

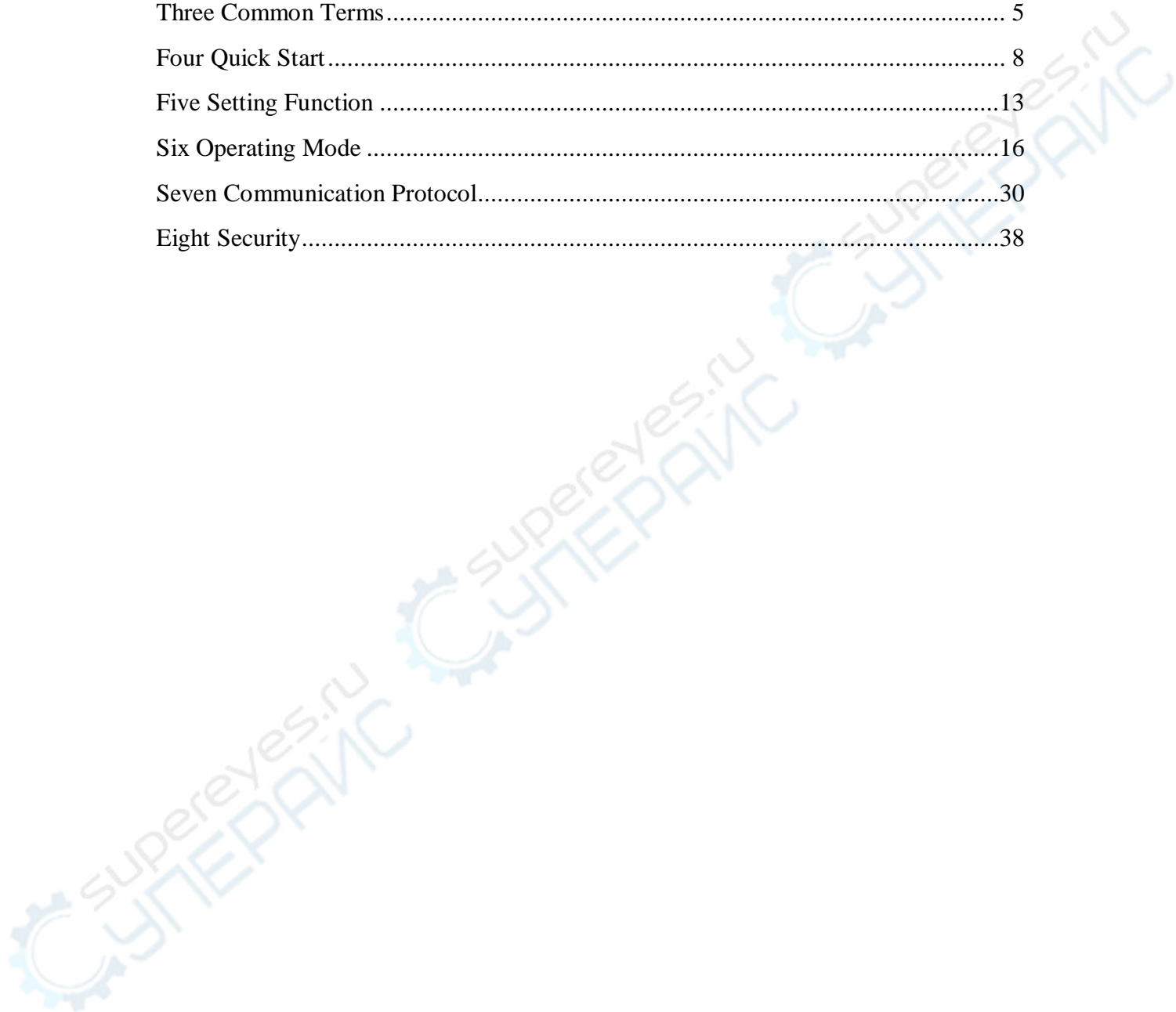
Rek[®] Meiruike Instruction Manual

RK8511RK8512series
DC ResistanceTester

SHENZHEN MEIRUIKE ELECTRONIC TECHNOLOGY CO., LTD

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One Abstract

Welcome to use the RK8511 Programmable DC Electronic Load series designed by Meiruike Electronic Technology Co., Ltd, electronic load adopt the high-performance chip-based, in accordance with the high precision design, with the resolution of 1mV and 0.1mA, novel appearance, the manufacturing technique is scientific and rigorous, compared with the similar products, it is more cost-effective.

RK8511 series including RK8511 and RK8512 this two products, in the instructions below, if there is no special points out, the content of the instructions is applicable to both of the product.

Electronic load is widely used in the production line of electronic products (such as mobile phone charger, cell phone batteries, electric vehicle batteries, switch power supply, linear power supply), scientific research institution, automotive electronics, aerospace, ship, solar batteries, fuel cells and other industries.

Main Feature

- ◆ High brightness VFDS display screen, showed a clear and pleasing to the eye.
- ◆ Using software to correct circuit parameters, do not use the adjustable resistance, it is stable and reliable work.
- ◆ Over current, over voltage, over power, overheating, the polarity reverse protection.
- ◆ Intelligent fan system, can according to the temperature change to start or stop automatically, and adjust the wind speed.
- ◆ Supporting the external trigger input, cooperate with external equipment, complete automation testing.
- ◆ After the completion of automatic test, can output trigger signal to an external device.
- ◆ Provide the terminal of current waveform output, can connect the oscilloscope to observe current waveform.
- ◆ Supporting far-end voltage compensation input terminals.
- ◆ Supporting for multiple testing function, specific as follows:
 - Constant voltage
 - Soft start constant voltage
 - Loading unloading constant voltage
 - Constant current
 - Soft start constant current
 - Loading unloading constant current
 - Constant current turns to Constant voltage
 - Constant power
 - Loading unloading rated power
 - Constant resistance

- Loading unloading constant resistance
- Constant resistance turns to constant voltage
- Dynamic testing
- Battery capacity test
- Short Circuit Function
- Listing Output
- Automatic testing



Two Technical Parameters

Basic Parameter

Type	Items	RK8511		RK8512	
Input	Voltage	150V			
	Electric Current	30A		60A	
	Power	150W		300W	
CV-Constant Voltage mode	Scope	0—20V	0—150V	0—20V	0—150V
	Resolution Ratio	1mV	10mV	1mV	10mV
	Accuracy	0.03%±0.05%FS	0.03%±0.05%FS	0.03%±0.05%FS	0.03%±0.05%FS
CC-Constant Current mode	Scope	0—3A	0—30A	0—6A	0—60A
	Resolution Ratio	0.1mA	1mA	0.1mA	1mA
	Accuracy	0.03%±0.05%FS	0.03%±0.05%FS	0.03%±0.05%FS	0.03%±0.05%FS
Constant Power mode (≥10% scale span)	Scope	0—150W		0—300W	
	Resolution Ratio	10mW		10mW	
	Accuracy	0.2%±0.2%FS		0.2%±0.2%FS	
Constant Resistant mode (≥10% scale span)	Scope	0—10K		0—10K	
	Resolution Ratio	0.01 Ω		0.01 Ω	
	Accuracy	0.2%±0.2%FS		0.2%±0.2%FS	

Soft start and dynamic testing time parameters

Setting Resolution	0.01mS
Working Resolution	0.02mS
The maximum setting value	99999.99mS

Battery capacity test parameters

Resolution Ratio	Capacity <10AH	10AH≤Capacity <100AH	100AH≤Capacity <1000AH
	1uAH	10uAH	100uAH
Max Filling range	999.999999AH		



Three Common Terms

The interpretation of the term used in the instruction as below.

◆ **The power supply waited for be test**

Electronic load is used to measure the various features of dc power supply, such as the stability of power supply voltage, load capacity, the ability of transient suppression, overload capacity, capacity (battery) and other indicators. In this paper, if mentioned the power supply waited for be test, mean the power supply is to be measured, or the test object power supply.

◆ **Operating Mode**

Electronic load has a variety of work mode, different mode of work can finish different measuring function, such as constant voltage mode and constant current mode, battery capacity testing work mode, automatic test work mode, etc.

Under normal working state, the bottom right corner of the screen displays the current working mode, the specific meaning is as follows:

Word operator	Meaning	Word operator	Meaning
CV	Constant voltage	CR	Constant resistance
CVS	Soft start constant voltage	CR-LU	Loading unloading Constant resistance
CV-LU	Loading unloading constant voltage	CR-CV	Constant resistance turns to constant voltage
CC	Constant current	DYNAMIC TEST	Dynamic testing
CCS	Soft start constant current	BATT	Battery test
CC-LU	Loading unloading constant current	SHORT WORK MODE	Short-circuit test
CC-CV	Constant current turns to constant voltage	LIST OUTPUT	Listing Output
CP	Constant power	ATUO TEST	Automatic testing
CP-LU	Loading unloading constant power		

◆ **Normal state and setting state**

Normal state and setting state is relative. In normal state, the screen display various data, show the detected parameters and settings parameters.

In normal state, presses the specific button can into the setting state, in the condition of setting, usually will prompt the user input data to confirm a certain operation parameters, or in a couple of options to choose between them.

In setting state, the first line on the screen content is the same as the normal state, the content setted showed on the second line of the screen, if the statement displayed “screen”, it refers to the second line of the screen.

◆ **Setting value、 actual value and the calculated value**

Setting value refers to operation parameters setted by the user. Actual value refers to the value of the instrument detected. These two values sometimes are equal, but sometimes are not equal, with the constant current mode, for example, the user setting to 2A, but the external power supply can only provide 1.5A (it is possible power resistance is bigger, or the power supply itself with current limiting function), the “2A” is the setting value, 1.5A is the actual value.

Calculated value is the value calculated according to the actual value, such as magnitude of power and resistance value, they are not measured directly, but calculated according to the measured voltage and current data.

◆ **Setting parameters (setting value or running parameters) and parameters saving**

Setting parameters is the setting value of on the entry, in different context, sometimes named setting values, sometimes named setting parameters or running parameters.

Setting parameters specified by the user, as the voltage value of the constant voltage mode, the current value of the constant current model, the stopped test voltage value of the battery capacity test, etc.

When the users setting certain a parameter, if press the “Esc” key, then will return to normal state, and won't save the data inputed, if the data input is complete and press “Enter” key, the equipment will save the input data, data won't lost when the power is cut off, arrange another time to use.

◆ **Output State**

There are two kinds of electronic load for output state. It is “stop” and “run”. It showed as “ON” and “OFF” in the left upper corner of the screen respectively.

Electronic load internal has multiple power tube, working in one of the cut-off, amplification and saturated state, for the power supply will be tested, it is equivalent to a variable load.

The “stop” state express power tube cut-off, for the power supply will be tested, it express the open circuit of load (in physical, electronic load still connect with the power supply will be tested).

The “Running” state express the working state of power tube is amplification or saturated, the resistance value showed reduce, it will consume a certain amount of power.

◆ The shift key and shift

In keypad areas, 0-9 this ten number key have the second function mostly, in the condition of setting, used as a common number keys.

The "Shift" is called the Shift key, when press the Shift key, the upper right corner of the screen shows that the location of the output state will show "Shift" character, time is 5 seconds. Within the 5 seconds, shift function is effectively. If press buttons with the second functions, it will trigger the second function of the button.

If didn't press the bottom of the second function within 5 seconds, or press "Shift" key again, or presses the button don't have the second function. "Shift" characters on the screen disappeared, shift function is failure.

In this paper, using "Shift + 1" to express that press "Shift" key first, and press the button "1" within 5 seconds.

◆ Trigger Input

In the dynamic test work mode, the user can choose how to start the dynamic testing, if you select automatic, electronic load will switch between the two kinds of current value automatically, if you choose to trigger, the electronic load would be in a waiting trigger state, if there is a trigger event occurs, the electronic load will complete a current change process, specific operation can refer to the explanation of dynamic test model.

There are three kinds of trigger input methods, one is "Shift + ." . The second is the terminal on the back of the machine, connect two lead on the "TRI" and "GND" . When the two line short-circuit at a time, complete a trigger. The third is the trigger button on the PC.

◆ Trigger Output

After completion of the automatic test, or in the automatic test, one test fails can output a trigger signal. This signal sent by the rear of the machine load "TRQ" and "GND" , the user can connect externally a prompt equipment, used to prompt the operator whether the test completed or test failure.

The specific way of trigger output please refer to the introductions of the "automatic test" working mode.

Four Quick Start

Power On Self Test

The machine will be connected to the 220V power supply, press the power button on the lower left corner on the front faceplate and start the instrument, enter the self test process first, the prompt as below:

Project	VFD display	Explanation
Power on	RK8511 VERSION: 1.1 SYSTEM SELF TEST	Automatic System Check, and display the product model and the software version number.
1 seconds after	ERROR: EEPROM	If the EEPROM damage, the instrument can't work normally, the screen will display this information, buzzer warning sound.
	xxxxxxxV xxxxxxxA xxxxxxxW xxxxxxxX	VFD displayed as actual input voltage, electric current, power, setting the parameter value and the current state.

If the load can't start

Use the following methods can help to solve problem that you may encounter when open load.

- To check whether the 220V power supply is normal, and whether the power cord in good condition, whether the power switch is opened.
- Check whether the load of the fuse is burnt.

If the fuse is burnt, please use 0.3A/250V insurance tube replaced. The method of fuse replacement is as follows:

Prize up the small plastic cap at the bottom of the power input socket on the rear faceplate of the load with the slotted screwdriver. That can see the insurance tube, please use only the fuse of the above specifications.

If you still cannot start the instrument, please contact our after-sales personnel, Customers can't adjust the components in the instrument, please don't repair or modification for instrument, otherwise, our company will not assume any obligations, and the resulting any responsibility.

The Front Faceplate

The Front Faceplate appearance of electronic load of the RK8511 series as shown as the picture below (shown in the picture is RK8512, the RK8511 is the same, only the content printed on top of the PVC have difference):



Picture 3.1 The Picture of The Front Faceplate

The upper half of the front faceplate, the left side is VFD display screen, it used to display a variety of data, such as voltage, electric current, power, resistance, capacity or the setting parameters of the corresponding project.

Display content is divided into two lines, a total of six regions, in the top row, on the left shows the actual voltage, the middle shows the actual electric current, on the right shows the current running status of the project, such as display “ON” it express the project has been started, “OFF” express in a stopped state, “START” in the start state, etc.,. The specific meaning parameters described in a later chapter.

In one row below, under the normal state, the power value is displayed on the left, middle display settings value, the right side shows test items, such as “CC” express the current state, “CV” express the state of constant voltage and so on.

In the function setting, the second line area of the screen is used to display the corresponding function of setting content and setting parameters, in the introduction subsequent will explain in detail.

Upper right of the front faceplate is the parameter adjustment rotary knob, it used for setting the parameters of fine-tuning test project, when setted the parameters it will appears a cursor in a certain number below, it express you can use the rotary knob to change the parameters, such as the original data for the “12.345”, the cursor is under the number “4”, the clockwise data will change in accordance with the “12.355”, “12.365” ... the counterclockwise will change in accordance with the “12.335”, “12.325” ... from 0 to 9, or from 0 to 9, automatic up a carry or borrow.

You can also press the rotary knob to change the setting bits. According to the above example, press once, the cursor will transfer underneath the number “3”, then press again, it will transfer underneath the number “2”.

The lower half of the faceplate, the power button on the left, the middle is a keypad area, the specific methods of using please refer to the back of the specification, the right is the input terminal of the external power supply under test.

The Rear Faceplate

The Rear Faceplate of electronic load of the RK8512 series as shown as the picture below:



Picture 3.2 The Picture of The Rear Faceplate

The both sides of the rear faceplate is the heat emission hole, in working, if the instrument internal temperature reaches the setting value, the internal cooling fans started, there will be hot air blew out, so the two rows of holes can't be covered with other goods, especially working in the high-power load, the back of heat emission hole need to leave enough space, can't pile up something combustible.

In the middle of faceplate, the 220V power input socket is on the upward side, there is the insurance tube at the bottom of the socket, when necessary, can use the sharp objects to pry up the dust cover to change the insurance tube.

The socket labeled "BNC OUT" is for current waveform output, can external connect the oscilloscope, and check the current waveform flow past the electronic load.

The left side of the central lower part, is a set of five terminal in total, from left to right, is "-s", "+S", "TRQ", "TRI" and "GND" respectively.

Terminal access power supply under test through the front faceplate, but in the case of load current is larger, the lead voltage drops between the power supply under test and electronic load is larger, the line loss larger namely, voltage displayed on the electronic load is the voltage of the ends of the electronic load terminal, rather than the voltage at the ends of the power supply under test.

To make up the loss, can connect the output of the power supply under test through a thick wire to the binding post of electronic load on the front faceplate, and the output of the power supply under test will connect the terminal on the rear faceplate marked with "S" and "+S" through two lines (would use a thin wire). Through the settings menu to make electronic load voltage displayed source from the rear faceplate, it can compensate for the loss.

Keyboard Instructions

- Numbers and the decimal point

These buttons can be used in both cases, one is used for the input data in the process of parameter settings. The second is that press certain a number key can choose different functions or enter different function setting within press “Shift” button for 5 seconds.

When inputting the data, according to the expected data, such as “12.345”, press the button “1”, “2”, “.”, “3”, “4”, “5” in turn.

If the original data in digital input area on the screen(setting values (old)), or input the wrong data, the new input numbers will left shift follow at the back of the original data, it will not be able to achieve desired results, such as the original setting values for the 56, that input after the “12.345”, screen will shows “5612.345”. At this point, you can continue to input data when the data bits reach the largest digits(including the decimal point, eight bits in total) and then input data, it will remove the original data.

If you want to complete data input as soon as possible, can hold the first number keys of the input data hoped more than 1 second. The program will remove the original input, and the current input key as the first number of new data.

As in the example above, you can press the number keys the “1” more than 1 second that screen will display “1”, then please input “2”, “.”, “3”, “4”, “5” in turn.

In the “Shift+x” (“x” represents one of the following keys) cases, it will enter the setting state, described as follows:

The key value	Choosing function	The key value	Choosing function
0	Enter the function settings menu	1	Setting the parameters of loading and unloading
2	Setting the soft start parameters	3	Selecting dynamic testing
4	Setting the parameters of constant current turns to constant voltage	5	Setting the parameters of constant resistor turns to constant voltage
6	Setting the parameters of dynamic testing	8	Setting the parameters of battery capacity testing
9	Enter short circuit mode	.	Generating a trigger event

You can obtain what meaning of the second function represent according to the reminder at the bottom of the keypad.

- Shift

After click this button, the upper right corner of the screen shows “SHIFT” (the original showed is the output state) and it disappear automatically after 5 seconds, that display output state again.

Presses the button which has the second function before did not disappear can trigger the corresponding functions. As described above, specific operation can refer to the back of the instructions.

In the back of the instructions, it will use “Shift+1” to represent the first click the Shift key, then press the number keys “1” in 5 seconds.

- Esc

Push down this button in the state of function setting, you can exit the function setting.

Working in battery capacity test mode, long press this button to record the battery capacity can reset to 0.

- V-set、I-set、P-set and R-set

This four buttons used to open the parameter settings interface of “constant voltage” , “constant current” and “constant power” and “constant resistance” respectively, after input parameters finished, press “Enter” key to exit the setup interface to shut down the output, and then turn to the corresponding work mode, if it is already in the corresponding work mode before entering the settings, the former working mode and output state is changeless, only change the operation parameters.

For example, the original work mode is the “power”. Press “V-set” key to open the parameter settings interface of “constant voltage” , after the completion of the input parameters, press “Enter” key, the instrument exit the “power” model to close the output (regardless of the original output is On or Off) and then into “constant voltage” work mode; If the original is “constant voltage” working mode, after setting is completed, exit the setting state, is still the “constant voltage” model, and does not change the output state of the equipment (it is still “On” and “Off”).

- On/Off

This is a toggle, if the original output state is “On” , press this button to turn “Off” , and press this button again, it will back to the “On” state.

- ▲▼

In the condition of function setting, this two key are used to change the project settings, or adjust project parameters, specific usage refer to the back of the part function setting.

- Enter

After the completion of the function setting, click this button to exit the function setting and save the corresponding parameters setting, according to the context, return to the previous menu or return to normal working condition.

Five Setting Function

This chapter explain the function of the electronic load setup section, in the function setting, can set whether to open the buttons beep and the basic parameters such as the tap position of voltage and current. The detailed explanation as following.

If the electronic load in the setting state, the options and related data display on the second line of the screen. In this paper, if in explaining the setup process when it refer to “screen shows...”, it is the content on the second line of the screen displayed.

Press “Shift+0” button, the screen will shows “MENU SYSTEM SET”, and entered the state function setting of the root menu.

In this state, choosing between “SYSTEM SET”、 “LIST SET”、 “ATUO TEST SET” and “EXIT” in the menu by pressing the “▲” or “▼” keys, after the completion of the selection, according to the different selection, press “Enter” key to select the corresponding subroutine, or into the next level menu, or exit the settings status.

In function setting state, the user can choose the menu as follow:

MENU	SYSTEM SET		
		SOUND SET	
			ON
			OFF
		SYSTEM TERMINAL SELECT	
			FRONT
			BACK
		SYSTEM VOLTAGE RANGE	
			HIGH
			LOW
		SYSTEM CURRENT RANGE	
			HIGH
			LOW
		SET EXIT	
MENU	LIST SET		
		LOAD LIST	
		EDIT LIST	
			END
			CONTINUOUS
			RESET
			HOLD
			SET LENGH
			SETP 1:CURR=
			SETP 1:TIME=

	EXIT LIST SET		
MENU	AUTO TEST SET		
	LOAD AUTO TEST		
	EDIT AUTO TEST		
		SETP LENGTH=	
		SETP 1: MODE	
		SETP 1: PARA	
		SETP 1: TEST	
		SETP 1: MIN	
		SETP 1: MAX	
		SETP 2: TIME	
	SETUP AUTO TEST		
		TRIG TIME	
			TEST FAIL
			DISABLE
			TEST PASS
		OUTPUT MODE	
			LEVEL
			PULSE
	EXIT AUTO TEST SET		
MENU	EXIT		

In the above table, the same column items can use “▲” or “▼” button to choose, some of choices is the menu item, some of them is setting items.

The difference of menu items and setting items is that the menu item is not the last column, it still has the option in the lower right cell, setting items in the end, it has no subsequent projects to choose.

For example, in the tail end of the table above, “OUTPUT MODE” is menu item, it has two settings items “LEVEL” and “PULSE” .

If you choose the “EXIT” character contained of the menu item, and press “Enter” button can return to the higher level menu, if select “EXIT” in the root menu item (MENU EXIT) it will returned to normal status.

In this chapter, only explain “SYSTEM SET” and its sub menu, the menu “LIST SET” and “AUTO TEST SET” refer to the explanation of work mode in next chapter.

In the root menu select “SYSTEM SET” and then press “Enter” button to enter the next level(level 2)sub menu, in this level menu can choose as follows:

- SOUND SET

Press “Enter” button to enter setting item, can choose to “ON” or “OFF” by “▲” or “▼” key, “ON” express that enabled the sound, when press the button, under the condition of support currently the keys function, it will be issued the sound, “OFF” express that close the sound.

- SYSTEM TERMINAL SELECT

It has two choices, “FRONT” and “BACK” , it express before and after respectively, and it refers to the electronic load measuring voltage of the

voltage source input from the front faceplate terminal of cage, or input from the rear terminal of the cage. When input from the terminal behind, it can compensate voltage drop of the wire from the power supply under test to the electronic load.

- SYSTEM VOLTAGE RANGE

Setting the voltmeter gear, “HIGH” and “LOW” two gears, “LOW” gear can measure and control the voltage from 0 to 20V, “HIGH” gear allows reached 0 to 150V.

If work in “LOW” gear, voltage values displayed accurate to three decimal places(that is, 1mV), when working in “HIGH” gear, voltage values displayed accurate to two decimal places(that is, 10mV).

- SYSTEM CURRENT RANGE

Setting the current meter gear, “HIGH” and “LOW” two gears, “LOW” gear can measure and control the current from 0 to 3A(RK8512 is 0-6A), “HIGH” gear allows to 0 to 30A(RK8512 is 0-60A).

If work in “LOW” gear, current value displayed accurate to four decimal places(that is, 0.1mA), when working in “HIGH” gear, current value displayed accurate to three decimal places(that is, 1mA).

- SET EXIT

Select this option, after press “Enter” key it will return the root menu.

Notice:

In the process of setting, can press the “Esc” key to exit the setup state at any time, but you don't save parameters have changed.

Six Operating Mode

Prompt:

This chapter will explain the operation mode of the electronic load, DC electronic load support working mode as following:

- 1: Constant voltage
- 2: Soft start constant voltage
- 3: Loading unloading constant voltage
- 4: Constant current
- 5: Soft start constant current
- 6: Loading unloading constant current
- 7: Constant current turns to constant voltage
- 8: Constant power
- 9: Loading unloading constant power
- 10: Constant resistance
- 11: Loading unloading constant resistance
- 12: Constant resistance turns to constant voltage
- 13: Dynamic testing
- 14: Battery capacity testing
- 15: Short circuit function
- 16: Listing output
- 17: Automatic testing

The following section introduce the work mode above-mentioned in detail, in the introductions, composing according to the following format:

Meaning: Introduce the measuring principle of work patterns.

Enter method: How to enter the working mode.

Operational process: Start to run the work mode.

Notice: Something matters need attention about using this pattern.

Constant voltage (CV)

Meaning:

Electronic load as a high power voltage-regulator diode, no matter current flow past the electronic load how to change, it maintain the voltage at the ends of the constant.

Enter method:

Press “V-set” button, the screen shows “STANDARD VOLT=” to prompt input the expected voltage value, when the input is completed, press “Enter” key to return to normal state, the bottom right corner of screen shows “CV”, it express that is in constant voltage mode currently.

Operational process:

Operate the “On/Off” key, it will start or stop the output. Adjust the turn-knob on the top right corner of the faceplate can change the voltage value, press the turn-knob can change the bits of digits and obtain the speed or accuracy.

Notice:

If the voltage inputted is less than the setting value of constant voltage, it will not get a stable constant voltage value.

Loading unloading constant voltage (CV-LU)

Meaning:

It does not start before the input voltage rising to the load voltage, only when the input voltage is greater than the load voltage, the electronic load will start to enter the constant voltage mode; If in the process of operation, the input voltage declining below the discharge voltage, it will cease the constant voltage mode. In order to prevent some of the power supply joined the larger load and cannot be started during startup.

Enter method:

Enter the “constant voltage” work mode first, and input the expected final voltage value, then press “Shift+1” button, the screen shows “ONSET=” that prompts input the expected load voltage value. After input is completed, press “Enter” key and the screen shows “OFFSET VOLT=” that prompts input the expected unloading voltage value, after input is completed, press “Enter” button and return to normal state, the bottom right corner of screen shows “CV-LU”, it express it is in the loading and unloading voltage mode currently.

Operational process:

Operate “On/Off” key to start or stop the output, if the input voltage is less than the load voltage, the upper right corner of the screen shows “WAIT”, if it is greater than the load voltage, the screen shows “ON”. Adjust the turn-knob on the top right corner of the faceplate can change the voltage value, press the turn-knob and can change the bits of digits and obtain the speed or accuracy expected.

Notice:

When setting load and unload voltage value, it should be set according to the following formula, otherwise it will cause oscillation:

on-load voltage > setting value of the constant voltage > discharge voltage

Soft start constant voltage (CVS)

Meaning:

In this work mode, the constant voltage value according to the appointed time, rise from 0 to the voltage value specified of “constant voltage working mode”.

Enter method:

Enter the “constant voltage” work mode first, and input the expected final voltage value, then press “Shift+2” button, the screen shows “RISING TIME=” that prompts input the expected time premium. After input is completed, press “Enter” key to return to normal state, the bottom right corner of screen shows “CV-S”, it express it is in the soft start constant voltage mode currently.

The maximum time allowed setting is 99999.99mS, is about 100 seconds.

Operational process:

Operate “On/Off” key to start or stop the output, the meaning of the character displayed on the upper right corner is as follows:

OFF: Not Started

START: In the process of soft start

ON: The boot process has been completed, enter the constant voltage mode

When start every time, the virtual voltage will be increased from zero to constant voltage setting value.

Notice:

If the input voltage is less than the constant voltage setting value, it will not get a stable voltage value.

Constant current (CC)

Meaning:

Electronic load of resistance increases with the rise of the input voltage, remain the current flowed past the electronic load unchanged, it showed the characteristics of constant current.

Enter method:

Press the “I-set” button and the screen shows “STANDARD CURR=”, it prompt that input the expected current value, after input is completed and press “Enter” key to return to normal state, the bottom right corner of screen shows “CC”, it express is in constant current mode currently.

Operational process:

Operate “On/Off” key to start or stop the output. Adjust the turn-knob on the top right corner of the faceplate can change the current value, press the turn-knob and can change the bits of digits and obtain the speed or accuracy expected. 操作

Notice:

If the electric current provided by the load is less than the specified current value (such as power supply resistance or power supply current circuit limited), it will not obtain the setting current value.

Loading unloading constant current (CC-LU)

Meaning:

It does not start before the input voltage rising to the load voltage, only when the input voltage is greater than the load voltage value, the electronic load will start and enter the constant current mode; If in the process of operation, the input voltage declining below the discharge voltage, it will cease the constant current mode. In order to prevent some of the power supply joined the larger load and cannot be started during startup.

Enter method:

Enter the “constant current” work mode first, and input the expected final voltage value, then press “Shift+1” button, the screen shows “ONSET=” that prompts input the expected load voltage value. After input is completed, press “Enter” key and the screen shows “OFFSET VOLT=” that prompts input the expected unloading voltage value, after input is completed, press “Enter” button and return to normal state, the bottom right corner of screen shows “CC-LU”, it express it is in the loading and unloading current mode currently.

Operational process:

Operate “On/Off” key to start or stop the output, if the input voltage is less than the load voltage, the upper right corner of the screen shows “WAIT”, if it is

greater than the load voltage, the screen shows “ON” .Adjust the turn-knob on the top right corner of the faceplate can change the current value, press the turn-knob and can change the bits of digits and obtain the speed or accuracy expected.

Notice:

When setting load and unload voltage value, it should be set according to the following formula, otherwise it will cause oscillation:

on-load voltage > uninstal voltage

Soft start constant current 软启动定电流 (CCS)

Meaning:

In this work mode, the constant current value according to the appointed time, rise from 0 to the current value specified of “constant current working mode” .

Enter method:

Enter the “constant current” work mode first, and input the expected final current value, then press “Shift+2” button, the screen shows “RISING TIME=” that prompts input the expected time premium. After input is completed, press “Enter” key to return to normal state, the bottom right corner of screen shows “CC-S” , it express it is in the soft start constant current mode currently.

The maximum time allowed setting is 99999.99mS, is about 100 seconds.

Operational process:

Operate “On/Off” key to start or stop the output, the meaning of the character displayed on the upper right corner is as follows:

OFF: Not Started

START: In the process of soft start

ON: The boot process has been completed, enter the constant voltage mode

When start every time, the rated current will be increased from zero to constant current setting value.

Notice:

If the electric current provided by the load is less than the specified current value (such as power supply resistance or power supply current circuit limited), it will not obtain the setting current value.

Constant current turns to constant voltage (CC-CV)

Meaning:

In the work of stage 1, the electronic load discharge to the power under test by the stable current, if the voltage of power supply is lower than the specified value, the electronic load will into stage 2—the constant voltage mode.

Enter method:

Enter the “constant current” work mode first, and input the expected final current value, then press “Shift+4” button, the screen shows “CC TO CV VOLT=” that prompts input the expected voltage values. After input is completed, press “Enter” key to return to normal state, the bottom right corner of screen shows “CC-CV” , it express it is in the mode of constant current turns to constant voltage currently.

Operational process:

Operate “On/Off” key to start or stop the output. The upper right corner of the screen shows the current working status by “OFF”、 “CC” 和 “CV” respectively. “OFF” express do not Started, “CC” express is in a state of constant current discharge currently, “CV” express that enter the constant voltage state.

Notice:

When working state turns from the constant current into the constant voltage, there will be a prompt tone, press any key to cancel the prompt tone.

Constant power (CP)

Meaning:

When electronic load run with constant power mode, its impedance rise with the voltage rising, make the product of the voltage and current is constant, the power is constant namely.

Enter method:

Press “P-set” button, and the screen shows “STANDARD POWR=” that prompts input the expected magnitude of power. After input is completed, press “Enter” key to return to normal state, the bottom right corner of screen shows “CP”, it express it is in the mode of constant power currently.

According to different types of the equipment, the maximum allowable consumption power of RK8511 is 150W, the maximum allowable consumption power of RK8512 is 300W power.

Operational process:

Operate “On/Off” key to start or stop the output, if the input voltage is less than the load voltage. Adjust the turn-knob on the top right corner of the faceplate can change the magnitude of power.

Notice:

None.

Loading unloading constant power (CP-LU)

Meaning:

It does not start before the input voltage rising to the load voltage, only when the input voltage is greater than the load voltage value, the electronic load will start and enter the constant power mode; If in the process of operation, the input voltage declining below the discharge voltage, it will cease the constant power mode. In order to prevent some of the power supply joined the larger load and cannot be started during startup.

Enter method:

Enter the “constant power” work mode first, and input the expected final power value, then press “Shift+1” button, the screen shows “ONSET=” that prompts input the expected on-load voltage value. After input is completed, press “Enter” key and the screen shows “OFFSET VOLT=” that prompts input the expected unloading voltage value, after input is completed, press “Enter” button and return to normal state, the bottom right corner of screen shows “CP-LU”, it express it is in the loading and unloading constant power mode currently.

Operational process:

Operate “On/Off” key to start or stop the output, if the input voltage is less than the load voltage, the upper right corner of the screen shows “WAIT”, if it is greater than the load voltage, the screen shows “ON”. Adjust the turn-knob on the top right corner of the faceplate can change the magnitude of power, press the turn-knob and can change the bits of digits and obtain the speed or accuracy expected.

Notice:

When setting load and unload voltage value, it should be set according to the following formula, otherwise it will cause oscillation:

on-load voltage > uninstal voltage

Constant resistance (CR)

Meaning:

In constant resistance mode, the electronic load behave as a normal resistance, the electric current will increased linearly with the input voltage rises, current and linear increase.

Enter method:

Press “R-set” key and the screen shows “STANDARD RESI=” that prompts input the expected resistance value, after input is completed, press “Enter” button and return to normal state, the bottom right corner of screen shows “CR”, it express it is in the constant resistance mode currently.

Operational process:

Operate “On/Off” key to start or stop the output. Adjust the turn-knob on the top right corner of the faceplate can change the magnitude of power.

Notice:

None.

Loading unloading constant resistance (CR-LU)

Meaning:

It does not start before the input voltage rising to the load voltage, only when the input voltage is greater than the load voltage value, the electronic load will start and enter the constant resistance mode; If in the process of operation, the input voltage declining below the discharge voltage, it will cease the constant resistance mode. In order to prevent some of the power supply joined the larger load and cannot be started during startup.

Enter method:

Enter the “constant resistance” work mode first, and input the expected final power value, then press “Shift+1” button, the screen shows “ONSET=” that prompts input the expected on-load voltage value. After input is completed, press “Enter” key and the screen shows “OFFSET VOLT=” that prompts input the expected unloading voltage value, after input is completed, press “Enter” button and return to normal state, the bottom right corner of screen shows “CR-LU”, it express it is in the loading and unloading constant resistance mode currently.

Operational process:

Operate “On/Off” key to start or stop the output, if the input voltage is less than the load voltage, the upper right corner of the screen shows “WAIT”, if it is greater than the load voltage, the screen shows “ON”. Adjust the turn-knob on the top right corner of the faceplate can change the resistance value, press the turn-knob and can change the bits of digits and obtain the speed or accuracy expected.

Notice:

When setting load and unload voltage value, it should be set according to the following formula, otherwise it will cause oscillation:

$$\text{on-load voltage} > \text{uninstall voltage}$$

Constant resistance turns to constant voltage (CR-CV)

Meaning:

In the work of stage 1, the electronic load work with the mode of constant resistance, when the voltage of the power supply under test decline to a designated value, it will enter the mode of constant voltage.

Enter method:

Enter the “constant resistance” work mode first, and input the expected final resistance value, then press “Shift+5” button, the screen shows “CR TO CV VOLT=” that prompts input the expected voltage value. After input is completed, press “Enter” key and return to normal state, the bottom right corner of screen shows “CR-CV”, it express it is in the mode of constant resistance turns to constant voltage currently.

Operational process:

Operate “On/Off” key to start or stop the output. The upper right corner of the screen shows the current working status by “OFF”、“CR”和“CV” respectively. “OFF” express do not Started, “CR” express is in a state of constant resistance discharge currently, “CV” express that enter the constant voltage state.

Notice:

When working state turns from the constant resistance into the constant voltage, there will be a prompt tone, press any key to cancel the prompt tone.

Dynamic testing

Meaning:

This work mode used for testing the ability of impact resistant of the power supply under test, the electronic load discharge to the power supply under test with two current (the minimum is 0, the maximum can be the maximum allowable value), the size of the two kinds of current, the duration and the duration between the current conversion can adjust respectively.

Enter method:

Set the above parameters first and press “Shift+6” key, it can enter the settings. The following table gives the contents and meanings of settings, each complete one input needs to press “Enter” to the next item.

Content Displayed	Meaning
LEVEL A CURR=	Input the current value of A segments current.
WIDTH A TIME=	Input the duration of A segments current.

WIDTH OF A-B=	Input the duration of A segments current turns to B segments current.
LEVEL B CURR=	Input the current value of B segments current.
WIDTH B TIME=	Input the duration of B segments current.
WIDTH OF B-A=	Input the duration of B segments current turns to A segments current.
TRANSMIT MODE=	Use “▲”和“▼”key can choose “AUTO”、“TRIG” and “PULSE”.

In the table above, the last item is used to setting the dynamic testing mode, explaining in detail as follow:

AUTO: It express that after the electronic load starting, the change of current complete in accordance with “A → A-B → B → B-A → A” automatically, without outside intervention.

TRIG: When received the trigger signal, it will according to the original of the electric current is A or B, in accordance with “A → A-B → B”, or “B → B-A → A” to complete one change, and then stopped at the final electrical level.

PULSE: When received the trigger signal, the change of current in accordance with “A → A-B → B → B-A → A” to complete a time, then stop in A current and waiting for the next trigger.

In the “PULSE” and “TRIG” this two kinds of mode, the trigger signal can be from three aspects.

1. “Shift+.” key
2. Through the switch short-circuit a time and connect the binding post “TRI” and “GND” of the cage.
3. Trigger instructions remotely by the PC.

Operational process:

Press “Shift+3” key and screen shows “DYNAMIC TEST” into the dynamic testing mode, operate “On/Off” key to start or stop the output. The upper right corner of the screen shows it whether start and the current state after start by “OFF”、“A” “A-B”、“B” and “B-A” respectively.

Notice:

None.

Battery capacity test (BATT)

Meaning:

The working mode is used to measure the capacity of the battery, after start-up, the electronic load discharge to the power supply under test by the specified current and accumulate the time of discharge at the same time, it calculated the electric quantity out hereby, in the process of discharge, if the voltage of the power supply under test is lower than the specified value, it will stop the discharge.

Enter method:

Firstly, set the discharge current by setting “the constant current working mode”, and then press “Shift+8” key, the screen shows “END TEST VOLT=” and prompt that input the voltage of the test termination, after the input is completed, press “Enter” key

to return to normal state, the bottom right corner screen shows “BATT”, it express it is in the mode of the battery capacity test currently.

Operational process:

Operate “On/Off” key to start or stop the output. The upper right corner of the screen shows “Not Started” “In measurement” “Test ending” by “OFF” “TEST” “END” respectively.

The middle position of the second Line on the screen displayed the electric quantity has been released, the unit is AH, that is “Ampere-Hour”, the data showed accurate to the sixth decimal places after the decimal point, therefore, it can display accurately the electric quantity of 1uAH, it is the electric quantity discharged by 1uA current during 1 hour namely.

Notice:

In the working mode of the battery capacity testing, long press “Esc” key and the time reach more than 1 second, it can reset the capacity value measured to 0.

Short circuit function

Meaning:

The high-power tube of internal electronic load is breakover completely, simulate a short circuit in the input end.。

Enter method:

Press “Shift+9” button, the screen shows “SHORT WORK MODE” and express enter the short circuit working mode currently, this mode is not running parameters can be set up, so there is no need to “Enter” key to confirm.

Operational process:

Operate “On/Off” key to start or stop the output. The upper right corner of the screen shows whether to open the short circuit mode by “ON” and “OFF”.

Notice:

None.

Listing Output (LIST)

Meaning:

Listing output is also known as the output of the program, it refers to the electronic load output successively in accordance with the constant current value compiled and its corresponding time, in order to achieve the edit capabilities of any current waveform.

Setting method:

Press “Shift+0” button, enter the menu selection of function setting and press “▲” and “▼” key, turn to “LIST SET” item, and then press “Enter” button, press “▲” and “▼” button again and select “EDIT LIST”, press “Enter” key to enter the list to editing interface, the steps of edit list as follow:

1: The motion after the list output ending

CONTINUOUS: Continue to start from step 1 after the list output ending, loop output setting value.

RESET: Shut down the output after the list output ending.

HOLD: Remain the final output value invariant after the list output ending. Press “Enter” key to enter the next step after selection is completed.

2: Setting the length of steps

The largest number of steps of list is 200 steps, but not every test project need such a long steps. It need to input the number of steps in this step, and then press “Enter” button and enter the next step.

The following steps to set the number for 5 step as an example to explain.

3: Setting every step of the constant current value

The screen shows “STEP x: CURR=” and prompt input the current value of x step, x represents a value of 1-200.

After input is completed, press “Enter” button and enter the next step.

4: Setting the duration of each step

Screen shows “STEP x: TIME=” and prompt input the duration of x step, x represents a value of 1-200.

After input is completed and press “Enter” button, if you have already completed all the steps (in this case is 5step), exit to the list of editing and return to the up one level menu, if you haven't completed all the steps, that the step number plus 1 (x value namely) and return to 3 step to continue to input next set of data on the list.

All the editing of the list data is finished, you can select the menu of “EXIT” menu item at all levels of the menu to return to normal status, it also can be click “Esc” key to return to normal state directly.

Enter method:

Press “Shift+0” button to into the selection menu of function setting and press “▲” and “▼” key, turn to “LIST SET” item, then press “Enter” button and exit from the function selection menu, the screen shows “LIST OUTPUT”, it express that is in the mode of list output currently.

Operational process:

Operate “On/Off” key to start or stop the output, the upper right corner of the screen shows whether the list output has been launched by “OFF” and “ON” .

According to the motion after the list output ending setted by the first step in the first paragraph of “Settings Method” . The bottom right of screen will display different content as a reminder:

CONTINUOUS: Always show “RUN” .

RESET: It shows “RUN” when it running, it shows “RESET” after the list output ending.

HOLD: It shows “RUN” when it running, it shows “HOLD” after the list output ending.

Notice:

None.

Automatic testing

Meaning:

The work mode of automatic testing is used to proceed a series of tests for power supply under test, it will given the conclusion of the product whether is qualified after the test is completed.

In operation, you can set the 50 work steps at most (of course, if you don't need so many steps, can also be less than 50 steps), in each step, the user can designate the working mode of the step (constant voltage, constant current, constant power and constant resistance, short circuit and open circuit), and operation parameters and running time of this step working in this mode is given.

Next, specifying the steps of measuring project can choose the voltage, electric current, power and resistance, and then specify the upper and lower limit of measured value.

In operation, the electronic load measuring the specified project according to the operation mode listed and the appointed time of parameters running at the end of each period of time, and comparing with the upper and lower of specified parameters, if it is greater than the upper limit or less than the lower limit value, it will stop the test and send out alarm to prompt the products is unqualified.

Setting method:

One、Basic setting

Press “Shift+0” button to enter the selection menu of function setting, press “▲” and “▼” key turn to “AUTO TEST SET” item, and then press “Enter” button, and press “▲” and “▼” button again, select “EDIT AUTO TEST” and press “Enter” key, enter the editing interface of the automatic test program, it is in the steps of edit list as follow:

1: Setting the length of the step

The largest number of steps in list is 50 steps, but not every test project need such a long steps, input the number of steps needed in this step, and press “Enter” button and enter the next step.

The following to setting 5 step as an example to explain.

2: Setting the work mode of every step

The screen shows “STEP x: yy” and prompt input the current value of x step, x represents a value of 1-50. “yy” express the work patterns, the meaning of letters shown in the following table:

Letter	Meaning	Letter	Meaning
CV MODE	Constant Voltage mode	CC MODE	Constant Current mode
CP MODE	Constant Power mode	CR MODE	constant resistant Mode
OPEN MODE	Open Circuit Mode	SHORT MODE	Short circuit mode

After input is completed, press “Enter” button and enter the next step.

3: Setting the working model of working parameters

According to the different work mode selected in the second step, the prompt information in this step is also different, listed as below:

Selection Mode	Prompt Information	Selection Mode	Prompt Information
CV MODE	SETP x: VOLT=	CC MODE	SETP x: CURR=
CP MODE	SETP x: POWR=	CR MODE	SETP x: RESI=

Because of short circuit and open circuit don't need the work parameters, it will skip this step.

After completion of work parameter input, press "Enter" key and enter the next step.

4: Input the running time

In this step, input every step needs the running time, the units is second, and the maximum is 255 seconds.

When the time value input is completed, press "Enter" key and enter the next step.

5: Selecting the measuring project

In this step, select the project which be measured, it can be one of the following items:

Measuring Items	Display Character	Measuring Items	Display Character
Measuring Voltage	TEST VOLTAGE	Measuring Current	TEST CURRENT
Measured Power	TEST POWER	Measuring Resistance	TEST RESISTANCE

When the measuring project selection is completed, press "Enter" key and enter the next step.

6: Selecting the limit of measurement parameter

After the specified running time of each step in the process of automatic test pass, it will measure the specified measurement project in fifth step, the parameters obtained will compare with the parameters setted in this step, if the measured values is less than the lower limit of parameters, it will stop the follow-up measurement and send out the prompt.

When the lower limiting value inputted is completed, press "Enter" key and enter the next step.

7: Selecting the upper limit of the measurement parameter

Same as the sixth step, this step specify the upper limit of the parameters, if the measured value is greater than this value, it will stop the subsequent measurement, and send out the prompt.

When the upper limit inputted is completed, press "Enter" button, if all steps have been completed(in this case is the fifth step), then exit to the list editor of automatic measurement and return to the higher level menu, if you haven't completed

all the steps, the step number add 1(x value namely) and return to the second step to continue to input the next set of data on list.

Two、Setting the signal output

When the test failed or after completion of the test, it can output a signal to the peripheral equipment, so as to make prompt and the method of enter is:

Press “Shift+0” button and enter the selection menu of function setting, press “▲” and “▼” key and turn to “AUTO TEST SET”, press “Enter” key and press “▲” and “▼” button again, then turn to “SETUP AUTO TEST”, press “Enter” key, setting divide into two steps, described as below:

1: Setting the trigger time

The screen shows “TRIG TIME: xxx”, XXX can be one of the following characters, the meaning in followed.

DISABLE: Don't output the trigger signal

TEST PASS: All measuring project output the trigger signal when all through.

TEST FAIL: In one step, when the measurement fail will output the trigger signal.

Selecting the expected triggering time by “▲” and “▼” button, and then press “Enter” button and enter the next step.

2: Selecting the way of the output signal

After press “Enter” key in the previous step, the screen shows “OUTPUT MODE: xxx”, it start selecting the way of the output signal, and can be pulse can also be electrical level, XXX values are as follows:

PULSE: Output the 5 seconds low level, turns to the high level after 5 seconds.

LEVEL: Output turns to the low level, until a key input turns to the high level in addition.

Selecting the expected output signal by “▲” and “▼” button, and then press “Enter” button and return to the higher level menu.

Enter method:

Press “Shift+0” button and enter the selection menu of function setting, press “▲” and “▼” key and turn to “AUTO TEST SET”, press “Enter” key, the screen shows “LOAD AUTO TEST”, press “Enter” key once again, exit from the selection menu of function setting, and the screen shows “AUTO TEST STOP”, it express it is in the automatic test mode and the stop state currently.

Operational process:

Operate “On/Off” key to start or stop the output, the upper right corner of the screen express whether the automatic test has been started by “OFF” and “ON” .

In the process of running, the screen shows that in which measurement step currently. If occur the testing failures or testing is completed, it will setting the trigger signals outputed according to above data. The screen also can shows the prompt, such as the tip:

AT FAIL STEP= 2 Express the test failed, occur in the second step.

AUTO TEST END
qualified.

Notice:
None.

Automatic testing is completed, power supply under test is



Seven Communication Protocol

一、 The connection of hardware

1. This machine is provided with the standard RS232 port, if you want to connect to the computer, need to buy the RS232 adapter provided by our company. Insert the adapter into the RS232 port on the rear faceplate of the native machine, then connected to the computer through a standard RS232 connecting line.
2. Please install VB6SP3 patches before open the PC software, or the PC software will appear error reminder.
3. Open the PC software “Dc electronic load remote communication program. Exe” provided by our company, this software is a green software, no need the installation.
4. Open the host of the electronic load, at this point, the information bar of the principal computer should display the connected state, and other some information about the electronic load.

二、 Communication program

Open the PC software, the software will send the shake hands signal to slave computer periodically, after the slave computer receiving the valid data will returned twice the native data to the PC, PC according to the data returned to update the working parameters and working state displayed on slave computer.

三、 Communication protocol

(一) The data format of slave computer pass back: usually slave computer pass back 29 bytes of data.

1. DATA0, DATA1: The Frame header data, fixed as “0x55 0xAA” .
2. DATA2: Fixed as “0x01” .
3. DATA3, DATA4: Working mode and working process, specific as table.

Table One:

DATA3: working pattern	DATA4: progress of work
0x01 Standard constant voltage	0x01 stop, 0x02 operation
0x02 Loading unloading constant voltage	0x01 stop, 0x02 waiting, 0x03 operation
0x03 Soft start constant voltage	0x01 stop, 0x02 start, 0x03 succeed
0x04 Standard constant current	0x01 stop, 0x02 operation
0x05 Loading unloading constant current	0x01 stop, 0x02 waiting, 0x03 operation
0x06 Soft start constant current	0x01 stop, 0x02 start, 0x03 succeed
0x07 Constant current turns to constant voltage	0x01 stop, 0x02 constant current, 0x03 constant voltage
0x08 Standard constant power	0x01 stop, 0x02 operation

0x09 Loading unloading constant power	0x01 stop, 0x02 waiting, 0x03 operation
0x0A Soft start constant resistance	0x01 stop, 0x02 operation
0x0B Loading unloading constant resistance	0x01 stop, 0x02 waiting, 0x03 operation
0x0C constant resistance turns to constant voltage	0x01 stop, 0x02 constant resistance, 0x03 constant voltage
0x0D Test of battery	0x01 stop, 0x02 operation, 0x03 ending
0x0E Test of short-circuit	0x01 stop, 0x02 operation
0x0F Dynamic testing	0x01 stop, 0x02 waiting 0 trigger, 0x03 B test to the edge of A, 0x04 parameter A test, 0x05 waiting 1 trigger, 0x06 A test to the edge of B, 0x07 parameter B test.
0x10 Program testing	0x01 stop, 0x02 operation, 0x03 End by reset, 0x04 End by maintain.
0x11 Automatic testing	0x01 stop, 0x02 start, 0x03 operation, 0x04 Failure to end, 0x05 Successful end

4. DATA5:

- a) If the model number of slave computer is RK8512, DATA5 is 0x01, other types is 0x00;
- b) If the tap position of voltage is high, DATA5 reach 0x80, otherwise not to it.
- c) If the tap position of current is high, DATA5 reach 0x40, otherwise not to it;
- d) If the voltage source input on the rear faceplate, DATA5 reach 0x20, otherwise not to it;

5. DATA6, DATA7, DATA8, DATA9: Voltage value is the 32-bit fixed-point number.
6. DATA10, DATA11, DATA12, DATA13: Current value is the 32-bit fixed-point number.
7. DATA14, DATA15, DATA16, DATA17: Magnitude of power is the 32-bit fixed-point number.
8. DATA18, DATA19, DATA20, DATA21: Resistance value is the 32-bit fixed-point number.
9. DATA22, DATA23, DATA24, DATA25: Battery capacity value is the 32-bit fixed-point number.
10. DATA26: Voltage setting value is not more than 20V as 0x00, more than 20V as 0x01.
11. DATA27: Current setting value is not more than 6A as 0x00, more than 6A as 0x01.
12. DATA28: DATA0—DATA27 data cumulative sum.

13. Note that when receives commands to get correction parameters in the host from the principal computer, the host sent 35 bytes of data correction to the

principal computer, the specific data format please see the PC command for correction of the data format of obtain correction parameter.

(二) The data format of PC command:

The length of command data is different, but the first two bytes DATA0, DATA1 as the frame header data. The fixed format is “0x55 0xAA”, at the end of data is calibration bytes, makes the low eight bits of the whole command cumulative sum is 0, it will no longer described with the frame header data and the check digit. PC during the entire process of execution, it will always send handshake command to slave computer in free time. The slave computer will upload local data to the PC two times when it receive any command from the principal computer.

1. Handshake command: 4 bytes: DATA2, 0x00;
2. Close the output command: 4 bytes: DATA2, 0x10;
3. Open the output command: 4 bytes: DATA2, 0x11;
4. Energy reset command: 4 bytes: DATA2, 0x12;
5. Set the work mode command: 5 bytes:
DATA2: 0x20;
DATA3: Work Mode setting, see the table 2 in detail.

Table 2

DATA3	Working Mode
0x01	Standard constant voltage
0x02	Loading unloading constant voltage
0x03	Soft start constant voltage
0x04	Standard constant current
0x05	Loading unloading constant current
0x06	Soft start constant current
0x07	Constant current turns to constant voltage
0x08	Standard constant power
0x09	Loading unloading constant power
0x0A	Standard constant resistance
0x0B	Loading unloading constant resistance
0x0C	Constant resistance turns to constant voltage
0x0D	Battery testing

0x0E	Short-circuit testing
0x0F	Dynamic testing
0x10	Program testing
0x11	Automatic testing

6. Download parameters command: 21 bytes:

DATA2: 0x30;

DATA3: See the table 3 in detail.

Table 3

DATA3	The meaning of the other data
0x00	DATA4 DATA5 DATA6 DATA7 is the setting value of constant voltage.
0x01	DATA4 DATA5 DATA6 DATA7 is the setting value of constant voltage. DATA8 DATA9 DATA10 DATA11 is the Load voltage value. DATA12 DATA13 DATA14 DATA15 is the unloading voltage value.
0x02	DATA4 DATA5 DATA6 DATA7 is the setting value of constant voltage. DATA8 DATA9 DATA10 DATA11 is soft start time value.
0x03	DATA4 DATA5 DATA6 DATA7 is the setting value of constant current.
0x04	DATA4 DATA5 DATA6 DATA7 is the setting value of constant current. DATA8 DATA9 DATA10 DATA11 is the Load voltage value. DATA12 DATA13 DATA14 DATA15 is the unloading voltage value.
0x05	DATA4 DATA5 DATA6 DATA7 is the setting value of constant current. DATA8 DATA9 DATA10 DATA11 is soft start time value.
0x06	DATA4 DATA5 DATA6 DATA7 is the setting value of constant current. DATA8 DATA9 DATA10 DATA11 is the value of constant current turns to constant voltage.
0x07	DATA4 DATA5 DATA6 DATA7 is the setting value of constant power.
0x08	DATA4 DATA5 DATA6 DATA7 is the setting value of constant power. DATA8 DATA9 DATA10 DATA11 is the Load voltage value. DATA12 DATA13 DATA14 DATA15 is the unloading voltage value.
0x09	DATA4 DATA5 DATA6 DATA7 is the setting value of constant resistance.
0x0A	DATA4 DATA5 DATA6 DATA7 is the setting value of constant resistance. DATA8 DATA9 DATA10 DATA11 is the Load voltage value. DATA12 DATA13 DATA14 DATA15 is the unloading voltage value.
0x0B	DATA4 DATA5 DATA6 DATA7 is the setting value of constant resistance. DATA8 DATA9 DATA10 DATA11 is the value of constant resistance turns to constant voltage.
0x0C	DATA4 DATA5 DATA6 DATA7 is the setting value of constant current. DATA8 DATA9 DATA10 DATA11 is ending the voltage value for the battery capacity testing.
0x0E	1. DATA4 is 0x00, DATA5 is testing pattern: 0, Continuous pattern; 1, Trigger mode; 2, pulse pattern 2. DATA4 is 0x01, DATA5, DATA6, DATA7, DATA8: The current setting value of A transient current; DATA9, DATA10, DATA11, DATA12: The time premium of A transient

	<p>current;</p> <p>DATA13, DATA14, DATA15, DATA16: The transient time of transient current A to B.</p> <p>3. DATA4 is 0x02,</p> <p>DATA5, DATA6, DATA7, DATA8: The current setting value of B transient current;</p> <p>DATA9, DATA10, DATA11, DATA12: The time premium of B transient current;</p> <p>DATA13, DATA14, DATA15, DATA16: The transient time of transient current B to A.</p>
0x0F	<p>1. DATA4 is 0x00,</p> <p>DATA5, the mode of stopping list output.</p> <p>DATA6, the data length</p> <p>2. DATA4 is less than or equal to 0x64, but not for 0x00, DATA4 as list data indexes;</p> <p>DATA5, DATA6, DATA7, DATA8: The output current value;</p> <p>DATA9, DATA10: output time</p> <p>DATA11, DATA12, DATA13, DATA14: output current value next;</p> <p>DATA15, DATA16: Output time next.</p>
0x10	<p>1. DATA4 is 0x00,</p> <p>DATA5: The triggering time of automatic testing</p> <p>DATA6: The trigger mode of automatic testing;</p> <p>DATA7: The length of the automatic testing data.</p> <p>2. DATA4 is less than or equal to 0x32, but not for 0x00, DATA4 as the automatic testing data index;</p> <p>DATA5: The automatic testing work mode of current data;</p> <p>DATA6: DATA7, DATA8, DATA9: The current data test the working parameter automatically.</p> <p>DATA10: The current data test the working time automatically.</p> <p>DATA11: The current data test the project automatically.</p> <p>DATA12, DATA13, DATA14, DATA15: The current data test the limit inferior of parameter automatically.</p> <p>DATA16, DATA17, DATA18, DATA19: The current data test the lines superiors of parameter automatically.</p>
0x11	<p>1. DATA4 is 0x00: Select the front faceplate when input the voltage;</p> <p>DATA4 is the other values: Select the rear faceplate when input the voltage;</p> <p>2. DATA5 is 0x00: the voltage profile is low and the maximum of the voltage setting is 20000;</p> <p>DATA5 is the other values: the voltage profile is high and the maximum of the voltage setting is 150000.</p> <p>3. DATA6 is 0x00: the current document is low and the maximum of the current setting is 60000;</p> <p>DATA6 is the other values: the current document is high and the maximum of the current setting is 600000.</p>

7. PC trigger command: 4 bytes

DATA2: 0x31;

8. The calibration parameter setting commands: 10 bytes

DATA2: 0xF0;

DATA3, DATA4: fixed to 0xA5, 0x5A;
 DATA5, DATA6: Specific see the table 4.

Table 4

DATA5	DATA6	The other bytes
0	0	DATA7, DATA8: The measurement voltage is low, when in 0V voltage will correct data;
	1	DATA7, DATA8: The measurement voltage is high, when in 0V voltage will correct data;
	2	DATA7, DATA8: The measurement voltage is low, the voltage multiplying power will correct data;
	3	DATA7, DATA8: The measurement voltage is high, the voltage multiplying power will correct data;
1	0	DATA7, DATA8: The measurement current is small, when in 0A current will correct data;
	1	DATA7, DATA8: The measurement current is large, when in 0A current will correct data;
	2	DATA7, DATA8: The measurement current is small, the current multiplying power will correct data;
	3	DATA7, DATA8: The measurement current is large, the current multiplying power will correct data;
2	0	DATA7, DATA8: The control voltage is low, when in 0V voltage will correct data;
	1	DATA7, DATA8: The control voltage is high, when in 0V voltage will correct data;
	2	DATA7, DATA8: The control voltage is low, the voltage multiplying power will correct data;
	3	DATA7, DATA8: The control voltage is high, the voltage multiplying power will correct data;
3	0	DATA7, DATA8: The control current is small, when in 0A current will correct data;
	1	DATA7, DATA8: The control current is large, when in 0A current will correct data;
	2	DATA7, DATA8: The control current is small, the current multiplying power will correct data;
	3	DATA7, DATA8: The control current is large, the current multiplying power will correct data;

9. Obtaining correction parameters command: 6 bytes

DATA2: 0xF1;
 DATA3, DATA4: fixed to 0xA5, 0x5A;

When the host receives the command from the PC, need to send the 36 bytes of correction parameter data packets to the PC, the specific format as shown in table 5.

Table 5

Data series	The content of data
DATA0	The frame header data is 0x55
DATA1	The frame header data is 0xAA
DATA2	The fixed data is 0xA0

DATA3	The measurement voltage is low,when in 0V voltage will correct the the high 8-bit of parameters;
DATA4	The measurement voltage is low,when in 0V voltage will correct the the low 8-bit of parameters;
DATA5	The measurement voltage is high,when in 0V voltage will correct the the high 8-bit of parameters;
DATA6	The measurement voltage is high,when in 0V voltage will correct the the low 8-bit of parameters;
DATA7	The measurement voltage is low,the voltage multiplying power will correct the the high 8-bit of parameters;
DATA8	The measurement voltage is low,the voltage multiplying power will correct the the low 8-bit of parameters;
DATA9	The measurement voltage is high,the voltage multiplying power will correct the the high 8-bit of parameters;
DATA10	The measurement voltage is high,the voltage multiplying power will correct the the low 8-bit of parameters;
DATA11	The measurement current is small,when in 0A current will correct the the high 8-bit of parameters;
DATA12	The measurement current is small,when in 0A current will correct the the low 8-bit of parameters;
DATA13	The measurement current is large,when in 0A current will correct the the high 8-bit of parameters;
DATA14	The measurement current is large,when in 0A current will correct the the low 8-bit of parameters;
DATA15	The measurement current is small,the current multiplying power will correct the the high 8-bit of parameters;
DATA16	The measurement current is small,the current multiplying power will correct the the low 8-bit of parameters;
DATA17	The measurement current is large,the current multiplying power will correct the the high 8-bit of parameters;
DATA18	The measurement current is large,the current multiplying power will correct the the low 8-bit of parameters;
DATA19	The control voltage is low,when in 0V voltage will correct the high 8-bit of parameters;
DATA20	The control voltage is low,when in 0V voltage will correct the low 8-bit of parameters;
DATA21	The control voltage is high,when in 0V voltage will correct the high 8-bit of parameters;
DATA22	The control voltage is high,when in 0V voltage will correct the low 8-bit of parameters;
DATA23	The control voltage is low,the voltage multiplying power will correct the high 8-bit of parameters;
DATA24	The control voltage is low,the voltage multiplying power will correct

	the low 8-bit of parameters;
DATA25	The control voltage is high, the voltage multiplying power will correct the high 8-bit of parameters;
DATA26	The control voltage is high, the voltage multiplying power will correct the low 8-bit of parameters;
DATA27	The control current is small, when in 0A current will correct the the high 8-bit of parameters;
DATA28	The control current is small, when in 0A current will correct the the low 8-bit of parameters;
DATA29	The control current is large, when in 0A current will correct the the high 8-bit of parameters;
DATA30	The control current is large, when in 0A current will correct the the low 8-bit of parameters;
DATA31	The control current is small, the current multiplying power will correct the the high 8-bit of parameters;
DATA32	The control current is small, the current multiplying power will correct the the low 8-bit of parameters;
DATA33	The control current is large, the current multiplying power will correct the the high 8-bit of parameters;
DATA34	The control current is large, the current multiplying power will correct the the low 8-bit of parameters;
DATA35	The data package correct the bytes.

10. Saving the correction parameters command: 6 bytes

DATA2: 0xF2;

DATA3, DATA4: fixed data is 0xA5, 0x5A;

The host will saved the correction parameter into EEPROM when received this command.

Eight Security

Do not install replaced parts in the instrument by yourself, or perform any unauthorized modification. If there is a problem, please contact our after-sale maintenance personnel, if it still can't be solve, please send them to the the maintenance department designated of our company for repairing.

Quality guarantee

Our company will give a year of quality assurance about the materials and manufacture of our products since the date of shipment.

Quality assurance limited

The guarantee of the above is not applicable for the damage caused by the following:

- Incorrect or improper repair products.
- Unauthorized modification or misuse.
- Use in the environment beyond the instrument withstanded.
- Configure or maintain in the maintenance point unspecified.
- The customer install circuit to cause the damage.

Annunciations

If change the contents of this manual, it without prior notice.



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