BK PRECISION

Instruction Manual

Model 8500 300W DC Electronic Load

Warranty Information

Certification

We certify that this product met its published specifications at time of shipment from the factory.

Safety Summary

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument .We assumes no liability for the customer’s failure to comply with these requirements.

Environmental Conditions

This instrument is intended for indoor use. Pollution degree 2 environments . It is designed to operate at a maximum relative humidity of 95% and at altitudes of up to 2000 meters. Refer to the specifications tables for the ac mains voltage requirements and ambient operating temperature range.

Before Applying Power

Verify that all safety precautions are taken. Note the instrument's external markings described under "Safety Symbols".

Ground The Instrument

This product is a Safety Class 1 instrument (provided with a protective earth terminal). To minimize shock hazard, the instrument chassis and cover must be connected to an electrical ground. The instrument must be connected to the ac power mains through a grounded power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet. Note: Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the instrument in the presence of fumes or flammable gases.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must not remove instrument covers except as instructed in this Guide for installing or removing electronic load modules. Component replacement and internal adjustments must be made only by qualified service personnel. Do not replace components with power cable connected. Under certain conditions dangerous voltages may exist even with the power cable removed. To avoid injuries always disconnect power, discharge circuits, and remove external voltage sources before touching components.

DO NOT SERVICE OR ADJUST ALONE

Do not try to do some internal service or adjustment unless another person capable of rendering first aid resuscitation is present.

Safety Symbols

 Direct current

 Alternating current

 Both direct and alternating current

 Protective earth (ground) terminal

 Caution (refer to accompanying documents)

WARNING

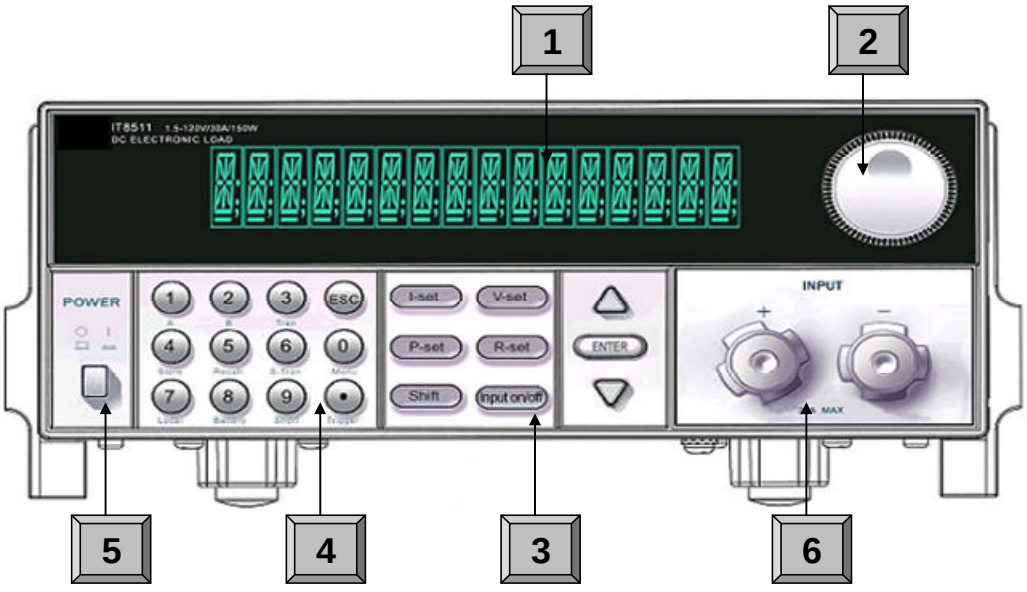
The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

CAUTION

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

Quick Reference

The Front Panel



1 **16-character display shows voltage and current measurements.**
2 **Rotary knob**
3 **Keypad:**

Enable/disable input.
Setup the current, resistance and voltage modes.
Set and reset protection functions.

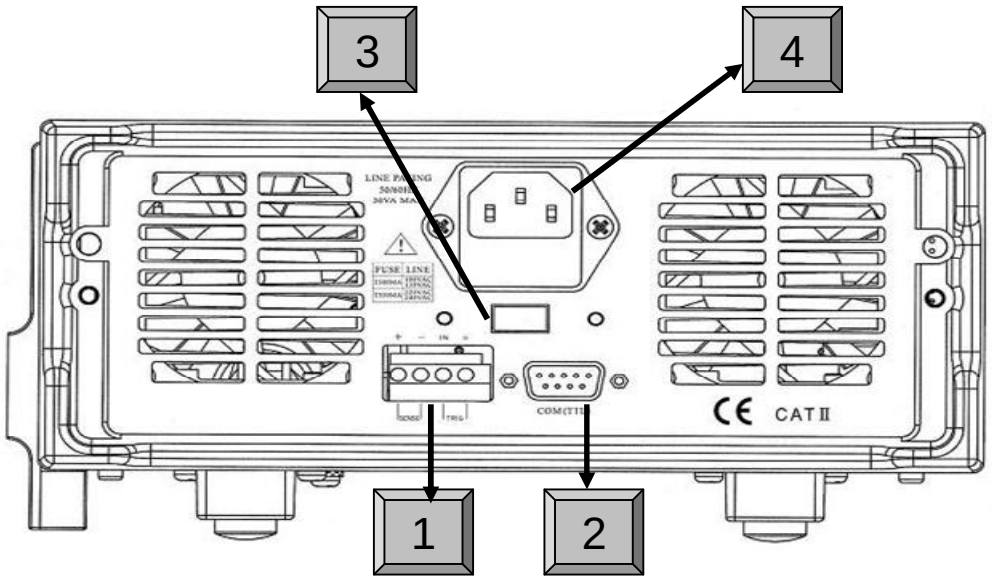
Scroll through front panel.

4 **Entry keys:(numeric keys)**

Enter values.
Increasing or decreasing the setup values.
Menu commands.

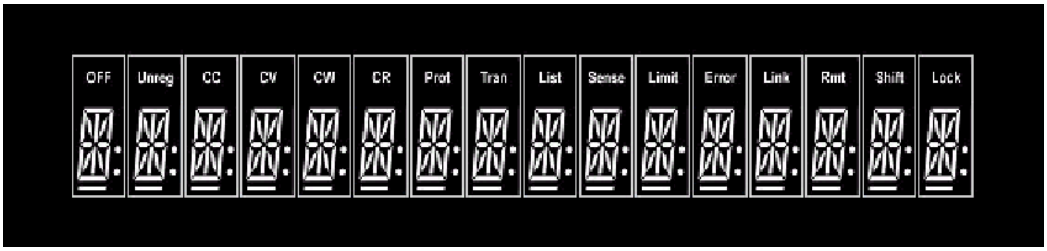
5 **Power switch ON/OFF**
6 **Input terminals.**

The Rear Panel



1 **4 Pin Trigger and Remote sensing connectors.**
2 **9-Pin COM port interface connector.**
3 **Power switch (110V / 220V)**
4 **3 Pin IEC320 ac input connector. (Power code requires ground conductor).**

Front Panel Annunciators



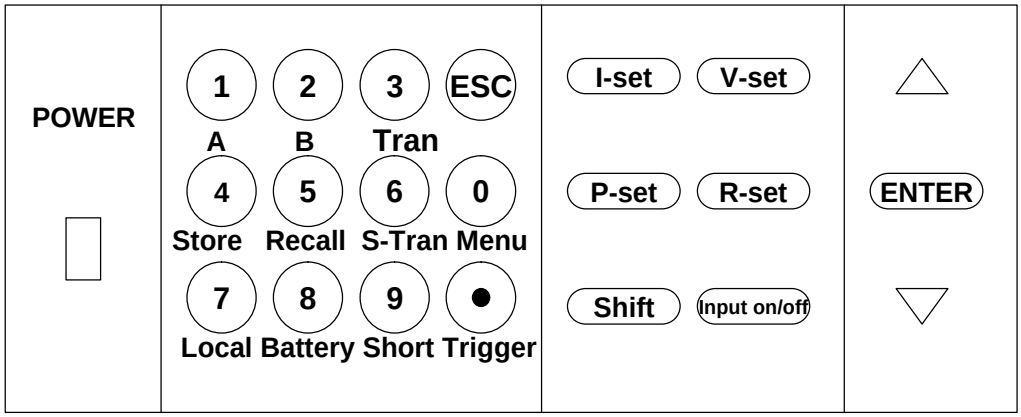
OFF	power off	**Trigger**	Indicates that the electronic load is waiting an initiate and trigger to occur.
CC	Constant current (CC) mode.	**Sense**	Indicates that the electronic load is in Remote sensing state
CV	Constant voltage (CV) mode.	**Error**	A errors have occurred
CW	Constant power (CW) mode.	**Link**	In the communication state
CR	Resistance (CR) mode.	**Rmt**	Indicates that the electronic load is in remote state (RS-232). In the remote state, only the active key is the Local key.
Tran	The input channel is enabled for transient operation.	**Shift**	Indicates that the shift key has been pressed.
List	List mode is initiated or running.	**Lock**	keyboard is locked by password
Unreg	The input is unregulated.		

Immediate Action Keys

V-set	Choosing CV mode and setting the input of regulation voltage mode
I-set	Choosing CI mode and setting the input of regulation current mode
P-set	Choosing CP mode and setting the input of regulation power mode
R-set	Choosing CR mode and setting the input of regulation resistor mode
Shift + **A**	Switch to A setting value

Shift + B	Switch to B setting value
Shift + store	Press to store an existing electronic load state in non-volatile Memory.
Shift + Recall	Press to recall an existing electronic load state in non-volatile Memory.
Shift + Menu	Enter operation Menu.
Shift + Short	Turn on or turn off short circuit Test.
Shift + Tran	Start /Stop transition operation
Shift + Trigger	Causes a trigger to occur. Change the trigger source is IMMIDIATE
Shift + Battery	Battery discharge electronic operation
Shift + S-Tran	Set the transition operation parameter
Input on/off	Enable or disable load input.

Front Panel Menus



Key Pad

0 ~ 9	0 through 9 are used for entering numeric values.
•	Decimal point.
ESC	The escape key. It may used to exit any working state.
I-set	Choosing CC mode and setup the input current of regulation current mode.
V-set	Choosing CV mode and setup the input voltage of regulation voltage mode.
P-set	Choosing CW mode and setup the input watt of regulation power mode.
R-set	Choosing CR mode and setup the input resistor of regulation resistance mode.
Shift	Shift keys.
Input on/off	Power ON/OFF
?	Scrolling keys let you move through the commands in the presently Selected function menu. Bring up the next command in the list. Function menus are circular; you can return to the starting position by continuous pressing the key.
?	Go back to the previous command in the list .Function menus Are circular; you can return to the starting position by continuous pressing the key.
ENTER	Confirmation key.

Menu Operation

Press Menu to indicate operation mode .View the menu in VFD and using ？ and ？ to scroll through the completely menu list as following .IF press ENTER key, you could get the selected menu function. Press ESC back to the previous menu selection page.

MENU			
CONFIG			
	INITIAL CONFIG		Return to the factory default setup value.
	POWER-ON RECALL		Setting Power-on state of Load.
		ON	When users turn on the electronic load; the electronic load setup value will keep the state of last time when users turn off the electronic load.
		OFF<DEFAULT>	Disable this function.
	INPUT RECALL		Setup of the electronic load input state in Power on.
		ON	When users turn on the electronic load; the electronic load input will keep the state of last time when users turn off the electronic load.
		OFF<DEFAULT>	When users turn on the electronic load, the electronic load input will keep the state off.
	KEY SOUND SET		Keypad sound setting.
		ON<DEFAULT>	Enable key sound.
		OFF	Disable key sound.
	KNOB LOCK SET		Setup Rotary knob lock state.
		ON	Lock Rotary knob.
		OFF<DEFAULT>	Unlock Rotary knob.
	REMOTE SENSE		Setup voltage measurement Mode.
		ON	The electronic load will measure input voltage from the remote sense connector.
		OFF<DEFAULT>	The electronic load will measure input voltage from the front panel connector.
	TRIGGER SOURCE		Choosing the trigger signals source.
		IMMEDIATE<DEF>	Trigger signals from Shift + Trigger key
		EXTERNAL	Trigger signals from the TRIG connector in the rear panel.
		BUS	Communication command trigger mode.
	BAUDRATE SET		Setting baud rate.
		9600<DEFAULT>	

		9600	
		19200	
		38400	
	COMM. PARITY SET	Command parity setting.	
		NONE<DEFAULT>	
		EVEN	
		ODD	
	ADDRESS SET	Setting communication Flow mode	
	KEY LOCK SET	Setting keypad password. Press ENTER directly to disable the key lock function.	
		EXIT	
SYSTTEM SET			
	MAX CURRENT SET	Setup the Maximum current.	
	MAX POWER SET	Setup the Maximum Power.	
	MAX VOLTAGE SET	Setup the Maximum Voltage.	
	EXIT		
LIST SET			
	MODE SET	Setting operation mode.	
		FIXED MODE	Fixed mode.
		LIST MODE	Choosing List mode.
	CALL LIST FILE	Recall list operation file.	
	EDIT LIST FILE	Edit list operation file.	
	LIST STORE MODE	Users can choose 4 kind of memory space to save the list file.	
		8 X 120 STEPS	Total 8 files and each file have120 list steps.
		4 X 250 STEPS	Total 4 files and each file have250 list steps.
		2 X 500 STEPS	Total 2 files and each file have500 list steps.
		1 X 1000 STEPS	Total 1 file and each file have1000 list steps.
	EXIT		
LOAD ON TIMER			
	TIMER STATE	Setting LOAD ON timer state	
		ON	When users choose the timer state ON, and then turn on the electronic load input, the LOAD ON TIMER will start working, and when the LOAD ON TIMER is reach the setup time, the electronic load input will turn off automatically,.
		OFF<DEFAULT>	
	TIMER SET	Setting time of LOAD ON timer,	
	EXIT		
EXIT			

General Information

Document Orientation

This manual describes the operation of the Model 8500 DC Electronic Loads. Unless otherwise noted, all units will be referred to by the description "electronic load" throughout this User's manual. The following documents and software are shipped with your electronic load.
This User's Guide (this document), contains installation, checkout, front panel information and detailed programming information.
The Getting Started Map will help you find the information you need to complete the specific task that you want to accomplish. Refer to the table of contents or index of each guide for a complete list of the information contained within.

Getting Started Map

Task	Where to find information
Checking out the unit Verifying proper operation Using the front panel Calibrating the unit	User's Guide
Using the front panel Front panel keys Front panel examples	User's Guide
Using the programming interface RS-232 interface	User's Guide
Remote operation mode Protocol information	User's Guide
Controller Program and Software driver: Power View PV8500 software Calibration PC8500 software Active driver PD-8500 OCX software	CD-ROM

Options and Accessories

Options

IT-E151 Rack mounts kit: for install one or two 8500 series load on the 19 inch rack.
ITE-131 isolated communication cable: This cable converts the Electronic Load's serial port (TTL 5V level) to PC RS232 interface.

Accessories

Power cord
User’s manual
Software CD-Rom

Description

The 8500 serial Electronic Load is used for design, manufacturing, and evaluation of DC power supplies, batteries, and power components and so on. The Electronic load contains a processor, serial port connector, front-panel keypad and VFD, and other circuits common to the other entire load module.
8500 serial Electronic Load could work in constant current (CC) mode, constant voltage (CV) mode, or constant resistance (CR) mode and constant power (CW) Mode.

Features And Capabilities

• High accuracy and high resolution
• Capable to work with constant current (CC), constant voltage (CV), constant resistance (CR) mode and constant power (CW) operation.
• Serial port interface-DB9-RS232 port.
• Triggered input and measurement functions.
• Within the controlled keypad in the front panel
• Built-in pulse generator for continuous, pulsed, and toggled transient mode operation.
• Over voltage, over current, overpower, and over temperature protection.
• Electronic load calibrate by Software.
• Fan speed control by temperature.
• VFD display
• Short circuit test
• Battery testing function.

Front Panel Controls

The front panel has keyboard controls for setting the input voltage, current and resistance. The panel display provides digital readouts of a number of functions including the inputs. Annunciators display the operating status of the electronic load.

Remote Programming

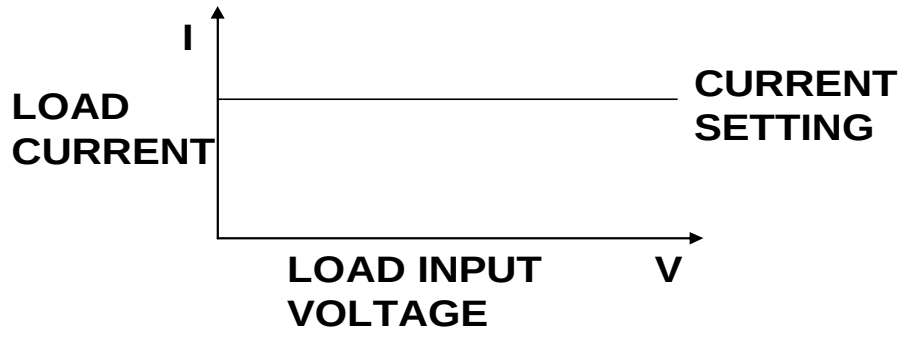
The electronic load may be remotely programmed from the computer via the **IT-E131** isolated communication cable.

Operating Modes

The four modes of operation are:
1: Constant current (CC).
2: Constant voltage (CV).
3: Constant resistance (CR).
4: Constant power (CW)

Constant Current(CC) Mode

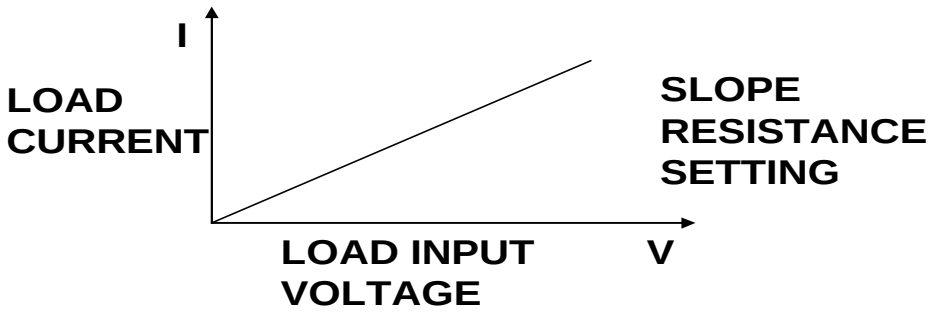
In this mode, the electronic load will sink a current in accordance with the programmed value regardless of the input voltage. CC mode can be set with front panel keys. The CC mode parameters are discussed in the following paragraphs.



CONSTANTCURRENT MODE

Constant Resistance (CR) Mode

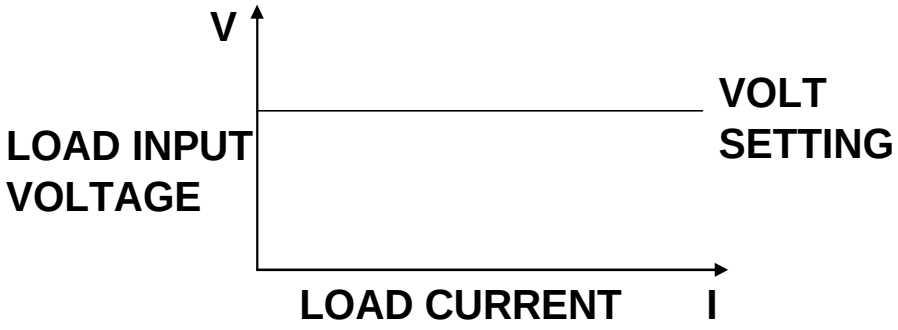
In this mode, the module will sink a current linearly proportional to the input voltage in accordance with the programmed resistance. The CR mode can be set at the front panel. The CR mode parameters are described in the following paragraph



CONSTANT RESISTANCE MODE

Constant Voltage (CV) Mode

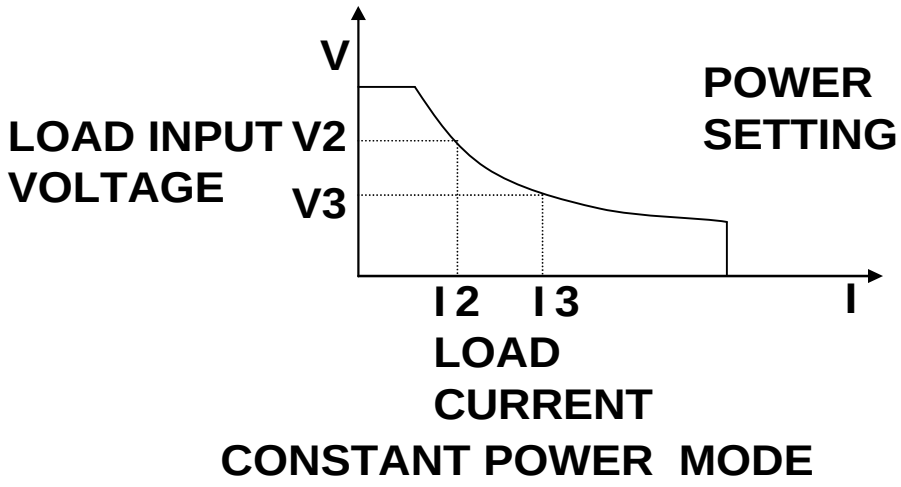
In this mode, the electronic load will attempt to sink enough current to control the source voltage to the programmed value. The module acts as a shunt voltage regulator when operating in the CV mode. The CV mode can be set at the front panel. The CV mode parameters are described in the following paragraphs.



CONSTANT VOLTAGE MODE

Constant Power (CW) Mode

In this mode, the electronic loads will consumption power accordance with the programmed value regardless of the input voltage. The CW mode can be set with front panel keys. The CW mode parameters are discussed in the following paragraphs.

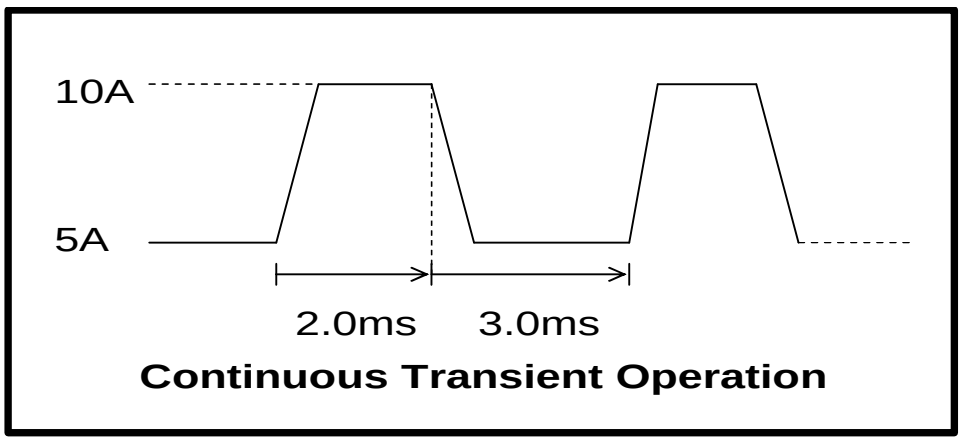


Transient Operation

Transient operation enables the electronic load to periodically switch between two load levels, as might be required for testing power supplies. A power supply's regulation and transient characteristics can be evaluated by monitoring the supply's output voltage under varying combinations of load levels, frequency, and duty cycle. Transient operation can be turned on and off at the front panel or PC via the IT-E131 isolated communication cable. Before you turn on transient operation, you should set the desired mode of operation as well as all of the parameters associated with transient operation. Transient operation may be used in the CC, CR, or CV or CW modes and can be setup in continuous, pulsed, or toggled operation mode.

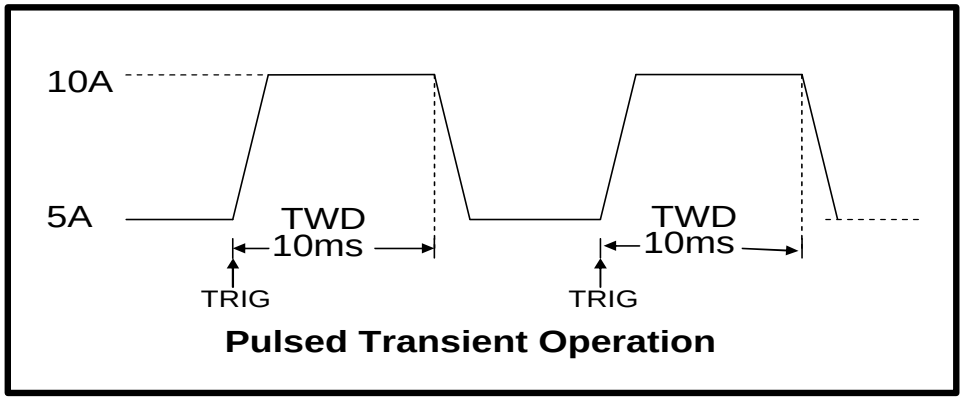
Continuous

Generates a repetitive pulse stream the toggles between two load levels and change the state between value A and value B.



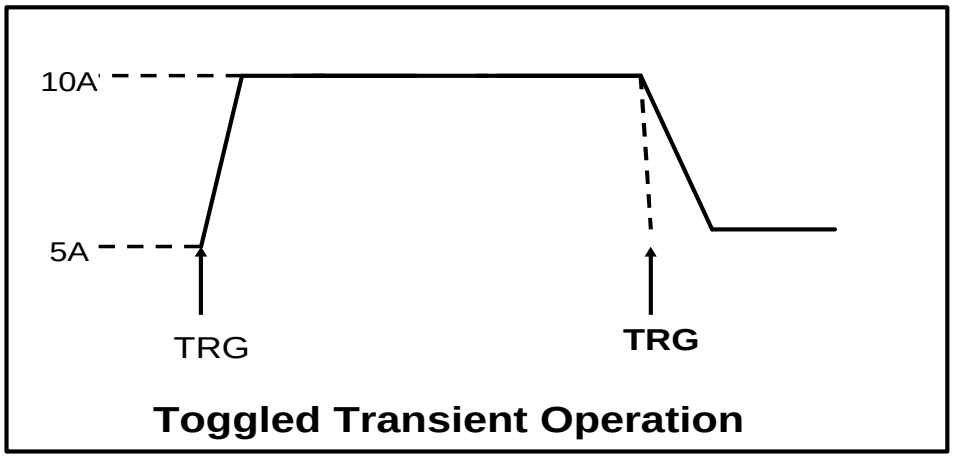
Pulse

Switch to value B as receiving one trigger signal , taking the pulse time(**TWD**) of value B , Load will return to Value A .



Trigger Mode

Switching the state between value A and value B once receiving a triggering signal



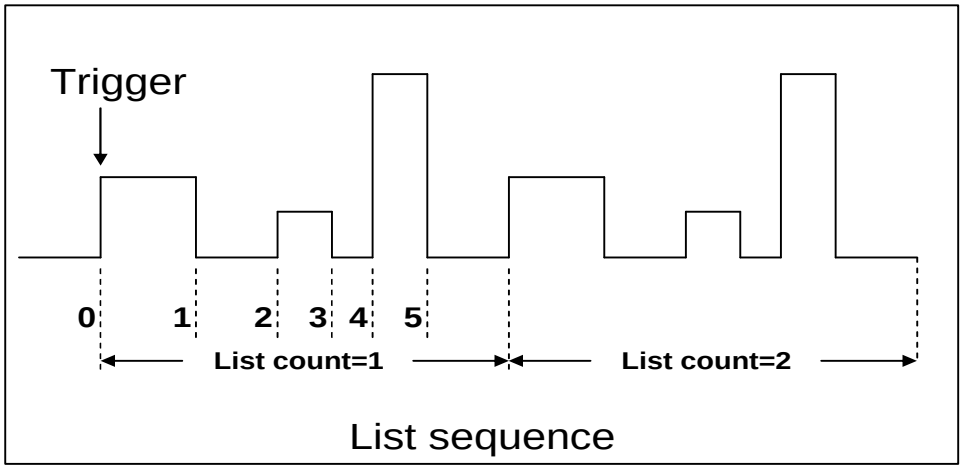
List Operation

List mode lets you generate complex sequences of input changes with rapid, precise timing, which may be synchronized with internal or external signals. List operation can be changed by edit every step value and time in list operation. The parameter of list operation include the group file name, input step setting (the max steps is 1000 steps),time of one step(1mS~1h) and setting value of one step. In CC mode, dwell time range is 1mS to 6S, which also have an associated value. Note that lists data can only be saved in total 1000 steps memory of 4 situations.

GROUP	Total = 1000 steps

1	**1000 steps**							
2	**500 steps**				**500 steps**			
4	**250 steps**		**250 steps**		**250 steps**		**250 steps**	
8	**120 steps**	**120 steps**	**120 steps**	**120 steps**	**120 steps**	**120 steps**	**120 steps**	**120 steps**

When receiving one trigger signal, it will start the list operation until receiving another trigger signal or finish the List operation.



Triggered Operation

The electronic load has various triggering modes to allow synchronization with other test equipment or events. Such as:

Keypad triggering mode: Press Shift + Trigger to trigger the electronic load.

TTL triggering mode: Send a high pulse with a constant time more than 5m Sec to the trigger terminals in rear panel to trigger the electronic load.

Command triggering mode: Send triggering command to the electronic load via the serial port.

Input Control

Short On/Off

Load can simulate a short circuit at its input by turning the load on with full-scale current. The short circuit can be toggled on/off at the front panel using the

Shift + Short .Short operation is not influence the operation setting current value , When short operation is on OFF state , Load back to the original setting state. The actual value of the electronic short is dependent on the mode and current range that are active when the short is turned on.
In CC, CW and CR mode, the max short-circuit current value is 1.2 times of the current range. In CV mode, short-circuit operation is same as the operation of setting CV to 0V.

NOTE

Turning the Short Test on in CV mode may cause the load to draw so much current that the software current limit operates, which may turn the input off. Turning the short circuit on does not affect the programmed settings, and the load input will return to the previously programmed values when the short is turned off.

Input On/Off

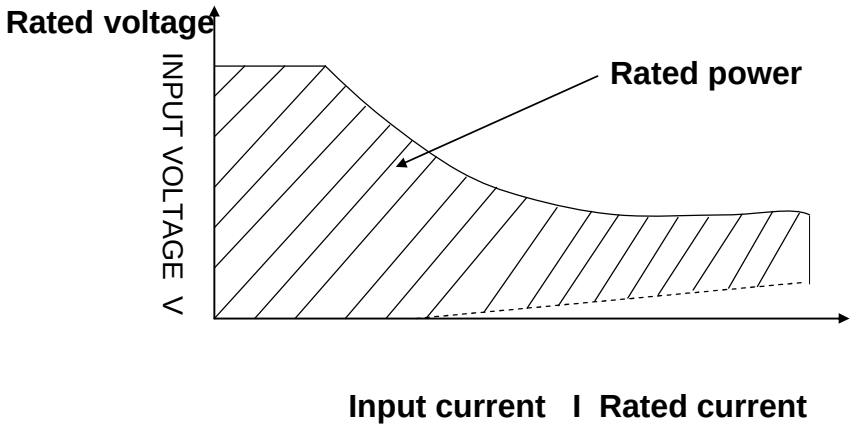
Electronic load's input can be toggled on/off at the front panel. Turning the input off (zero current) does not affect the programmed settings. The input will return to the previously programmed values when the input is turned on again.

NOTE

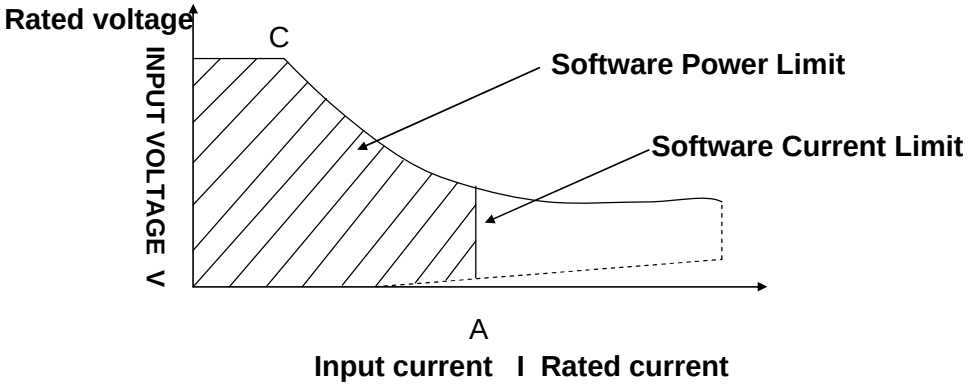
The Input On/Off command supersedes the mode commands and Short Test On/Off command.

Operation Range

Work in the range of Rated Current, Rated voltage and Rated Power, The figure is as following:



Operation mode change state



Protection Features

Electronic load includes the following protection features:

Over Voltage

If input voltage exceeds the voltage limit, Load will turn OFF the input, Buzzer is mooing. VFD display as following:

OVER VOLTAGE

Over Current

When work in the CR or CC and CP mode, input current is ascending continuously, the load current will be limited by a current limit circuit, Load will work in the over current protection state , VFD display the information as CC.
When work in CV mode and transition mode and List mode, Input current exceeds the current limit, Buzzer is mooing, VFD display the flashing current value.

Over Power

If the input power exceeds the power limit in the normal operation mode, Load will work in the over power protection state. VFD displays the information as CW.
When work in transition mode and list mode, If the input power exceeds the power limit. Buzzer is mooing, VFD display the flashing current value and voltage value.

Reverse Voltage

This feature protects the load module in case the input DC voltage lines are connected with wrong polarity, if a reverse voltage condition is detected, Buzzer is mooing. VFD display as following:

REVERSE VOLTAGE

Over Temperature

If internal power components ‘s temperature exceeds safe limits (80?), Over temperature protection is on work . Load will turn off the input and Buzzer is mooing, VFD display as following:

OVER HEAT

Remote Sense Function

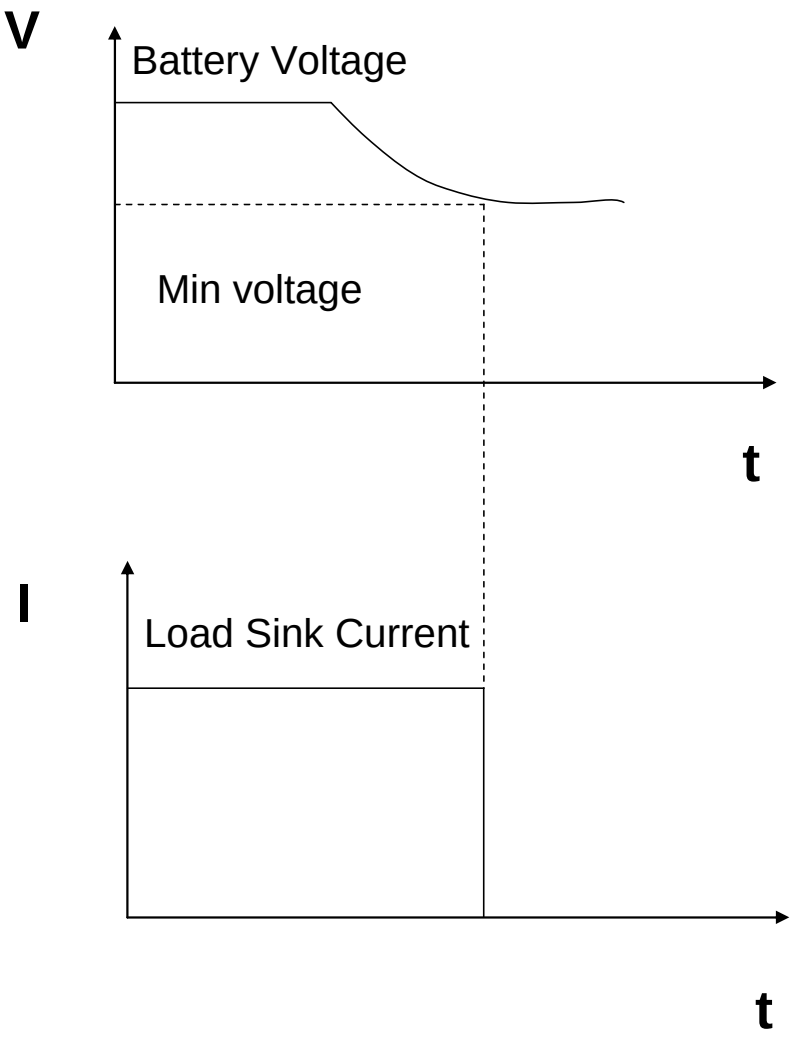
When work in CV, CR and CP mode, if load consumes biggish current, it will cause one depressed voltage in the connection line between tested machine and terminals of Load. In order to assure testing precision, Load provides one remote testing terminals in the rear panel, Users could test the output terminals voltage of tested machine through it. Users should set the Load in REMOTE mode before using the function.

Saving And Recalling Settings

The electronic load has internal registers in which settings (mode, current, voltage, resistance, transient level, etc.).Users could use Shift+Store and Shift+Recall to save and recall the relative data as following:
CC value /CW value /CR value /CV value
Transition current A value /Transition current B value /Transition voltage A value /Transition voltage B value / Transition power A value /Transition power B value /Transition Resistance A value /Transition Resistance B value
Current A pulse width time/ Current B pulse width time/Voltage A pulse width time/ Voltage B pulse width time /Power A pulse width time/Power B pulse width time /Resistance A pulse width time /Resistance B width time
Transition current testing mode/Transition voltage testing mode/Transition power testing mode /Transition resistance testing mode
Max current value / Max voltage value / Max power value

Battery Testing

Load provides the function of discharging electronic of testing battery. Setting discharging current by press I-set, then press Shift +Battery to set the mix voltage, Battery testing operation is run. When Battery Voltage setting value is lower than the limited voltage; Load will turn off the input. VFD will display the capacity of testing battery, Press Shift +Battery and return the normal mode.



External Control Signals

Electronic Load has a 4-pin connector mounted on its rear panel. These signals are described in the following paragraphs.

Remote Sensing: SENSE (+) and **SENSE (–)** are the remote sensing inputs**.** By eliminating the effect of the inevitable voltage drop in the load leads, remote sensing provides greater accuracy by allowing the load to regulate directly at the source's output terminals.

TRIG: A TTL-compatible input that responds to external edge trigger signal. A trigger applied to this input can be used to change settings (voltage, current, resistance, etc.), toggle between settings in transient-toggle mode, or generate a pulse in transient-pulse mode.

Installation

Inspection

Damage

When you receive your electronic load, inspect it for any obvious damage that may have occurred during shipment. If there is damage, notify the shipping carrier and nearest Agent office and Support Office immediately.

Items Supplied

The following user replaceable items are included with your electronic load.

Item	Description
Power Cord	Users will get one of the power cord.
User's Guide	Contains installation, checkout, and front panel information and
Software CD-Rom	Programming information
Calibration Report	The Instrument calibration report.

Cleaning

Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally.

WARNING

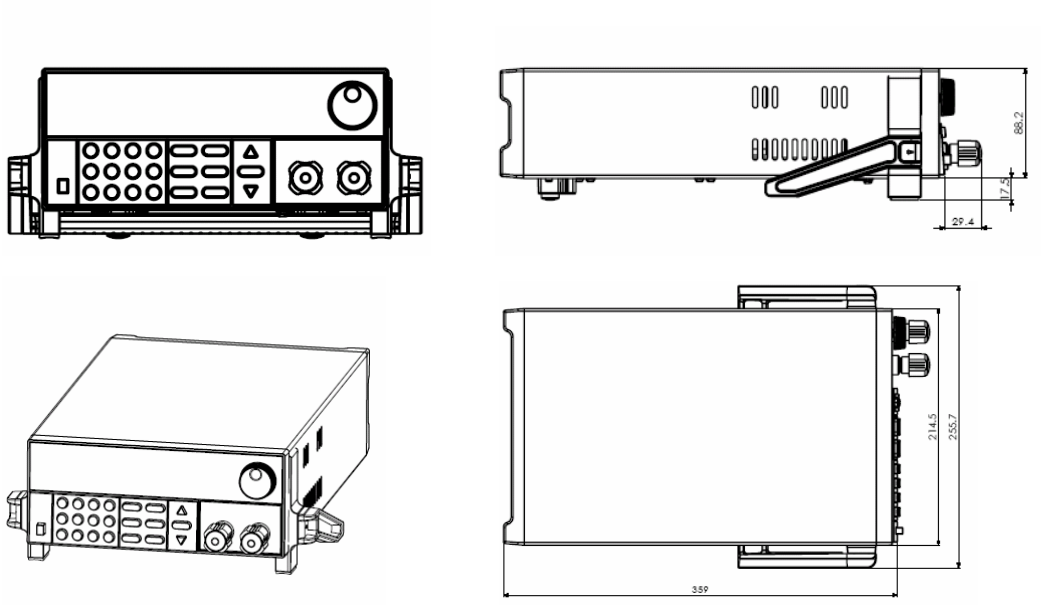
To prevent electric shock, unplug unit before cleaning.

Location

The outline diagram in following figure gives the dimensions of your electronic load. The electronic load must be installed in a location that allows sufficient space at the sides and back of the unit for adequate air circulation.

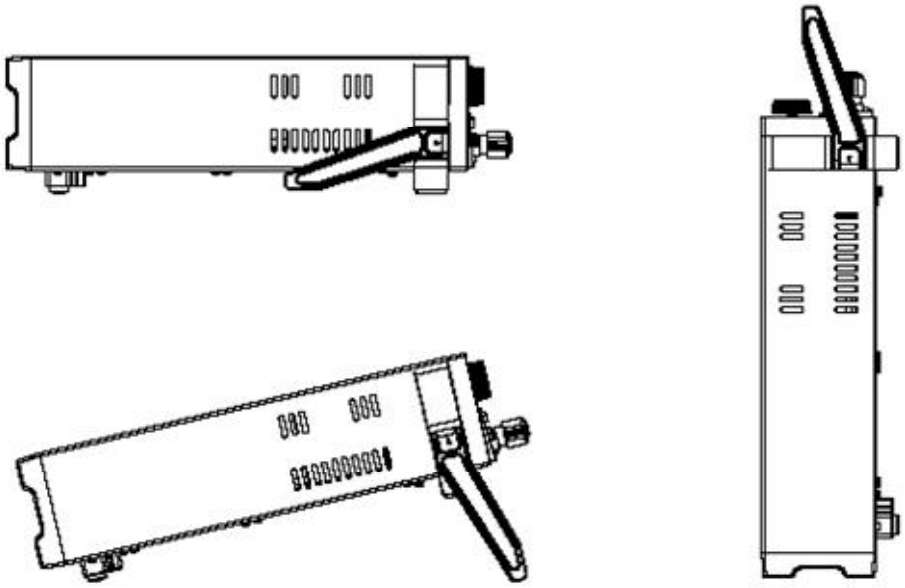
Installation

Dimension :101mmW x 215mm H x 366mm D
Terminal length: 29.4mm Feet height:17.5mm



Outline Diagram **Unit (mm)**

Carrying Handle



Bench Operation

A fan cools the electronic load by drawing air through the button and sides and exhausting it out the back.
Minimum clearances for bench operation are 25 mm along the sides.

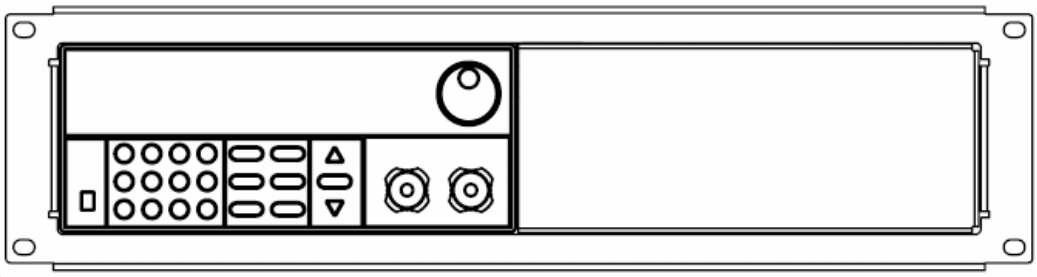
CAUTION

Do not block the fan exhaust at the rear of the Load.

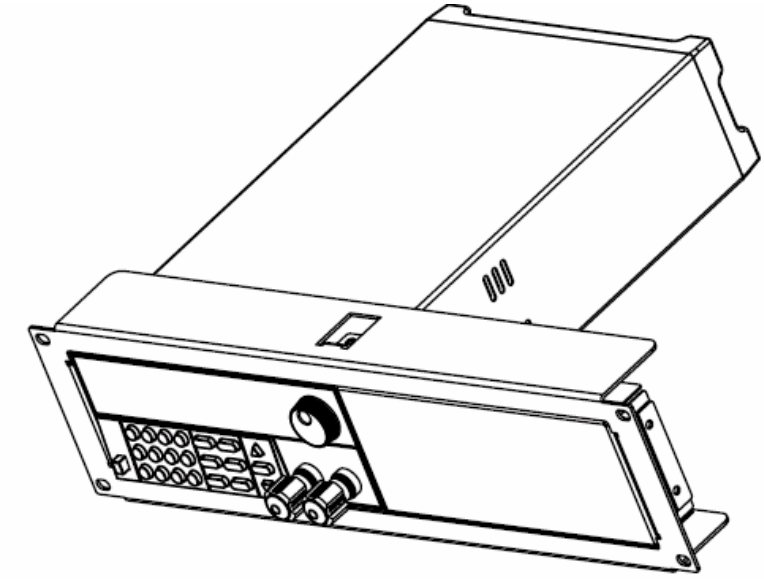
Rack Mounting

The 8500 serial electronic load can be mounted in a standard 19-inch rack. Rack mount kits are available as Option IT-E151. The electronic load can be mounted in a standard 19-inch rack panel or enclosures using an Option IT-E151 rack mount kit. A rack mount kit for joining two half-rack units is also available by using Option IT-E151.

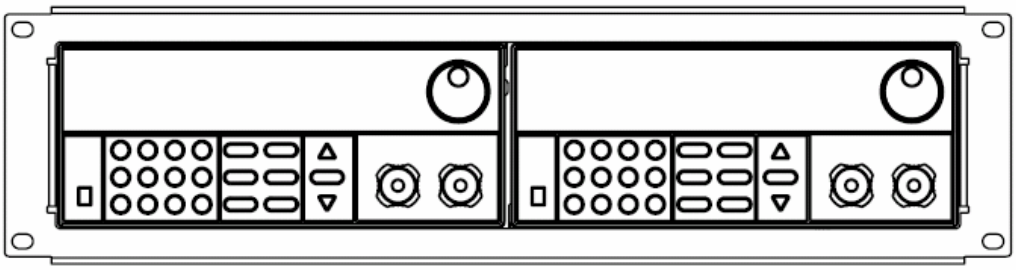
Rack Installation



Elevation for Installation one electronic load in a standard 19-inch rack



Side elevation for Installation one electronic load in a standard 19-inch rack



Elevation for Installation two electronic loads in a standard 19-inch rack

NOTE

Remove the carrying handle and the two plastic ears before rack-mounting the instrument. To remove the handle, grasp the handle by sides and pull outwards and rotate it to a special position to let the arrow on the handle oppose the another arrow on the plastic ears, then pull the handle outward. After removing the handle, you can use a screwdriver to remove the two plastic ears.

Trigger And Remote Sensing Connections

A 4-pin connector and a quick-disconnect mating plug are provided on rear panel for accessing input signals and remote sensing, all leads connected to the connector should be twisted and shielded to maintain the instrument's specified performance.

Remote Sensing: sense (+) and **sense (-)** Used to connect the remote sensing leads to the power source.

TRIG IN: TRIG (IN) A TTL-compatible input that responds to external edge trigger signal. A trigger applied to this input can be used to change settings (voltage, current, resistance, etc.), toggle between settings in transient-toggle mode, or generate a pulse in transient-pulse mode.

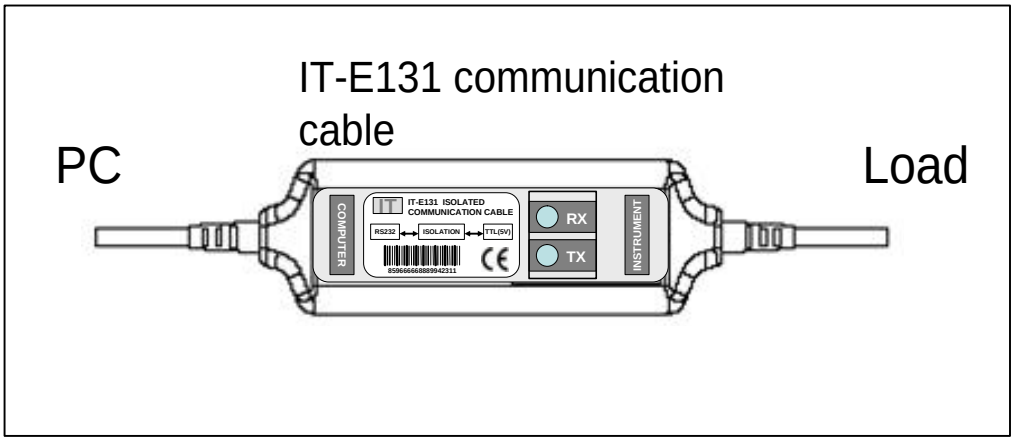
TRIG GND: TRIG (⏚) Provides the common connection for the trigger signals.

Computer Connections

The electronic load can be controlled through a PC serial port.

RS-232 Interface

The electronic loads have an serial port programming interface; all applicable commands are available through serial port programming. It available to connect the electronic load to any computer or terminal with the IT-E131 isolated communication cable.



CAUTION

Users must use IT-E131 to realize the remote operation between PC and 8500 series electronic load.

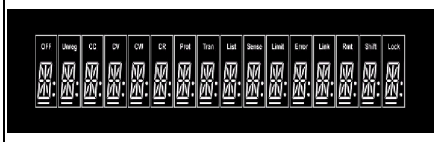
Turn-On Checkout

Introduction

Successful tests in this chapter provide a high degree of confidence that the electronic load is operating properly.

Checkout Procedure

The test in this section checks for proper operation of the electronic load. If you have not already done so, connect the power cord to the unit and plug it in.

Procedure	Display	Explanation
1. Turn the unit on. The electronic Load undergoes a self-test when you First turn it on.		During self test, all segments are briefly lit
2. Wait for 1s after turn on electronic load.	**EPROM ERROR**	EEPROM damage or Lost data of last power off **Run well if no such display, system will go to the step 3 directly.**
3. Wait for another 2S.	**ERROR CAL.DATA**	EEPROM Lost calibration data **Run well if no such display, system will go to the step 4 directly.**

4. Press Shift button and ? ? keys .	**LOAD MODEL:IT85XX** **SN: XXX-XXX-XXX** **VER x.xx**	Display the information of the product Type, series number version of software.
5. Press ESC **button**	**0.000V 0.000A**	Display the actual input voltage and current value.
6.Press ? ?	**0.000W I: 0.000A**	Display the actual power value and setting value.

In Case Of Trouble

Electronic load failure to run during power-on operation. The test of following in this section help you to solve the possible problem When you turn on the power of electronic load .

1) Make sure if you have connected the power cord to the unit and plug it in. Power switch have been pressed.

2) Check the power voltage setting.

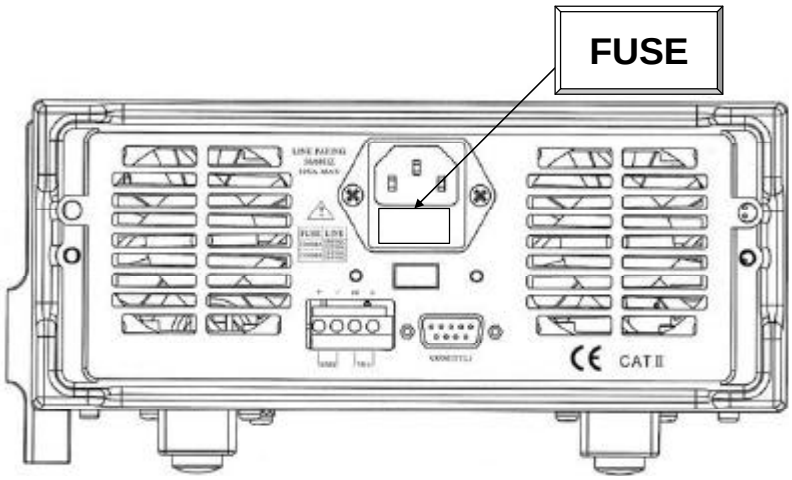
Work voltage of load have two type 110V or 220V , Please make sure it is right voltage accordance to the voltage in your area. You could change the voltage setting through dial the switch in the rear panel.

3) Check the fuse of load.

If fuse is blowout, please change it as following specification.

Model	Fuse specification (110VAC)	Fuse specification (220VAC)
8500	**T0.5A 250V**	**T0.3A 250V**

4) Location of Fuse



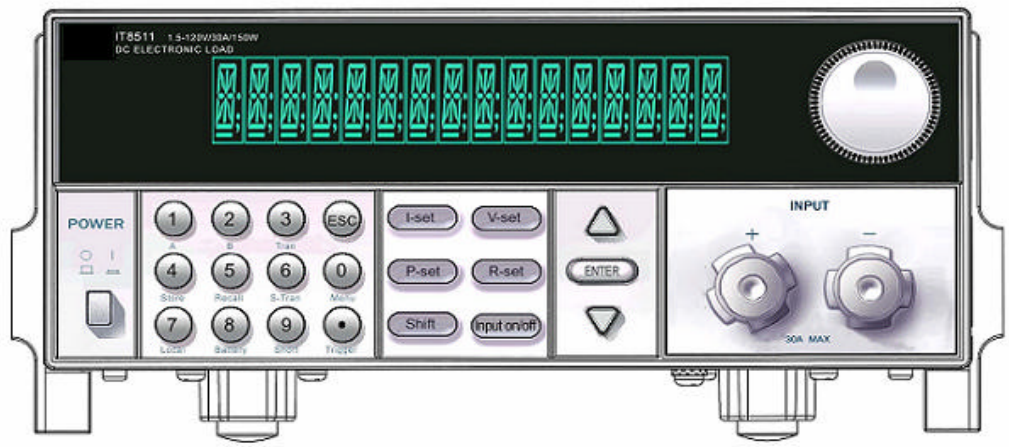
Front Panel Operation

Introduction:

Here is what you will find in this chapter:

A complete description of the front panel controls

Front panel programming examples.



Display

16-character fluorescent display for showing measurements and programmed values.

Annunciators

Annunciators light to indicate operating modes and status conditions:

OFF	power off	**Trigger**	Indicates that the electronic load is waiting an initiate and trigger to occur.
CC	The selected input channel is in the constant current (CC) mode.	**Sense**	Indicates that the electronic load is in sense state
CV	The selected input channel is in the constant voltage (CV) mode.	**Error**	A errors have occurred
CW	The selected input channel is in the constant power (CW) mode.	**Link**	In the communication state
CR	The selected input channel is in the resistance (CR) mode.	**Rmt**	Indicates that the electronic load is in remote state (RS-232). In the remote state, only the active key is the Local key.
Tran	The selected input channel is enabled for transient operation.	**Shift**	Indicates that the shift key has been pressed.
List	A list is initiated or running.	**Lock**	keyboard is the mode for password

Function keys

Main Function:

Set up a constant current output.
Set up a constant power output.
Set up a constant resistance output
Select CC, CR and CV and CW modes.
Select Current, Resistance and Voltage levels.
Set Trigger and Transient levels.
Set up front panel measurements.
Recall the stored data
Battery testing
Short-circuit testing

Entry Keys

Entry keys let you:
Enter programming values.
Increasing or decreasing setup values.
Press ？ or ？ select the front panel menu parameters.

Power

The Power switch turns the electronic load power on or off.

Example

I-set (set up a constant current from 0 to Max current)

Set up a constant DC current input is the first main function of programmable DC electronic load,
8500 serial electronic load provides two methods to set up the constant DC current output by using the number keyboard and the rotary button. Please see the following operation procedure.

Procedure	Operation details	VFD display
STEP 1	Press **I-set**	**CURRENT=0.000A**
STEP 2	Enter the password or jump the step 4 if your password for reentering	**PASSWORD:**
STEP 3	Enter the original value which displayed in the LCD or enter a new value by using number keys or Rotary knob to adjust the voltage value	**CURRENT=*.***A**
STEP 4	Press **ENTER** to confirm	**0.000V *.***A**

Setup the output current at 4.33A.
Method 1: To set up by using number keyboard

Step1. Press **I-set** button.

Step2. Press numeric button to enter the current value 4.33.

Step3. Press ENTER button to confirm the current value.

Method 2: To set up I-set by using Rotary SW

(1) If the key board is unlocked by password, directly adjust the Rotary SW button, and voltage will be continually changed from the previews value according the rotation. At the beginning, the cursor will be shown on the last number of the value which is indicated on the VFD, you can move the cursor to the first number, second number etc by using number buttons, and then adjust the Rotary SW to change each number, and let it stay at *.** A. Please see the following description. Then press I-set to confirm the value.
0.00A 0.00V
0.0W 4.33A

Procedure:

Step1. Press I-set button,

Step2. Adjust the Rotary knob to change the value, the operation is as the same as item (1)

Step5. Press ENTER button to confirm the current value.

P-set (set up a constant power from 0 to Max power)

8500 series electronic load can be set up for a constant power.
Constant power setup procedure is as following:

Procedure	Operation details	VFD display
Step 1	Press P-set	**POWER =0.000W**
Step 2	Enter a new value by using numeric keys or Rotary knob to adjust the voltage value	**POWER=*.***W**

Step 3	Press ENTER to confirm.	**0.000W P:*.000W**

R-set (set up a constant resistance from 0.1Ω to 4000Ω)

8500 series electronic load can be setup for a constant resistance.
Constant resistance setup procedure is as following:

Procedure	Operation details	VFD display
Step 1	Press R-set	**RESISTANCE =0000R**
Step 2	enter a new value by using numeric keys or Rotary knob to adjust the resistance value	**RESISTANCE=*****R**
Step 3	Press ENTER to confirm.	**0.000W R:0000R**

V-set (set up a constant voltage from 1.5V to Max voltage)

8500 electronic load can be setup for a constant voltage.
Constant voltage setup procedure is as following:

Procedure	Operation details	VFD display
Step 1	Press V-set	**VOLTAGE=1.500V**
Step 2	enter a new value by using numeric keys or Rotary knob to adjust the resistance value	**VOLTAGE=*.***V**
Step 3	Press ENTER to confirm.	**0.000W V:3.000V**

Shift + Store

Procedure	Operation details	VFD display
Step 1	Press Shift and Store	**STORE 1**
Step 2	Press ENTER to confirm.	Store the relative data

Shift + Recall

Procedure	Operation details	VFD display
Step 1	Press Shift and Recall	**RECALL 1**
Step 2	Press ENTER to confirm	Recall the saving data

Out On/Off input setting

Use Input on/off to change the state of electronic load. Switch on to off state by press Input on/off.

Menu description

procedure	The operation methods	VFD display
Step 1	Press Shift + Menu button	
Step 2 The VFD display the menu functions one by one, user can use	?	**CONFIG**
	Enter	INITIAL CONFIG
	?	POWER-ON LOAD
	?	POWER-ON RECALL
	?	KEY SOUND SET
	?	KNOB LOCK SET
	?	REMOTE SENCE

the ? and ? button to change the selecting function, press ENTER button to execute the selection function or step into the next sub-menu	?	TRIGGER SOURUSE
	?	BAUDRATE SET
	?	COMM.PARITY SET
	?	ADDRESS SET
	?	KEY LOCK SET
	?	EXIT
	?	**SYSTEM SET**
	ENTER	MAX CURRENT SET
	?	MAX POWER SET
	?	MAX VOLTAGE SET
	?	EXIT
	?	**LIST SET**
	Enter	MODE SET
	?	CALL LIST FILE
	?	EDIT LIST FILE
	?	LIST STORE MODE
	?	EXIT
	?	**LOAD ON TIMER**
	Enter	TIMER STATE
	?	TIMER SET
	?	EXIT
	?	**EXIT**

Transition Testing Operation

Users could switch between the two different current and voltage in the transition mode; it could test the transition specialty of power supply. Users could use front panel or communication interface(TRAN ON AND TRAN OFF) to make it work or not, Please setting parameters before transition operation. Include Transition setting value, Constant pulse width setting and Transition Pulse width setting and Transition testing mode. The mix pulse width is 500uS.The Max pulse width is 6S. Transition Operation only could work in CC and CV mode.

Users can choose one of the three operation modes: Continuous, Pulse and Toggling mode.

Transition Parameter Setting

Users could press Shift + S-Tran to set the transition parameter.

Shift + S-Tran	**LEVEL A = *****	Setup value A

ENTER	**WIDTH A = ********	Setup time width of value A
ENTER	**LEVEL B=*******	Setup value B
ENTER	**WIDTH B= ********	Setup time width of value B
ENTER	**CONTINUOUS** **PULSE** **TOGGLED**	Choose one of the three transition modes
ENTER		Finish transition setting

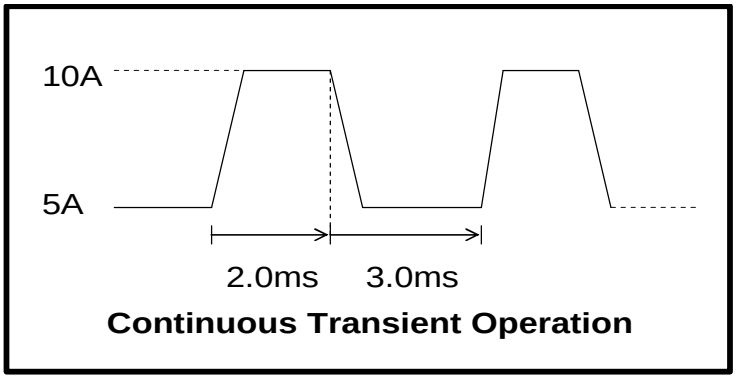
Continuous Transient Operation

In this mode, electronic load will generates a repetitive pulse stream that toggles between two load levels. ; Load could switch the state between two setting value (value A and value B).

In this following example, assume that the CC mode is active; the applicable transient operation parameters have been set as follows.

For example:

Continuous mode, current level A =5A, width = 2mS. Current level B =10A, width = 3ms. Testing machine output voltage is 12V.



Continuous Transient Operation

Action

1. On the Function keypad, press Input on/off button to turn off the load input.

2. Press Shift and S-Tran, setting LEVEL A=5A, WIDTH A=3mS, LEVER B=10A, WIDTH B=2mS, transition mode is **CONTINOUS.** .

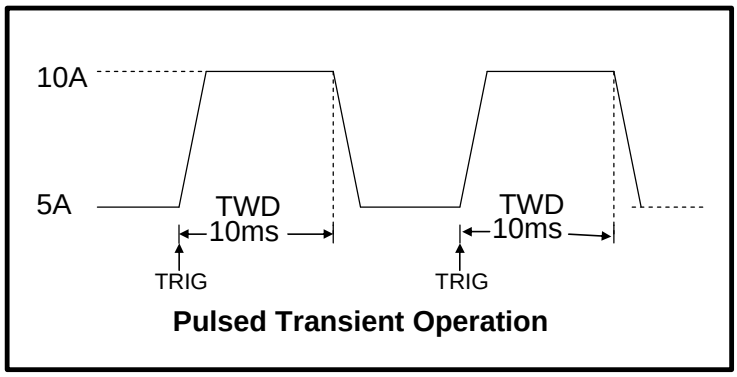
3. Press Shift and Tran to activate the transient mode.

4. Press Shift and Tran again to stop the transient operation.

Pulse Transient Operation

In this mode, generates a transient pulse of programmable width when pulsed transient operation is in effect.

For example: When load receiving one trigger signal, it will switch to 10A current value, and taking 10mS to return the current value of 5A.



Pulsed Transient Operation

Action

1. On the Function keypad, press Input on/off button to turn off the load input.

2. Press Shift and S-Tran, set LEVER A=5A, LEVER B=10A, WIDTH B=10mS, Transition mode is **PULSE** .

3. Press Shift and Tran to activate the transient mode.

4. Press Shift and Trigger to start another pulse. Press Shift and Trigger, get more pulse.

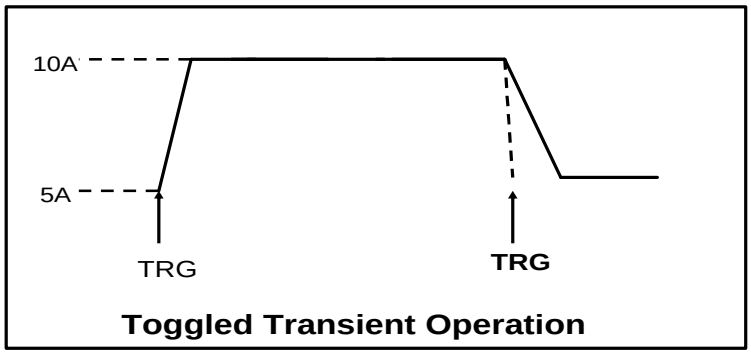
5. Press Shift and Tran again to stop the transient operation.

Toggled Transient Operation

In this mode, after transition operation start, Load could change the input between the main level and the transient level when toggled transient operation is in effect.

For example:

When Load receives one trigger signal, Load current will switch between 5A and 10A.



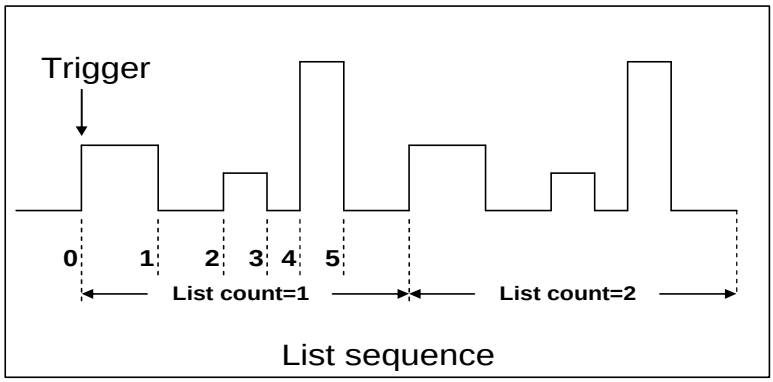
Toggled Transient Operation

Action

1. Press Shift and S-Tran , Setting LEVER A=5A, LEVER B=10A, Transition mode is PULSE .
2. Press Shift and Tran to activate the transient mode.
3. Press Shift and Trigger switch to the current value of 10A.
4. Press Shift and Trigger, switch between 5A and 10A.
5. Press Shift and Tran again to stop the transient operation.

List Operation

Users can use the front panel keypad or Power View 8500(PV-8500) software to programming the list sequence. Please refer to the software user's guide.
The following example will help you how to do the list operation in front panel.



List sequence

Action

1) Press the button of Input on/off, execute the input of Load I in **OFF** state.

2) Press Shift and Menu, move cursor to the option of menu of **CONFIG ,** Press ENTER into the next step menu ,move cursor to **TRIGGER SOURCE** . Press ENTER and move cursor to **IMMEDIATE <DEF>,** setting trigger source mode is panel **IMMEDIATE** mode.

3) Press ENTER to confirm.

4) Press ESC to the previous menu , move cursor to **LIST SET** .

5) Press ENTER into the next step menu .move cursor to **EDIT LIST FILE.**

6) Press ENTER into the next step menu, move cursor to **CURRENT LIST,** select **CURRENT MODE**.

7) Press ENTER, move cursor to REPEAT . Setup LIST is in cycle mode.

8) Press ENTER to confirm, setup the list steps = 5.

9) Press ENTER to confirm, setup step 1 current =3A.

10) Press ENTER to confirm, setup step 1 width=6mS.

11) Repeat 7) and 8) operation , set current and width of one step 0A, 5mS;2A, 4mS;6A,2mS;0A,5mS.

12) Press ENTER **to confirm, Menu STORE LIST FILE 1. save file in group1.**

13) **Move cursor to Mode Set , press** ENTER to enter into the next step menu to s**et mode is <LIST MODE >**

14) **Press** ENTER to confirm

15) Press ESC , Press Input on/off, Make Load in ON state.

16) Press Shift and Trigger, make list operation run or stop.

17) Stop the list operation mode. Move cursor to **LIST SET** , Press ENTER**,** move cursor to **Mode Se**t in option menu, press ENTER, Enter into next step menu . Select mode is <FIXED MODE> ?

18) Press ENTER to confirm.

Specifications

Parameter		8500	
Input rating (0 ~ 40 ？)	Voltage	0 to 120V	
	Current	1mA to 30A	
	Power	300 W	
Load Regulation	Range	Accuracy	Resolution
	0-18V	±(0.05%+0.02%FS)	1mV
	0-120V / 500V	±(0.05%+0.025%FS)	10mV
	0-3A	±(0.1%+0.1%FS)	0.1mA
	0-30A / 15A	±(0.2%+0.15%FS)	1mA
CV Mode Regulation	1.5-18V	±(0.05%+0.02%FS)	1mV
	1.5-120V/500V	±(0.05%+0.025%FS)	10mV
CC Mode Regulation	0-3A	±(0.1%+0.1%FS)	0.1mA
	0-30A /15A	±(0.2%+0.15%FS)	1mA
CR Mode Regulation Input current FS 10% Input VoltageFS 10%	0.1-10O	±(1%+0.3%FS)	0.001O
	10-99O	±(1%+0.3%FS)	0.01O
	100-999O	±(1%+0.3%FS)	0. 1O
	1K-4KO	±(1%+0.8%FS)	1O
CW Mode Regulation Input current FS 10% Input VoltageFS 10%	0-100W	±(1%+0.1%FS)	1mW
	100-300W	±(1%+0.1%FS)	10mW
Current Measurement	0-3A	±(0.1% + 0.1%FS)	0.1mA
	0-30A /15A	±(0.2%+0.15%FS)	1mA
Voltage Measurement	1.5-18V	±(0.02% + 0.02%FS)	1mV
	1.5-120V/500V	±(0.02% + 0.025%FS)	10mV
Power Measurement Input currentFS 10% Input VoltageFS 10%	0-100W	±(1%+0.1%FS)	1mW
	100-300W	±(1%+0.1%FS)	10mW
Battery testing function	Input=0.8-120V / 500V Max measurement capacity= 999A/H Resolution =10mA Timer range=1~60000sec		
Transition Mode	o Frequency 0.1Hz-1kHz Frequency error rate< 0.5%		
Weight	11.6lb. (5.25 kg)		

Remote Operation Mode

DB9 in the rear panel of electronic load could connect with RS-232 through on TTL connector. The following information may help you to know how to control the output of Electronic load through PC.

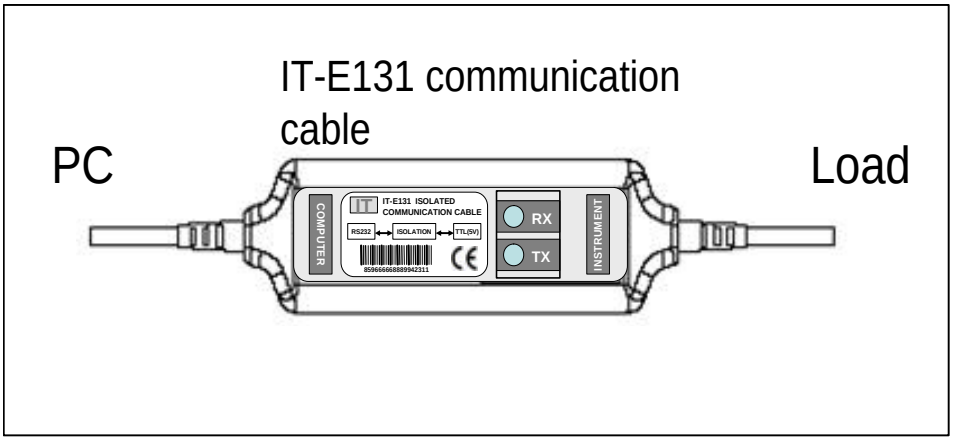
1. Communication Setting

Ensure setting the same baud rate in the communication address of Electronic load and computer software .otherwise, the communication will fail. You can adjust the baud rate and communication address in Menu button in front panel of machine. Address of the Electronic load. (0 ~ 0XFE, default value is 0)

1. Baud rate : (4800,9600,19200,38400, default value is 9600)
2. Data bit : 8
3. Stop bit : 1
4. sum: (NONE,ODD,EVEN,INITIAL SETTING is NONE)

2. DB9 Interface Details

DB9 in the rear panel of electronic load is TTL (5V) level signal .it can be connecting with standard PC interface through the IT-E131 isolated communication cable.



CAUTION

Forbidden to connect DB9 connector in Electronic load directly with PC or other RS232 port.

3. Frame Format

Frame length is 26 bytes. Details as following:

AAH	Address	Command	4—25bytes are information content	Parity code

Description ：

1. Start bit is AAH, occupies one byte.
2. Address range from 0 to FE, occupies one byte.
3. Each command occupies one byte. Following is the command details.

20H	Selecting the Remote control mode
21H	Selecting the input on/off state
22H	Setting the max input voltage
23H	Reading the max setup input voltage.
24H	Setting max input current
25H	Reading the max setup input current.
26H	Setting max input power.
27H	Reading the max setup input power.
28H	Selecting CC/CV/CW/CR operation mode of Electronic load.

29H	Reading the operation mode.
2AH	Setting CC mode current value
2BH	Reading CC mode current value
2CH	Setting CV mode voltage value
2DH	Reading CV mode voltage value
2EH	Setting CW mode watt value
2FH	Reading CW mode watt value
30H	Setting CR mode resistance value
31H	Reading CR mode resistance value
32H	Setting CC mode transient current and timer parameter.
33H	Reading CC mode transient parameter
34H	Setting CV mode transient voltage and timer parameter.
35H	Reading CV mode transient parameter
36H	Setting CW mode transient watt and timer parameter
37H	Reading CW mode transient parameter
38H	Setting CR mode transient resistance and timer parameter
39H	Reading CR mode transient parameter
3AH	Selecting the list operation mode (CC/CV/CW/CR)
3BH	Reading the list operation mode.
3CH	Setting the list repeat mode (ONCE / REPEAT)
3DH	Reading the list repeat mode.
3EH	Setting the number of list steps.
3FH	Reading the number of list steps
40H	Setting one of the step’s current and time values.
41H	Reading one of the step’s current and time values.
42H	Setting one of the step’s voltage and time values.
43H	Reading one of the step’s voltage and time values
44H	Setting one of the step’s power and time values
45H	Setting one of the step’s power and time values.
46H	Setting one of the step’s resistance and time values
47H	Reading one of the step’s resistance and time values
48H	Setting list file name.
49H	Reading list file name.
4AH	Selection the memory space mode for storing list steps.
4BH	Reading the memory space mode for storing list steps.
4CH	Save list file in appointed area.
4DH	Get the list file from the appointed area.
4EH	Setting min voltage value in battery testing mode.
4FH	Reading min voltage value in battery testing mode
50H	Setting timer value of FOR LOAD ON
51H	Reading timer value of FOR LOAD ON
52H	Disable/Enable timer of FOR LOAD ON

53H	Reading timer state of FOR LOAD ON
54H	Setting communication address
55H	Enable/Disable LOCAL control mode.
56H	Enable/Disable remote sense mode.
57H	Reading the state of remote sense mode.
58H	Selecting trigger source.
59H	Reading trigger source.
5AH	Sending a trigger signal to trigging the electronic load.
5BH	Saving user's setting value in appointed memory area for recall.
5CH	Recall user's setting value in appointed memory area.
5DH	Selecting FIXED/SHORT/TRAN/LIST/BATTERY function mode.
5EH	Getting function mode state.
5FH	Reading input voltage, current, power and relative state
60H	Enter the calibration mode
61H	Getting the calibration mode state.
62H	Calibrate voltage value.
63H	Sending the actual input voltage to calibration program.
64H	Calibrate current value.
65H	Sending the actual input current to calibration program.
66H	Store the calibration data to EEPROM.
67H	Setting calibration information.
68H	Reading calibration information.
69H	Restore the factory default calibration data.
6AH	Reading product's model, series number and version information.
6BH	Reading the information of bar code.
6CH	Setting information of bar code
12H	The return information of command operation in electronic load.

NOTE

If control output of electronic through PC, please setting Electronic load is on PC control state. Command is 20H. Make a calibration on input of electronic Load, Ensure the calibration protection mode is OFF state when setting calibration information.

If electronic load in calibration mode, user's can't change the input and operation mode of electronic load

4. From 4th byte to 25th byte are information contents.
5. 26th is sum code, is the sum of the former 25 bytes.

4. Communication Protocol

1. Selecting the Remote control mode(20H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(20H)
4th .byte	Operation mode(0 is front panel operation mode , 1 is remote operation mode)
From 5th to 25th byte	System reserve
26th byte	Sum code

NOTE

Front panel operation state is not in effect if electronic load is in calibration mode.

2. Selecting the input on/off state (21H)

1st byte	Start bit (AAH)
2nd byte	Address(0—0XFE)
3rd byte	Command(21H)
4th byte	Input state(0 is OFF, 1is ON)
From 5th to 25th byte	System reserve
From26th byte	Sum code

3. Setting / Reading max input voltage(22H/23H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(22H/23H)
4th byte	The Lowest byte of max voltage value
5th byte	The lower byte of max voltage value.
6th byte	The higher byte of max voltage value.
7th byte	The highest byte of max voltage value.
From 8th to 25th byte	System reserve.
26th byte	Sum code.

NOTE

Represent a voltage upper limit value by 4 bytes of Hex. Lower bytes are in the front location, higher bytes are in the later location. 1 represent 1mV.For Example : The voltage upper limit is 16.000V, the hex code is 0X00003EB0, then the 4th byte is 0XB0, 5th byte is 0X3E, 6th byte is 0X00, 7TH byte is 0X00?

4. Setting / Reading the max input current .

(24H/25H)

1st byte	Start bit (AAH)
2nd byte	Address(0—0XFE)
3rd byte	Command(24H/25H)
4th byte	The Lowest byte of max current value
5th byte	The Lowest byte of max current value
6th byte	The higher byte of max current value
7th byte	The highest byte of max current value
From 8th to 25th byte	System reserve
26th bye	Sum code

NOTE

Represent an current value by 4 bytes of Hex .Lower bytes are in the front location, higher bytes are in the later location.1 represent 0.1mA,If setting upper limit is **3.0000**A, the hex code is **0X00007530**, then the 4th byte is **0X30**, 5th is **0X75**, 6th is 0X00, 7th is **0X00**?

5. Setting / Reading max input power(26H/27H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(26H/27H)
4th byte	The lowest byte of max power value.
5th byte	The lower byte of max power value
6th byte	The higher byte of max power value.
7th byte	The highest byte of max power value.

From 8th to 25th byte	System reserve
26th byte	Sum code

NOTE

Represent power value by 4 bytes of Hex. Lower bytes are in the Front location, higher bytes are in the later location. 1 represents 1mW. If setting upper value is **200.000W**, the hex code is **0X00030d40**, then the 4th byte is **0X40**, 5th is **0X0d**, 6th is 0X03, 7th is **0X00**?

6. Selecting / Reading CC/CV/CW/CR operation mode of Electronic load.(28H/29H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(28H/29H)
4th byte	Mode(0 is CC mode, 1 is CV mode , 2 is CW mode , 3 is CR mode)
From 5th To 25th byte	System reserve
26th byte	Sum code

7. Setting / Reading CC mode current value (2AH/2BH)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command (2AH/2BH)
4th byte	The lowest byte of current value
5th byte	The lower byte of current value.
6th byte	The higher byte of current value.
7th byte	The highest byte of current value.
From 8th To 25th byte	System reserve

27th byte	Sum code

NOTE

Represent current by 4 bytes of Hex. Lower bytes are in the front location, higher bytes are in the later location. For example: current is **3.0000**A, Hex code is **0X00007530**, NO. 4 bye is **0X30**, NO. 5 bye is **0X75**, NO. 6 bye is 0X00, NO. 7 bye is **0X00**?

8. Setting / Reading CV mode voltage value.

(2CH/2DH)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(2CH/2DH)
4th byte	The lowest byte of voltage value.
5th byte	The lower byte of voltage value.
6th byte	The higher byte of voltage value.
7th byte	The highest byte of voltage value.
From 8th to 25th byte	System reserve
26th byte	Sum code

NOTE

Represent voltage by 4 bytes of Hex. Lower bytes are in the front location, higher bytes are in the later location. For example :voltage is **16.000**V, Hex code is **0X00003EB0**, 4th byte **0XB0**, 5TH byte is **0X3E**, 6th byte is 0X00, 7th byte is **0X00**?

9. Setting / Reading CW mode watt value

(2EH/2FH)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)

3rd byte	Command(2EH/2FH)
4th byte	The lowest byte of max power value
5th byte	The lower byte of max power value
6th byte	The higher byte of max power value
7th byte	The highest byte of max power value
8th to 25th byte	System reserve
26th byte	Sum code

NOTE

Represent power by 4 bytes of Hex. Lower bytes are in the front location, higher bytes are in the later location. For example :power is **200.000W**, Hex is **0X00030d40**, 4th byte is **0X40**, 5th byte is **0X0d**, 6th byte is 0X03, 7th byte is **0X00**?

10. Setting / Reading CR mode resistance value

(30H/31H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(30H/31H)
4th byte	The lowest byte of resistance value.
5th byte	The lower byte of resistance value.
6th byte	The higher byte of resistance value.
7th byte	The highest byte of resistance value.
8th to 25th byte	System reserve
26th byte	Sum code

NOTE

Represent resistance value by 4 bytes of Hex. Lower bytes are in the front location, higher bytes are in the later location. If resistance value is **200.000R**, Hex code is **0X00030d40**, 4TH byte is **0X40**, 5TH byte is **0X0d**, 6th byte is 0X03, 7th byte is **0X00**?

11. Setting /Reading CC mode transient current and timer parameter. (32H/33H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(32H/33H)
From 4th byte to 7th byte	Setting value of current A (Lower bytes are in the front location, higher bytes are in the later location.)
From 8th byte to 9th byte.	Time value of timer A ((Lower bytes are in the front location, higher bytes are in the later location) (1 represent 0.1mS)
From 10th to 13th byte	Setting value of current B (Lower bytes are in the front location, higher bytes are in the later location)
From 14th to 15th byte	Time value of timer B (Lower bytes are in the front location, higher bytes are in the later location) (1 represent 0.1mS)
16th byte	Transition operation mode (0 is CONTINUES, 1 is PULSE, 2 is TOGGLED)
From 17th to 25th byte	System reserve
26th byte	Sum code

12. Setting /Reading CV mode transient voltage and timer parameter.(34H/35H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(34H/35H)
From 4th to 7th byte.	Setting value of voltage A (Lower bytes are in the front location, higher bytes are in the later location)
From 8th to 9th byte.	Time value of timer A (Lower bytes are in the front location, higher bytes are in the later location) (1represent 0.1mS)
From 10th to 13th byte	Setting value of voltage B(Lower bytes are in the front location, higher bytes are in the later location)
From 14th to 15th byte	Time value of timer B (Lower bytes are in the front location, higher bytes are in the later location) (1represent 0.1mS)

16th byte	Transient operation mode (0 is CONTINUES,1 is PULSE,2 is TOGGLED)
From 17th to 25th byte	System reserve
26th byte	Sum code

13. Setting /Reading CW mode transient watt and timer parameter(36H/37H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(36H/37H)
From 4th to 7th byte	Setting value of power A (Lower bytes are in the front location, higher bytes are in the later location)
From 8th to 9th byte	Time value of timer A (Lower bytes are in the front location, higher bytes are in the later location) (1 represent 0.1mS)
From 10th to 13th byte	Setting value of power B(Lower bytes are in the front location, higher bytes are in the later location)
From 14th to 15th byte	Time value of timer B (Lower bytes are in the front location, higher bytes are in the later location) (1 represent 0.1mS)
16th byte	Transition operation mode (0 is CONTINUES,1is PULSE,2 is TOGGLED)
From 17th to 25th byte	System reserve
26th byte	Sum code

14. Setting /Reading CR mode transient resistance and timer parameter(38H/39H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(38H/39H)
From 4th byte to 7th byte	Setting value of resistance A (Lower bytes are in the front location, higher bytes are in the later location)

From 8th byte to 9th byte.	Time value of timer A (Lower bytes are in the front location, higher bytes are in the later location) (1 represent 0.1mS)
From 10th byte to 13th byte	Setting value of resistance B (Lower bytes are in the front location, higher bytes are in the later location)
From 14th byte to 15th byte	Time value of timer B (Lower bytes are in the front location, higher bytes are in the later location) (1 represent 0.1mS)
16th byte	Transition operation mode (0 is CONTINUES,1 is PULSE,2 is TOGGLED)
17th byte to 25th byte	System reserve
26th byte	Sum code

15. Selecting /Reading the list operation mode (CC/CV/CW/CR)(3AH/3BH)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(3AH/3BH)
4th byte	LIST operation mode(0is CC mode, 1 is CV mode ,2 is CW mode,3 is CR mode)
From 5th to 25 byte	System reserve
26th byte	Sum code

16. Setting /Reading the list repeat mode. (3CH/3DH)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(3CH/3DH)
4th byte	LIST repeat operation mode(0 is ONCE, 1 is REPEAT)
From 5th to 25th byte	System reserve
26th byte	Sum code

17. Setting / Reading the number of list steps. (3EH/3FH)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(3EH/3FH)
From 4thto 5th byte	LIST steps
From 6th to 25th byte	System reserve
26th byte	Sum code

18. Setting / Reading one of the step's current and time values. (40H/41H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(40H/41H)
From 4th byte to 5th byte	Appointed one step
From 6th to 9th byte	Current value of current step (Lower bytes are in the front location, higher bytes are in the later location)
From 10th to 11th byte	Time value of current step (Lower bytes are in the front location, higher bytes are in the later location) (1 represent 0.1MS)
From 12th to 25th byte	System reserve
26th byte	Sum code

19. Setting / Reading one of the step's voltage and time values. (42H/43H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(42H/43H)
From 4th to 5th byte	Appointed one step

From 6th byte to 9th byte	Voltage value of current step (Lower bytes are in the front location, higher bytes are in the later location)
From 10th to 11th byte	Time value of current step (Lower bytes are in the front location, higher bytes are in the later location) (1 represent 0.1MS)
From 12th to 25th byte	System reserve
26th byte	Sum code

20. Setting / Reading one of the step's power and time values. (44H/45H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(44H/45H)
4th byte	Appointed one step
From 5th to 8th byte	Power value of current step (Lower bytes are in the front location, higher bytes are in the later location)
From 9th to 10th byte	Time value of current step (Lower bytes are in the front location, higher bytes are in the later location) (1 represent 0.1MS)
From 11th to 25th byte	System reserve
26th byte	Sum code

21. Setting / Reading one of the step's power and time values. (46H/47H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command (46H/47H)
From 4th to 5th byte	Appointed one step
From 6th to 9th byte	Resistance value of current step (Lower bytes are in the front location, higher bytes are in the later location)
From 10th to 11th byte	Time value of current step (Lower bytes are in the front location, higher bytes are in the later location) (1 represent 0.1MS)
From 12th to 25th byte	System reserve

26th byte	Sum code

22. Setting / Reading List file name (48H/49H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command (48H/49H)
From 4th to 13th byte	LIST file name (ASSIC code)
From 14th to 25th byte	System reserve
26th byte	Sum code

23. Selection / Reading the memory space mode for storing list steps. (4AH/4BH)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(4AH/4BH)
4th byte	partition mode (1 | 2 | 4 | 8)
From 5th to 25th byte	System reserve
26th byte	Sum code

24. Save / Get list file in appointed area.. (4CH/4DH)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(4CH/4DH)
4th byte	Storing area 1 ~ 8)
From 5th to 25th byte	System reserve
26th byte	Sum code

25. Setting / Reading min voltage value in battery testing mode.(4EH/4FH)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(4EH/4FH)
4th byte	The lowest byte of voltage value.
5th byte	The lower byte of voltage value.
6th byte	The higher byte of voltage value.
7th byte	The highest byte of voltage value.
From 8th to 25th byte	System reserve
26th byte	Sum code

26. Setting / Reading timer value of FOR LOAD ON (50H/51H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(50H/51H)
4th byte	The lowest byte of time value in timer. (1 represent 1S)
5th byte	The highest byte of time value in timer.
From 8th to 25th byte	System reserve
26th byte	Sum code

Time unit in Timer is S, 1S is represented by 1.

27. Disable / Enable timer of FOR LOAD ON (52H);

Reading timer state of FOR LOAD ON(53H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(52H/53H)

4th byte	Timer state (0 is disable ,1 is enable)
From 5th to 25th byte	System reserve
26th byte	Sum code

28. Setting communication address (54H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command (54H)
4th byte	New communication address (0~0XFE)
From 5th to 25th byte	System reserve
26th byte	Sum code

29. Enable/Disable LOCAL control mode. (55H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command (55H)
4th byte	State of LOCAL button(0:disable,1:enable “)
From 5th to 25th byte	System reserve
26th byte	Sum code

30.Enable / Disable remote sense mode.(56H)

Reading the state of remote sense mode.(57H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(56H/57H)
4th byte	Remote mode state (0:disable,1:enable)
5th to 25th byte	System reserve
26th byte	Sum code

31. Selecting / Reading trigger source. (58H/59H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command (58H/59H)

4th byte	**Trigger mode** (0:Keypad,1 External,2.command)
From 5th to 25th byte	System reserve
26th byte	Sum code

32. Sending a trigger signal to trigging the electronic load. (5AH)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(5AH)
From 4th to 25th byte	System reserve
26th byte	Sum code

33. Saving / Recall user's setting value in appointed memory area for recall. (5BH/5CH)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(5BH/5CH)
4th byte	Storing area ( )
From 5th to 25th byte	System reserve
26th byte	Sum code

34. Selecting / Getting FIXED/SHORT/TRAN/LIST/ BATTERY function mode. (5DH/5EH)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(5DH/5EH)
4th byte	Work mode (0:FIXED,1:SHORT, 2:TRANSITION,3:LIST,4: BATTERY
From 5th to 25th byte	System reserve
26th byte	Sum code

35.Reading input voltage, current, power and relative state. (5FH)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command (5FH)
From 4th to 7th byte	Actual input voltage value (Lower bytes are in the front location, higher bytes are in the later location)
From 8th to 11th byte	Actual input current value (Lower bytes are in the front location, higher bytes are in the later location)
From 12th to 15th byte	Actual input power value (Lower bytes are in the front location, higher bytes are in the later location)
16th byte	Operation state register
From 17th to 18th byte	Demand state register
From 19th to 25th byte	System reserve
26th byte	Sum code

BIT	Signal	Meaning
		Operation state register
0	CAL	Calculate the new demarcate coefficient
1	WTG	Wait for trigger signal
2	REM	Remote control mode
3	OUT	Output state
4	LOCAL	LOCAL button state (0 is represent “not in effect “,1 is represent ‘in effect “)
5	SENSE	Remote testing mode
6	LOT	FOR LOAD ON timer state
		Demand state register
0	RV	Input reverse voltage
1	OV	Over voltage
2	OC	Over current
3	OP	Over power
4	OT	Over temperature
5	SV	Not connect remote terminal
6	CC	Constant current
7	CV	Constant voltage
8	CP	Constant power
9	CR	Constant resistance

36. Enter the calibration mode(60H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(60H)
4th byte	Calibration mode select(0:disable;1:enable)
5th byte	Calibration password(0X85H)
6th byte	Calibration password(0X11H or 0X12H)
From 7th to 25th byte	System reserve
26th byte	Sum code

NOTE

If Load is not in protection state, users could do the calibration operation.

37. Getting the calibration mode state(61H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(61H)
4th byte	Calibration protection state
From 5th to 25th byte	System
26th byte	Sum code

NOTE

Represent calibration protection state by one byte. Each byte is defined as:

From high to low

7	6	5	4	3	2	1	0

0 byte: protection state, 0 represent not in the protection state , 1 represent in protection state.

38. Calibrate voltage value(62H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(62H)
4th byte	Voltage calibration point(1~4)
From 5th to 25th byte	System reserve
26th byte	Sum code

NOTE

Current calibration standard points have four: 1, 2, 3, 4.

39. Sending the actual input voltage to calibration program(63H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(63H)
4th byte	The lowest byte of actual voltage
5th byte	The lower byte of actual voltage
6th byte	The higher byte of actual voltage.
7th byte	The highest byte of actual voltage.
From 8th to 25th byte	System reserve
26th byte	Sum code

40. Calibrate current value(64H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(64H)
4th byte	Current calibration point (1~4)
From 5th to 25th byte	System reserve
26th byte	Sum code

NOTE

Current calibration standard points have four: 1,2,3,4

41. Sending the actual input current to calibration program (65H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(65H)
4th byte	The lowest byte of actual current
5th byte	The lower byte of actual current
6th byte	The higher byte of actual current
7th byte	The highest byte of actual current
From 8th to 25th byte	System reserve
26th byte	Sum code

42. Store the calibration data to EEPROM(66H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command (66H)
From 4th to 25th byte	System reserve
26th byte	Sum code

NOTE

Finish the calibration operation, users should save the calibration parameter in EEPROM with this command; users could use these data in next power on.

43. Setting / Reading calibration information (67H/68H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)

3rd byte	Command(67H/68H)
From 4th to 23rd byte	Demarcate information(ASIC code)
24th byte	System reserve
25th byte	System reserve
26th byte	Sum code

44. Restore the factory default calibration data (69H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(69H)
From 4th to 25th byte	System reserve
26th byte	Sum code

NOTE

User could use the initial calibration data of factory with this command.

45. Reading product's model, series number and version information(6AH)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(6AH)
From 4th to 8th byte	Mode information (ASIC code)
9th byte	The lowest byte of software version number(BCD code)
10th byte	The highest byte of software version number(BCD code)
From 11th to 20th byte	Product series number (ASIC code)
From 21st to 25th byte	System reserve
26th byte	Sum code

For example:

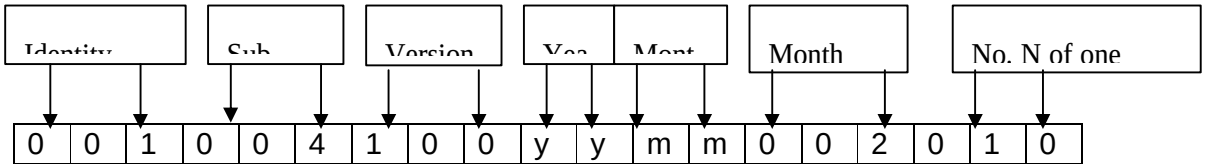
Product's series number is 000045, product mode is 8511,software version number is V2.03, data as following

AA	00	31	38	35	31	31	00	03	02	ZZ	ZZ	ZZ	ZZ	ZZ	ZZ	ZZ	ZZ	ZZ	ZZ	XX	XX	XX	XX	XX	57

46. Reading information in bar code (6BH)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command (6BH)
From 4th to 22nd byte	Information in bar code(ASIC？)
From 23rd to 25th byte	System reserve
26th byte	Sum code

Bar code rule ： All of bar cod of our products is distinguished by the former three characters.



47. Setting information of bar code(6CH)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command(6CH)
4th to 22nd byte	Product series number(ASIC code)
24th byte	System reserve
25th byte	System reserve
26th byte	Sum code

48. The return information of command operation in electronic load(12H)

1st byte	Start bit (AAH)

2nd byte	Address (0—0XFE)
3rd byte	Command(12H)
4th byte	Command calibration result
From 5th to 25th byte	System reserve
26th byte	Sum code

NOTE

Receiving one frame command and verify them
If verify sum is wrong, return the parameter 90H
If setting parameter is wrong or over brim, return parameter A0H.
If command is not enforce, return to parameter B0H
If command is invalid, return to parameter C0H
Otherwise, return to parameter 80H

NOTE

Receiving one frame command and verify them
If verify sum is correct, return the relative reading data.
If verify sum is wrong , return the verify command(90H) ?

Limited One-Year Warranty

B&K Precision Corp. warrants to the original purchaser that its product and the component parts thereof, will be free from defects in workmanship and materials for a period of one year from the data of purchase.

B&K Precision Corp. will, without charge, repair or replace, at its' option, defective product or component parts. Returned product must be accompanied by proof of the purchase date in the form a sales receipt.

To obtain warranty coverage in the U.S.A., this product must be registered by completing and mailing the enclosed warranty card to B&K Precision Corp., 22820 Savi Ranch Parkway, Yorba Linda, CA 92887 within fifteen (15) days from proof of purchase.

Exclusions: This warranty does not apply in the event of misuse or abuse of the product or as a result of unauthorized alterations or repairs. It is void if the serial number is altered, defaced or removed.

B&K Precision Corp. shall not be liable for any consequential damages, including without limitation damages resulting from loss of use. Some states do not allow limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific rights and you may have other rights, which vary from state-to-state.

Model Number: _____ **Date Purchased: _____**

22820 Savi Ranch Parkway
Yorba Linda, CA 92887
714.921.9095
714.921.6422 Facsimile

Service Information

Warranty Service: Please return the product in the original packaging with proof of purchase to the below address. Clearly state in writing the performance problem and return any leads, connectors and accessories that you are using with the device.

Non-Warranty Service: Return the product in the original packaging to the below address. Clearly state in writing the performance problem and return any leads, connectors and accessories that you are using with the device. Customers not on open account must include payment in the form of a money order or credit card. For the most current repair charges contact the factory before shipping the product.

Return all merchandise to B&K Precision Corp. with pre-paid shipping. The flat-rate repair charge includes return shipping to locations in North America. For overnight shipments and non-North America shipping fees contact B&K Precision Corp..

B&K Precision Corp.
22820 Savi Ranch Parkway
Yorba Linda, CA 92887
Phone: 714- 921-9095
Facsimile: 714-921-6422
Email: service@bkprecision.com

Include with the instrument your complete return shipping address, contact name, phone number and description of problem.

PN: 481-535-9-001
Printed in China

22820 Savi Ranch Parkway
Yorba Linda, CA 92887
USA
TEL: 714-921-9095
FAX: 714-921-6422

www.bkprecision.com