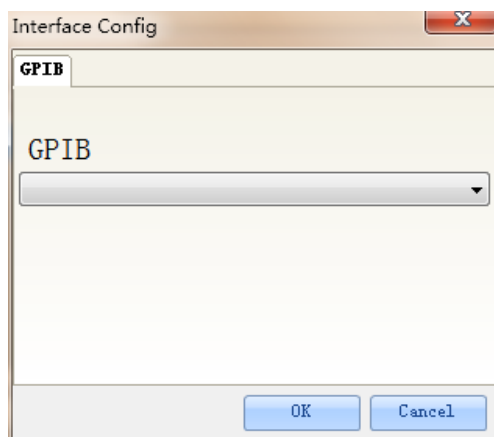
● RS232 Interface Parameter Configuration



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

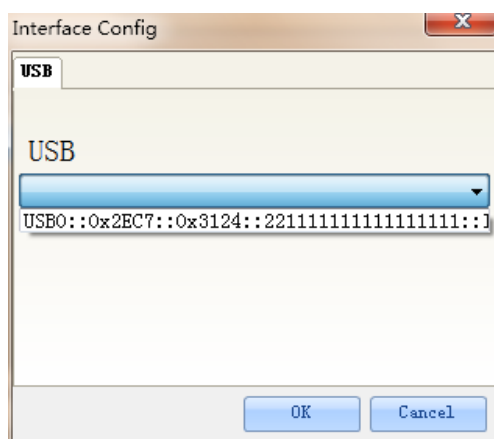
Baud rate, parity check bit, data bits and stop bit must be configured consistently with those in menu setup.

- GPIB Interface Parameter Configuration



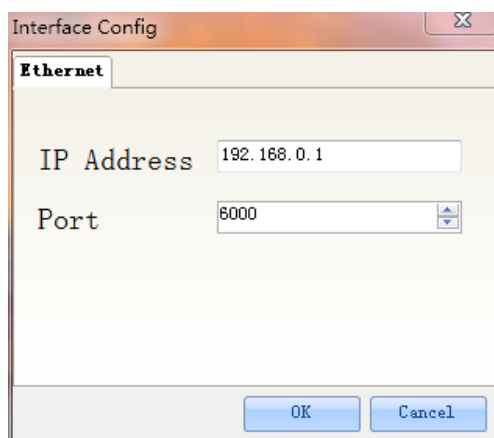
During GPIB communication of load device, the address setting range is: 0 to 30.

- USB Interface Parameter Configuration



- LAN Interface Parameter Configuration

If LAN interface is used for communication, both computers and device are connected via HUB (or, the device and computer are directly connected via cross network cable). The computer and device IP setting should be in a same network segment.

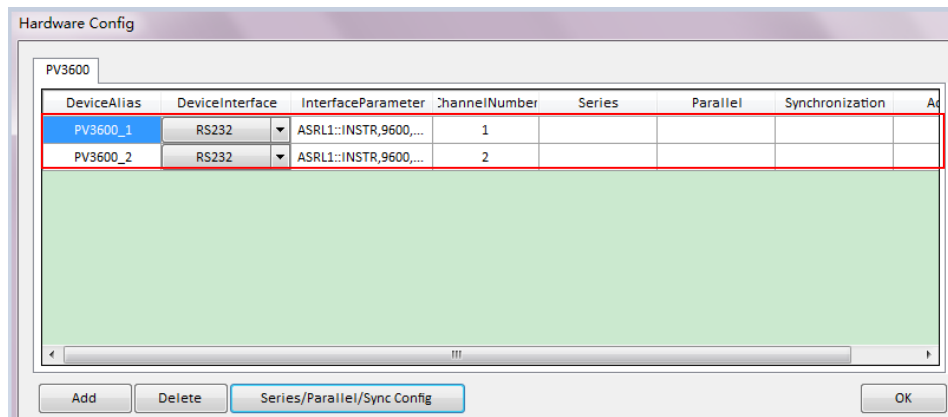


3. After interface parameter configuration, click "OK". Finish interface parameter configuration.

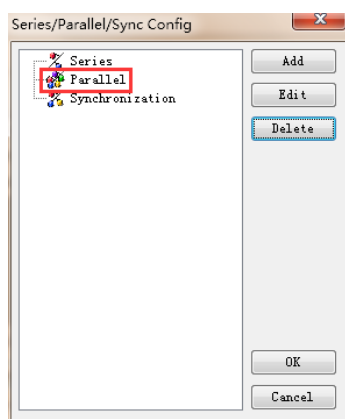
2.1.4 Parallel and Synchronization Configuration

Parallel Configuration

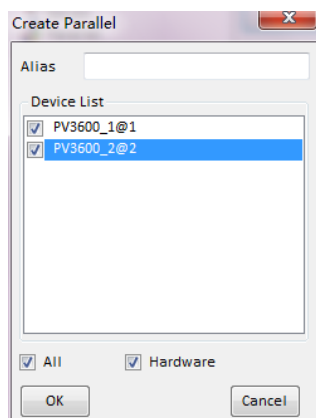
1. Follow the above steps to configure and connect 2 sets of IT-M3600 devices.



2. Click **[Series/Parallel/Synchronization]** button and click **[Parallel]** in the figure below.



3. Click **[Add]** button to create parallel.



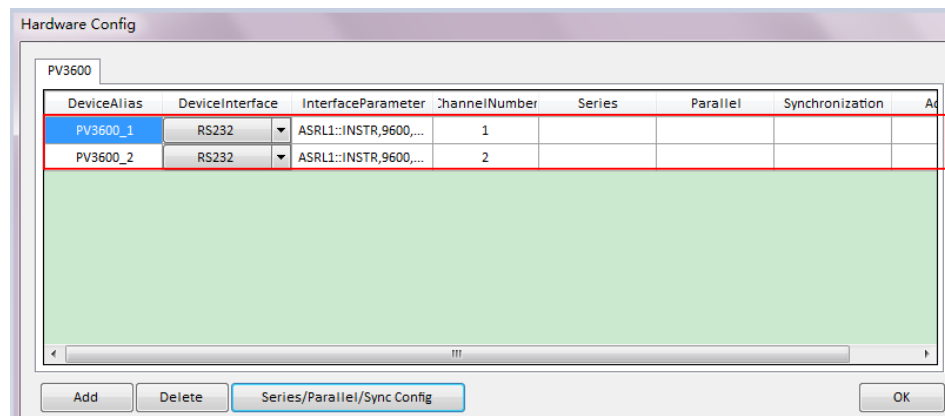
4. Name alias: IT3600. Click the box at front of PV3600_1@1 and PV3600_2@2 and select the devices for parallel, and also check the box at front of "Hardware".
5. Click **[OK]** button. The parallel configuration interface will display

configured device.

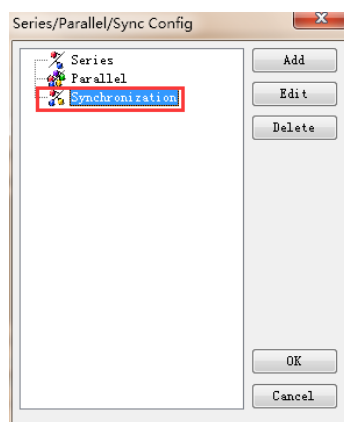
6. Click **[OK]** to save the current parallel configuration information. At this time, the parallel configuration name "IT3100_2" will be displayed at the left top of the interface.

Synchronization Configuration

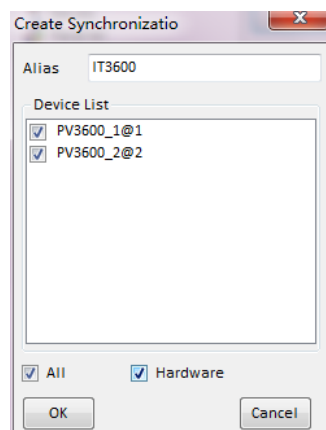
1. Follow the above steps to configure and connect 2 sets of IT-M3600 devices.



2. Click **[Series/Parallel/Synchronization]** button and click **[Synchronization]** in the figure below.



3. Click **[Add]** button to create synchronization.
4. Name alias: IT3600. Click the box at front of PV3600_1@1 and PV3600_2@2 and select the devices for synchronization, and also check the box at front of "Hardware".



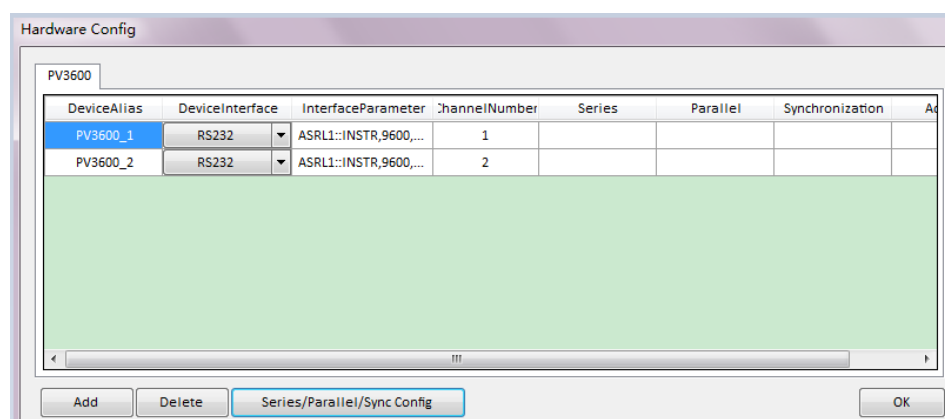
5. Click **[OK]** button. The synchronization configuration interface will display configured device.
6. Click **[OK]** to save the current synchronization configuration information. At this time, the synchronization configuration name "IT3600" will be displayed at the left top of the interface.
7. Double click IT3600 to display the Synchronization Control Interface

2.2 Multiple Devices

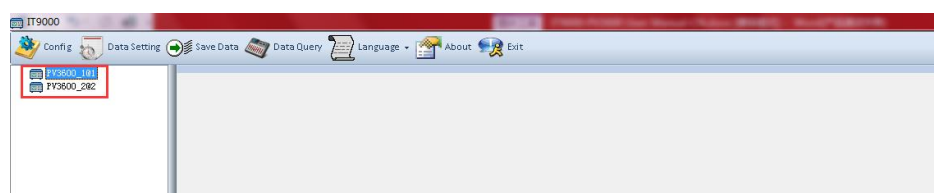
IT9000 software can control multiple devices on the same interface and rapidly configure the voltage value and current value and measurements and view multiple measurements simultaneously. Take two devices as an example to introduce the configuration procedures.

Procedures

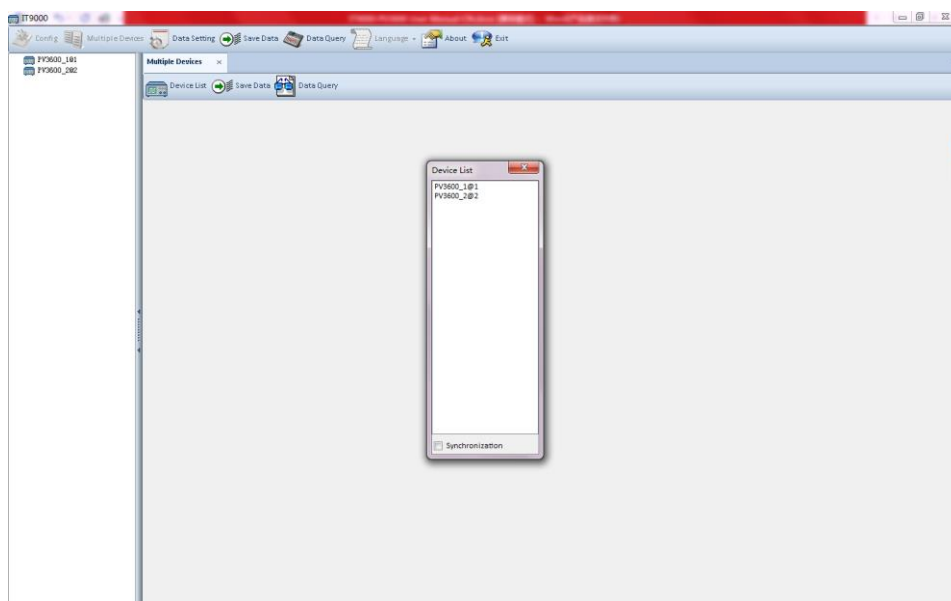
1. Follow the above steps to configure and connect 2 sets of IT-M3600 devices.



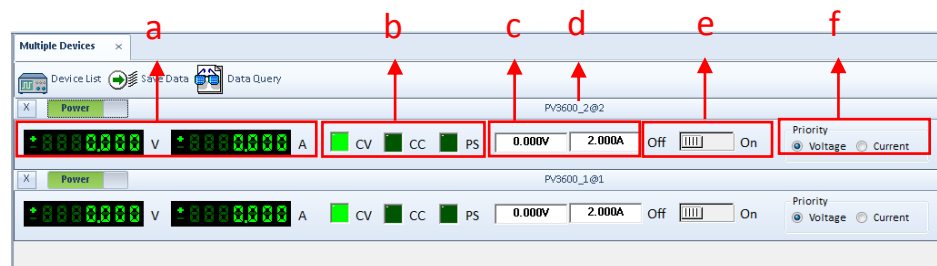
2. Click **[OK]** to save the current configuration information. At this time, the configuration names of each device (PV3600_1@1 and PV3600_2@2) are displayed on the top right of the interface.



- Click [Multiple Devices] to enter the following interface.




- Double click the PV3600_1@1 and PV3600_2@2 to select the devices needed.



The descriptions for each parameter on the interface are as follows.

- Alias: the alias for the connected devices.
- Measure voltage: to display the voltage measurement value of the device.
- Voltage: double-click to set the voltage setting value of the device.
- Set: when the setting in the software is finished, the voltage setting value doesn't take effect in the device until click Set.
- Measure current: to display the current measurement value of the device.
- Current: double-click to set the current setting value of the device.
- Set: when the setting in the software is finished, the current setting value doesn't take effect in the device until click Set.
- Output switch: to turn the output of all devices on or off.
- Save interval: to set the interval for the data save during the multiple devices test.

Save data: to save the voltage measurement value and current measurement value of all the devices in this interface.

The Power or Load button is used to switch the mode of instrument to power mode or load mode. And click the  button to remove the instrument.



Note

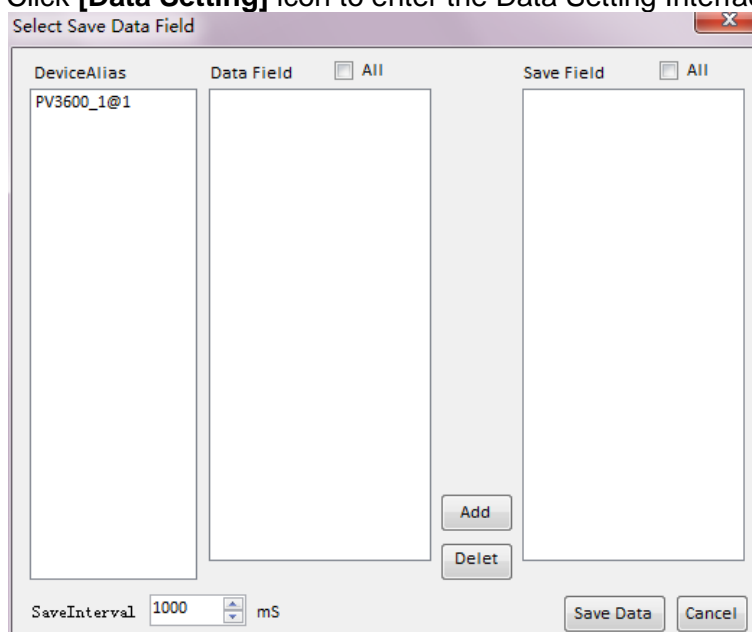
When the voltage setting value or current setting value exceeds the rated value of the device, click **[Set]** and the device issues an error and emits a short beep.

2.3 Data Setting and Saving

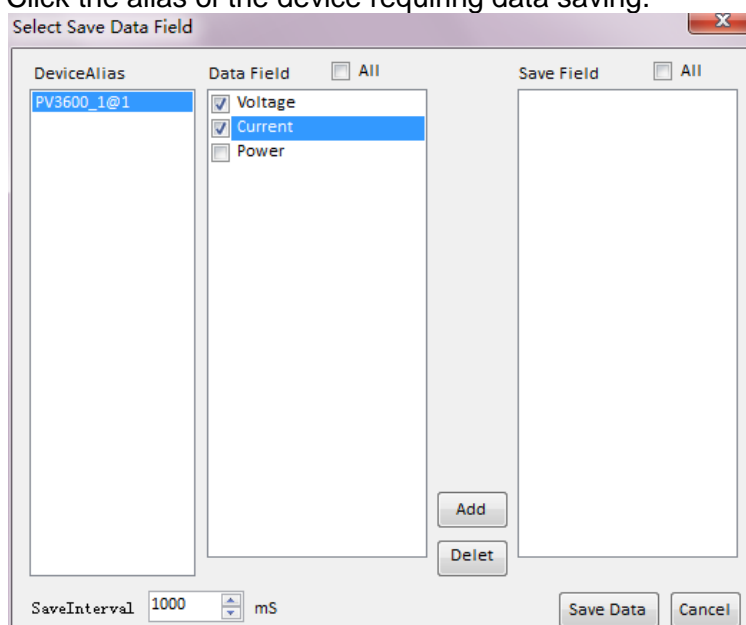
IT9000 can save test data. Before data saving, select the data field to be saved. Select the device alias for saving and the save interval.

Operation steps

1. After device hardware configuration is finished, double click the device name (device alias @ channel number) displayed at top left of the interface. At this time, Device Control Interface will be displayed. As shown below.
2. Click **[Data Setting]** icon to enter the Data Setting Interface.

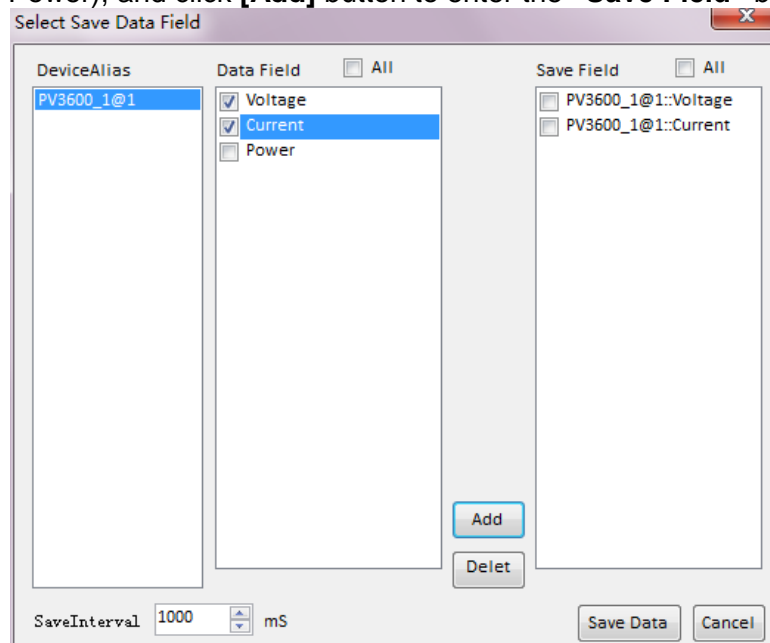


3. Click the alias of the device requiring data saving.




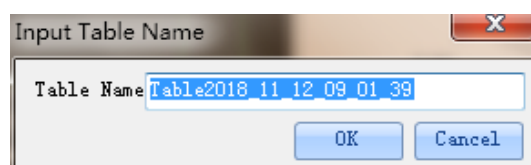
4. In **"Data Field"** bar, check the box at front of Data Field (Voltage, Current,



Power), and click **[Add]** button to enter the “Save Field” bar.



You may also click the Field Name in the Save Field bar. Click **[Delete]** button to delete the saved field.

5. Set **[Save Interval]**.
6. Click **[Save Data]** button to save data setting.
7. In the Control Interface, click  icon to appear the interface as shown below. You need to input Save File Name.




8. Click **[OK]** button in the figure above to start data save. Then, the icon will change to , and “Data Setting” and “Data Query” will be grayed out. Click  icon to stop saving.

2.4 Data Query

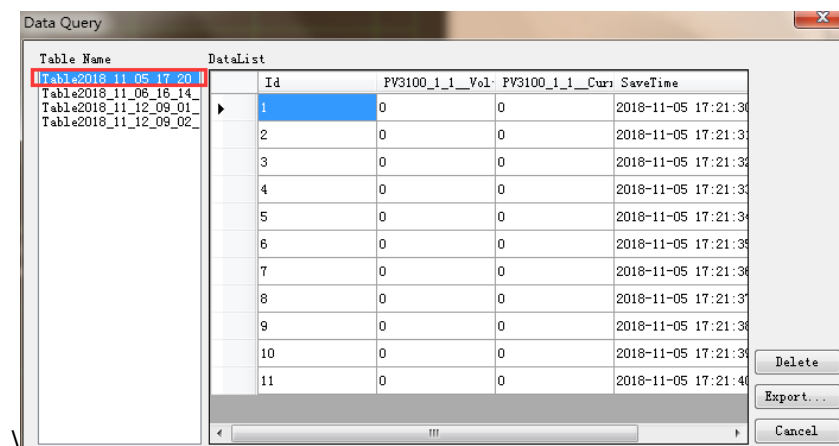
IT9000 software provides query function for measured data. You can query measured data at different periods of time and export and save these measured data.

Operation steps

1. Click  icon to enter the Data Query Interface.



2. In Data Query Interface, select and click the “Table Name” of data saving, and the test data will be displayed in the data list. As shown below.



- Delete: to delete the data in current data list.
- Export: Click Export to export the data in current data list to EXCEL table. Saving path is optional.
- Cancel: to exit the Data Query Interface.

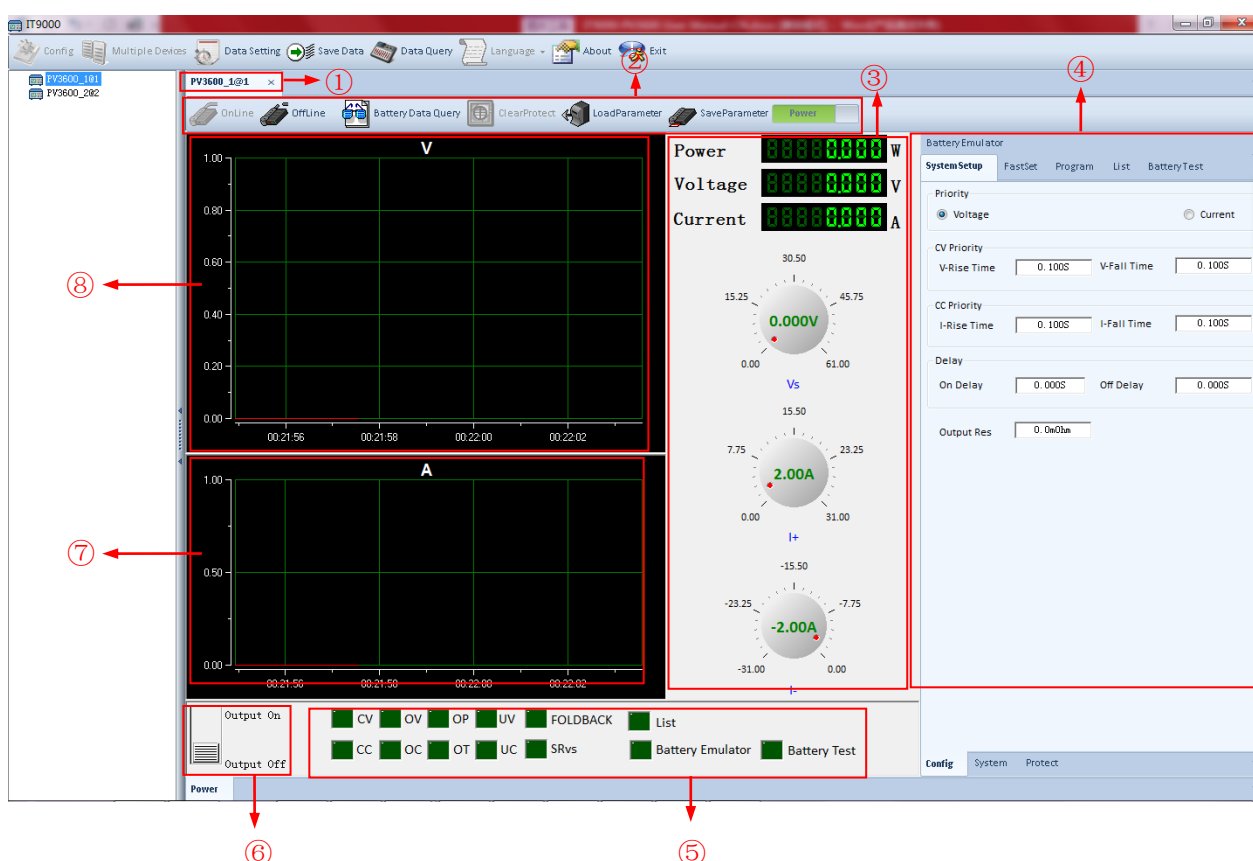
Chapter3 Power Control Interface

IT9000 software can automatically identify instrument model and display model-based functions. For specific functions, refer to user manual of corresponding model. This chapter provides description of control functions of IT9000 software based on IT-M3632. The screenshot information varies from different models, so please take the actual interfaces of instrument and software.

3.1 Introduction of Control Interface

Double click the device alias on the left side of the interface and enter into the IT9000 control interface of PV3100, as shown below.

To use the function on the software interface, you need to click **[Online]** in the tool bar to set the device to remote control mode.



The descriptions of each part are as follows.

1. Tab bar, to switch the display of Control Interfaces of different devices.
2. Toolbar, main functions include:
 - ◆ Online: remote control, to set the device to remote control mode.
 - ◆ Offline: local switch, to return the device back to local mode from remote mode.
 - ◆ Battery Data Query: to query export or save battery measurement data in different time period.
 - ◆ Clear Protect: to clear device protection status.
 - ◆ Config: to configure the Config menu, System menu and Protect menu

- of the device.
- ♦ Load Parameter: to call test parameters saved before, including fast setting, scan, program and test parameters.
 - ♦ Save Parameter: to save fast setting, scan, program and test parameters, for fast access and usage by the user.
 - ♦ Power/Load: To switch the mode of IT-M3600.
3. Display the measurement power, voltage and current value, and use the rotary knob to adjust the voltage and current setting value.
 4. System setup, Fast set, program, List, battery test, Battery Emulator function. Refer to corresponding chapter for more information.
 5. Status indicators, the descriptions are as follows.

<ul style="list-style-type: none"> ♦ CV: the output is turned on and the device is in constant voltage mode. ♦ OV: over-voltage protection. ♦ OP: over-power protection. ♦ UV: under-voltage protection. ♦ SRVs: Sense reverse connection protection. ♦ Battery Emulator: battery emulator operation. ♦ Battery: battery test operation. 	<ul style="list-style-type: none"> ♦ CC: the output is turned on and the device is in constant current mode. ♦ OC: over-current protection. ♦ OT: over-temperature protection. ♦ UC: under-current protection. ♦ FOLDBACK: Fold back protect ♦ LIST: list operation. ♦ -
---	---
 6. Output On/Off switch
 7. Current curve graph
 8. Voltage curve graph

3.2 Configuration Function

IT9000 software provides configuration function. User can configure the most commonly used controls and measurements in the Config menu, System menu and Protect menu of the device. Please refer to IT-M3600 user manual for more information about the detailed introduction.

Config Menu Interface

In the Config menu interface, the user can configure the voltage rising and falling time, current rising and falling time, output-on and output-off delay time, output timer.

Priority

☒ Voltage
☐ Current

CV Priority

V-Rise Time
V-Fall Time

CC Priority

I-Rise Time
I-Fall Time

Delay

On Delay
Off Delay

Output Res

System Menu Interface

In the System menu interface, the user can turn the beeper sound on or off, set the sense state and specify the power-on state.

Beep

☐ OFF
☒ ON

Sense

☒ OFF
☐ ON

PowerOn

☒ Reset
☐ Last
☐ Last + Off

Protect Menu Interface

You can set the following functions in the Protect menu interface.

Over-voltage protection, over-current protection, over-power protection, under-voltage protection, under-current protection and UUT over-temperature protection and foldback protection, these functions disable the output to protect the device under test (DUT), as well as the power supply.

OVP

☒ OFF
☐ ON
Level
Delay

OCP

☒ OFF
☐ ON
Level
Delay

OPP

☒ OFF
☐ ON
Level
Delay

UVP

☒ OFF
☐ ON
Warm-Up

Level
Delay

UCP

☒ OFF
☐ ON
Warm-Up

Level
Delay

UUT OTP

☒ OFF
☐ ON
Level

FOLDBACK

☒ OFF
☐ CC
☐ CV
Delay

3.3 Setting Voltage or Current Value

You can set voltage or current value by the following three methods.



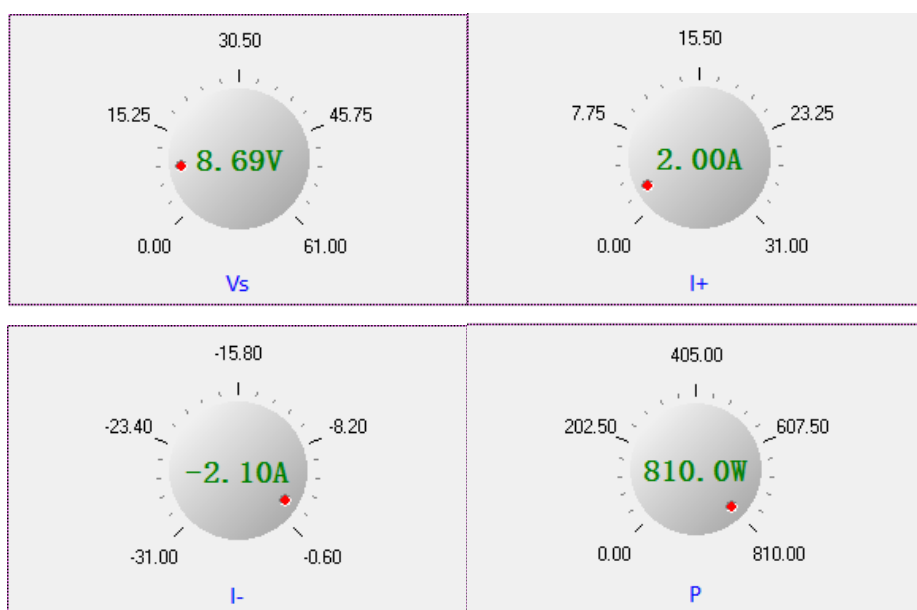
Note

When setting the set value with software, be sure that you have clicked **[Online]** to set the power supply to Remote Control status. "Online" status is gray, click "Offline" to disconnect Remote Control status.

Simulated Pulsating Knob

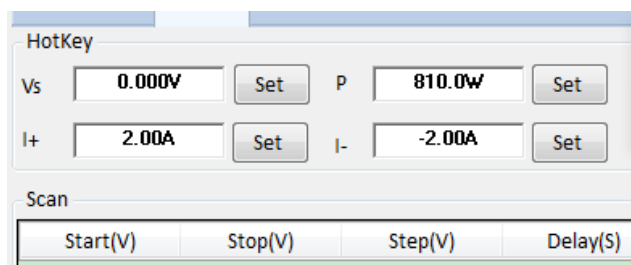
Move the mouse to Simulated Pulsating Knob. Click and rotate the mouse to set the voltage or current value. The displayed power, voltage and current values are the real-time measurement values.

Voltage and current ranges differ from models. The figures below are only for reference.



Fast Setting Function

Using Simulated Pulsating Knob can't set the value accurately. If you want to set accurately, you can enter the desired voltage or current values in the following fast set boxes. Click **[Set]** and then the setting value will take effect.



The Fast Setting Function interface includes a 'HotKey' section with input fields and 'Set' buttons for Vs, I+, I-, and P. Below this is a 'Scan' section with a table for defining scan steps.

Start(V)	Stop(V)	Step(V)	Delay(S)

Scan Function

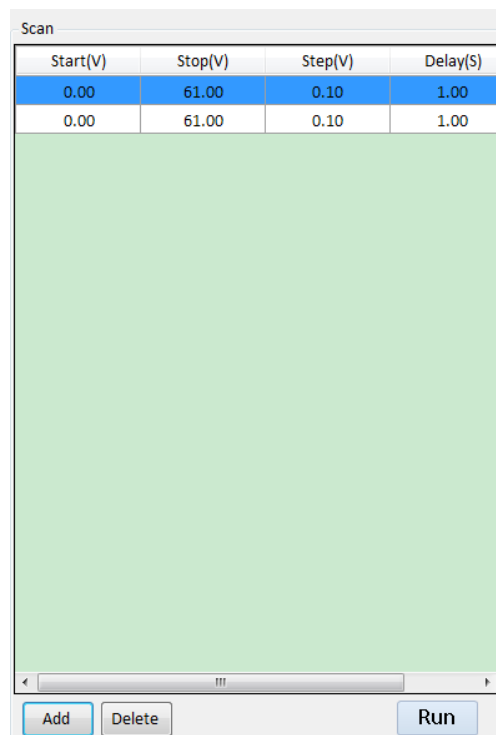
The user can use scan function to create a test program made of multiple scan steps. You must specify a scan type (V or I) for each step, set the start value, stop value and the step value. The device will output according to the setting

values, from start value to stop value and increase by the step value. You can also set the delay time and repetition counts for each step.

The operation steps to edit the scan test program are as follows.

1. Click **[Add]** to add a group of scan data in the scan edit area.

(Click **[Delete]** to delete the selected step.)



Start(V)	Stop(V)	Step(V)	Delay(S)
0.00	61.00	0.10	1.00
0.00	61.00	0.10	1.00

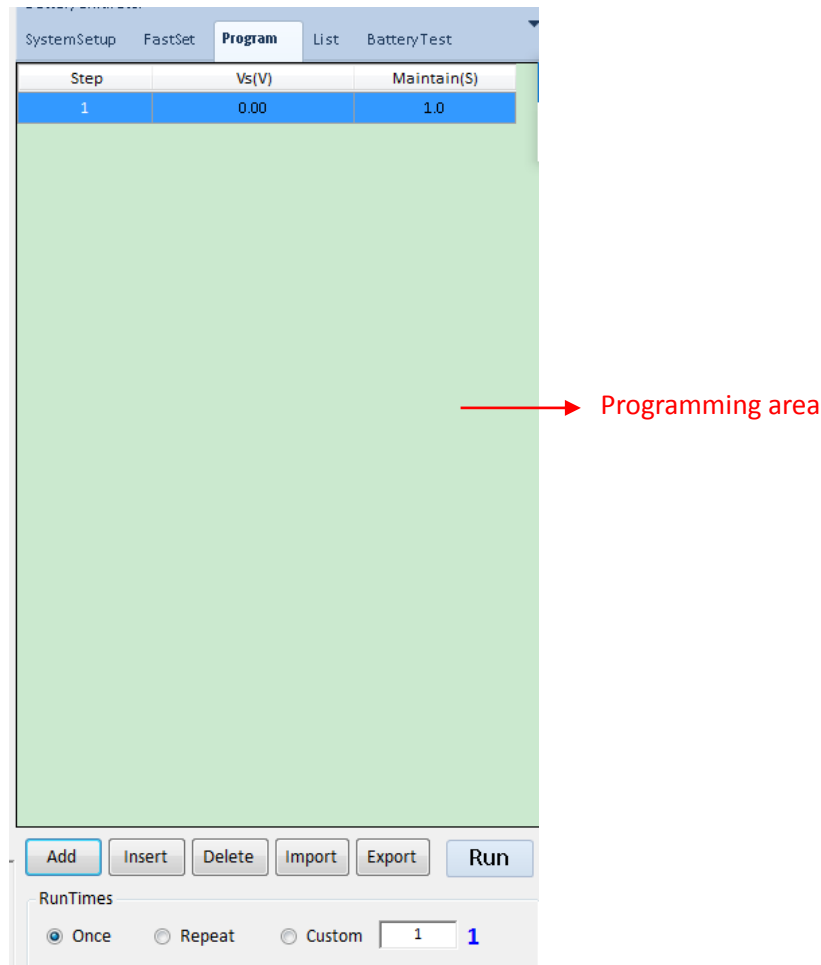
Buttons: Add, Delete, Run

2. Double click the value corresponding to scan data (Start, Stop, Step, Delay, Loop). Set them to required values.
3. If needed, repeat steps 1 through 2 to continue to add the scan step.
4. After finishing the edit, click **[Run]** to execute the scan operation.

The **[Run]** button will change to **[Stop]** button once the operation starts. Click **[Stop]** to pause the scan operation.

3.4 Program Function

The user can use program function to create a test program made of multiple steps. The user need to set the voltage value, current value and delay time for each step, and can also set the repeat times for the test program. In addition, the user can save the test program by exporting it to PC and can also import it from PC.



Program Interface Introduction

- **Add:** Add a step. Click this button to add 1 step.
- **Insert:** Insert a step. Click this button to insert 1 step before current step.
- **Delete:** Delete a step. Click this button to delete current step.
- **Import:** Import external program documents.
- **Export:** Export program file being edited.
- **Run Times:** Run times of List programs, which can be set as Once, Repeat or Custom. When it is customized, you need to enter the run times.
- **Run:** Run program.

Edit Program

1. Click [Program] tab to enter Fast Programming page.
2. At the bottom of Programming page, click [Add] button to add the first step of program.

Step	Vs(V)	Maintain(S)
1	0.00	1.0

3. Double click the value corresponding to program step (Voltage, Current,

Delay). Set them to required values.

4. If needed, repeat step 2 through 3 to add steps.

Import File From Externals

IT9000 software supports import function of program files. The user can finish the editing of program file in Excel and import it into the software. This function simplifies the program file edit and facilitates user operation. Detailed operation steps are as below:

1. Create a new Excel document on local PC and name it program.
2. Open the Excel document and save it as in "other formats" i.e. "(*.csv)".
3. Open the *program.csv* document and edit the program. Set every step of the program and corresponding parameters. After setting, save and close the document.

A	B
Vs (V)	Maintain(S)
0	1
3	1
6	1

4. Click **[Import]** button. Select and open *program.csv* file. Finish import of the program file.

SystemSetup	FastSet	Program	List	BatteryTest
Step	Vs(V)	Maintain(S)		
1	0.00	1.0		
2	3.00	1.0		
3	6.00	1.0		
4	12.00	1.0		

Run Program File

1. Follow the steps above to edit program file.
2. Set Run Times, including Once, Repeat or Custom. When Custom is selected, you may set the repetition count of programs.

RunTimes

☒ Once
☐ Repeat
☐ Custom

1
1



Note

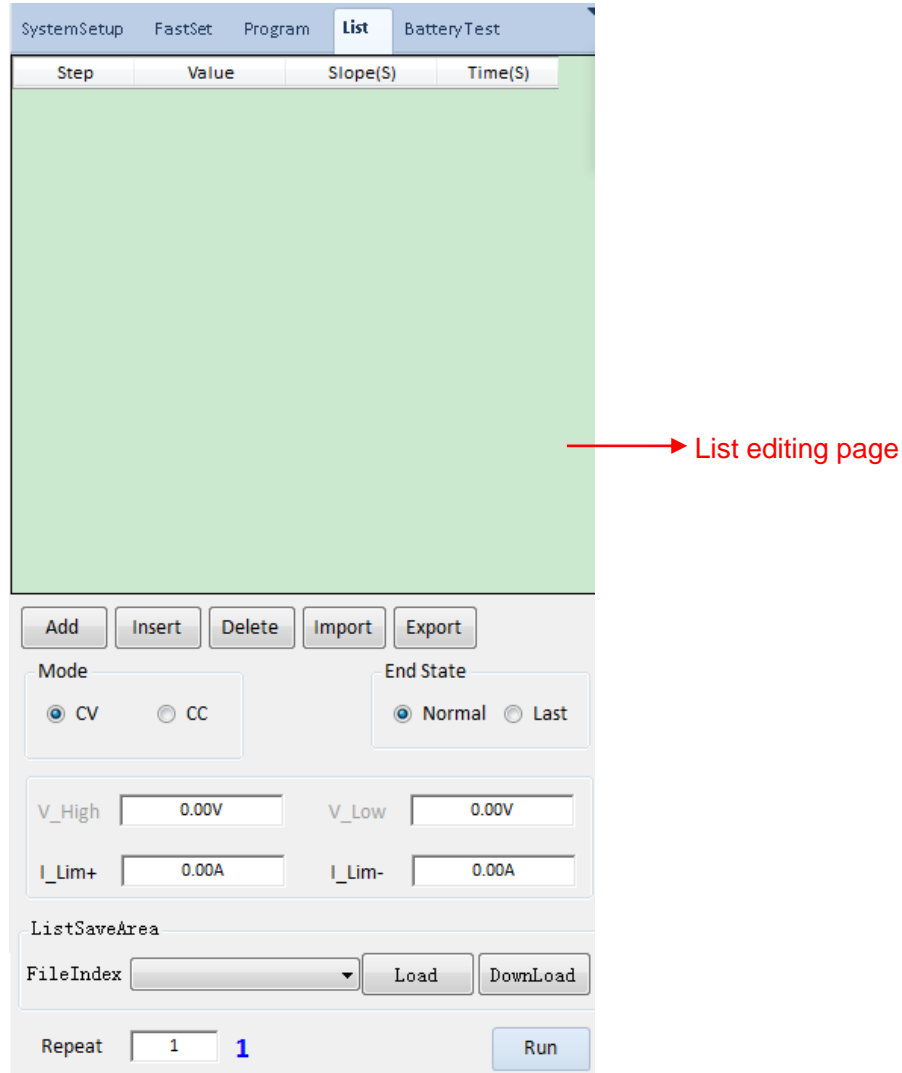
The blue number is the current execute count. Once the operation executes once, the number increases by one.

3. Click **[Run]** to execute the program operation.

The **[Run]** button will change to **[Stop]** button once the operation starts. Click **[Stop]** to pause the operation.

3.5 List Function

The user can use list function to create a test program made of multiple steps. Each list program can be made of up to 100 steps. The user need to set voltage or current, slope and dwell time for each step. The user also can set repeat times, end state and so on for each list program.



SystemSetup FastSet Program **List** BatteryTest

Step	Value	Slope(S)	Time(S)

Mode: ☒ CV ☐ CC
 End State: ☒ Normal ☐ Last

V_High: 0.00V V_Low: 0.00V
 I_Lim+: 0.00A I_Lim-: 0.00A

ListSaveArea
 FileIndex: Load

Repeat: **1**

→ List editing page

Introduction of List Interface

- **Add:** Add a step. Click this button to add one step.
- **Insert:** Insert a step. Click this button to insert one step before current step.
- **Delete:** Delete a step. Click this button to delete the selected step.
- **Import:** Import external list files.
- **Export:** Export the list file being edited.
- **List Mode:** Specify the list mode to current mode or voltage mode.
- **End State:** Set the running state after the list program is running over.
 - ◆ **Normal:** turn the output off when the dwell time is over.
 - ◆ **Last:** keep outputting the last step when the dwell time is over.
- **Trig Out:** Set the trigger out state.
- **File Index:** Select List file number (FILE1-FILE10), for loading and

downloading.

- **Load:** Call the edited List file content from the instrument based on selected file number and display it on the software interface for PC operation.
- **Download:** Download the editing List file on the current Software Interface to the selected number file for local running by instrument.
- **Repeat:** Set the number of list repetitions.
- **Run:** Run the list file.

Edit List File

1. Click **[List]** and enter to the list function page.
2. Select **[List Mode]** according to the need.
3. At the bottom of page, click **[Add]** button to add the first step of list file.

SystemSetup	FastSet	Program	List	BatteryTest
Step	Value	Slope(S)	Time(S)	
1	0.000	0.001	0.100	

4. Double click the value corresponding to step (Value, Slope, Time). Set them to required values.

The voltage value needs to be set when CV mode is selected; the current needs to be set when CC mode is selected.

5. If needed, repeat step 3 through 4 to add more steps.

Import List File from Externals

IT9000 software supports import function of list files. The user can finish the editing of list file in Excel and import it into the software. This function simplifies the list file edit and facilitates user operation. Detailed operation steps are as below:

1. Create a new Excel document on local PC and name it List 1.
2. Open the Excel document and save it as in "other formats" i.e. "(*.csv)".
3. Open the *List 1.csv* document and edit the list file. Set every step of the list file and corresponding parameters. After setting, save and close the document.

Value	Slope(S)	Time(S)
1	0.001	0.001
2	0.001	0.001
3	0.001	0.001

4. Click **[Import]** button. Select and open List 1.csv file. Finish import of the list file.

SystemSetup	FastSet	Program	List	BatteryTest
Step	Value	Slope(S)	Time(S)	
1	1.000	0.001	0.100	
2	2.000	0.001	0.100	
3	3.000	0.001	0.100	

Load the List File from Device to Software

IT9000 software supports load function of list files. The user can load the list file from device to software. Detailed operation steps are as below:

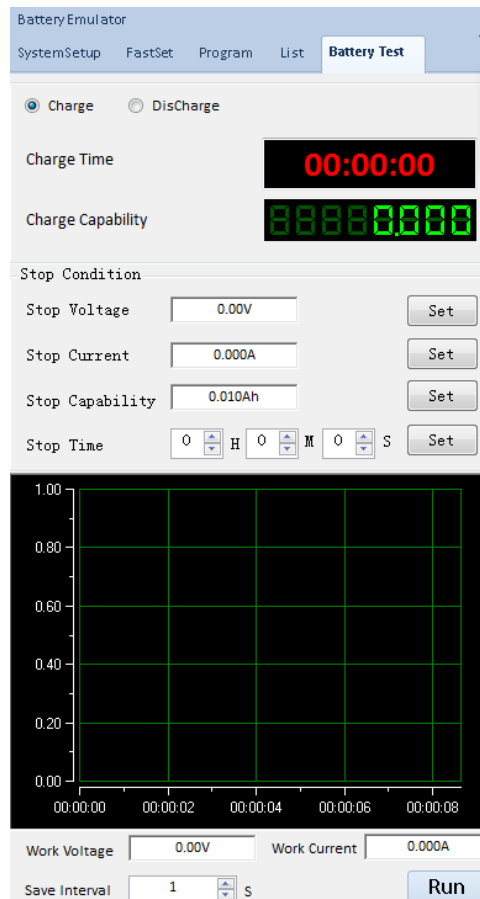
1. Edit the list file on the device and save as List5.
2. Click the drop-down arrow next to the file index and select FILE5.
3. Click **[Load]** and the list page will display the list5 file.

Run List File

1. Follow the steps above to edit list file.
2. Set end state and trig out state.
3. Set the number of list repetitions.
4. Click **[Run]** to execute the list file. And Clicking **[Stop]** can pause the test.

3.6 Battery Test Function

When using battery charging test function, the user need to set the stop voltage, stop current, stop capacity and the stop time. The interface will display the charge time, charge capability and the waveform graph of them.



Introduction of Battery Test Interface

- **Stop Condition:**
 - ◆ Stop Voltage: when the output voltage reaches the stop voltage, the test stops.
 - ◆ Stop Current: when the output current reaches the stop current, the test stops.
 - ◆ Stop Capability: when the battery capability reaches the stop capability, the test stops.
 - ◆ Stop Time: once the time runs out, the test stops.
- **Charge Time:** display the charging time of the battery.
- **Charge capability:** display the charging capability of the battery.
- **Work Voltage:** set the output voltage of the device.
- **Work Current:** set the output current of the device.
- **Save Interval:** set the saving interval of the battery test data.
- **Run:** execute the battery test.

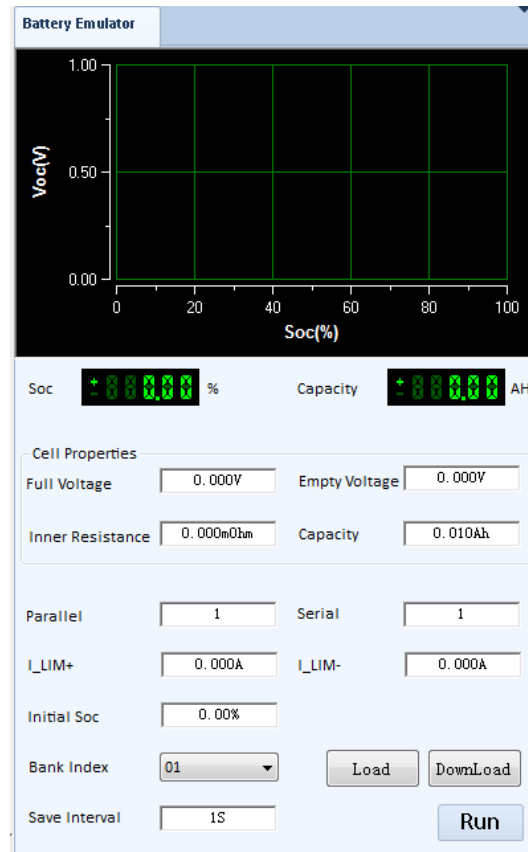
Procedures

1. Click **[Battery]** and enter into the battery test page.
2. Set the stop conditions, including stop voltage, stop current, stop capacity and the stop time. Click **[Set]** next to the input box and the setting value will take effect.
3. Set the work voltage, work current and saving interval.

4. Click **[Run]** to execute the battery test.

3.7 Battery Emulator

Under this function, you can set battery-related parameters to simulate the charge and discharge characteristics of the battery to assist with other tests. The menu items for this function are described below:



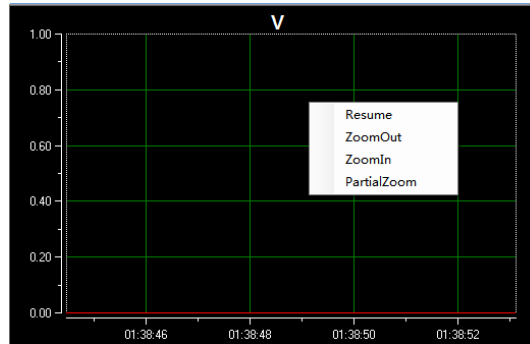
Parameter Description

- Full Voltage: Simulates the voltage value when the cell battery is fully charged.
- Empty Voltage: Simulates the voltage value when the cell battery is in the empty state.
- Inner Resistance: Simulates the internal resistance of a cell battery.
- Capacity: Simulates the capacity of a cell battery.
- Parallel: Set the number of parallel connected batteries.
- Serial: Set the number of batteries in series.
- I_LIM+: Positive current limit value, which simulates the maximum discharge current of the battery pack.
- I_LIM-: Negative current limit value, which simulates the maximum charge current of the battery pack.
- Initial Soc: Set the initial state of charge (SOC) of the battery. 0~100% corresponds to the voltage range from no-load voltage to full-load voltage.
- Bank Index: Select the name of the battery simulation test file.
- Load: Recall the battery simulation test file which is saved in the instrument to the software interface.
- Download: Save the battery simulation test file currently edited in the software interface to the inside of the instrument.

- Run: Run the currently edited battery simulation test file.

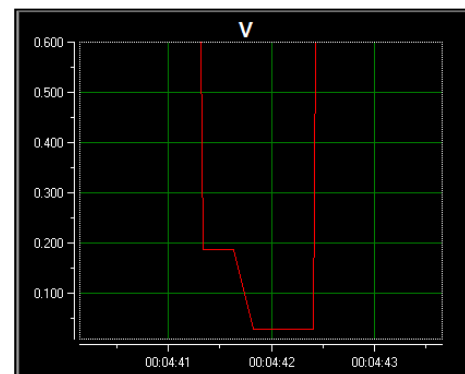
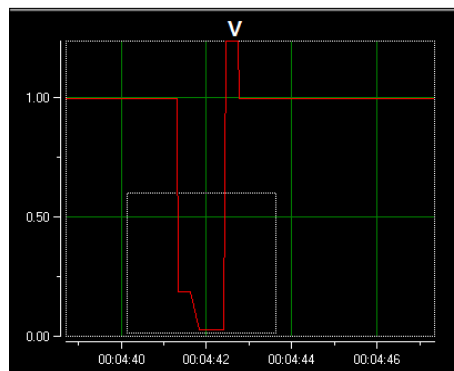
3.8 Curve Zoom In and Translation

In the IT9000 software, voltage and current curve graphs have such functions as Resume, Zoom Out, Zoom In and Partial Zoom. Right click any one at the curve graph, as shown below.



Curve zoom out

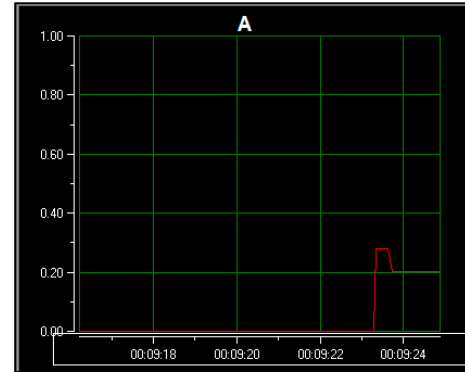
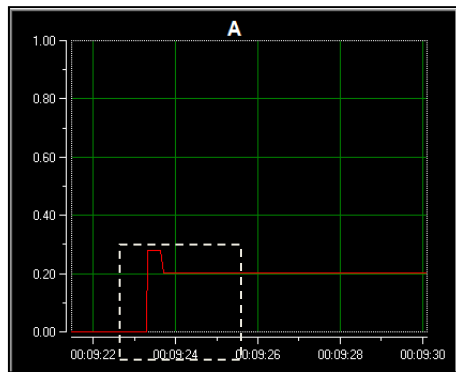
1. Right click the curve graph and select "Partial Zoom". At the bottom of cursor will display a small rectangle box.
2. Move the cursor of small rectangle box to pull out a bigger rectangle box to define the location which you need enlarge the partial wave.
3. Release the mouse left key and the image will be promptly zoomed out.



4. To resume dynamic records, right click the curve graph and choose "Resume".

Translation view

1. Move the cursor shape to any position of the horizontal coordinate axis (Time Axis) and the mouse will change to be a hand.
2. Hold down the mouse left key to move the mouse. When moving left, you will see the curve after the current time; when moving right, you will see the curve before the current time.
3. Similarly, you can translate the voltage/current coordinate to view curve.



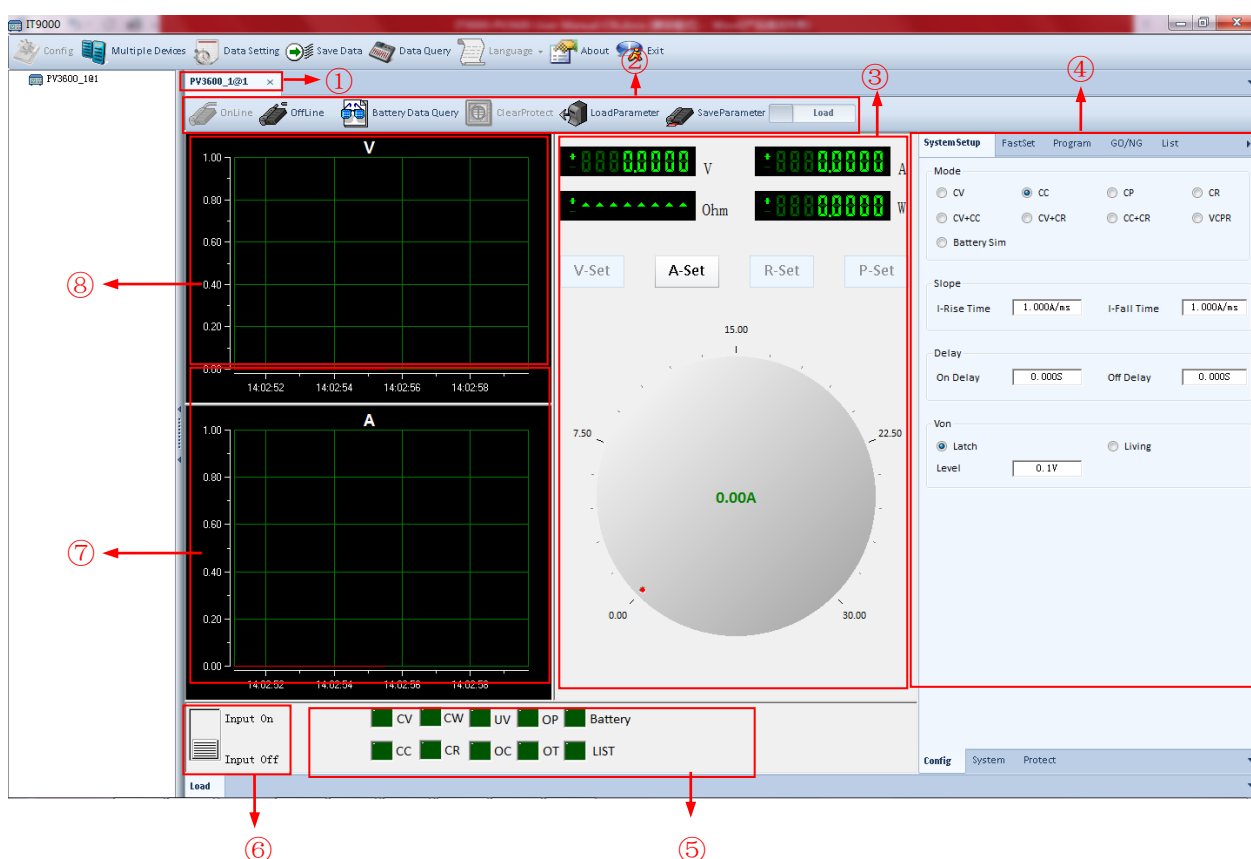
4. To resume dynamic records, right click the curve graph and choose "Resume".

Chapter4 Load Control Interface

IT9000 software can automatically identify instrument model and display model-based functions. For specific functions, refer to user manual of corresponding model. This chapter provides description of Load control functions of IT9000 software based on IT-M3632. The screenshot information varies from different models, so please take the actual interfaces of instrument and software.

4.1 Introduction of Control Interface

The PV3600 Control Interface of IT9000 software (after clicking "Online") is as shown below.



1. Tab bar, to switch the display of Control Interfaces of different devices.
2. Toolbar, main functions include:
 - **Online:** remote control, to set the instrument to Remote Control mode.
 - **Offline:** local switch, to return the instrument back to Local Mode from Remote Mode.
 - **Battery Data Query:** query the test data saved when the Battery Test function is running.
 - **Clear Protect:** to clear instrument protection status.
 - **Load Parameter:** to recall the parameter settings stored in a file suffixed with .it36, including the parameters in the program, scan, and List interface.

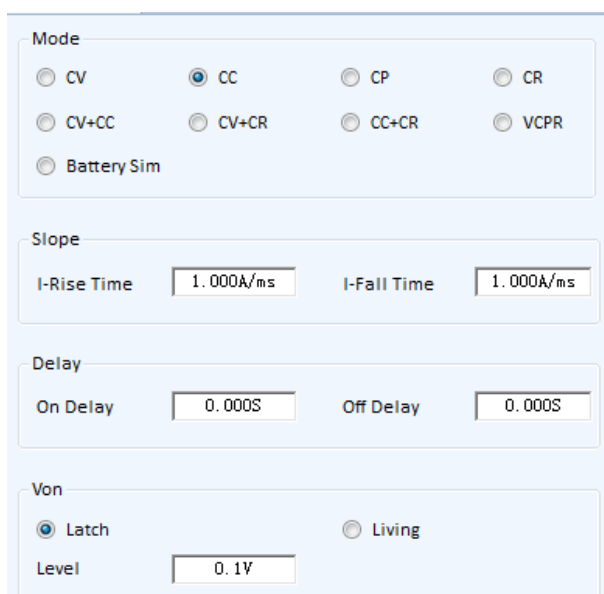
- **Save Parameter:** to save the parameters in the program and List interface to a file with a .it36 suffix for users to quickly and easily use.
 - **Load/Power:** to switch the load mode and power mode.
3. Display the measurement power, voltage and current value, and use the rotary knob to adjust the voltage and current setting value.
 4. SystemSetup, FastSet, Program, GO/NG, List and battery test.
 5. Status indicators, the descriptions are as follows.
 - ◆ CV: the input is turned on and the device is in constant voltage mode.
 - ◆ CC: the input is turned on and the device is in constant current mode.
 - ◆ CW: the input is turned on and the device is in constant power mode.
 - ◆ CR: the input is turned on and the device is in constant resistance mode.
 - ◆ OP: over-power protection.
 - ◆ OT: over-temperature protection.
 - ◆ UV: under-voltage protection.
 - ◆ OC: Over-current protection.
 - ◆ Battery: battery test operation.
 - ◆ LIST: list operation.
 6. Output On/Off switch
 7. Current curve graph
 8. Voltage curve graph

4.2 System Setup

IT9000 software provides configuration function. User can configure the most commonly used controls and measurements in the Config menu, System menu and Protect menu of the device. Please refer to IT-M3600 user manual for more information about the detailed introduction.

Config

In the Config menu interface, the user can configure the mode of load, and current rising and falling time, input-on and input-off delay time, Von state and level.

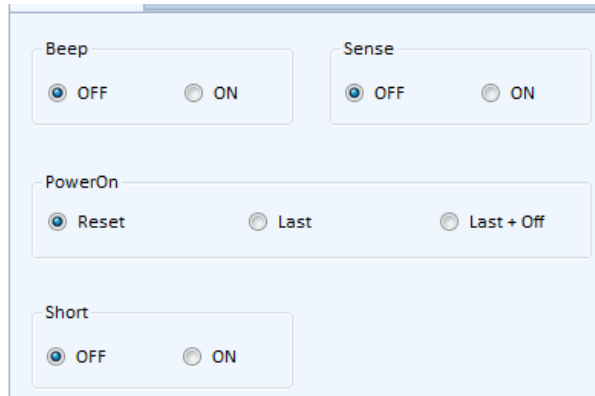


The screenshot shows the Config menu interface with the following settings:

- Mode:**
 - ☐ CV
 - ☒ CC
 - ☐ CP
 - ☐ CR
 - ☐ CV+CC
 - ☐ CV+CR
 - ☐ CC+CR
 - ☐ VCPR
 - ☐ Battery Sim
- Slope:**
 - I-Rise Time: 1.000A/ms
 - I-Fall Time: 1.000A/ms
- Delay:**
 - On Delay: 0.000S
 - Off Delay: 0.000S
- Von:**
 - ☒ Latch
 - ☐ Living
 - Level: 0.1V

System Menu Interface

In the System menu interface, the user can turn the beeper sound on or off, set sense state, short function state, and specify the power-on state.

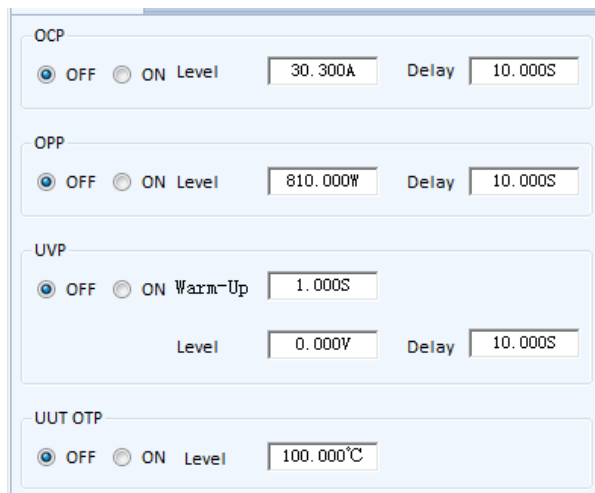


The System Menu Interface is a light blue window with four sections:

- Beep:** Two radio buttons, ☒ OFF and ☐ ON.
- Sense:** Two radio buttons, ☒ OFF and ☐ ON.
- PowerOn:** Three radio buttons, ☒ Reset, ☐ Last, and ☐ Last + Off.
- Short:** Two radio buttons, ☒ OFF and ☐ ON.

Protect Menu Interface

You can set the following functions in the Protect menu interface.



The Protect Menu Interface is a light blue window with four sections, each containing radio buttons for ON/OFF, a Level input field, and a Delay input field:

- OCP:** ☒ OFF, ☐ ON. Level: 30.300A, Delay: 10.000S.
- OPP:** ☒ OFF, ☐ ON. Level: 810.000W, Delay: 10.000S.
- UVP:** ☒ OFF, ☐ ON. Warm-Up: 1.000S. Level: 0.000V, Delay: 10.000S.
- UUT OTP:** ☒ OFF, ☐ ON. Level: 100.000°C.

4.3 Setting Voltage or Current Value

You can set voltage or current value by the following three methods.



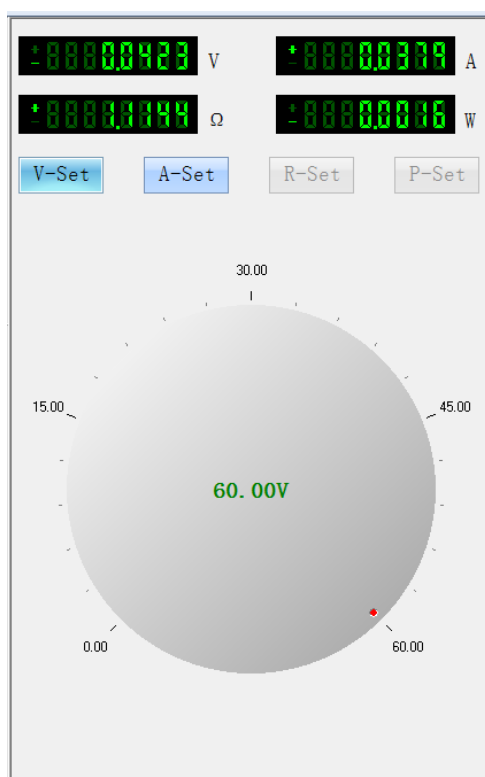
Note

When setting the set value with software, be sure that you have clicked **[Online]** to set the power supply to Remote Control status. "Online" status is gray, click "Offline" to disconnect Remote Control status.

Simulated Pulsating Knob

Move the mouse to Simulated Pulsating Knob. Click and rotate the mouse to set the value. The displayed power, voltage, current and resistance values are the real-time measurement values.

Voltage and current ranges differ from models. The figures below are only for reference.



Fast Setting Function

Using Simulated Pulsating Knob can't set the value accurately. If you want to set accurately, you can enter the desired voltage, current, power or resistance values in the following fast set boxes. Click **[Set]** and then the setting value will take effect.

HotKey					
Voltage	<input type="text" value="60.00V"/>	<input type="button" value="Set"/>	Current	<input type="text" value="0.000A"/>	<input type="button" value="Set"/>
Resistance	<input type="text" value="0.0400hm"/>	<input type="button" value="Set"/>	Power	<input type="text" value="0W"/>	<input type="button" value="Set"/>

Scan Function

The user can use scan function to create a test program made of multiple scan steps. Under the specified mode such as CC/CV/CR/CW, set the start value, stop value and the step value. The device will input according to the setting values, from start value to stop value and increase by the step value. You can also set the delay time and repetition counts for each step.

The operation steps to edit the scan test program are as follows.

1. Click **[Add]** to add a group of scan data in the scan edit area.

(Click **[Delete]** to delete the selected step.)

Start(V)	Stop(V)	Step(V)	Delay(S)	
0.00	60.00	0.10	1.00	1
0.00	60.00	0.10	1.00	1
0.00	60.00	0.10	1.00	1

2. Double click the value corresponding to scan data (Start, Stop, Step, Delay, Loop). Set them to required values.
3. If needed, repeat steps 1 through 2 to continue to add the scan step.
4. After finishing the edit, click **[Run]** to execute the scan operation.

The **[Run]** button will change to **[Stop]** button once the operation starts. Click **[Stop]** to pause the scan operation.

4.5 Program Function

The user can use program function to create a test program made of multiple steps. The user need to set the value and delay time for each step, and can also set the repeat times for the test program. In addition, the user can save the test program by exporting it to PC and can also import it from PC.

Step	Value(V)	Delay(S)
1	0.00	1.0
2	0.00	1.0
3	0.00	1.0

→ Programming area

Add Insert Delete Import Export Run

RunTimes
☒ Once ☐ Repeat ☐ Custom 1

Program Interface Introduction

Add: Add a step. Click this button to add 1 step.

Insert: Insert a step. Click this button to insert 1 step before current step.

Delete: Delete a step. Click this button to delete current step.

Import: Import external program documents.

Export: Export program file being edited.

Run Times: Run times of List programs, which can be set as Once, Repeat or Custom. When it is customized, you need to enter the run times.

Run: Run program.

Edit Program

1. Click [Program] tab to enter Fast Programming page.
2. At the bottom of Programming page, click [Add] button to add the first step of program.

Step	Value(V)	Delay(S)
1	0.00	1.0
2	0.00	1.0
3	0.00	1.0

3. Double click the value corresponding to program step. Set them to required

values.

4. If needed, repeat step 2 through 3 to add steps.

Import File from Externals

IT9000 software supports import function of program files. The user can finish the editing of program file in Excel and import it into the software. This function simplifies the program file edit and facilitates user operation. Detailed operation steps are as below:

1. Create a new Excel document on local PC and name it program.
2. Open the Excel document and save it as in "other formats" i.e. "(*.csv)".
3. Open the *program.csv* document and edit the program. Set every step of the program and corresponding parameters. After setting, save and close the document.

Value(V)	Delay(S)
0	1
0	1
0	1
0	1

4. Click **[Import]** button. Select and open *program.csv* file. Finish import of the program file.

Step	Value(V)	Delay(S)
1	0.00	1.0
2	0.00	1.0
3	0.00	1.0

Run Program File

1. Follow the steps above to edit program file.
2. Set Run Times, including Once, Repeat or Custom. When Custom is selected, you may set the repetition count of programs.

RunTimes
☒ Once
☐ Repeat
☐ Custom
1



Note

The blue number is the current execute count. Once the operation executes once, the number increases by one.

3. Click **[Run]** to execute the program operation.

The **[Run]** button will change to **[Stop]** button once the operation starts. Click **[Stop]** to pause the operation.

4.6 GO/NG

With this function, you can test whether the selected electronic load meets required specifications.



Step	Short	Mode	Set(A/V/Ohm/W)	Measure(A/V/Ohm/W)
1	<input type="checkbox"/>	CV	60.0000	0.0000
2	<input type="checkbox"/>	CV	60.0000	0.0000
3	<input type="checkbox"/>	CV	60.0000	0.0000

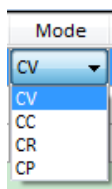
→ Edit area

Add Insert Delete Import Export Run

Interface Introduction

Short Short: to select whether short circuit test is required. If so, click the box.

Mode Mode: to select load mode. Click the drop-down arrow in Mode bar to pop up the mode list as shown below. Select the required mode.



Mode

CV

CC

CR

CP

Set(A/V/Ω/W) Set(A/V/Ω/W): to set the set value under specific mode, like CC 3A.

Measure(A/V/Ω/W) Measure(A/V/Ω/W): this option is a read-back value and requires no setting.

Type Type: This option is measured value type. Setting method is same as mode selection. Options include V, I, R, W.

Max(A/V/Ω/W): to set maximum read-back value.

Min(A/V/Ω/W): to set minimum read-back value.

Delay(S) Delay(S): to test the delay time of each step.

Pass: to judge test results. This option cannot be set.

Edit the GO/NG

1. Click "GO/NG" tab to enter Test page.
2. At the bottom of Test page, click "Add" button to add the first step of Test procedure.
3. Set short circuit, mode and type.
4. Double click the value corresponding to test program step (Set, Max, Min, Delay). Set them to required values and click OK.
5. Repeat steps 2-4 to set other four steps of Test Procedure.

External import of GO/NG program

1. Create a new Excel document on local PC and name it Test 1.
2. Open the Excel document and save it as in "other formats" in (*.csv).
3. Open the Test 1.csv document and edit the Test. Set every step of the Test and corresponding parameters.

You can also "Export" a .csv file template and edit based on this template.

4. Click "Import" button. Select and open Test 1.csv file. Finish import of the Test file.

Run GO/NG Program

1. Follow the steps above to edit Test file.
2. Click "Run" to run program file. Click "Stop" to stop operation.
3. After running is completed, click "Export" to save the test results to Excel.
4. Name the file as Test. Open Test to display measured value and test result.

4.7 List

The user can use list function to create a test program made of multiple steps. Each list program can be made of up to 100 steps. The user need to set voltage or current, slope and dwell time for each step. The user also can set repeat times, end state and so on for each list program.



- Step: The number of the voltage/current point in the List waveform. No settings are required here.
- Value: The set value of the voltage/current point.
- Slope: The slope of the rise or fall from the previous voltage/current point to the currently set point.
- Time: The duration of the currently set voltage/current point.
- Add: Add a step.
- Insert: Insert a step before the currently selected step.
- Delete: Delete the currently selected step.
- Import: Import the edited List waveform file (.csv format) from the outside.
- Export: Export the currently edited List waveform to a file in .csv format.
- Repeat: The number of repetitions of the List waveform. The default 0 means that after the user clicks "Run", the waveform will be output repeatedly until the user clicks "Stop" to stop the output.
- Mode: select the list mode.
- End State: Indicates the working status of the instrument after the List waveform output ends
 - Normal: Returns to the state before the List waveform was output.
 - Last: Stays in the state of the last voltage/current/resistance/power point of the List waveform.

- FileIndex Select the name of the List waveform file.
- Load: Recall the List waveform file which is saved in the instrument to the software interface.
- Download: Save the List waveform file currently edited in the software interface to the inside of the instrument.
- Run: Run to output the currently edited waveform.

Edit the List

1. Click "List" tab to enter Fast Programming page.
2. At the bottom of Programming page, click "Add" button to add the first step of program.
3. Double click the value corresponding to program step (Value, Slope, Time). Set them to required values and click OK.
4. Repeat step 2-3 to set other four steps in List file.
5. Set parameters such as "Mode", "End State", and "Repeat".

IT9000 software supports import function of list files. The user can finish the editing of list file in Excel and import it into the software. This function simplifies the list file edit and facilitates user operation. Detailed operation steps are as below:

1. Create a new Excel document on local PC and name it List 1.
2. Open the Excel document and save it as in "other formats" i.e. "(*.csv)".
3. Open the *List 1.csv* document and edit the list file. Set every step of the list file and corresponding parameters. After setting, save and close the document.

Value	Slope(S)	Time(S)
1	0.001	0.001
2	0.001	0.001
3	0.001	0.001

4. Click [Import] button. Select and open List 1.csv file. Finish import of the list file.

Load the List File from Device to Software

IT9000 software supports load function of list files. The user can load the list file from device to software. Detailed operation steps are as below:

4. Edit the list file on the device and save as List5.
5. Click the drop-down arrow next to the file index and select FILE5.
6. Click **[Load]** and the list page will display the list5 file.

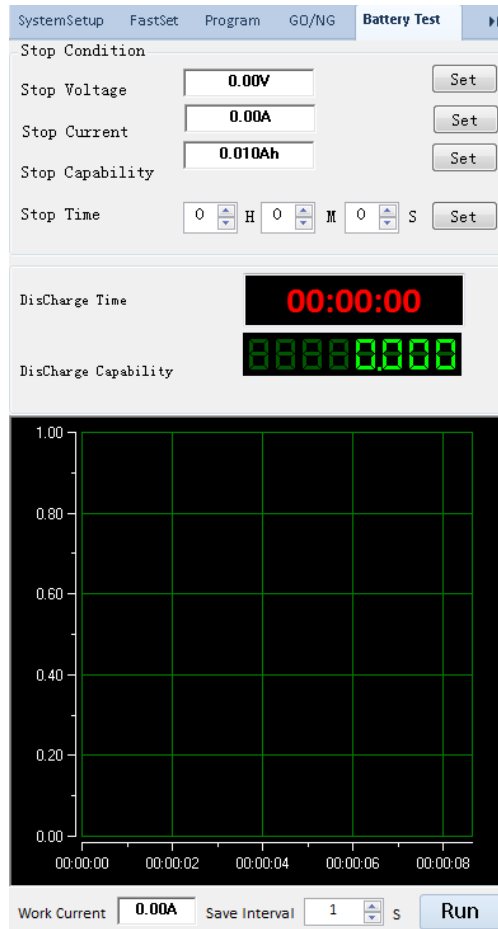
Run List File

5. Follow the steps above to edit list file.
6. Set end state and trig out state.
7. Set the number of list repetitions.

1. Click **[Run]** to execute the list file. And Clicking **[Stop]** can pause the test.

4.8 Battery Test

When the DUT is a battery, the electronic load will discharge the battery in constant current, constant power or constant resistance mode. The user needs to set the stop voltage, stop capacity and stop time. The interface will display discharge time and discharge capacity. Details are as shown below.



The screenshot shows the 'Battery Test' tab in the software interface. It includes fields for 'Stop Condition' with 'Stop Voltage' (0.00V), 'Stop Current' (0.00A), and 'Stop Capability' (0.010Ah), each with a 'Set' button. Below these is a 'Stop Time' field with units H, M, and S, also with a 'Set' button. A 'DisCharge Time' display shows '00:00:00' in red. A 'DisCharge Capability' display shows '88888.0000' in green. A graph area shows a grid with the y-axis ranging from 0.00 to 1.00 and the x-axis showing time intervals from 00:00:00 to 00:00:08. At the bottom, there is a 'Work Current' field set to '0.00A', a 'Save Interval' field set to '1' with a unit 's', and a 'Run' button.

- Stop Voltage: Stop the test when the battery voltage is the set value.
- Stop Current: Stop the test when the battery current is the set value.
- Stop Capability: Stop the test when the capacity reaches the set value.
- Stop Time: Stop the test when the test duration reaches the set value.
- DisCharge Time: Display the battery discharge time.
- Discharge Capability: Display the battery discharge capacity.
- Work Current: The current value of load.
- Save Interval The time interval for saving battery discharge test data.
- Run: Start running the battery discharge test. After clicking "Run", the interface prompts as shown below.

Procedure:

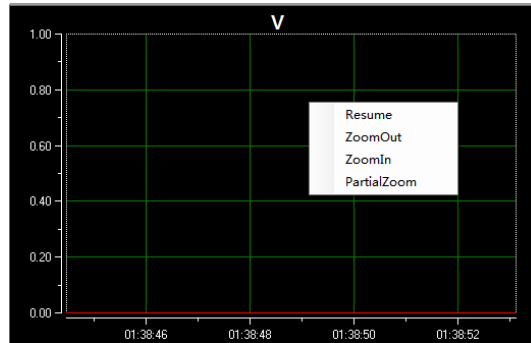
1. Click **[Battery Test]** and enter into the battery test page.
2. Set the stop conditions, including stop voltage, stop current, stop capacity

and the stop time. Click **[Set]** next to the input box and the setting value will take effect.

3. Set the work voltage, work current and saving interval.
4. Click [Run] to execute the battery test.

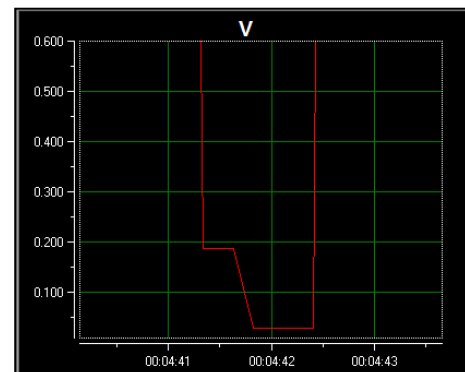
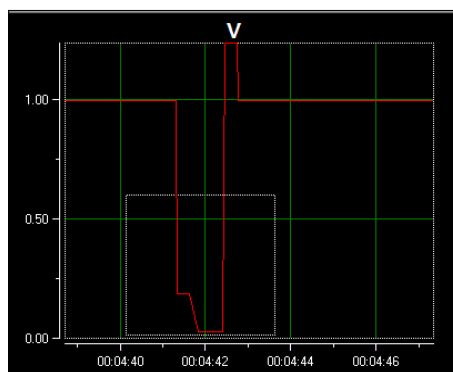
4.9 Curve Zoom In and Translation

In the IT9000 software, voltage and current curve graphs have such functions as Resume, Zoom Out, Zoom In and Partial Zoom. Right click any one at the curve graph, as shown below.



Curve zoom out

1. Right click the curve graph and select “Partial Zoom”. At the bottom of cursor will display a small rectangle box.
2. Move the cursor of small rectangle box to pull out a bigger rectangle box to define the location which you need enlarge the partial wave.
3. Release the mouse left key and the image will be promptly zoomed out.

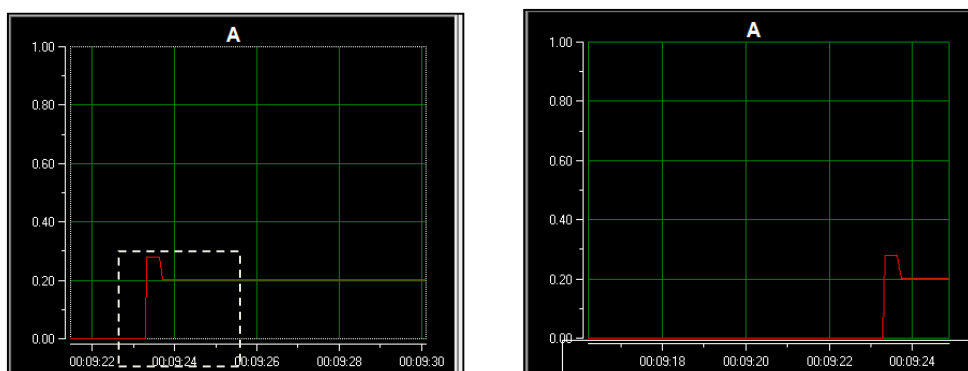


4. To resume dynamic records, right click the curve graph and choose “Resume”.

Translation view

5. Move the cursor shape to any position of the horizontal coordinate axis (Time Axis) and the mouse will change to be a hand.
6. Hold down the mouse left key to move the mouse. When moving left, you will see the curve after the current time; when moving right, you will see the curve before the current time.

7. Similarly, you can translate the voltage/current coordinate to view curve.



To resume dynamic records, right click the curve graph and choose “Resume”.

Contact US

Thank you for purchasing ITECH products. If you have any doubt about this product, please contact us as follows.

1. Visit ITECH website www.itechate.com.
2. Select the most convenient contact for further consultation.