

## OPERATION MANUAL


# MODEL : CH8710B/CH8710C Program-controlled DC Load

**Changzhou Beich Electronic Technology Co., Ltd.**

**(VER2.2 @2014.1)**

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**Thank you for purchasing our products!  
Please read the last chapter “Contents & Warranty” to  
confirm. If there is any incomplete, please contact us!**

## 一、 General Information

### 1.1 Brief introduction:

CH8710B/CH8710C Program-controlled DC Load Series can be widely used in on-line test and labs of power transformer, charger, switch power, storage battery industries, etc. The instruments of the series use LCD display coordinated with number keys and knob encoder, which makes the display clear and complete and the operation easy. Functions of the perfect constant voltage, current, power and resistance, long-distance measurement, short-circuit test, battery test, dynamic test and software control of upper unit help you enjoy the convenience.

#### Features:

- Number operation and control
- LCD display with high definition and high contrast, rich display information
- Easy operation of knob encoder switch
- Basic load function: constant current, voltage, power and resistance
- Multi units used to multiple load ability
- Short-circuit test
- Battery test
- Dynamic test
- Remote voltage measurement
- Panel and exterior trigger function
- Protection function: over-voltage, over-current, over-power, over-heat, polarity connection in reverse
- 10 sets of parameters memorized and loaded, and automatically loaded on turning on the instrument
- Intelligent fan control
- Key lock and knob lock functions
- Min. start voltage, min. break voltage and automatic delayed break functions
- Friendly multi-level menu setup, clear and convenient operation
- RS232C communication interface and multi-unit communication function

## 1.2 Specifications

### 1.2.1 Main specifications:

Model		CH8710B	CH8710C
Rated value	Input voltage	0~360V	0~360V
	Input current	1mA~30A	1mA~30A
	Input power	150W	300W
	Range	Accuracy	Solution
Load accuracy	0-9.999V	$\pm (0.1\%+0.03\%FS)$	1mV
	10V-99.99V	$\pm (0.1\%+0.03\%FS)$	10 mV
	100V-360V	$\pm (0.1\%+0.03\%FS)$	100 mV
	0-9.999A	$\pm (0.1\%+0.1\%FS)$	1 mA
	10A-30A	$\pm (0.2\%+0.15\%FS)$	10mA
Constant-voltage mode	1.5V-9.999V	$\pm (0.1\%+0.03\%FS)$	1mV
	10V-99.99V	$\pm (0.1\%+0.03\%FS)$	10 mV
	100V-360V	$\pm (0.1\%+0.03\%FS)$	100 mV
Constant-current mode	0-9.999A	$\pm (0.1\%+0.1\%FS)$	1 mA
	10A-30A	$\pm (0.2\%+0.15\%FS)$	10mA
Constant-resistance mode	0.1 $\Omega$ -10 $\Omega$	$\pm (1\%+0.3\%FS)$	0.001 $\Omega$
	10 $\Omega$ -99 $\Omega$	$\pm (1\%+0.3\%FS)$	0.01 $\Omega$
	100 $\Omega$ -999 $\Omega$	$\pm (1\%+0.3\%FS)$	0.1 $\Omega$
	1K $\Omega$ -4K $\Omega$	$\pm (1\%+0.8\%FS)$	1 $\Omega$
Constant-power mode	0-9.999W	$\pm (1\%+0.1\%FS)$	1 mW
	10-99.99W	$\pm (1\%+0.1\%FS)$	10 mW
	100-300W	$\pm (1\%+0.1\%FS)$	0.1W
Current display	0-9.999A	$\pm (0.1\%+0.1\%FS)$	1 mA
	10A-30A	$\pm (0.2\%+0.15\%FS)$	10mA
Voltage display	1.5V-9.999V	$\pm (0.1\%+0.03\%FS)$	1mV
	10V-99.99V	$\pm (0.1\%+0.03\%FS)$	10 mV
	100V-360V	$\pm (0.1\%+0.03\%FS)$	100 mV
Power display	0-10W	$\pm (1\%+0.1\%FS)$	1 mW
	10-100W	$\pm (1\%+0.1\%FS)$	10 mW
	100-300W	$\pm (1\%+0.1\%FS)$	0.1W
Battery test	Input= 0.8-120V      Max measurement capacity= 999A/H Resolution=10 mA      Timer range=1~6000sec		
Dynamic test	Range of Pulse Width    10ms-10s		

## 1.2.2 Working environment

Temperature: 0°C ~ 40°C

Humidity: ≤90%RH

Air pressure: 86 ~ 104Pa

## 1.2.3 Working power supply ⚡

220/110(1±10%)V AC, 50Hz/60 Hz (1±5%)

## 1.2.4 Dimensions

310mm×225mm×100mm

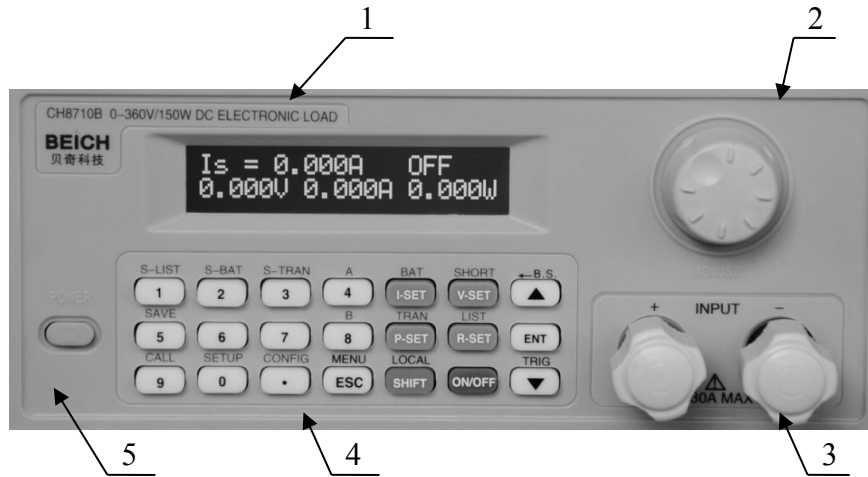
## 1.2.5 Weight

Approx. 5.5kg(2275)

6kg (2280)

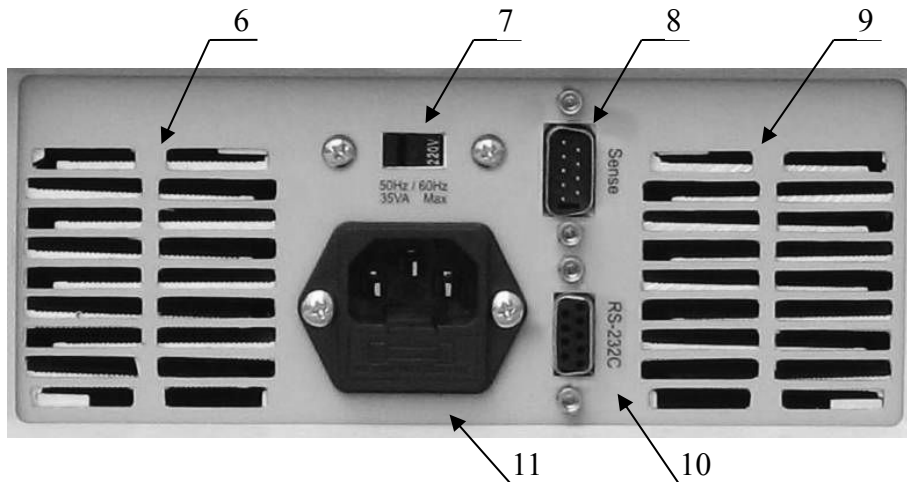
## 二、Panel Description

### 2.1 Front panel



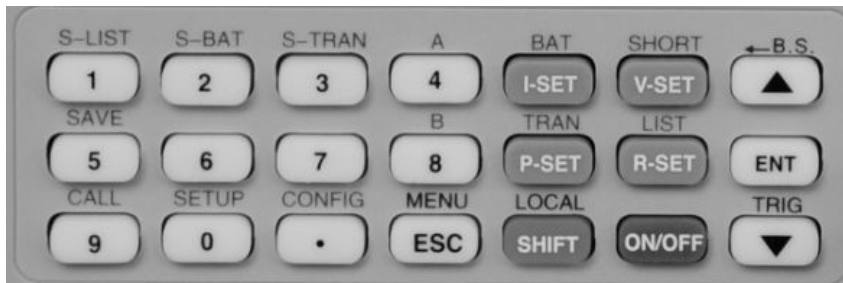
No.	Name	Description
1	Display	Refer to 2.4
2	Knob	
3	Input port: Red for positive pole, and black for negative pole	<b>⚠ Voltage polarity in reverse may result in large current</b>
4	Keys	Refer to 2.3
5	Power switch ⚡	

### 2.2 Rear panel



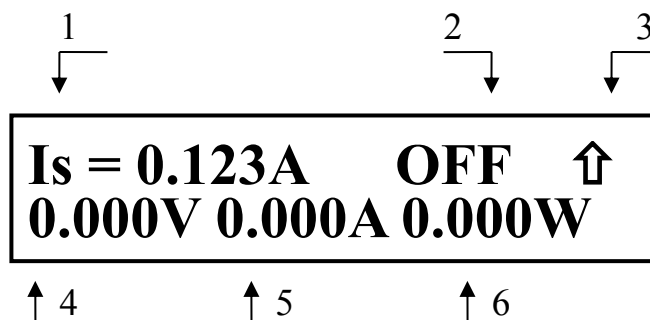
No.	Name	Description
6, 9	Cooling window	<b>ⓘ Don't jam, to keep ventilate!</b>
7	110V/220V AC input switch ⚡	<b>⚡ Please confirm the consistency of switch position and input power.</b>
8	Input interface of remote measurement and trigger	Refer to Index A for port configuration
10	RS232C communication interface	
11	AC power input ⚡	<b>⚡ Fuse of 1A inside</b>

### 2.3 Keys



Number keys	1, 2, 3, 4, 5, 6, 7, 8, 9, 0, .
Load basic mode key	I-SET,V-SET,P-SET,R-SET
Start/Stop key	ON/OFF
Menu selection key	ESC,ENT, ▲, ▼
The 2 <sup>nd</sup> function key	S-BAT,S-TRAN,SAVE,CALL,SETUP,CONFIG BAT,SHORT,TRAN, A,B
Upper bin key	SHIFT
Derived function key	MENU,LOCAL,BackSpace(B.S.),TRIG

### 2.4 Basic information





No.	District description	Description	Note
1	Load working mode	Is: Constant current	
		Vs: Constant voltage	
		Ps: Constant power	
		Rs: Constant resistance	
		Short: Short-circuit test	
		Battery: Battery test	
		Transient: Dynamic test	
2	Load status information	OFF: Load off	
		RUN: Load running	Battery test and dynamic test displayed
		.....: Status switch or waiting	
		UREG: Load not being constant	
		CC: Constant-current working of load	
		CV: Constant-voltage working of load	
		CP: Constant-power working of load	
		CR: Constant-resistance working of load	
		OC: Over-current	Alarm and load off may be resulted
		OV: Over-voltage	Alarm and load off automatically
		OP: Over-power	Alarm and load off may be resulted
		HOT: Over-heat	Alarm and load off automatically
		R.V: Polarity connection in reverse	Large current may be resulted even load off!
		ERR: Error	
3	Operation function	⬆ Upper bin key	
		🔒 Key lock	
		☐ Remote control	
4	Input voltage	Voltage of input port of load or remote measurement displayed	
5	Load consumption current	Actual current consumption of electric load displayed	At the time of battery test, dynamic test, different information displayed
6	Load consumption power	Actual power consumption of electric load displayed	
Other	Important alarm information	Reverse Voltage!!! : connection of voltage pole in reverse	At the time of polarity connection in reverse, load lost of control. Danger!
		Exceed Voltage!!!: Input voltage beyond	Load off automatically at the time of

		the range	over-voltage
		Over Hot!!!: Over-heat	Load off automatically at the time of over-heat

## 三、 Menu

### 3.1 General information

The menu includes all the contents of setup of instrument and parameters with the same entry (MENU pressed to enter), or enter submenu directly in shortcut mode.

In waiting status, press **【MENU】**, i.e. (ESC) key to menu function, and the available menus are displayed. **【▲】** and **【▼】** keys, or knob can be operated to select the menu, and press **【ENT】** key to the next-level menu, or **【ESC】** key to exit.

### 3.2 Menu description

Main menu	1 <sup>st</sup> submenu	Content or 2 <sup>nd</sup> submenu
System Config	Power-on Call	OFF
		Number 0 ~ 9 for file No.
	Key Beep	ON
		OFF
	Key Lock	ON
		OFF
	Knob Lock	ON
		OFF
	Trigger Source	MAN for manual
		EXT for exterior
		BUS
	Communication Mode	Separator
		Multiper
	Local Address	Number 000 ~ 127
Baud Rate	8 baud rates: 4800 9600 11520 12800 14400 19200 28800 38400	
Reset Settings	Esc	
	Enter	
Restore Cal Date	Esc	
	Enter	
Exit	Back to System Config	
Load Setup	Remote Sense	ON
		OFF
	Max Current	<b>【Ent】</b> key pressed to input current value
	Max Voltage	<b>【Ent】</b> key pressed to input voltage value
	Max Power	<b>【Ent】</b> key pressed to input power value
	On Voltage	OFF
<b>【Ent】</b> key pressed to input voltage value		

	Off Voltage	OFF		
		【Ent】 key pressed to input voltage value		
	Auto Off	OFF		
		【Ent】 key pressed to input time		
	Exit	Back to Load Setup		
Battery Test Set	Discharge Current	【Ent】 key pressed to input current value		
	Min Voltage	【Ent】 key pressed to input voltage value		
	Exit	Back to Battery Test Set		
Tran Test Set	Tran Load	Current for constant current		
		Voltage for constant voltage		
	Level A	【Ent】 key pressed to input load value ( voltage or current )		
	Width A	【Ent】 key pressed to input time ( ms )		
	Level B	【Ent】 key pressed to input load value ( voltage or current )		
	Width B	【Ent】 key pressed to input time ( ms )		
	Tran Mode	CONT		
		PULS		
	TRIG			
	Exit	Back to Tran Test Set		
List Test Set	Step Number	Number 00 ~ 14		
	Step Mode	AUTO		
		TRIG		
	Repeat	ON		
		OFF		
	Step00~14	List Load	ConstCurr for constant current	
			ConstVolt for constant voltage	
			ConstPower for constant power	
			ConstRes for constant resistance	
			Short for short circuit	
			Open for open circuit	
		Level	【Ent】 key pressed to enter rated value	
	Delay	【Ent】 key pressed to enter time		
Compare	OFF			
	InVoit for comparison of voltage			
	InCurr for comparison of current			

			InPower for comparison of power
		Limit Low	【Ent】 key pressed to enter rated value
		Limit High	【Ent】 key pressed to enter rated value
		Copy To Nest	Esc to exit Enter to copy
		Exit	Back to step
Save File	Number 0 ~ 9 【Ent】 key pressed to save selected file		
Recall File	Number 0 ~ 9 【Ent】 key pressed to load selected file		
Exit	【Ent】 key pressed to exit		

### 3.3 Shortcut menu


In waiting status, press SHIFT, then press the 2<sup>nd</sup> function corresponding to number key, to enter 1<sup>st</sup> submenu:

SHIFT + CONFIG	To enter submenu of system configuration
SHIFT + SETUP	To enter submenu of load setup
SHIFT + CALL	To enter submenu of file recall
SHIFT + SAVE	To enter submenu of file save
SHIFT + S-BAT	To enter submenu of battery discharge test
SHIFT + S-TRAN	To enter submenu of dynamic test
SHIFT + A	Spare function
SHIFT + B	Spare function

### 3.4 Menu setup

The main menu includes submenus of system configuration, dynamic parameter setup, file save/recall, etc, as shown:



Note: Sign  after menu means 【▲】 and 【▼】 keys or knob can be operated to select.

### 3.4.1 System Config

The System Config menu includes some system parameters, such as private setup of the instrument, communication function setup, etc. To save modification of system configuration, operation should be done in “Save Config” in the menu.



All the submenus in System Config can be selected through **【▲】** and **【▼】** keys or knob.

#### ◆ Power-on Call

At the time of Power-on Call = OFF, the function is off. When number 0 to 9 is selected, the corresponding file will be automatically loaded when the instrument is turned on. If the corresponding file is not saved (not existing), the default parameters will be loaded.

 **Note:** Please refer to “Save File” menu for how to save files.

#### ◆ Key Beep

The function is to set the beep at the time of pressing keys.

KeyBeep = ON: The sound of “DI” will be heard when keys are pressed.

KeyBeep = OFF: No sound will be heard when keys are pressed.

#### ◆ Knob Lock

The function is to select the knob function.

KnobLock = ON : Knob is locked and it can not be turned.

KnobLock = OFF : Knob lock is off, and knob is available.


#### ◆ Trigger Source


At the time of dynamic test and list test, trigger may be needed to select the next load. There are three types of trigger: MAU, EXT and BUS.

TriggerSource = MAN: manual trigger, triggered by pressing the “TRIG” key 手动触 on the panel;

TriggerSource = EXT : exterior trigger, triggered through Sensor terminal on 外部触 the rear panel;

TriggerSource = BUS : BUS trigger, triggered through program command on RS232C 总线 interface.

 **Note:** Refer to Index A for pin configuration of Sense interface on the rear panel.

 **Note:** Refer to Index C for programmed communication command.

#### ◆ Communication Mode

The RS232C communication interface can be used for the communication of multi units. One PC can communicate with multi electric loads, which can be used for parallel of loads.

8-bit digit mode is applied for either multi-unit communication or single-unit communication. However, multi-unit communication will recognize software address, and the single-unit communication is not related to address.

CommunicationMode = Separator : Single-unit communication mode


CommunicationMode = Multipler : Multi-unit communication mode

 **Note: Please refer to Index B fro RS232C interface communication.**

#### ◆ Local Address

When multi units are communicating, different addresses must be distributed to each instrument in the system. PC will exchange information with instruments according to their addresses. And in single-unit communication mode, address is invalid.

The address ranges from 0 to 127 (hex 00H ~ 7FH)。

 **Note: 【Ent】** key can be pressed to enter numbers.

 **Note: There can not be the same address repeated in one system.**


#### ◆ Baud Rate

The communication rate of data on RS232C interface should be consistent with the setup on PC.

The instrument has 8 baud rates: 4800 9600 11520 12800 14400 19200 28800 38400

#### ◆ Reset Settings

This operation is used to instrument the user settings (system configuration the Config and user settings Setup) back to factory original state. Avoid lead instrument does not work properly due to the user's settings reason in this menu, press [Ent] key recovery, then shut down and reboot, the system will re-initialize.

 **Note:** Do not do this instrument does not appear abnormal.

#### ◆ Reset Settings

when the test data is error,then use the menu to reset the data to the default calibration data

#### ◆ Exit

In this menu, **【Ent】** key is pressed to exit back to main menu, as pressing **【Esc】** key.

### 3.4.2 Load Setup

Load setup includes common parameters of electric load which decide the whole working characteristics of electric load. Max. power, max. voltage, and max. current decide not only max.

protection limit of electric load, but also working range of load.

Different load should be set in different operations.

If you want the modification of load setup to be still valid next time, the operation of saving should be done in the menu of “Save Setup”.

## LOAD SETUP: Remote Sense



### ◆ Remote Sense

In CV, CR, CP modes, voltage sampling accuracy will affect working accuracy of electric load. When load consumes larger current, voltage fall will come into being on the connection line of power to be tested and load. In order to make the test accurate, there is a remote measurement terminal on the rear panel, through which user can measure the voltage of output terminal of the instrument to be tested.

RomoetSense = ON : Remote test is turned on, and the instrument samples voltage through remote measurement terminal on the rear panel.

RomoetSense = OFF : Remote test is turned off, and the instrument samples voltage through load input terminal on the front panel.

Press **【▲】** and **【▼】** keys or knob to turn on or off remote measurement function.

**☰ Note: Please refer to Index A for pin configuration of Sense interface on the rear panel.**

### ◆ Max Current

Max. load current should be set before the test in order to ensure the safety of the test and accuracy of current test.

Max. load current has three main functions:

- a) To limit the constant current to be set less than the max. current;
- b) In CV, CP, CR and short-circuit test modes, when load current is over max. current, the instrument alarms and displays over-current protection (OC), and the over-current lasting for long time will result in the automatic turning off of load.
- c) When the set max. current is less than 3A (30A system) or 6A (60A system), load will work in the range of low current. Otherwise, it will work in the range of high current.

**☰ Example:** If actual working current is less than 2.5A, select menu to Max Current, and press **【Ent】** key to enter, then press **【Ent】** key again to input numbers. Press **【2】【.】【5】**. Afterwards, press **【Ent】** key to enter, and the default unit is A.

### ◆ Max Voltage

It has three main functions to set max. input voltage:

- a) To limit the constant voltage to be set less than the max. voltage;
- b) When input voltage is over max. voltage, electric load will alarm and displays “Exceed



Voltage!!!”, and the load will automatically turn off.

- c) When the set max. voltage is less than 18V (120V system) or 36V (360V system), load will work in the range of low voltage. Otherwise, it will work in the range of high voltage.

**☰ Note: The set of max. voltage has the same method as that of max. current, and the default unit is V.**

#### ◆ Max Power

If the consumed power is over the max. power, the instrument will alarm and displays power protection (OP), and it will probably automatically turn off.

**☰ Note: The set of max. power has the same method as that of max. current, and the default unit is W.**

#### ◆ On Voltage

Min. start voltage can be used in constant voltage, constant current, constant power and constant resistance modes. If min. start voltage is turned on, press **【ON/OFF】** key to start load. When input voltage is less than On Voltage, load will wait, and “ . . . . ” will be displayed. Once input voltage is over On Voltage, load will automatically start.

**☰ Example:** If the set min. start voltage is 1.25V, select menu to OnVoltage, and press **【Ent】** key to enter. And the original set value will be displayed (or in OFF status); then press **【Ent】** key to input numbers. Press **【1】【.】【2】【5】**. Afterwards, press **【Ent】** key to enter, and the default unit is V.

**☰ Note: If the set value is or close to 0, “OFF” will be displayed, that is, the function is turned off.**

#### ◆ Off Voltage

Min. off voltage can be used in constant voltage, constant current, constant power and constant resistance modes. If min. off voltage is turned on, after the load is started, when input voltage is less than OffVoltage, the load will automatically turn off.

**☰ Note: The set of Off Voltage has the same method as On Voltage.**

**☰ Note:** If the set value is or close to 0, “OFF” will be displayed, that is, the function is turned off.

#### ◆ Auto Off

Auto delay off can be used in constant voltage, constant current, constant power and constant resistance modes. If auto delay off is turned on, the time will be counted in the unit of second after the load starts. When the delay time reaches the set value of Auto Off, the load will automatically turn off.

**☰ Note: The set of Auto Off has the same method as On Voltage, and the unit is second (s). It ranges from 0 to 60000s.**

**☰ Note:** If the set value is or close to 0, “OFF” will be displayed, that is, the function is turned off.

◆ **Save Setup**

The operation is to save load setups, so that it can be kept till next time of turning on the instrument.

◆ **Exit**

In this menu, **【Ent】** key is pressed to exit back to main menu, as pressing **【Esc】** key.

### 3.4.3 Battery Test Set

Please set parameters of battery test before starting the test.

## BATTERY TEST SET: Discharge Current

◆ **Discharge Current**


Battery discharge test works in constant current mode, and the current is defined by DischargeCurrent.

Setting: After entering the submenu of DischargeCurrent, press **【Ent】** key to input numbers, then press **【Ent】** key again to affirm with unit of A.

◆ **Min Voltage**

At the time of discharging, when input voltage is less than off voltage, the discharge test stops, and discharge time and battery capacity will be displayed.

Setting: After entering the submenu of MinVoltage, press **【Ent】** key to input numbers, then press **【Ent】** key again to affirm with unit of V.

 **Note:** MinVoltage must be set, which can not be turned off as OffVoltage in load setup. If the set value is or close to 0, battery test probably can not automatically ends.

◆ **Exit**

In this menu, **【Ent】** key is pressed to exit back to main menu, as pressing **【Esc】** key.

### 3.4.4 Tran Test Set

Please set parameters of dynamic test before starting the dynamic test.



#### ◆ Tran Load

There are the following load types of dynamic test:

ConstCurr : Constant Current Mode (CC)

ConstVolt : Constant Voltage Mode (CV)

Please press **【▲】** and **【▼】** keys or knob to select load type.

#### ◆ Level A

It is to set value of point A. After entering Level A menu, the current value will be displayed in the second line. Then press **【Ent】** key to input numbers with the unit of A or V which depends on the load type.

#### ◆ Width A

It is to set width of point A. After entering Width A menu, the current value will be displayed in the second line. Then press **【Ent】** key to input numbers with the unit of ms.

#### ◆ Level B

It is to set value of point B After entering Level B menu, the current value will be displayed in the second line. Then press **【Ent】** key to input numbers with the unit of A or V which depends on the load type.

#### ◆ Width B

It is to set width of point B. After entering Width B menu, the current value will be displayed in the second line. Then press **【Ent】** key to input numbers with the unit of ms.

#### ◆ Tran Mode

In dynamic test mode, load has three control modes in the switch of point A and point B:

CONT : continuous mode. Load will automatically switch after delaying corresponding time;

PULS : pulse mode. Load works with A value. After the trigger, it switches to value B, and switches to value A again after delaying width B;

TRIG : trigger mode. The width doesn't work, and load switches in the effect of trigger signal.

Please press **【▲】** and **【▼】** keys or knob to select dynamic mode.

 **Note: Please refer to 4.7 for dynamic modes.**

◆ **Exit**

In this menu, **【Ent】** key is pressed to exit back to main menu, as pressing **【Esc】** key.

### 3.4.5 List Test Set

Please set parameters of list test before starting the test.



#### 3.4.5.1 Step Number

It is to set steps of list test, reaching to max. 15 steps. The set value ranges from 00 to 14, and 00 设定 means the first step.

Press **【▲】** and **【▼】** keys or knob to modify the step number.

#### 3.4.5.2 Step Mode

Step mode: the mode of switching from step N to step N+1.

AUTO : The load automatically switches after the set delay time;

TRIG : The load waits for trigger signal to switch after the set delay time.

 **Note: The trigger has three modes: MAN, EXT, and BUS, referring to “System Configuration”.**

#### 3.4.5.3 Repeat

It is to set the automatic repeat of list test. When Repeat is turned on, after the load switches from step 0 to step N, it will go back to step 0 for continuous test.

ON : Repeat test is turned on.

OFF : Repeat test is turned off.

#### 3.4.5.4 Step XX

XX here is the step number from 00 to 14. Press **【Ent】** key to submenu.

■ **List Load**

It is to set current load type:

ConstCurr : Constant Current Load (CC)


ConstVolt: Constant Voltage Load (CV)

ConstPower : Constant Power Load (CW)  
ConstRes : Constant Resistance Load (CR)  
Short : Short-circuit Load  
Open : Open-circuit Load

#### ■ Level

It is to set the current load. If load is set to be short-circuit or open-circuit, the value is invalid.

After entering Level menu, press **【Ent】** key to input numbers.

 Note: The unit will be automatically selected by the instrument according to the load type (A、V、W、Ω) .

#### ■ Delay

It is to set the current test time with unit of second (s).

After entering Delay menu, press **【Ent】** key to input numbers.

#### ■ Compare

It is to set the current status of comparator, to judge the test result.

OFF : The comparator is off and no judgment for the result.  
InVolt : Comparison of input voltage  
InCurr : Comparison of current load consumes  
InPower : Comparison of power load consumes

#### ■ Limit Low

It is to set low limit of comparator. After entering LimitLow menu, press **【Ent】** key to input numbers.

 **Note: The values don't display units which are decided by the set comparison type.**

#### ■ Limit High

It is to set high limit of comparator. After entering LimitHigh menu, press **【Ent】** key to input numbers.

 **Note: The values don't display units which are decided by the set comparison type.**

#### ■ Copy To Next

It is to copy the current setups of parameters to next step.

#### ■ Exit

In this menu, **【Ent】** key is pressed to exit back to list menu, as pressing **【Esc】** key.

### 3.4.6 Save File

It is to save test parameters, including current load mode, set load (constant current, constant voltage, constant power, constant resistance), battery test parameters, dynamic test parameters, list test parameters. 10 files can be saved.

Saved file can be recalled manually, or automatically recalled by setting Power-onCall in system configuration.

SystemConfig and LoadSetup can be separately saved in their menu.



After entering Save File page, file No. and file status are displayed in the second line. “Y” means the file has existed, and “N” means the file hasn’t been saved.

Press **【▲】** and **【▼】** keys to select the file No. to be saved, then press **【Ent】** key to save. And “Saving.....” is displayed.

**ⓘ Note: Saved file will be covered when it is saved again.**

### 3.4.7 Recall File

It is to manually recall saved file.



After entering Recall File page, file No. and file status are displayed in the second line. “Y” means the file has existed, and “N” means the file hasn’t been saved.

Press **【▲】** and **【▼】** keys to select the file No. to be saved, then press **【Ent】** key to save. And “Saving.....” is displayed. Only file with “Y” status can be recalled. Otherwise, “File Not Exit” will be displayed, meaning the file doesn’t exist.

### 3.4.7 Exit

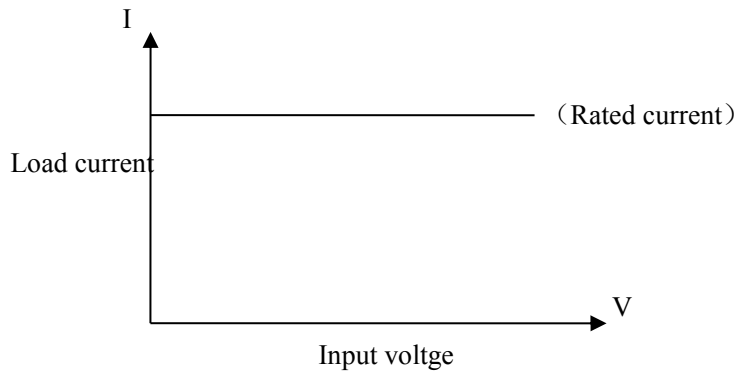
In this menu, **【Ent】** key is pressed to exit back, as pressing **【Esc】** key.

## 四、 Test Operation

The chapter mainly introduces how to make load operation and different test modes.


### 4.1 Mode of constant current (CC)

In the mode of constant current, a constant current is consumed, in spite of the change of input voltage.



In other load modes, press **【I-SET】** key to enter constant current mode. Press **【ON/OFF】** key to start or stop working.

When load hasn't started, knob can be operated to change set value, or press **【I-SET】** key again to input numbers.

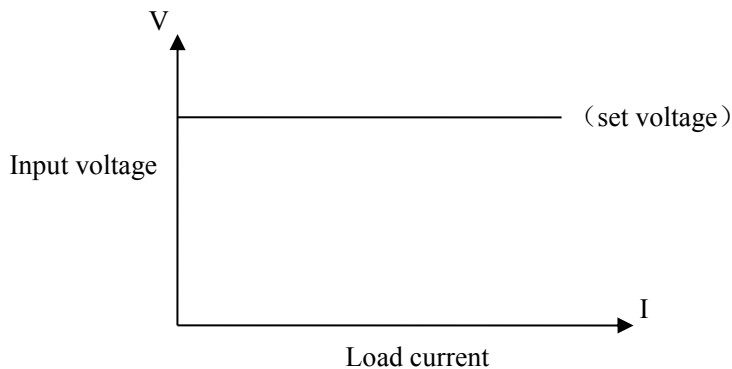
 Example: 1.234A is going to be set.

In constant current mode, operate knob to adjust to 1.234A.

Press **【I-SET】** key, and  $I_s = \_$  will be displayed. Press number keys **【1】【.】【2】【3】【4】** to input (if keys are not locked), then press **【Ent】** key to enter, or **【Esc】** key to give up.

### 4.2 Constant Voltage Mode (CV)


In the mode of constant voltage, electric load will consume enough current to make input voltage constant in set value.




In other load modes, press **【V-SET】** key to enter constant voltage mode. Press **【ON/OFF】** key to start or stop working.

When load hasn't started, knob can be operated to change set value, or press **【V-SET】** key again to input

numbers.

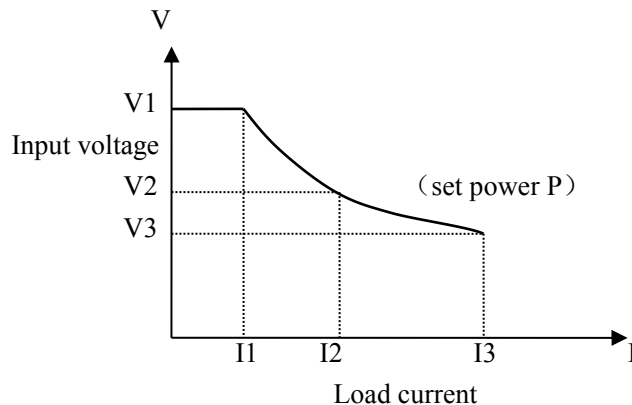
 Note: Refer to 4.1 to change set voltage.

 **Note: Source voltage is less than set voltage, load will not work in constant voltage.**

 **Note: Difference between source voltage and set voltage will fall on source resistance and lead resistance. If difference is large but resistance small, load will probably consume large current.**


### 4.3 Constant Power Mode (CP)

In constant power mode, load consumes a constant power. When input voltage changes, load will adjust current to keep the consumed power.



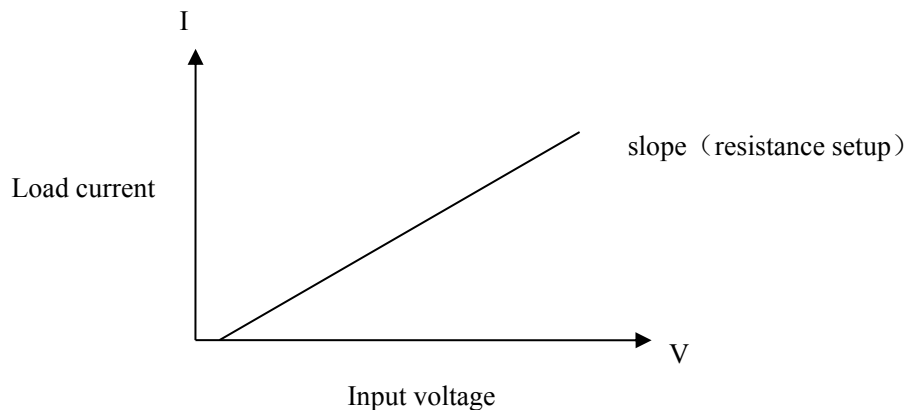
In other load modes, press **【P-SET】** key to enter constant power mode. Press **【ON/OFF】** key to start or stop working.

When load hasn't started, knob can be operated to change set value, or press **【P-SET】** key again to input numbers.

 Note: Refer 4.1 to change set power.

### 4.4 Constant Resistance Mode (CR)

In constant resistance mode, load will equaled to be a constant resistance. Load will consume current changing with input voltage.






In other load modes, press **【R-SET】** key to enter constant resistance mode. Press **【ON/OFF】** key to start or stop working.

When load hasn't started, knob can be operated to change set value, or press **【R-SET】** key again to input numbers.

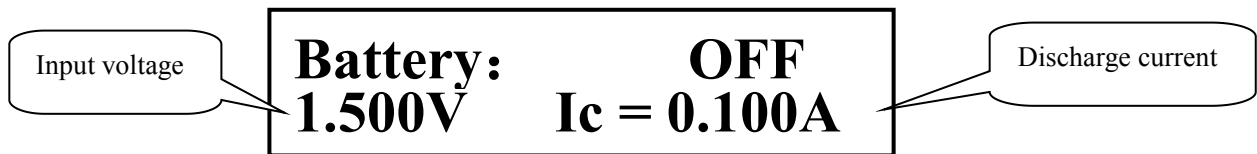
The resistance ranges from  $0.1\Omega$  to  $4000\Omega$ .

 Note: Refer 4.1 to change set resistance.

## 4.5 Battery test mode


Discharge test works in the mode of consuming constant current to test discharge time and capacity of battery source. During the process of continuous discharge, battery voltage continually falls. When input voltage of load is less than set value, discharge test automatically stops, and discharge time and battery capacity are displayed.

Battery discharge test is shown as follows:



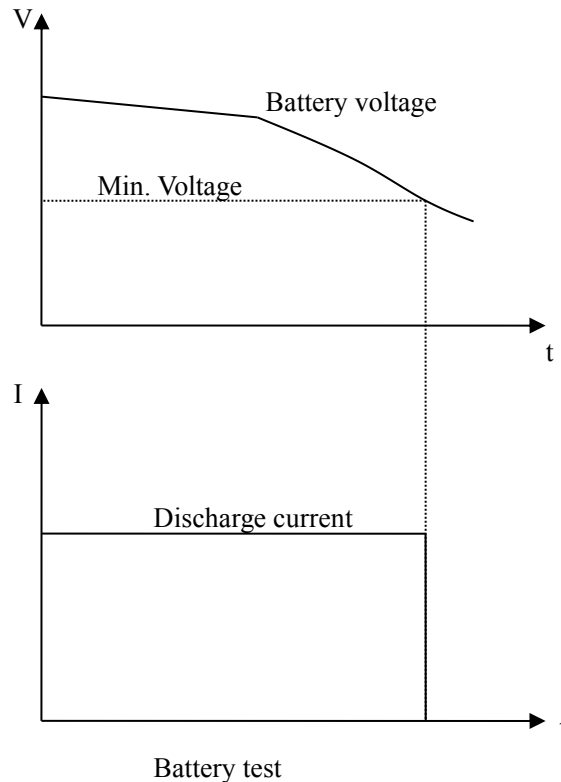
After the test, the following page is displayed. If time and capacity are not displayed currently, press **【ENT】** key to switch.



 Note: During the process of discharge test, press **【ENT】** key to switch display to observe real-time discharge time and capacity.

In other load modes, press **【SHIFT】+【BAT】** key to enter discharge test mode; press **【ON/OFF】** key to start discharge test, and press it again to stop test. After discharge, count will be restarted.

Before discharge test starts, discharge parameters should be set first. Press **【SHIFT】+【S\_BAT】** key 进入 to enter discharge parameter setup menu, including Discharge Current, Min. Voltage. Please refer to 3.4.3 for setup of discharge test.



## 4.6 Short-circuit Test Mode

In short-circuit test, load works with current as max. as possible, in order to simulate a short circuit between input terminals.

In other load modes, press **【SHIFT】 + 【SHORT】** key to enter discharge test mode. Press **【ON/OFF】** key to start or stop short-circuit.

In short-circuit test, no parameters need to be set.

## 4.7 Dynamic test mode

In dynamic test, load can be switched between two voltages or currents. The function can be used to test dynamic characteristics of power source.

Input voltage displayed,  
and no display after  
turning on.

**Transient:                    OFF**

**1.000V      Ia = 0.100A**

Set value displayed, **【▼】**  
key pressed to read before  
the start.

In other modes, press **【SHIFT】 + 【TRAN】** key to enter dynamic test mode. Press **【ON/OFF】** key to

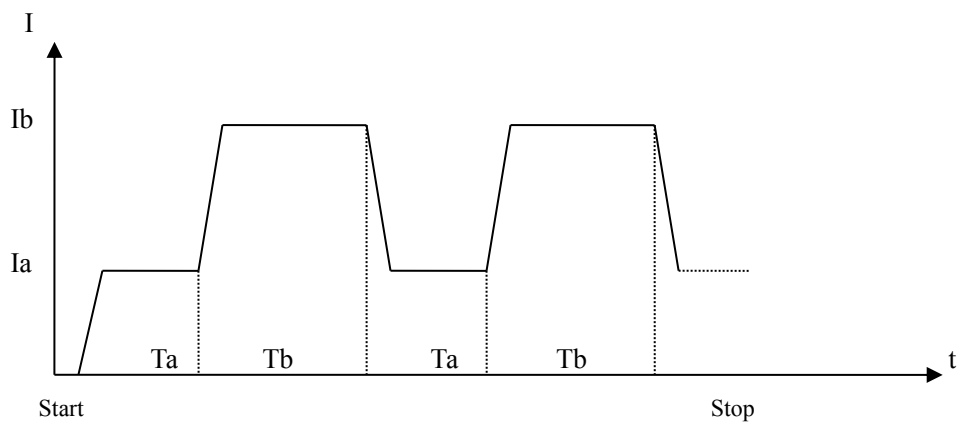
start or stop the test.

Before the dynamic test starts, related parameters of dynamic test should be set first. Press **【SHIFT】** + **【S\_TRAN】** key to enter parameter setup menu, including Level A, Width A, Level B, Width B, and continuous mode. Refer to 3.4.3 for detailed setting.

Dynamic mode has continuous, pulse and trigger modes.

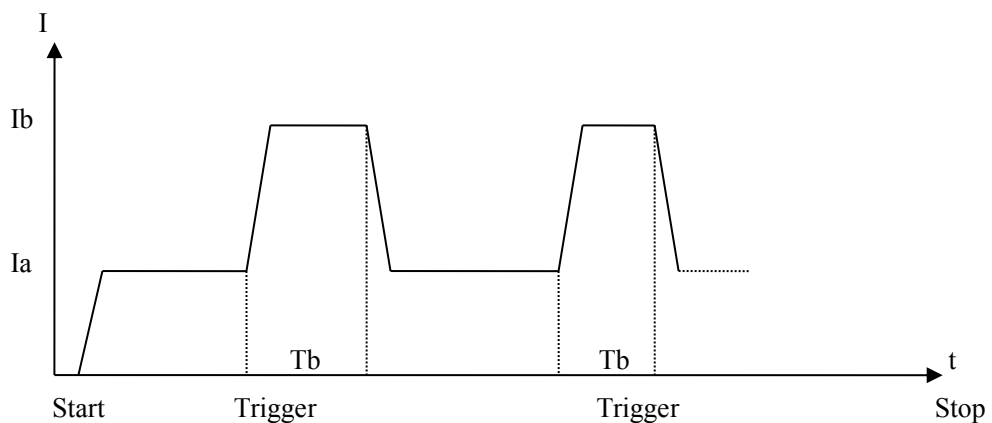
### 4.7.1 Continuous Mode (CONT)

After dynamic test starts, load can continuously switch between Level A and Level B, respectively keeping width A and width B.



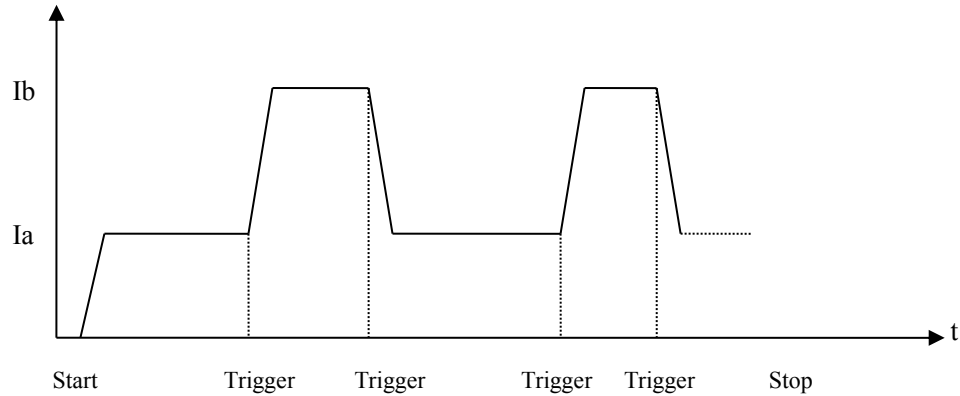
### 4.7.2 Pulse Mode (PULS)

After dynamic test starts, load works in Level A first. After receiving a trigger signal, it switches to Level B, keeping width B, then switches to Level A. And width A is invalid in this mode.



### 4.7.3 Trigger Mode (TRIG)

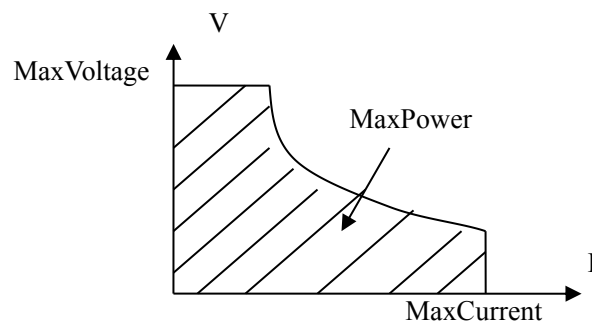
After the dynamic test starts, load works in Level A or B. Once receiving a trigger signal, the load switches between Level A and B. Width A and B are invalid in this mode.



### 4.8 Protection Function

The electric load only works in the range of nominal voltage, current and power which differ with different models. Please refer to 1.2.2 for detailed specifications.

User-level voltage, current and power protection can be set by user, referring to 3.4.2 for load setup, including Max Voltage, Max Current, Max Power. Load protection is based on the set range by user, as shown below:



Electric load also has protection function of reverse polarity and over-heat.

**ⓘ Note: In dynamic test mode, protection function is invalid!**

### 4.8.1 Over-voltage protection

When input voltage is over max. voltage, load will be off because of over-voltage protection, and the beeper alarms. The following information is displayed:

**Exceed Voltage!!!**

### 4.8.2 Over-current protection

When load current is over max. current, it alarms and “OC” is displayed because of over-current protection. If over-current lasts for long time and it exceeds 110% of max. current, load will automatically be off.

### 4.8.3 Over-power protection

When consumed power of load is over max. power, it alarms and “OP” is displayed because of over-power 当 protection. If over-power lasts for long time and it exceeds 110% of max. power, load will automatically be off.

### 4.8.4 Alarm of input polarity in reverse

**Warning: At the time of polarity connection in reverse, load loses of control. And electric load is in short circuit status. Caution !**

At the time of polarity connection in reverse, load stops working and alarms. The following information is 输 displayed:

**Reverse Voltage!!!**

### 4.8.5 Over-heat protection

When temperature of internal power devices of electric load is over 80°C, load will be off because of over-heat protection, and the beeper alarms. The following information will be displayed:

**Over Hot!!!**

## 五、 Examples



The chapter introduces examples in battery test, dynamic test and list test.

### 5.1 Battery test:

#### 5.1.1 Parameter

Battery rated voltage ——6V;  
 Discharge current ——500mA;  
 Min. voltage ——3V

#### 5.1.2 Setting

No.	Operation	Display
1	In waiting status, press <b>【MENU】</b> key to enter menu, then press <b>【▲】</b> <b>【▼】</b> key to select Battery Test Set, press <b>【Ent】</b> key to enter setting menu, or press <b>【SHIFT】</b> + <b>【S-BAT】</b> key to enter Battery Test Set menu.	BATTERY TEST SET: Discharge Current 
2	Press <b>【Ent】</b> key to enter discharge current setup.	DISCHARGE CURRENT: 0.000A
3	Press <b>【Ent】</b> key to input <b>【0】</b> <b>【.】</b> <b>【5】</b> , then press <b>【Ent】</b> key to enter with unit of A.	DISCHARGE CURRENT: 0.5_
4	Press <b>【ESC】</b> key to exit back to step 1, then press <b>【▼】</b> key to select Min Voltage.	BATTERY TEST SET: Min Voltage 
5	Press <b>【Ent】</b> key to enter.	MIN VOLTAGE: 0.000V
6	Press <b>【Ent】</b> key to input <b>【3】</b> , then press <b>【Ent】</b> key to enter with unit of V.	MIN VOLTAGE: 3_
7	Battery discharge test ends, press <b>【ESC】</b> key till exiting from all the menus, press <b>【SHIFT】</b> + <b>【BAT】</b> to enter battery test page.	Battery: OFF 6.120V I <sub>c</sub> = 0.500A

### 5.1.3 Test

No.	Operation	Display				
1	Connect battery to be tested with electric load in right polarity.					
2	Press <b>【ON/OFF】</b> key to start test. After consumed current is constant, “CC” is displayed.	<table border="1"> <tr> <td>Battery:</td> <td>CC</td> </tr> <tr> <td>6.020V</td> <td>I<sub>c</sub> = 0.500A</td> </tr> </table>	Battery:	CC	6.020V	I <sub>c</sub> = 0.500A
Battery:	CC					
6.020V	I <sub>c</sub> = 0.500A					
3	During the test, press <b>【Ent】</b> key to switch display, observe real-time discharge time and capacity. And the display will be automatically off after 8 seconds.	<table border="1"> <tr> <td>Battery:</td> <td>CC</td> </tr> <tr> <td>234s</td> <td>0.033AH</td> </tr> </table>	Battery:	CC	234s	0.033AH
Battery:	CC					
234s	0.033AH					
4	When battery input voltage is less than 3V, test automatically ends, or press <b>【ON/OFF】</b> key to stop test. The test time and capacity can be checked by pressing <b>【Ent】</b> key.	<table border="1"> <tr> <td>Battery:</td> <td>OFF</td> </tr> <tr> <td>10808s</td> <td>1.501AH</td> </tr> </table>	Battery:	OFF	10808s	1.501AH
Battery:	OFF					
10808s	1.501AH					

## 5.2 Dynamic test

### 5.2.1 Parameters

Voltage of power to be tested ——12V  
 Dynamic test A ——1.1A  
 Dynamic time A ——100ms  
 Dynamic current B ——2.2A  
 Dynamic time B ——200ms  
 Dynamic mode ——continuous

### 5.2.2 Setup

No.	Operation	Display				
1	In waiting status, press <b>【MENU】</b> key to enter menu, then press <b>【▲】【▼】</b> key to select Tran Test Set, press <b>【Ent】</b> key to enter setting menu, or press <b>【SHIFT】 + 【S-TRAN】</b> key to enter Tran Test Set menu.	<table border="1"> <tr> <td>TRAN TEST SET:</td> <td></td> </tr> <tr> <td>Tran Load</td> <td>⊕</td> </tr> </table>	TRAN TEST SET:		Tran Load	⊕
TRAN TEST SET:						
Tran Load	⊕					

2	After selecting TranLoad, press <b>【Ent】</b> key; after selecting ConstCurr, press <b>【ESC】</b> key to exit back to previous menu.	<div style="border: 1px solid black; padding: 5px;">           TRAN LOAD:            ConstCurr <span style="float: right;">↕</span> </div>
3	Press <b>【▲】【▼】</b> key to select Level A, then press <b>【Ent】</b> key to enter.	<div style="border: 1px solid black; padding: 5px;">           LEVEL A:            0.000A         </div>
4	Press <b>【Ent】</b> key to input <b>【1】【.】【1】</b> , then press <b>【Ent】</b> key to enter. The units differ with load types, which is A here.	<div style="border: 1px solid black; padding: 5px;">           LEVEL A:            1.1_         </div>
5	Press <b>【ESC】</b> key to exit back to previous menu, then press <b>【▲】【▼】</b> key to select Width A	<div style="border: 1px solid black; padding: 5px;">           TRAN TEST SET:            Width A <span style="float: right;">↕</span> </div>
6	Press <b>【Ent】</b> key to enter width setup of Level A, then press <b>【Ent】</b> key to input <b>【1】【0】【0】</b> , press <b>【Ent】</b> key to enter with unit of ms.	<div style="border: 1px solid black; padding: 5px;">           WIDTH A:            100_         </div>
7	Press <b>【ESC】</b> key to exit back to previous menu to respectively select Level B and Width B to set current and width of dynamic B, referring to step 3, 4, 5, 6.	<div style="border: 1px solid black; padding: 5px;">           LEVEL B:            2.200A         </div> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;">           WIDTH B:            200ms         </div>
8	In TRAN TEST SET menu, select Tran Mode, then press <b>【Ent】</b> key to select CONT by pressing <b>【▲】【▼】</b> key.	<div style="border: 1px solid black; padding: 5px;">           TRAN MODE:            CONT <span style="float: right;">↕</span> </div>
9	Press <b>【ESC】</b> key till exiting menu, then press <b>【SHIFT】+【TRAN】</b> to enter dynamic test page.	<div style="border: 1px solid black; padding: 5px;">           Transient:   OFF            12.18V    I<sub>a</sub> = 1.100A         </div>



### 5.2.3 Test

No.	Operation	Display		
1	Connect battery to be tested with electric load in right polarity.			
2	Before dynamic test starts, press <b>【▼】</b> key to check set values of Level A and Level B.	<table border="1"> <tr> <td>Transient: OFF</td> </tr> <tr> <td>12.18V Ib = 2.200A</td> </tr> </table>	Transient: OFF	12.18V Ib = 2.200A
Transient: OFF				
12.18V Ib = 2.200A				
3	Press <b>【ON/OFF】</b> key to start test, and load switches between two status with voltage monitor not being displayed. Protection function can not be used in dynamic test.	<table border="1"> <tr> <td>Transient: RUN</td> </tr> <tr> <td>.....V Ia = 1.100A</td> </tr> </table>	Transient: RUN	.....V Ia = 1.100A
Transient: RUN				
.....V Ia = 1.100A				
4	If dynamic mode is pulse or trigger, TRIG key ( <b>【▼】</b> key) on panel can be pressed, or external and BUS trigger.			
5	Press <b>【ON/OFF】</b> key to end dynamic test.			

## 5.3 List test









### 5.3.1 Parameters

Charger test is required as follows:

Test step	Mode	Voltage range	Current range	Power	Test time
Step one	Open	9.1V ~ 10V	0		2s
Step two	CC	8.7V ~ 9.5V	230mA	≤6W	5s
Step three	CV	9V	220 ~ 260 mA		3s
Step four	CV	8V	220 ~ 260 mA		1s
Step five	Short-circuit	0	≤260 mA		1s

Parameters in shadow need to be judged in the test.

### 5.3.2 Setup

No.	Operation	Display
1	In waiting status, press <b>【MENU】</b> key to enter menu, then press <b>【▲】【▼】</b> key to select List Test Set, press <b>【Ent】</b> key to enter setting menu, or press <b>【SHIFT】+List Test Set</b> key to enter List Test Set.	LIST TEST SET: Step Number 
2	Press <b>【Ent】</b> key to enter list step setup. Press <b>【▲】【▼】</b> key to select step No. (00 is the first step).	STEP NUMBER: 04 
3	Press <b>【ESC】</b> key to exit back to list test menu, then press <b>【▼】</b> key to select StepMode.	LIST TEST SET: Step MODE 
4	Press <b>【Ent】</b> key to enter, selecting step mode to AUTO.	STEP MODE: AUTO 
5	Press <b>【ESC】</b> key to exit back to list test menu, then press <b>【▼】</b> key to select Repeat. Press <b>【Ent】</b> key to select OFF, and the example will not be repeated.	REPEAT: OFF 
6	Press <b>【ESC】</b> key to exit back to list test menu, then press <b>【▼】</b> key to select Step00, then press <b>【Ent】</b> key to set step 00.	Step00: List Load 
6a	Set load type of step 00: press <b>【Ent】</b> key to enter List Load, then press <b>【▲】【▼】</b> key to select Open.	LIST LOAD: Open 
6b	Press <b>【ESC】</b> key to exit back to setting menu of step 00, then press <b>【▼】</b> key to select Level In this example, it is open, so load value can not be set.	LEVEL: 0.000
6c	Press <b>【ESC】</b> key to exit back to setting menu of step 00, then press <b>【▼】</b> key to select Delay. Press <b>【Ent】</b> key to enter, then press <b>【Ent】</b> key to input <b>【2】</b> , press <b>【Ent】</b> key to enter with unit of s.	DELAY: 2_
6d	Press <b>【ESC】</b> key to exit back to setting menu of step 00, then press <b>【▼】</b> key to select Compare. Press <b>【Ent】</b> key to enter to select InVolt.	COMPARE: InVolt 

6e	Press <b>【ESC】</b> key to exit back to setting menu of step 00, then press <b>【▼】</b> key to select LimitLow. Press <b>【Ent】</b> key to enter, then press <b>【Ent】</b> key to input <b>【9】【.】【1】</b> , press <b>【Ent】</b> to enter.	<div style="border: 1px solid black; padding: 5px;">LIMIT LOW: 9.1_</div>
6f	Press <b>【ESC】</b> key to exit back to setting menu of step 00, then press <b>【▼】</b> key to select LimitHigh. Press <b>【Ent】</b> key to enter, then press <b>【Ent】</b> key to input <b>【1】【0】</b> to enter.	<div style="border: 1px solid black; padding: 5px;">LIMIT HIGH: 10_</div>
7	Press <b>【ESC】</b> key till exiting back to list test menu, then press <b>【▼】</b> key to select Step01.	<div style="border: 1px solid black; padding: 5px;">LIST TEST SET: Step01 <span style="float: right;">↕</span></div>
7a-f	Respectively set parameters of step 01: Load type  Load value  Delay time  Comparator  Low limit  High limit	<div style="border: 1px solid black; padding: 5px;">LIST LOAD: ConstCurr <span style="float: right;">↕</span></div> <div style="border: 1px solid black; padding: 5px;">LEVEL: 0.230A</div> <div style="border: 1px solid black; padding: 5px;">DELAY: 5s</div> <div style="border: 1px solid black; padding: 5px;">COMPARE: InVolt <span style="float: right;">↕</span></div> <div style="border: 1px solid black; padding: 5px;">LIMIT LOW: 8.700</div> <div style="border: 1px solid black; padding: 5px;">LIMIT HIGH: 9.500</div>
8	Respectively set parameters of step 02 ( CV ), step 03 ( CV ), step 04 ( SHORT ) .	If parameters of step 02 and step 03 are similar, CopyToNext can be used.
9	Press <b>【ESC】</b> key till exiting from all menus.	

### 5.3.3 Test

No.	Operation	Display
1	Press <b>【SHIFT】</b> + <b>【LIST】</b> to enter list test mode. And input voltage and set list parameter (load type and value) will be displayed in the second line.	<div style="border: 1px solid black; padding: 5px;">           List (N=05) :    OFF            9.650V    S00=Open         </div>
2	Press <b>【Ent】</b> key to switch to display the test time of the step.	<div style="border: 1px solid black; padding: 5px;">           List (N=05) :    OFF            9.650V    S00:    2s         </div>
3	Press <b>【▲】</b> <b>【▼】</b> key to check load values and types of other steps, then press <b>【Ent】</b> key to check test time.  In this example, total number of step is 5, so S04 is max.	<div style="border: 1px solid black; padding: 5px;">           List (N=05) :    OFF            9.650V    S01=0.230A         </div>
4	Press <b>【ON/OFF】</b> key to start list test, and load scans from S00 to S04 step by step.	<div style="border: 1px solid black; padding: 5px;">           List (N=05) :    RUN            9.002V    S02=9.000V         </div>
5	During the test, press <b>【Ent】</b> key to switch display, checking currently actual load current. If comparator is also set, comparison result will also be displayed.	<div style="border: 1px solid black; padding: 5px;">           List (N=05) :    RUN            9.650V 0.000A    FAIL         </div>
6	During the test, <b>【ON/OFF】</b> key can be pressed any time to stop test..  After the normal test, whole judgment result will be displayed in status information area (if comparator is turned on in any step).	<div style="border: 1px solid black; padding: 5px;">           List (N=05) :    PASS            9.650V    S00=Open         </div>