

Programmable DC Electronic Load

IT8400 Series User Manual



Model: IT8400 Series Version: V1.1/9,2022



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Manual Part Number



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Safety Notices

CAUTION

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

WARNING

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



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



Quality Certification and Assurance

We certify that series instrument meets all the published specifications at time of shipment from the factory.

Warranty

ITECH warrants that the product will be free from defects in material and workmanship under normal use for a period of one (1) year from the date of delivery (except those described in the Limitation of Warranty below).

For warranty service or repair, the product must be returned to a service center designated by ITECH.

- The product returned to ITECH for warranty service must be shipped PRE-PAID. And ITECH will pay for return of the product to customer.
- If the product is returned to ITECH for warranty service from overseas, all the freights, duties and other taxes shall be on the account of customer.

Limitation of Warranty

This Warranty will be rendered invalid in case of the following:

- Damage caused by circuit installed by customer or using customer own products or accessories;
- Modified or repaired by customer without authorization;
- Damage caused by circuit installed by customer or not operating our products under designated environment;
- The product model or serial number is altered, deleted, removed or made illegible by customer;
- Damaged as a result of accidents, including but not limited to lightning, moisture, fire, improper use or negligence.



Safety Symbols

	Direct current		ON (power)
\sim	Alternating current	0	OFF (power)
\sim	Both direct and alternating current	Д	Power-on state
	Chassis (earth ground) symbol.	П	Power-off state
Ţ	Earth (ground) terminal	±	Reference terminal
Â	Caution	+	Positive terminal
	Warning (refer to this manual for specific Warning or Caution information)		Negative terminal
₩	A chassis terminal	-	-

Safety Precautions

The following safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or specific warnings elsewhere in this manual will constitute a default under safety standards of design, manufacture and intended use of the instrument. ITECH assumes no liability for the customer's failure to comply with these precautions.



WARNING

- Do not use the instrument if it is damaged. Before operation, check the casing to see whether it cracks. Do not operate the instrument in the presence of inflammable gasses, vapors or dusts.
- The instrument is provided with a power cord during delivery and should be connected to a socket with a protective earth terminal, a junction box or a three-phase distribution box. Before operation, be sure that the instrument is well grounded.
- Please always use the provided cable to connect the instrument.
- Check all marks on the instrument before connecting the instrument to power supply.
- Ensure the voltage fluctuation of mains supply is less than 10% of the working voltage range in order to reduce risks of fire and electric shock.
- Do not install alternative parts on the instrument or perform any unauthorized modification.
- Do not use the instrument if the detachable cover is removed or loosen.
- To prevent the possibility of accidental injuries, be sure to use the power adapter supplied by the manufacturer only.
- We do not accept responsibility for any direct or indirect financial damage or loss of profit that might occur when using the instrument.
- This instrument is used for industrial purposes, do not apply this product to IT power supply system.
- Never use the instrument with a life-support system or any other equipment subject to safety requirements.



WARNING

- SHOCK HAZARD Ground the Instrument. This product is provided with a protective earth terminal. To minimize shock hazard, the instrument must be connected to the AC mains through a grounded power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet or distribution box. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in injury or death.
- Before applying power, verify that all safety precautions are taken. All connections must be made with the instrument turned off, and must be performed by qualified personnel who are aware of the hazards involved. Improper actions can cause fatal injury as well as equipment damage.
- SHOCK HAZARD, LETHAL VOLTAGES This product can input the dangerous voltage that can cause personal injury, and the operator must always be protected from electric shock. Ensure that the input electrodes are either insulated or covered using the safety covers provided, so that no accidental contact with lethal voltages can occur.
- Never touch cables or connections immediately after turning off the instrument. Verify that there is no dangerous voltage on the electrodes or sense terminals before touching them.
- After using the device, turn off the power switch of the device before unplugging the power cord or disassembling the terminals. Do not touch the cable or the terminal immediately. Depending on the model, the dangerous voltage at the plug or terminal is maintained for 10 seconds after the device is switched off. Make sure that there is no dangerous voltage before touching them.

CAUTION

- Failure to use the instrument as directed by the manufacturer may render its protective features void.
- Always clean the casing with a dry cloth. Do not clean the internals.
- Make sure the vent hole is always unblocked.

Environmental Conditions

The instrument is designed for indoor use and an area with low condensation. The table below shows the general environmental requirements for the instrument.



Environmental Conditions	Requirements
Operating temperature	0°C~40°C
Operating humidity	20% ~ 80%(non-condensation)
Storage temperature	-10°C ~ 70 °C
Altitude	Operating up to 2,000 meters
Installation category	II
Pollution degree	Pollution degree 2



In order to ensure the accuracy of measurement, it is recommended to operate the instrument half an hour after start-up.

Regulation Tag

CE	The CE tag shows that the product complies with the provisions of all relevant European laws (if the year is shown, it indicates that the year when the design is approved).
UKCA	The UKCA tag shows that the product complies with the provisions of all relevant United Kingdom laws (if the year is shown, it indicates that the year when the design is approved).
	This instrument complies with the WEEE directive (2002/96/EC) tag requirements. This attached product tag shows that the electrical/electronic product cannot be discarded in household waste.
	This symbol indicates that no danger will happen or toxic substances will not leak or cause damage in nor- mal use within the specified period. The service life of the product is 10 years. The product can be used safely within the environmental protection period; oth- erwise, the product should be put into the recycling system.



Waste Electrical and Electronic Equipment (WEEE) Directive



Waste electrical and electronic equipment (WEEE) directive, 2002/96/EC The product complies with tag requirements of the WEEE directive (2002/96/EC). This tag indicates that the electronic equipment cannot be disposed of as ordinary household waste. Product Category According to the equipment classification in Annex I of the WEEE directive, this instrument belongs to the "Monitoring" product. If you want to return the unnecessary instrument, please contact the nearest sales office of ITECH.



Compliance Information

Complies with the essential requirements of the following applicable European Directives, and carries the CE marking accordingly:

- Electromagnetic Compatibility (EMC) Directive 2014/30/EU
- Low-Voltage Directive (Safety) 2014/35/EU

Conforms with the following product standards:

EMC Standard

IEC 61326-1:2012/ EN 61326-1:2013 123

Reference Standards

CISPR 11:2015+A1:2016 Ed 6.1

IEC 61000-3-2: 2018 RLV

IEC 61000-3-3: 2013+A1:2017

IEC 61000-4-2:2008

IEC 61000-4-3 2006+A1:2007+A2:2010/ EN 61000-4-3 A1:2008+A2:2010

IEC 61000-4-4:2012

IEC 61000-4-5:2014+A1:2017

IEC 61000-4-6:2013+cor1:2015

IEC 61000-4-11:2004+A1:2017

- 1. The product is intended for use in non-residential/non-domestic environments. Use of the product in residential/domestic environments may cause electromagnetic interference.
- 2. Connection of the instrument to a test object may produce radiations beyond the specified limit.
- 3. Use high-performance shielded interface cable to ensure conformity with the EMC standards listed above.

Safety Standard

IEC 61010-1:2010+A1:2016



Content

	Quality Certification and Assurance	!
	Warranty	!
	Limitation of Warranty	I
	Safety Symbols	II
	Safety Precautions.	II
	Environmental Conditions	IV
	Regulation Tag	V
	Waste Electrical and Electronic Equipment (WEEE) Directive	VI
	Compliance Information	VII
1	Inspection and Installation	1
	1.1 Unpacking and Transportation	1
	1.2 Verifying the Shipment	
	1.3 Instrument Size Introduction	4
	1.4 Connecting the Power Cord	9
_	1.5 Connecting the DUT	
2	Quick Reference	
	2.1 Brief Introduction	
	2.2 Front Panel Introduction	
	2.3 Keyboard Introduction	19
	2.4 Fast Function Key	
	2.5 Function Description of VFD Status Indicators	
	2.6 Rear Panel Introduction	
~	2.7 Power-on Selftest	
3	Function and Features	
	3.1 Switching of Local/Remote Operation Modes	
	3.2 Constant-status Operation Mode	
	3.2.1 Constant Current Operation Mode (CC)	
	3.2.2 Constant Voltage Operation Mode (CV)	
	3.2.3 Constant Resistance Operation Mode (CR)	
	3.2.4 Constant Power Operation Mode (CW)	
	3.2.5 Compound Operation Mode	
	3.3 Input Control Function	
	3.4 Keyboard Locking Function	
	3.5 Short-circuit Analog Function	
	3.6 System Menu Function(System)	
	3.6.1 Restored to Factory Setting(Initialize)	
	3.6.2 Power On Parameter (Power-On)	
	3.6.3 Key Sound Set(Buzzer)	
	3.6.4 Rolary Knob Sel(Knob)	
	3.6.6 Set Memory Croup (Memory Croup)	30 20
	2.6.7 Leading Time Dieplay Set(Diepl)	30 20
	2.6.9 Communication Set	30 20
	2.7 Configuration many function (Config)	
	3.7 Configuration menu function (Config)	
	2.7.2 Auto Switching Voltage Pange Set(Measures)/ Pange)	
	2.7.2 Auto-Switching Voltage Range Set(Measure V-Range)	
	3.7.5 Setting File (Medsule - File)	
	2.8 Triggering Eulerion	
	3.0 Dynamic Test Function	
	2.0.1 Continuous Mode	44 <i>۸۸</i>
	3.0.2 Dulce Mode	44
	3.0.3 Togale Mode	40 17
	3.0. OCP Test Function	41 ۸۵
	3.10 OUT TEST UNUMBER 3.11 OPP Test Function	



	3.12 Battery discharge test function	51
	3.13 CR-LED test function	52
	3.14 Measure Function	55
	3.15 Configuration Save Function	56
	3.16 VON Function	57
	3.17 Protective Function	59
	3.17.1 Overvoltage Protection (OVP)	59
	3.17.2 Overcurrent Protection (OCP)	60
	3.17.3 Overpower Protection (OPP)	60
	3.17.4 Overtemperature Protection (OTP)	61
	3.17.5 Current Oscillation Protection(OSC)	61
	3.18 List Operation	62
	3.19 Terminal Function of Rear Panel	64
	3.19.1 External Trigger Function	65
	3.19.2 External On/Off Control	65
	3.19.3 Voltage Fault Indication	66
	3.19.4 External Analog Function	66
	3.19.5 Current Monitoring (I Monitor)	66
	3.20 Auto Test Function	67
	3.21 Parallel Function	72
4	Technical Specification	76
	4.1 Main specifications	76
	4.1.1 IT8406-600-150	76
	4.1.2 IT8412-600-300	78
	4.1.3 IT8418-600-450	80
	4.1.4 IT8424-600-600	82
	4.1.5 IT8430-600-750	84
	4.1.6 IT8436-600-900	86
	4.1.7 IT8442-600-1050	88
	4.1.8 IT8448-600-1200	90
	4.1.9 IT8454-600-1350	92
	4.1.10 IT8406-1200-75	95
	4.1.11 IT8412-1200-150	97
	4.1.12 IT8418-1200-225	99
	4.1.13 IT8424-1200-300	101
	4.1.14 IT8430-1200-375	103
	4.1.15 IT8436-1200-450	105
	4.1.16 IT8442-1200-525	107
	4.1.17 IT8454-1200-675	109
	4.2 Additional features	111
5	References of Load Communication Interfaces	112
	5.1 RS-232 interface	112
	5.2 USB interface	114
	5.3 GPIB interface	114
	5.4 LAN interface	115
А	Appendix	116
	A.1 Specifications of Red and Black Test Cables	116
	A.2 Fuse Replacement	117



1 Inspection and Installation

- Unpacking and Transportation
- Verifying the Shipment
- Instrument Size Introduction
- Connecting the Power Cord
- Connecting the DUT

1.1 Unpacking and Transportation

Unpacking

For cabinet products, they are packaged in wooden boxes at the factory. After you receive them, please refer to the unpacking instructions provided with the box for disassembly; for products packaged in cartons, please use appropriate tools for unpacking.

It is recommended to keep the complete transport packaging for the lifetime of the device for relocation or return to the manufacture for repair.

Transportation

If you need to transport non-cabinet products, you must pay attention to the following to ensure the safety of equipment and personnel.

CAUTION

- Before moving, make sure that the cabinet or stand where the equipment will be placed has been fixed and meets the load-bearing conditions to avoid tilting and collapsing, causing personnel to be injured, and equipment broken.
- Due to the weight of the product, transport by hand should be avoided where possible. If unavoidable, carry it with two people and holding the product shell and not external parts (such as handles, electrodes, knobs, etc.).
- When carrying, be prepared to bear the weight to avoid sprains or being crushed by heavy objects.
- Use suitable safety clothing, especially safety shoes, when carrying the equipment, as due to its weight a fall can have serious consequences.



After unpacking the cabinet product, if you need to move it to other places, you must pay attention to the following matters to ensure the safety of equipment and personnel.

CAUTION

- The cabinet product is very heavy. Before moving to another location, confirm whether the ground load is in compliance.
- During the process of moving the cabinet, it is recommended that two or more people cooperate and push it slowly and at a constant speed. If you encounter a pit, you need to pay special attention. It is forbidden to push it quickly, otherwise it will easily cause excessive inertia and cause the casters at the bottom of the cabinet to jam and the cabinet to fall.
- It is not advisable to push down the slope to prevent the cabinet from falling down due to the shift of the center of gravity. It is recommended to use a forklift or crane to move the cabinet.
- ITECH 27U and 37U cabinets are equipped with hoisting rings as standard on the top. It is recommended to use a crane equipped with a four-leg hoisting belt structure for horizontal hoisting and moving, and ensure that the four hoisting belts are the same length to avoid cabinet skew during movement. As shown below.
- After moving to the destination, please lock the four casters to secure the cabinet.
- The cabinet should be placed on a level ground. It is forbidden to place the cabinet on a sloped ground.





1.2 Verifying the Shipment

Open the package and check the articles within package box before operation. In case of any non-conformity, missing or appearance wearing, please contact ITECH immediately.

Device name	Quant- ity	Model	Remarks
Electronic load	1	IT8400 series	Please refer to 2.1 Brief Introduction for complete models of this series electronic loads.
Power cord	1	IT-E171/IT- E172/ IT-E173/ IT-E174	User may select an appropriate power cord that matches the specifications of power socket used in the area. See the section Categories of power cords for details.
Red and black test lines	a set	-	The load whose power is greater than or equal to 10KW in this series are standard equipped with a set of

Table 1–1 Package box contents	(to a machine as a referen	nce standard)
	(



Device name	Quant- ity	Model	Remarks
			red and black test line, the test line specification is 95mm ² / 3m.
Factory alignment report	1	-	Test report before delivery.
USB communic- ation cable	1	-	This accessory is selected when the USB interface is used for starting up remote operation.



After confirming that package contents are consistent and correct, please appropriately keep package box and related contents. The package requirements should be met when the instrument is returned to factory for repair.

1.3 Instrument Size Introduction

The instrument should be installed at well-ventilated and rational-sized space. Please select appropriate space for installation based on the electronic load size.























1.4 Connecting the Power Cord

Before connect

To avoid burning out and electric shock, The safety precautions must be observed.



WARNING

- To avoid burning out, be sure to confirm that the power voltage matches with the supply voltage.
- If the working voltage of the instrument supports 110V or 220V, before connecting the power cord, please confirm the 110V / 220V transfer switch to ensure that the switch of the load matches the supply voltage. Otherwise, the instrument may be damaged.
- Please ensure the power switch of the instrument is turned Off.
- To avoid burning out and electric shock, please only use the power cord supplied as a standard accessory.
- Be sure to connect the main power socket to the power outlet with protective grounding. Do not use terminal board without protective grounding.
- To prevent electric shock, be sure to take protective earthing. Please connect the power cable to the socket with the protective earth terminal.
- Do not use an extended power cord without protective grounding, otherwise the protection function will fail.
- Please use the AC power socket matching the power cord shipped with the box and take the protective earthing measures. If you can not use a suitable AC power cord, do not use the instrument.

AC power input level

Working voltage for this series electronic load is 100V~240V, AC power input level: 100V~240V 50Hz/60Hz

Power Cord Type and Connecting Method

• 4U and 8U models provides the standard power cords as below. Please select appropriate power cords appropriate to local voltage based on the specifications of power cords below. If purchased model fails to meet local voltage requirements, please contact distributor or factory for change.





Connecting Method:

- 1. Please ensure the power switch of the instrument is turned Off.
- 2. Connect one end of the power cord to the AC input connector on the rear panel of the instrument.
- 3. Connect the other end of the power cord to the socket configured with protective earth.



• Other models (15U, 27U and 37U instruments) provides the standard power cords as below.



Connecting Method:

- 1. Please ensure the power switch of the instrument is turned Off.
- 2. Remove the protective cover outside the AC input terminal on the rear panel.
- See the below illustration, connect one end of the AC power cord to the AC input terminal in the rear board of the instrument. Connect the fire wire, zero line and ground to the corresponding terminal of the device. Connect the brown terminal to line (L), blue to neutral (N), and yellowgreen to ground.
- 4. Mount the protective cover back to its original position.
- 5. Connect the plug on the other end of the power cord to a grounded AC outlet.





1.5 Connecting the DUT

Before connecting the DUT

To avoid buring out and electric shock, The safety precautions must be observed.



WARNING

- Before connecting the DUT, be sure to switch off the power supply of the test loop in order to avoid electric shock.
- To avoid electric shock, before testing, please make sure the rating values of the testing lines, and do not measure the current that is higher than the rating value.
- Always use test lines provided by ITECH to connect the equipment. If test lines from other factories are used, please check that the test line can withstand maximum current.
- When a switch device is used to directly connect the DUT and the electronic load, a voltage overshoot higher than the original setting will be generated when the switch device is closed, which will damage the electronic load. In order to avoid damaging the load, it is recommended that you purchase an IT-E165A module to prevent overshoot voltage from being applied to the load at the moment when the switchgear is closed. Please refer to Connect the IT-E165A for connection method.

Specification

• Test lines are not standard accessories of the 4U instruments. Please select optional red and black test lines for individual sales based on the maximum current value. For specifications of test lines and maximum current values, refer to A.1 Specifications of Red and Black Test Lines.

If you want to make test lines by yourself, please refer to the maximum current value and the poles' size, as shown in the following figure.



 Other models (8U, 15U, 27U and 37U instruments) are standard equipped with a set of red and black test lines, the test lines specification are 95mm² / 3m. However, for instruments with a rated current greater than 500A, the user need to purchase additional 1 to 5 test lines. Please select optional red and black test lines for individual sales based on the maximum current value. For specifications of test lines and maximum current values, refer to A.1 Specifications of Red and Black Test Lines.



If you want to make test lines by yourself, please refer to the maximum current value and specifications of standard test lines .

Connecting the DUT (local measurement)

The steps of local measurement are as follows:

- 1. Before connecting the test lines, be sure that the instrument Power is in Off position.
- 2. Remove the load input terminal cover.
- 3. Loosen the screws of the input terminals and connect the red and black test lines to the input terminals. Re-tighten the screws.

When maximum current that one test line can withstand fails to meet the current rated current, use several pieces of red and black test lines. For example, the maximum current is 1,200A, then 4 pieces of 360A red and black lines are required.

- 4. Install the load input terminal cover.
- 5. Directly connect the other end of the red and black lines to the DUT terminals.



Connecting the DUT (remote measurement)

Under CC, CV, CR or CW mode, if the load consumes large current, a large voltage drop will be detected in connection line between tested instrument and load terminal. To ensure measurement accuracy, a remote sense measurement terminal is provided at load rear board to compensate voltage drop lost in wire.

Remote sense operation: VS+ and VS- are remote input terminals. To avoid voltage drop caused by long input wire of load, the remote sense test allows direct measurement at input terminal source so as to improve measurement accuracy.



The steps of remote measurement are as follows:

- 1. Press [Shift]+[9](Config) keys to enter the interface of configuration menu.
- 2. Operate Left/Right key and select Remote-Sense. Press [Enter] key.
- 3. Select ON to start Sense function; the instrument is set to remote sense measurement mode.
- 4. Connect the instrument and DUT as shown in the following figure.



<u></u> Note

Test lines and sense lines should be as short as possible, and sense lines should be twisted together.

Connect the IT-E165A

- 1. Make sure that the power of the DUT, IT-E165A, and IT8400 is turned off.
- 2. Refer to the following diagram to connect the IT8400 series instrument and the DUT.



- 3. Connect the power cord of IT-E165A.
- 4. Start the DUT and turn on the IT8400 power switch.
- 5. Turn on the Power switch of the IT-E165A.



2 Quick Reference

This Chapter will introduce power-on check steps of this series to ensure normal start-up and usage under initialization status of the load. Besides, to facilitate usage, this part also displays the functions of front board, rear board and keyboard keys as well as display functions to a quick view of load appearance, structure and key usage functions before operation.

- Brief Introduction
- Front Panel Introduction
- Keyboard Introduction
- Fast Function Key
- Function Description of VFD Status Indicators
- Rear Panel Introduction
- Power-on Selftest

2.1 Brief Introduction

IT8400 high-performance DC electronic load has two voltage levels, 600V and 1200V. It supports master-slave connection in parallel with power from 6 kW to 600 kW, and is capable of fast double power loading. It has three current readback ranges with a resolution of up to 40uA. IT8400 has faster loop response and current rising and falling speed. It supports up to 8 working modes. It also has dynamic mode, List, OCP, OPP test, automatic test and battery test functions. IT8400 has built-in CAN, LAN, GPIB, USB, RS232 and analog interfaces, suitable for remote control and system building. In addition, the full protection function makes it well matched with the test of fuel cell, power battery discharge, DC charging pile, BOC, power electronics, solar, automotive high-voltage components, DC-DC, motor and so on.

Feature:

- Max.Voltage : 1200V
- Current range: 1.5A~15,000 A
- Power extended to 600 kW through master-slave connection in parallel
- High-precision three current measurement ranges with resolution up to 40uA
- Fast double power loading capability (<3 s)
- 25kHz fast dynamic mode, current rising and falling time is adjustable
- Provide 8 working modes: CC, CV, CR, CW, CC+CV, CV+CR, CR+CC, CW +CC



- 1 kHz continuous sampling rate
- List programming
- The battery discharge function is used to test energy storage devices such as batteries and super capacitors
- CV loop speed is adjustable to match different power supplies
- 500 kHz voltage and current sampling rate
- Time measurement, OCP/OPP test short circuit simulation, automatic test
- I-monitor function
- Full protection: OVP, OCP, OPP, OTP, current oscillation protection, current limit, power limit, reverse alarm, etc.
- Power-off retention memory function, recording up to 100 groups data
- Independent control, easy to maintain and install.
- Built-in standard LAN, USB, RS232, GPIB, CAN and analog, IO interface
- LabVIEW driver and SCPI protocol

Input parameter	600V	1200V	heig- ht
6 kW	IT8406-600-150	IT8406-1200-75	4 U
12 kW	IT8412-600-300	IT8412-1200-150	8 U
18 kW	IT8418-600-450	IT8418-1200-225	15 U
24 kW	IT8424-600-600	IT8424-1200-300	27 U
30 kW	IT8430-600-750	IT8430-1200-375	27U
36 kW	IT8436-600-900	IT8436-1200-450	27U
42 kW	IT8442-600-1050	IT8442-1200-525	37U
48 kW	IT8448-600-1200	IT8448-1200-600	37U
54 kW	IT8454-600-1350	IT8454-1200-675	37U



Note

• The curves indicating relationship between the rated input power, input voltage and internal temperature of IT8400 series load is shown in the following figure.



• The naming rule of the IT8400 series is IT84XX-YY-ZZ, where XX represents the rated power of the model, YY represents the rated voltage and ZZ represents the rated current.

2.2 Front Panel Introduction

All of this series electronic loads have the same front panel. The front panel diagram and key diagram of 4U model is shown in the figure below; descriptions of the numbered items follow the figure.



Quick Reference



- 1. Power switch
- 2. Ventle hole
- 3. VFD screen
- 4. Shift and Local keys
- 5. Number key and composite key
- 6. Function keys
- 7. Up, Down, Left and Right key, to move cursor
- 8. Adjusting knob

2.3 Keyboard Introduction

The keyboard is shown in the following figure; Descriptions of the key function follow the figure below.



Detailed description of keys.

Key Name	Description
[Shift]	[Shift] Composite key.
[Local]	[Local] key, To shift local and remote operation.





Key Name	Description
[0]~[9]	[0]~[9] are numeric keys.
	Dot
[Esc]	[Esc] key, To exit at any working status.
[CC]	To select constant current mode and set current input value.
[CV]	To select constant voltage mode and set voltage input value.
[CR]	To select constant resistance mode and set resistance input value.
[CW]	To select constant power mode and set constant power input value.
[Enter]	[Enter] key.
[On/Off]	To control input status of load: on/off.
$\Delta \nabla$	Up/Down key, to select menu items during menu operation.
	Left/Right key, to adjust the cursor to the specified location to set the value.

2.4 Fast Function Key

A combination of front panel keys and **[Shift]** composition keys in this series load can realize functions marked at key bottom. For details, see table below.

Keys	Name and functions
[Shift]+[1] (Short)	To start or end short circuit test.
[Shift]+[2] (Tran)	To set dynamic operation parameters.
[Shift]+[3] (List)	To set list operation function.
[Shift]+[4] (Save)	To save existing setting load parameter values, e.g., voltage, current and power.
[Shift]+[5] (Battery)	To operate battery test function.



Keys	Name and functions	
[Shift]+[6] (Prog)	To operate auto test function.	
[Shift]+[7] (Info)	To display model, version number and serial number of electronic load.	
[Shift]+[8] (System)	To set system menu.	
[Shift]+[9] (Config)	To set configuration menu.	
[Shift]+[0] (Pause)	To pause operation during automatic test.	
[Shift]+[.] (Trigger)	Trigger key, to start up triggering functions.	
[Shift]+[CC] (OCP)	To operate OCP test function.	
[Shift]+[CV] (Setup)	To set specific parameters of constant voltage, constant current, constant resistance and constant power.	
[Shift]+[CW] (OPP)	To operate OPP test function.	
[Shift]+[Enter] (Recall)	To select stored load parameter values, e.g., voltage, current and power setting values.	
[Shift]+[On/Off] (Lock)	To operate Keyboard locking function.	

2.5 Function Description of VFD Status Indicators

The VFD indicator lamps introduction of this series load is shown as follows.

Flag	Function introduction	Flag	Function introduction
OFF	The load is off.	Error	The load has error.
сс	The load is under constant current mode.	Trig	The load is waiting for triggering signal.
CV	The load is under constant voltage mode.	Sen- se	The load is under remote sense input mode.
CR	The load is under constant resistance mode.	Prot	The load is under software over- current protection status.
CW	The load is under constant power mode.	Rear	Start external analog quantity function.



Flag	Function introduction	Flag	Function introduction
Rmt	The load is under remote operation mode.	Auto	Start automatic voltage range.
Addr	Send command under remote operation.	*	Start keyboard locking function
SR- Q	Serial request query.		Shift key is pressed.

2.6 Rear Panel Introduction

• Schematic Diagram of Rear Panel of this series (4U) electronic load.



- 1. AC power input socket (including fuse)
- 2. Ground terminal
- 3. External signal control interface
- 4. RS232 communication interface
- 5. USB communication interface
- 6. LAN communication interface
- 7. GPIB communication interface
- 8. SYSTEM BUS interface
- 9. Current monitoring terminal
- 10. External analog 0-10 V control terminal
- 11. Remote sense compensation terminal and input terminal
- Schematic Diagram of Rear Panel of this series (8U) electronic load.

This series (8U) load consists of two electronic loads (4U). The electronic load (4U) with front panel is the master and the other is the slave.





- 1. AC input socket of master, has been connected to AC OUT terminals of slave.
- 2. Ground terminal
- 3. External signal control interface
- 4. RS232 communication interface
- 5. USB communication interface
- 6. LAN communication interface
- 7. GPIB communication interface
- 8. SYSTEM BUS interface
- 9. Current monitoring terminal
- 10. External analog 0-10 V control terminal
- 11. Remote sense compensation terminal and input terminal
- 12. AC input socket of slave
- 13. AC OUT terminals of slave
- 14. RS-232 communication interface, used for slave calibration
- 15. SYSTEM BUS interface of slave, has been connected to SYSTEM BUS interface of master
- 16. Analog terminal of slave, has been connected to Analog terminal of master
- 17. Input terminal of slave, has been connected to Input terminal of master



 Schematic Diagram of Rear Panel of this series (15U) electronic load is shown as below, model 27U and model 37U have the same rear panels as 15U model. Only the sizes are different.



1. Threading hole for communication interface

To use the communication interface function , please remove this panel before connecting the terminals.

2. SYSTEM BUS interface, external analog control terminal, remote sense terminal and latch button SW.



You can switch the control state of the instrument between local control and remote control by using the latch button SW. Press the latch button SW to RP state, indicates the instrument is in the remote control. Press the latch button SW again to LP state, indicates the instrument is in local control.



The latch button SW of the instrument which is in single mode must keep LP state.

- 3. Input terminal
- 4. AC power switch and AC power input terminal

2.7 Power-on Selftest

A successful selftest indicates that the purchased load product meets delivery standards and is available for normal usage. Before operation, please confirm that you have fully understood the safety instructions.

WARNING

- To avoid burning out, be sure to confirm that power voltage matches with supply voltage.
- Be sure to connect the main power socket to the power outlet of protective grounding. Do not use terminal board without protective grounding. Before operation, be sure that the electronic load is well grounded.
- To avoid burning out, pay attention to marks of positive and negative polarities before wiring.

Selftest Steps

Normal selftest procedures:

1. Correctly connect the power line. Press [Power] key to start up.

The VFD screen displays the software version number

BIOS Ver 1.10

2. After approximately 1s, the system starts conducting self-test and the VFD displays

System Selftest...

3. After the self-test, the VFD displays information, as shown in the below.

0.00V 0.00A 0.0W CC=0.00A


Information description:

- The first line displays actual input voltage and current values.
- The second line displays actual power value and setting values of current (voltage, power and resistance).
- 4. Press **[Shift]+[7]**(Info), the VFD screen displays related information of the product, as shown below.

IT84XXX-XXXX-XXX Ver:0.XX-0.XX-1.XX SN:XXXXXXXXXXXXXXXXXXXXX

5. Press Up/Down key to switch between the display of product model, software version number, and product serial number.

Error Information References

The following error information may occur when an error occurs during Power On self-test:

Error information	Error information explanation	
Eeprom Failure	EEPROM Failure	
CAL data lost	Calibration data is lost	
Factory data lost	Factory data is lost	
System data lost	System setting data is lost	

Exception handling

If the electronic load cannot start normally, please check and take measures by reference to steps below.

1. Check whether the power line is correctly connected and confirm whether the electronic load is powered.

Correct wiring of power line => 2

Incorrect wiring of power line => Re-connect the power line and check whether the exception is removed.

2. Check whether the power in On. [Power] key is under "I" On status.

Yes => 3

No => Please check the **[Power]** key to start power and check whether the exception is removed.

- 3. Check whether set power voltage of electronic load is larger than the power supply voltage.
- 4. Check whether the fuse of the instrument is burned out.



If fuse is burnt out, replace the fuse with the same type and rating. The specification is 3.15AT/250V. Refer to A.2 Fuse Replacement for detailed replacement procedures.

3 Function and Features

This chapter describes in detail the use of the front-panel keys and shows how they are used to accomplish instrument operation. This chapter is divided into the following sections:

- Switching of Local/Remote Operation Modes
- Constant-status Operation Mode
- Input Control Function
- Keyboard Locking Function
- Short-circuit Analog Function
- System Menu Function(System)
- Configuration menu function (Config)
- Triggering Function
- Dynamic Test Function
- OCP Test Function
- OPP Test Function
- Battery discharge test function
- CR-LED test function
- Measure Function
- Configuration Save Function
- VON Function
- Protective Function
- List Operation
- Terminal Function of Rear Panel
- Auto Test Function
- Parallel Function

3.1 Switching of Local/Remote Operation Modes

The electronic load is provided with local and remote operation modes. These two modes can be switched through communication commands. At initialization, the electronic load is defaulted under local operation mode.

- Local operation mode: for operating related functions through keys on the electronic load machine.
- Remote operation mode: for operating related functions of the electronic load on PC through a connection between the electronic load and PC. Under remote operation mode, except [Local]key, other keys on the board are disabled. The [Local] key can be used for switching to local operation mode.



3.2 Constant-status Operation Mode

The electronic mode can work under the 4 constant-state operation modes:

- Constant current operation mode (CC)
- Constant voltage operation mode (CV)
- Constant resistance operation mode (CR)
- Constant power operation mode (CW)

3.2.1 Constant Current Operation Mode (CC)

Under CC mode, the electronic load will consume constant current in regardless of whether the input voltage changes or not, as shown in the following figure. (Load current) | +

Setting current
→ \/(Input voltage)

V(Input voltage)

Under CC mode, the electronic load provides three ways to set constant current.

- Rotate adjusting knob to set constant current value.
- ٠ Use numeric keys to input current value and press [Enter] key to confirm set constant current value.
- Use Left/Right key moving cursor and press Up/Down key to adjust values at corresponding positions.

Operation steps

1. Press [CC] key and [Shift]+[CV](Setup) to enter parameter setting screen.

```
Constant
           Current
Range=240.00A
```

2. Set maximum working current value and press [Enter] for confirmation.

```
Constant
           Current
Range =200.00A
```

3. Set maximum voltage value and press [Enter] key.

```
Constant
           Current
High=1205.0V
```

4. Set minimum voltage value and press [Enter] key.

Constant Current



Low=0.0V

5. Set high and low rate and press [Enter] key.

Constant Current High-Rate Low-Rate

6. Set ascending slope and press [Enter] key.

Constant Current Rise up=2.0000A/mS

7. Set descending slope and press [Enter] key.

Constant Current Fall down=2.0000A/mS

8. Complete parameter setting.

V0.0	0.00A
0.OW	CC=0.00A

Note

If the above method is for editing auto test step (as mentioned below), constant current range can also be set.

3.2.2 Constant Voltage Operation Mode (CV)

Under CV mode, the electronic load will consume sufficient current to maintain the input voltage at setting voltage, as shown in the following figure.



Under CV mode, the electronic load provides three ways to modify constant voltage.

- Rotate adjusting knob to set constant voltage value.
- Use numeric keys to input voltage value and press [Enter] key to confirm set constant voltage value.
- Use Left/Right key moving cursor and press Up/Down key to adjust values at corresponding positions.

Operation Steps

1. Press [CV] key and [Shift]+[CV](Setup) to enter parameter setting screen.

Constant Voltage



Range=1200.0V

2. Set maximum working voltage value and press [Enter] for confirmation.

```
Constant Voltage
Range=1000.0V
```

3. Set maximum current value and press [Enter] key.

```
Constant Voltage
High=252.00A
```

4. Set minimum current value and press [Enter] key.

```
Constant Voltage
Low=0.00A
```

5. Set limited current value under CV mode and press [Enter] key.

Constant Voltage I-Limit=240.00A

6. Set high and low rate and press [Enter] key.

Constant Voltage High-Rate Low-Rate

7. Complete parameter setting.

0.0V	0.00A
0.OW	CV=1000.0V

```
<u></u> Mote
```

If the above method is for editing auto test step (as mentioned below), constant voltage range can also be set.

3.2.3 Constant Resistance Operation Mode (CR)

Under CR mode, the electronic load is equivalent to a constant resistance (as shown below) and will give linear change of current with input voltage change, as shown in the following figure.



Under CR mode, the electronic load provides three ways to modify constant resistance.

- Rotate adjusting knob to set constant resistance value.
- Use numeric keys to input resistance value and press [Enter] key to confirm set constant resistance value.



• Use Left/Right key moving cursor and press Up/Down key to adjust values at corresponding positions.

Operation Steps

1. Press [CR] key and [Shift]+[CV](Setup) to enter parameter setting screen.

```
Constant Resistance Range=7500.0\Omega
```

2. Set maximum working resistance value and press [Enter] for confirmation.

```
Constant Resistance Range =7000.0\Omega
```

3. Set maximum voltage value and press [Enter] key.

```
Constant Resistance
High=1205.0V
```

4. Set minimum voltage value and press [Enter] key.

Constant Resistance Low=0.0V

5. Set limited current value under CR mode and press [Enter] key.

```
Constant Resistance
I-Limit=240.00A
```

6. Complete parameter setting.

0.0V	0.00A
0.OW	CR=7000.0Ω

<u></u> ↓ ↓ Note

If the above method is for editing auto test step (as mentioned below), constant resistance range can also be set.

3.2.4 Constant Power Operation Mode (CW)

Under CW mode, the electronic load will consume a constant power, as shown below. If input voltage rises, the input current decreases and power P (= V * I) will maintain at setting power, as shown in the following figure.

(Input voltage)V



Under CW mode, the electronic load provides three ways to modify constant power.



- Rotate adjusting knob to set constant power value.
- Use numeric keys to input power value and press **[Enter]** key to confirm set constant power value.
- Use Left/Right key moving cursor and press Up/Down key to adjust values at corresponding positions.

Operation Steps

1. Press [CW] key and [Shift]+[CV](Setup) to enter parameter setting screen.

```
Constant Power
Range=6000.0W
```

2. Set maximum working power value and press [Enter] for confirmation.

```
Constant Power
Range =5000.0W
```

3. Set maximum voltage value and press [Enter] key.

```
Constant Power
High=1205.0V
```

4. Set minimum voltage value and press [Enter] key.

Constant Power Low=0.0V

5. Set limited current value under CW mode and press [Enter] key.

Constant Power I-Limit=240.00A

6. Complete parameter setting.

0.0V	0.00A
0.0W	CW=0.0W

<u></u> Note

If the above method is for editing auto test step (as mentioned below), constant power range can also be set.

3.2.5 Compound Operation Mode

This series electronic load has four compound operation modes: CV+CC, CV +CR(CR-LED), CR+CC and CW+CC. These four compound operation modes add I-Limit (limited current value) setting function under CV/CR/CW mode, which can help engineers solve the transient surge current problems, avoid to trigger the protection function and protect DUT from burning.

For example, in charging station test, the electronic load needs to rise up to 700V under CV mode. During test process, in order to stabilize electronic load



at 700V faster, the current value will suddenly increase too much due to the fast rising speed, which will cause the charging station into OCP status and stop outputting. To avoid the similar problems, we can use CV+CC mode to set a limited current value so that the internal current adjustment will be no more than the over-current protection level, which will avoid the surge current and solve the OCP problem in charging station. The common applications for the four compound operation modes are as follows.

- The CV+CC mode can be applied to the load simulation battery and test the charging station or the car charger. When the CV is working, the maximum loading current is limited.
- The CR+CC mode is commonly used in the testing of voltage limiting, current limiting characteristics, constant voltage accuracy, and constant current accuracy of on-board chargers, which prevents over-current protection of on-board chargers.
- The CW+CC mode is often used to UPS battery test, simulate the current change when the battery voltage is decaying. It can also be used to simulate the characteristics of the inputs of DC-DC converters and inverters.

The operation procedures for CV+CC compound mode is shown as follows. CR +CC and CW+CC compound modes are the same.

1. Press **[CV]** key to switch into CV mode. Press numeric keys to set the constant voltage value.

0.0V	0.00A
0.0W	CV=1000.0V

2. Press the [Shift]+[CV] (Setup) keys to enter the parameter setting page.

```
Constant Voltage
Range=1200.0V
```

3. Set the maximum working voltage value, and enter the [Enter] key.

```
Constant Voltage
Range=1000.0V
```

4. Press up and down keys to select "I-Limit=240.00A". Set the limited current value under CV mode and press **[Enter]** to confirm.

```
Constant Voltage
I-Limit=240.00A
```

5. Press **[Esc]** to exit setting.

3.3 Input Control Function

Control input switch of the electronic load by pressing **[On/Off]** key on the front board. If **[On/Off]** lamp is on, the input is on; and if **[On/Off]** lamp is off, the input is off. When the electronic load input is on, the VFD status indicator "OFF" is unlit.



3.4 Keyboard Locking Function

Press the composite key **[Shift]+[On/Off]**(Lock) to lock the instrument board key, and the VFD displays *. Under this function statuses, except **[On/Off]** key and **[Shift]+[On/Off]**(Lock), other keys are disabled. Press this composite key to cancel locking.

3.5 Short-circuit Analog Function

The electronic load can analog a short circuit. On the front panel, press **[Shift]+[1]** to switch to the short circuit mode. The short circuit mode does not influence the existing settings. When the short-circuit analog is turned off, the instrument returns to the previous setting status.

In the short circuit mode, the current value is determined by the operation mode and the current range. Under CC, CW and CR modes, maximum short-circuit current is 110% of the current range. Under CV mode, short-circuit current equals to current when constant voltage is 0 V.

3.6 System Menu Function(System)

Initialize	INITIALIZE SYSTEM?		
		NO	Keep existing configurations.
		YES	Recover all configurations to factory set values.
Power-On	POWER ON		
		Rst(Def)	Set the input status of load at powering on as "status as delivered".
		Sav0	Set the input status of load at powering on as SAVE 0 value.
Buzzer	BUZZER ST	ATE	Set the buzzer status.
		Off	Set the buzzer as OFF status.
		On(default)	Set the buzzer as ON status.
Knob	LOAD ON KI	NOB MODE	Set the pulse knob.
		Update(default)	Real-time update.
		Old	No update (Recover to original value at ON/OFF).

Press [Shift]+[8](System) to enter system menu setting.



Trigger	TRIGGER SOURCE		Set triggering mode.		
		Manual(Def)	Manual trigger.		
		External	External signal trigger mode.		
		Hold	Trig:IMM valid.		
		Bus	GPIB bus trigger mode.		
		Timer	Timer trigger mode.		
			Timer=1.00S		
Memory	MEMORY		Work with Recall button to recall 100 sets saved parameters.		
		Group= (0-9)	0: represents 1-10 sets; 1: represents: 11-20 sets, by parity of reasoning.		
Displ	DISPLAY ON	NTIMER	Screen displays loading time.		
		Off(default)	Stop function.		
		On	Start function.		
Communciation	COMMUNIC	ATION	Select the interface for communication with a computer.		
		RS232	Select the RS232 communication interface.		
			Set baud rate: 4800/9600/19200/38400 /57600/115200		
			Set data bit: 8		
			Set parity check bit: N		
			Set stop bit: 1		
			Set handshake protocol: NONE		
		USBTMC	Select the USB communication interface.		
		GPIB	Select the GPIB communication interface, Address(0-31)		
		LAN	Select the LAN communication interface.		
			Gateway= 192.168.0.1		
			IP= 192.168.0.125		
			Mask= 255.255.255.0		
			Socket Port= 30000		
Parallel	PARALLEL		Parallel mode set up.		
	Single		Single mode.		
	Slave		Act as a slave mode.		
	Master		Act as a master mode.		



	Total = 3	Set	total	number	of	instruments	in
		para	llel.				

3.6.1 Restored to Factory Setting(Initialize)

This option is used to restore all settings in the system menu to factory setting values.

- 1. Press the composite key **[Shift]+[8]**(System) to enter system menu setting screen.
- 2. Operate Left/Right key and move to the Initialize and press [Enter] key.
- 3. Select "YES" and Press **[Enter]** to restore to factory setting values. In this case, all set values in the system will be restored to factory setting values, i. e., the (Def) mark values.

3.6.2 Power On Parameter(Power-On)

This parameter determines the state of electronic load after power up. If you select "Rst", the default input parameter settings will be active after power up. If you select "Sav 0", then the electronic load will automatically recall the input parameters setting saved in 0 register.

3.6.3 Key Sound Set(Buzzer)

This item can set the buzzer state. On option indicates that when you push buttons, the buzzer will sound. Off option indicates that the buzzer function is disabled. Factory default is On option.

- 1. Press the composite key [Shift]+[8](System) to enter system menu setting screen.
- 2. Operate Left/Right key and move to the Buzzer and press [Enter] key.
- 3. Select On or Off to change the buzzer status.

3.6.4 Rotary Knob Set(Knob)

This item is used to set rotary knob state. In Update mode, you can use this rotary knob to set the input value . Rotate the knob clockwise to increase the set value and anticlockwise to decrease the set value. In Old mode, this knob can't be used. Factory default is Update option.

- 1. Press the composite key [Shift]+[8](System) to enter system menu setting screen.
- 2. Operate Left/Right key and move to the Knob and press [Enter] key.



3. Select Update or Old to change the knob setting.

3.6.5 Trigge Mode(Trigger)

Triggering function is necessary to operate dynamic pulse output and list output. There are five kinds of trigger options: Manual, External, Hold, Bus and Timer

- 1. Press the composite key **[Shift]+[8]**(System) to enter system menu setting screen.
- 2. Operate Left/Right key and move to the Trigger and press [Enter] key.
- 3. Press Left/Right key to select trigger method and press **[Enter]** to complete setting.
 - Manual (Def): manual trigger
 - External: external signal trigger
 - Hold: special command trigger
 - Bus: BUS command trigger
 - Timer: timer trigger

3.6.6 Set Memory Group(Memory>Group)

The electronic load can save some commonly-used parameters in 100-group NVM for convenient and fast usage. The **[Shift]+[4]**(Save) keys can be used for saving parameters. The **[Shift]+[Enter]**(Recall) key is for quick invoking.

When you want to recall the data saved in the memory, you should set memory group in the system menu first. Group 0 means you can recall data saved in 0 to 10 groups. Group 1 means you can recall data saved in 11 to 20 groups. Group2 to Group 9 can be concluded in the same manner. The operation procedures for setting Group number is shown as follows.

- 1. Press the composite key [Shift]+[8](System) to enter system menu setting screen.
- 2. Operate Left/Right key and move to the Memory and press [Enter] key.
- 3. Press numeric keys to set Group number.

3.6.7 Loading Time Display Set(Displ)

This menu item can set if the main screen displays the loading time or not. If On is selected, the main screen displays the loading time. If Off is selected, the loading time will not be displayed. Factory default is Off option.

1. Press the composite key [Shift]+[8](System) to enter system menu setting screen.



- 2. Operate Left/Right key and move to the Dspl and press [Enter] key.
- 3. Operate Left/Right key and move to the On and press **[Enter]** key. The screen will display the loading time.

3.6.8 Communication Set

Under this item, you can set the specific communication mode. This unit has provided multiple communication interfaces: RS232/USB/GPIB/LAN. You can choose any one of them to communicate.

- 1. Press [Shift]+[8](System) to enter system menu setting.
- 2. Press Left/Right key to select "Communication". Press [Enter] key.
- 3. Press left or right keys to select communication interface: RS-232/USBTMC/ GPIB/LAN.

Please ensure the configuration consistency between our instrument and PC, so that you could have a successful communication.

- To select RS232 communication mode, you need to configure the baud rate 4800/9600/19200/38400/57600/115200, data bit 8 bits, parity bit N and stop bit 1 bit.
- To select the GPIB communication method, you need to configure the address. The address setting range is 0-31.
- To select the LAN communication method, you need to configure the gateway address, IP address, mask address and socket port.

3.7 Configuration menu function (Config)

Von	VOLTAGE ON	Set the load's von point		
	Living	Von point living state, ON /OFF		
		Point= 0.00V	Set the Von value.	
	Latch	Von point latch state, ON /OFF		
		Point= 0.00V Set the Von value.		
Protect	PROTECT MENU			
	Max-P	Set hardware power protection.		
		MAX POWER		
		Point=2000.0W Set hardware protect power value.		
	I-Limit	Set software current protection.		
		CURRENT LIMIT		

Press [Shift]+[9](Config) to enter menu configuration.



Function and Features

	Off			Stop function.		
		On		Start function.		
			Point=240.00A	Set software current protective value.		
			Delay= 3S	Set software current protective delay.		
	P-Limit	Set software power protection.				
		POWER LIMIT				
			Point=2000.0W	Set software power protective value.		
			Delay= 3S	Set software power protective delay.		
	Timer	Set LOA	D ON timer.			
		ON-TIME	ER			
		Off		Stop function.		
		On		Start function.		
			ON-TIMER			
			Delay=10.00S	Set LOAD ON timer value.		
	OSC	Set current oscillation protect Off On		ction		
				Stop function.		
				Start function.		
Measure	MEASURE MENU					
	V-Range	Auto swit	ch function of volta	ge range.		
		VOLTAG	E AUTO RANGE			
		On		Start auto voltage range.		
		Off		Stop auto voltage range.		
	Time V	Measure	voltage rise/fall tim	ne.		
		TIMER V	OLTAGE FUNC			
		Low		Set low voltage value.		
			Point1=0.00V			
		High		Set high voltage value.		
			Point2=1200.0V			
	Time C	Measure current rise/fall tim		е.		
		TIMER C	URRENT FUNC			
		Low		Set low current value.		
			Point1=0.000A			



Function and Features

		High		Set high current value.
			Point2=100.00A	
	Filter	Smoothir	ng function.	
		Average	Count=2^(2~16)	Set of average count.
CR-LED	CR LED MODE	Analog L	ED lamp function (under CR mode).
	On	Start CR-	-LED function.	
	Off	Stop CR-	LED function.	
Remote- Sense	REMOTE SENSE STATE	Remote sense compensation measurement.		
	Off	Stop remote sense compensation function.		
	On	Start remote sense compensation function.		
Ext-Program	EXTNAL PROGRAM	External analog quantity function.		
	Off	Stop external 0-10 V analog quantity control function.		quantity control function.
	On	Start external 0-10 V analog quantity control function.		
Enhance Power	Enhance Power	Transient over power loading capability		g capability
	Off	Stop fund	ction.	
	On	Start function.		

3.7.1 On-Timer Set(Protect>Time)

This menu item can set the load-on timer for the electronic load. When On is selected, turn the input on, and then the electronic load will automatically turn the input off until the setting time runs out. When Off is selected, the load-on timer function is off.

- 1. Press [Shift]+[9](Config) to enter configuration menu(Config Menu).
- 2. Press Left/Right key to select "Protect". Press [Enter] key.
- 3. Press Left/Right key to select "Timer". Press [Enter] key.
- 4. Press Left/Right key to select "On". Press [Enter] key.
- 5. Set value of load-on timer (i.e. "Delay"), and press [Enter] to confirm.

3.7.2 Auto-Switching Voltage Range Set(Measure>V-Range)

This menu item is used to set the voltage range to auto-switch. When On is selected, the instrument will automatically switch to high range or low range. When Off is selected, the auto-switching voltage range function is disabled.



- 1. Press [Shift]+[9](Config) to enter configuration menu(Config Menu).
- 2. Press Left/Right key to select "Measure". Press [Enter] key.
- 3. Press Left/Right key to select "V-Range". Press [Enter] key.
- 4. Press Left/Right key to select "On". Press [Enter] key.

3.7.3 Setting Filter(Measure>Filter)

This option sets the display filter frequency of the load. The filter function of this series of load is averaging calculation.

- 1. Press [Shift]+[9](Config) to enter configuration menu(Config Menu).
- 2. Press Left/Right key to select "Measure". Press [Enter] key.
- 3. Press Left/Right key to select "Filter". Press [Enter] key.
- 4. Set the filter frequency value (i.e. "Average Count"), and press **[Enter]** to confirm.

3.7.4 Set transient over power loading capability(Enhance Power)

This option is used to set transient over-power loading capability. Selecting On means turning the transient over-power loading capability function on. Selecting Off represents that the function is disabled.

Transient over power loading capability, it will make This series load to take 1.1 to 2 times the rated power loading capability in short time, users don't need to select types as maximum power value, it can extremely save cost. This function can be widely applied into the DUT transient peak power supply ability.

To ensure that the transient over-power loading capability function can work normally, please obey the following precautions.

WARNING

- When the loading power is over 1.1 times the rated power, the loading time must be limited within 3 seconds.
- The transient over-power loading capability function only works once, i.e., you need to reset this function in the configuration menu after turning the input on and off.
- The interval between the two over-power loading running must be up to 60 seconds.
- When the loading power is over 1.1 times the rated power, the fan runs at full power.



Refer to the following procedures to turn the transient over-power loading capability function on.

- 1. Press [Shift]+[9](Config) to enter menu configuration(Config Menu).
- 2. Press Left/Right key to select "Enhance-Power". Press [Enter] key.
- 3. Press Left/Right key to select "On". Press [Enter] key.

3.8 Triggering Function

Triggering function is necessary to operate dynamic pulse output and list output. There are five triggering methods to trigger the tested instrument. Optional triggering sources of triggering function of electronic load comprise:

- Key trigger: when key trigger is valid, press [Shift]+[.] (Trigger) key and the load will trigger an operation.
- External trigger signal (TTL): Trig on the rear board is the triggering input terminal. When external trigger signal method is effective, after applying a low pulse (>10 us), the load will trigger an operation.
- Bus trigger: when the bus trigger is valid, after the load receives a trigger command (GET or * TRG), the load will trigger an operation.
- Timing trigger: when the timing trigger is valid, the load will automatically trigger an operation at intervals.
- Trigger holding: when trigger holding is valid, only when the load receives trigger command (TRIG:IMM), the load will trigger an operation.

Select the triggering sources as follows:

1. Press [Shift]+[8](System) to enter system menu setting screen. SYSTEM MENU

Initialize Power-On Buzzer

2. Press Left/Right key to move to the Trigger and press **[Enter]** to enter triggering source selection screen.

TRIGGER SOURCE Manual(Def) External Hold

3. Press Left/Right key to select trigger method and press **[Enter]** to complete setting.

Manual (Def): manual trigger

External: external signal trigger

Hold: special command trigger

Bus: BUS command trigger

Timer: timer trigger

4. Press **[Esc]** to exit setting. The system displays original values under different modes.



3.9 Dynamic Test Function

Through dynamic test operation, the electronic load can be switched between two setting parameters based on setting rules. This function can be used to test dynamic performances of power supply. For dynamic test operation, press **[Shift] +[2]** (Tran) key on the front board to enter the dynamic test menu. Before test, firstly, set parameters related to dynamic test operation, including dynamic test mode, A value, B value, pulse width time, frequency, duty ratio, etc. Under CC mode, current ascending and descending slopes should be set for dynamic test.

The dynamic test mode can be divided into continuous mode, pulse mode and toggle mode.

3.9.1 Continuous Mode

Under continuous mode, after enabling dynamic test operation, the load will be switched continuously between A value and B value. The following picture shows the current waveform in continuous transient operation.



Taking CC mode as example (operations under other modes are similar), when output voltage and current of the tested instrument are 10 V and 3 A respectively, the load current will switch from 1 A and 2 A. Set the dynamic test parameters and perform the test as follows.

- 1. Press [CC] key to switch the load mode into CC mode.
- 2. Press [Shift]+[2](Tran) keys. Operate Left/Right key and move to On. Press [Enter] key (The Trig lamp that indicates VFD screen status is on).

TRANSITION

On Off

3. Operate Left/Right key and select Continuous. Press **[Enter]** for confirmation.



CONTINUOUS

Continuous Pulse Toggle

4. Operate Left/Right key and select high rate or low rate. Move to the High-Rate and press **[Enter]** key.

```
TRANSITION
High-Rate Low-Rate
```

5. Set ascending slope and press [Enter] key.

```
TRANSITION
Rise up=2.0000A/uS
```

6. Set descending slope and press [Enter] key.

```
TRANSITION Fall Down=2.0000A/uS
```

7. Set A value and press [Enter] key.

```
TRANSITION
Level A=1.00A
```

8. Set B value and press [Enter] key.

```
TRANSITION
Level B=2.00A
```

9. Set frequency value and press [Enter] key.

```
TRANSITION
Frequency=50.00HZ
```

10. Set duty ratio and press [Enter] key.

```
TRANSITION
Duty=50.00%(0.01%-99.99%)
```

11. Start dynamic test and operate Left/Right key. Move to On and press [Enter] key.

TRANSITION On Off

12. Enter the dynamic test mode.

0.00V	0.00A
0.OW	0 TRAN

13. Press [On/Off] key to open input and press [Shift]+[.](Trigger).

The load will continuously switch between A and B value. Time of operations is shown at bottom right.



After the running count is up to 65535, it goes to zero and re-count, which doesn't affect the normal running of dynamic test.



14. Press **[CC]/[CV]/[CR]/[CW]** key or any composite function key to exit dynamic test function. Repeat Steps 1-13 to continue parameter setting and operation of dynamic test.

3.9.2 Pulse Mode

Under pulse mode, after enabling dynamic test operation, the load will switch to A value after receiving of a trigger signal. Then the load will switch back to B value and be constant at B value after maintaining A for pulse width time. The following picture shows the current waveform in pulse transient operation.



Taking CC mode as example (operations under other modes are similar), when output voltage and current of the tested instrument are 10 V and 3 A respectively, the load current will switch from 1 A and 2 A. Set the dynamic test parameters and perform the test as follows.

- 1. Press [CC] key to switch the load mode into CC mode.
- 2. Press [Shift]+[2](Tran) keys. Operate Left/Right key and move to On. Press [Enter] key (The Trig lamp that indicates VFD screen status is on).

TRANSITION On Off

3. Operate Left/Right key and select Pulse. Press [Enter] for confirmation.

TRANSITION Continuous Pulse Toggle

4. Operate Left/Right key and select high rate or low rate. Move to the High-Rate and press **[Enter]** key.

TRANSITION High-Rate Low-Rate

5. Set ascending slope and press [Enter] key.

TRANSITION Rise up=2.0000A/uS

6. Set descending slope and press [Enter] key.



TRANSITION Fall Down=2.0000A/uS

7. Set A value and press [Enter] key.

```
TRANSITION
Level A=1.00A
```

8. Set B value and press [Enter] key.

```
TRANSITION
Level B=2.00A
```

9. Set time width and press [Enter] key.

```
TRANSITION
Pulse Width=5.00000S
```

10. Start dynamic test and operate Left/Right key. Move to On and press **[Enter]** key.

TRANSITION On Off

11. Enter the dynamic test mode.

0.00V 0.00A 0.0W 0 TRAN

12. Press [On/Off] key to open input and press [Shift]+[.](Trigger) key.

The load will switch after receipt of every trigger signal. The load will continuously switch between A and B value. Time of operations is shown at bottom right.

 Press [CC]/[CV]/[CR]/[CW] key or any composite function key to exit dynamic test function.



Repeat Steps 1-12 to continue parameter setting and operation of dynamic test.

3.9.3 Toggle Mode

Under toggle mode with dynamic test function enabled, the load switches between A value and B value upon receiving a trigger signal, as shown in the following figure. The following picture shows the current waveform in toggle transient operation.





Taking CC mode as example (operations under other modes are similar), when output voltage and current of the tested instrument are 10 V and 3 A respectively, the load current will switch from 1 A and 2 A. Set the dynamic test parameters and perform the test as follows.

- 1. Press **[CC]** key to switch the load mode into CC mode.
- 2. Press [Shift]+[2](Tran) keys. Operate Left/Right key and move to On. Press [Enter] key (The Trig lamp that indicates VFD screen status is on).

```
TRANSITION
On Off
```

3. Operate Left/Right key and select Toggle. Press [Enter] for confirmation.

TRANSITION Continuous Pulse Toggle

4. Operate Left/Right key and select high rate or low rate. Move to the High-Rate and press **[Enter]** key.

```
TRANSITION
High-Rate Low-Rate
```

5. Set ascending slope and press [Enter] key.

```
TRANSITION
Rise up=2.0000A/uS
```

6. Set descending slope and press [Enter] key.

```
TRANSITION
Fall Down=2.0000A/uS
```

7. Set A value and press [Enter] key.

```
TRANSITION
Level A=1.00A
```

8. Set B value and press [Enter] key.

```
TRANSITION
Level B=2.00A
```

9. Start dynamic test and operate key. Move to on and press [Enter] key.



TRANSITION On Off

10. Enter the dynamic test mode.

0.00V	0.00A
0.OW	0 TRAN

11. Press [On/Off] key to open input and press [Shift]+[.](Trigger) key.

The load will switch after receipt of every trigger signal. The load will switch between A and B value for one time. Time of operations is shown at bottom right.

12. Press [CC]/[CV]/[CR]/[CW] key or any composite function key to exit dynamic test function.



Repeat Steps 1-11 to continue parameter setting and operation of dynamic test.

3.10 OCP Test Function

This series electronic load is provided with over-current protection test function (OCP Test). Under OCP test mode, when input voltage reached Von value, delay for a while for the electronic load to latch. Ascend value by step value at regular interval. At the same time, check the load input voltage and judge whether it is higher than standard voltage value. If higher, it indicates that OCP does not occur. Repeat current stepping operation till the load operates to the cutoff current; if lower, it indicates that OCP does occur. Check whether the existing current value is within target scope again. If yes, PASS the test.

Operating steps:

1. Press [Shift]+[CC](OCP) keys to enter OCP test function setting screen.

	Run	OCP TEST			
OCP TEST		Operate OCP test documents.		documents.	
	Recall	OCP TEST			
		Recall OCP File=1	Recall OCP test documents (1-5).		
	Edit	OCP TEST			
		1 : Voltage on level=0.00V		Set Von voltage value.	
		2 : Voltage on Delay=0.00S		Set Von voltage delay time.	
		3 : Current Range=0.000A		Set working current range.	
		4 : Start Current=0.000A		Set initial current value.	
		5 : Step Current=0.000A		Set step current value.	



Function and Features

		6:Step Delay=0.00S	Set step delay time.	
		7 : End Current=0.000A	Set cutoff current value.	
		8 : OCP Voltage=0.000V	Set OCP value.	
		9:Max Trip Current=0.000A	Set overcurrent range (maximum value).	
		10:Min Trip Current=0.000A	Set overcurrent range (minimum value).	
		Save OCP File=1(1-5)	Save OCP test documents.	

2. Press [Shift]+[.](Trigger) key to start OCP test. If within range, pass the test and the board will display as follows:

9.97V		0	.005A
0.010W	5.100A	Pass	Stop

If not, there is FAULT and the board will display as follows:

9.97V		0.005A
0.010W	5.100A	Fault Stop

3. End test. Press [Esc] to return to setting screen. Press [Esc] again to exit.

3.11 OPP Test Function

This series electronic load is provided with overpower protection test function (OPP Test). Under OPP test mode, when input voltage reached Von value, delay for a while for the electronic load to latch. Ascend value by step value at regular interval. At the same time, check the load input voltage and judge whether it is higher than standard voltage value. If higher, it indicates that OPP does not occur. Repeat power stepping operation till the load operates to the cutoff power; if lower, it indicates that OPP does occur. Check whether the existing power value is within target scope again. If yes, PASS the test.

Operating steps:

1. Press **[Shift]+[CW]**(OPP) keys to enter OPP test function setting screen:

	Run	OPP TEST			
OPP TEST			Operate OPP test documents.		
	Recall	OPP TEST			
		Recall OPP File=1	Recall OPP test documents (1-5).		
	Edit	OPP TEST			
		1 : Voltage on level=0.00V		Set Von voltage value.	
		2 : Voltage on Delay=0.00S		Set Von voltage delay time.	



Function and Features

	3 : Current Range=0.000A	Set current range.
	4 : Start Power=0.00W	Set initial power value.
	5 : Step Power=0.00W	Set step power value.
	6 : Step Delay=0.00S	Set step delay time.
	7 : End Power=0.00W	Set cutoff power value.
	8 : OPP Voltage=0.000V	Set OPP value.
	9:Max Trip Power =0.00W	Set overpower range (maximum value).
	10 : Min Trip Power =0.00W	Set overpower range (minimum value).
	Save OPP File=1(1-5)	Save OPP test documents.

2. Press [Shift]+[.](Trigger) key to start OPP test. If within range, pass the test and the board will display as follows:

9.97V		0	.007A		
0.010W	49.1W	Pass	Stop		
If not, there	is FAUL	T and t	he board will	display as	s follows:

9.99V	0.007A	
0.01W	48.6W Fault Stop	

3. End test. Press [ESC] to return to setting screen. Press [ESC] again to exit.

3.12 Battery discharge test function

In this series electronic load, constant current mode is applied for discharge test with programmatic setting of stop voltage/capacity/discharging time. If stop voltage is set as the stop condition, the system determines whether the battery is about to reach the set threshold value or unsafe status when the battery voltage is low, and if yes, an automatic stop will be activated. During test, the operator can observe voltage, discharging time and discharged capacity of battery. Battery discharge test is a necessary step before battery replacement for it can reflect reliability and remaining life of battery.



WARNING

When a switch device is used to directly connect the DUT and the electronic load, a voltage overshoot higher than the original setting will be generated when the switch device is closed, which will damage the electronic load. In order to avoid damaging the load, it is recommended that you purchase an IT-E165A module to prevent overshoot voltage from being applied to the load at the moment when the switchgear is closed. Please refer to Connect the IT-E165A for connection method.

- 1. Press **[On/Off]** key to cut off load input status. Connect the battery to be tested.
- 2. Press **[CC]** key to switch the load mode into CC mode.
- 3. Press [Shift]+[5](Battery) keys to enter battery discharge function menu.
- 4. Set stop voltage and press [Enter] key.

Stop Voltage=0.0V

When the battery voltage drops to stop voltage, the load input status will automatically be Off.

5. Set battery stop capacity and press [Enter] key.

Stop Capacity=0.000Ah

When set battery capacity is reached, the load input status will automatically be Off.

6. Set discharge time and press [Enter] key.

Stop Timer=99999S

When the set stop time is reached, the load input status will automatically be Off.

7. Press **[Shift]+[.]**(Trigger) key to start test. The board will display discharge voltage, current discharge time and discharged capacity (Ah).

0.01V		0.00A
0.00W	0 S	0.000Ah

8. Press [Esc] key to exit battery capacity test mode.

3.13 CR-LED test function

With adding of diode break-over voltage setting in this series electronic load under conventional CR mode, the electronic load only works when voltage applied at its both ends is higher than the diode break-over voltage to give a real simulation of diode working principle, i.e., the ripple current at real LED test.

The I-V curve of LED is as shown below. Under conventional CR mode, the electronic load only simulates the static working point of diode as shown in the red circle of the following figure. It is unable to verify the dynamic characteristics



of LED under normal working conditions, and the status of accurate ripple current.



The definitions of parameters shown in the above figure are as follows:

- Vo: constant working voltage of load LED of LED constant current source;
- I_o: output current of LED constant current source;
- V_d: break-over voltage of diode (string);
- R: constant resistance.

Setting CR-LED Mode

Example: LED driver specification

The output current is 200mA and the range of output voltage is from 45V to 62V.

- 1. Start CR-LED function.
 - a. Press [Shift]+[9](Config) keys to enter configuration menu.
 - b. Press Right Key and select "CR-LED". Press **[Enter]** key for entry. Select "on" and press **[Enter]** key.
 - c. Press [Esc] key to exit.
- 2. Set CR mode and Vd value.

For example, the output voltage of LED driver is 50V, verify that whether the output current of LED is rated current 200mA.

- a. Press [CR] key and set corresponding constant resistance. (Set CR= 50Ω)
- b. Press [Shift]+[CV](Setup)keys for a series of related setting:

```
range=7500.0
high=130V
low=0V
```



which may remain the original values. Vd will be set based on the calculation below. (Set Vd=40V)

- c. Press the [Enter] key to save the settings.
- 3. Press [On/Off] key to turn on load input.

Calculation method of Vd and R

Definition:

- V: constant working voltage of load LED of LED constant current source;
- I: output current of LED constant current source;
- Vd: break-over voltage of diode (string);
- R: constant resistance.

V-I curve of LED is as shown below.



According to four parameters above and the V-I curve of LED, you can calculate the value of R and $V_{d}\,.$

$$R = \frac{V_2 - V_1}{I_2 - I_1}$$
$$V_3 = V_0 - (I_0 \times R)$$

Note

The value of V_2 , V_1 , I_2 and I_1 should be close to the static working point of LED as shown in the red circle above.

Or you can calculate the value of R and Vd by the following method.

Vd=V*0.8

R=0.2V/I

In the example:

Vd=50V*0.8=40V R=(0.2*50V)/0.2A=50Ω



3.14 Measure Function

This series load provide measure function, mainly used for measuring the rising and falling time of voltage or current within a specified range.

Operation methods

1. Connect the instruments.

Connect DC power to be tested to the input terminal of the electronic load.

- 2. Set the output parameters of the power supply.
 - a. The power is set with a value that is higher than the set high voltage/ current value.
 - b. Keep power output in Off status.
- 3. Set the low and high voltage/current comparison points' value for electronic load.
 - a. Press **[Shift]+ [9]**(Config) keys to enter configuration menu. Press Right key. Select "Measure" and press **[Enter]** key.
 - b. Press Left/Right to select "Time V". Press [Enter] key.
 - c. Press Left/Right key to select "Low". Press **[Enter]** key. Press numeric keys to set low voltage value and press **[Enter]** key.
 - d. Press Left/Right key to select "High". Press **[Enter]** key. Press numeric keys to set high voltage value and press **[Enter]** key.
 - e. Press [Esc] key to exit the voltage comparison points setting menu.
 - f. Press Left/Right to select "Time C". Press [Enter] key.
 - g. Press Left/Right key to select "Low". Press **[Enter]** key. Press numeric keys to set low current value and press **[Enter]** key.
 - h. Press Left/Right key to select "High". Press **[Enter]** key. Press numeric keys to set high current value and press **[Enter]** key.
 - i. Press [Esc] to exit setting.
- 4. Open the load input.
- 5. Open power output.
- 6. Use the following commands to read the voltage rising time, current rising time, voltage positive pulse time and current positive pulse time, when the power supply output is stable.

SENSe:TIME:VOLTage:UP?

SENSe:TIME:CURRent:UP?

SENSe:VOLTage:POSitive:PULSe?

SENSe:CURRent:POSitive:PULSe?

- 7. Close the power output.
- 8. Use the following commands to read the voltage falling time, current falling time, voltage negative pulse time and current negative pulse time, when the power supply output is stable.



SENSe:TIME:VOLTage:DOWN? SENSe:TIME:CURRent:DOWN? SENSe:VOLTage:NEGative:PULSe? SENSe:CURRent:NEGative:PULSe?

3.15 Configuration Save Function

The electronic load can save some commonly-used parameters in 100-group NVM for convenient and fast usage. The **[Shift]+[4]**(Save) keys can be used for saving parameters. The **[Shift]+[Enter]**(Recall) key is for quick invoking.

The parameters to be saved includes :

- Operation modes for the electronic load (CC/CV/CR/CW);
- The setting parameters under the four constant-status operation modes;
- The setting parameters in the configuration menu.

Memory Function

When you want to recall the data saved in the memory, you should set memory group in the system menu first. Group 0 means you can recall data saved in 0 to 10 groups. Group 1 means you can recall data saved in 11 to 20 groups. Group 2 to Group 9 can be concluded in the same manner.

Save Operation

If the operator needs to save configured parameter values for direct recall in follow-up operation, refer to the steps below:

E.g., power supply 6V and 3A. The electronic load works under constant current (CC) 1A. Save "CC 1A" in register 39 for recall.

1. Set the parameters ok (CC 1A), and press [Enter].

```
5.89V 0.99A
5.89W CC= 1.00A
```

2. Press [Shift]+[4](Save) to save the instrument's settings to a register.

5.89V 0.99A 5.89W Save: <u>1</u>

3. Enter number **[3]** and **[9]**, indicates the settings is saved in the 9th register in Group3.

```
5.89V 0.99A
5.89W Save: 3<u>9</u>
```

4. Press [Enter] key.



5.89V		0.99A
5.89W	CC=	1.00A

Recall Operation

- 1. Set the memory group number. If the group number has been set to 3 already, you can skip this step.
 - a. Press the composite key **[Shift]+[8]**(System) to enter system menu setting screen.
 - b. Operate Left/Right key and move to the Memory and press [Enter] key.
 - c. Set the value of Group to [3], the interface displayed as follows.

```
MEMORY
GROUP=<u>3</u>
```

- d. Press[Enter] to confirm the setting.
- e. Press [Esc] to return to home screen.

5.89V 0.00A 0.00W CC= 0.00A

2. Press [Shift]+[Enter](Recall) to execute the data recalling operation.

5.89V 0.00A 0.00W Recall: 1

3. Enter number **[9]**, indicates the data saved in the 9th register in Group3 is recalled.

5.89V 0.00A 0.00W Recall: <u>9</u>

4. Press [Enter] to confirm and recall the stored data.

5.89V 0.99A 5.89W CC=1.000A

3.16 VON Function

When testing some power products with slow voltage rise speed, if the electronic load input is opened before power, the power may latch protection. In this way, the user may set VON value. The electronic load only latches when power voltage is higher than this value.

Press **[Shift] + [9]**(Config) keys to enter configuration menu. Set voltage value in Voltage on under configuration menu to control On/Off status of electronic load. Based on Von value load and unload, the load has two modes: Living and Latch. When Living is selected, it indicates that the work load point is in living status; when Latch is selected, it indicates that the work load point is in latch load status.



Note

Please confirm whether it is necessary to set loading voltage, a step that provides convenience for limiting working voltage value. If not necessary, do not set the loading voltage without authorization to prevent unnecessary trouble from failure of loading.

If the instrument cannot load, please firstly check whether the VON function is set. If yes, reset the Von value to minimum value (which may be directly set as 0. If minimum voltage value of instrument is not 0, press 0 for confirmation and the menu will automatically set the value as minimum value).

 When VON LIVING function is started, the load starts load test only when the power voltage rises and is higher than Von Point loading voltage. When the power voltage drops and is lower than Von Point unloading voltage, the load will not unload.



Load working range when VON LIVING is started

• When VON LATCH function is started, the load starts load test only when the power voltage rises and is higher than Von Point loading voltage. When the power voltage drops and is lower than Von Point unloading voltage, the load will not unload.





Load working range when VON LATCH is started

3.17 Protective Function

The load is provided with following protective functions: overvoltage protection (OVP), overcurrent protection (OCP), overpower protection (OPP), overtemperature protection (OTP) and current oscillation protection(OSC).

3.17.1 Overvoltage Protection (OVP)

- Overvoltage protection: The load will be immediately Off and the buzzer will sound if the overvoltage circuit is triggered. OV and VF bits of the status register will be set and OVP will be displayed on the screen of the load till resetting.
- Clear overvoltage protection status: Inspect whether voltage of object under test is within load rated voltage or set protection voltage range. If not, disconnect the object. Press any key on load front board (or send command PROTection:CLEar), the load front board (OVP) word will get cleared and the load will exit OVP protection status.



3.17.2 Overcurrent Protection (OCP)

The electronic load is provided with two kinds of overcurrent protections: hardware overcurrent protection and software overcurrent protection.

- Hardware overcurrent protection: maximum load current of the electronic load is limited within about 110% of the existing current range by hardware. When the hardware triggers overcurrent protection, OC bit of the status register will be set; when such protection is removed, the OC bit will be reset. The On/Off status of load will not be changed by the hardware overcurrent protection.
- Software overcurrent protection: When software overcurrent protection function is on, if the loading current value exceeds delay of such overcurrent protection set value, the load will automatically be Off and the VFD will display **Over current** ! . At the same time, OC and PS bits of the status register will be set and keep till reset.

Set the OCP current value as follows:

- 1. Press the composite key **[Shift]+[9]**(Config) to enter configuration menu setting screen.
- 2. Press Left/Right key to move to the Protect and press [Enter].
- 3. Press Left/Right key to move to the I-Limit and press [Enter].
- 4. Press Left/Right key to move to the On and press [Enter].
- 5. Press numeric keys and set the OCP Point, press **[Enter]** to confirm.
- 6. Press numeric keys and set the Delay time, press [Enter] to confirm.
- 7. Press **[Esc]** to exit setting.
- Clear overcurrent protection status:Inspect whether current of object under test is within load rated current or set protection current range. If not, disconnect the object. Press any key on load front board (or send command PROTection:CLEar), the load front board (OCP) word will get cleared and the load will exit OCP protection status.

3.17.3 Overpower Protection (OPP)

The electronic load is provided with two kinds of overpower protections: hardware overpower protection and software overpower protection.

 Hardware overpower protection: the user can set load hardware overpower protection. Load overpower will be limited to existing power value. The On/Off status of load will not be changed by the hardware overpower protection.

Set the Max-P Point as follows:

- 1. Press the composite key **[Shift]+[9]**(Config) to enter configuration menu setting screen.
- 2. Press Left/Right key to move to the Protect and press [Enter].
- 3. Press Left/Right key to move to the Max-P and press [Enter].
- 4. Press numeric keys and set the Max-P Point, press [Enter] to confirm.



- 5. Press **[Esc]** to exit setting.
- Software overpower protection: If the loading power value exceeds delay of such overpower protection set value, the load will automatically be OFF and the VFD will display **Over power** ! . At the same time, OP and PS bits of the status register will be set and keep till reset.

Set the OPP Power value as follows:

- 1. Press the composite key **[Shift]+[9]**(Config) to enter configuration menu setting screen.
- 2. Press Left/Right key to move to the Protect and press [Enter].
- 3. Press Left/Right key to move to the P-Limit and press [Enter].
- 4. Press numeric keys and set the OPP Point, press [Enter] to confirm.
- 5. Press numeric keys and set the Delay time, press [Enter] to confirm.
- 6. Press **[Esc]** to exit setting.
- Clear overpower protection status: Inspect whether power of object under test is within load rated power or set protection power range. If not, disconnect the object. Press any key on load front board (or send command to PROTection:CLEar), the load front board (OPP) word will get cleared and the load will exit OPP protection status.

3.17.4 Overtemperature Protection (OTP)

- Overtemperature protection: When internal power device of load is higher than about 85 °C, the load is under temperature protection. At this time, the load will automatically be OFF and VFD will display OTP. At the same time, OT and PS bits of the status register will be set and keep till reset.
- Clear overtemperature protection: When load temperature is decreased to protection point, press any key on load front board (or send command to PROTection:CLEar), the load front board (OTP) word will get cleared and the load will exit OTP protection status.

3.17.5 Current Oscillation Protection(OSC)

- **Current oscillation protection:**When the load-on current and the current change frequency exceed a certain limit during the loading process, the current oscillation protection will be triggered. If current oscillation protection is triggered, the load will automatically be Off and the VFD will display "OSC protect!". At the same time, OSC and PS bits of the status register will be set and keep till reset.
- Clear current oscillation protection status: Press any key on load front board (or send command to PROTection: CLEar), the load front board (OSC) word will get cleared and the load will exit OSC protection status.
3.18 List Operation

LIST mode provides an accurate, fast and low-cost way to complete any complicated current change mode, which enables synchronization of internal or external signals in multiple quasi-bit load precision tests.

When different trigger sources are selected, the LIST function will form a variety of complex sequences by editing step value, pulse width and slope of each step to meet complicated test requirements. LIST parameters comprise designation of input list file, input step count (2 to 84 steps), step time (0.00002S to 3600S) as well as setting value and slope of each step. The list file can be stored in non-volatile RAM available for a quick output in case of usage. The user can edit 7 groups of list files at maximum.

If the load operation mode is at List operation, the load will start List operation when it receives a trigger signal till completion or receipt of another trigger signal.

Before List operation, be sure to edit List operation files and save them in load non-volatile RAM. Refer to examples below to know how to execute List operation through board. It is assumed that output voltage and current of the tested instrument are 10V and 3A respectively and the load is under CC mode.



Operation steps

 Press [Shift]+[3](List) keys. Operate Left/Right key and move to Edit. Press [Enter] key.

```
LIST
Off Recall Edit
```

2. Operate Left/Right key and move to the High-Rate and press [Enter] key. EDIT LIST

```
High-Rate Low-Rate
```

3. Set maximum working current value and press [Enter] for confirmation. EDIT LIST



Current Range=5.000A

4. Edit number of steps. Press [2] key to edit two steps. Press [Enter] key. EDIT LIST

File Step=2 (2-80)

5. Edit current value in step 1 and press [Enter] key.

```
EDIT LIST
Step 01 Level=0.0002A
```

6. Edit slope in step 1 and press [Enter] key. EDIT LIST

Step 01 Rate=0.0010A/mS

7. Edit time in step 1 and press [Enter] key.

```
EDIT LIST
Step 01 Width=0.00002S
```

8. Edit current value in step 2 and press [Enter] key.

```
EDIT LIST
Step 02 Level=2.0000A
```

9. Edit slope in step 2 and press [Enter] key.

EDIT LIST Step 02 Rate=1.0000A/mS

10. Edit time in step 2 and press [Enter] key.

```
EDIT LIST
Step 02 Width=3600.00000S
```

11. Edit repeat count and press [Enter] key.

```
EDIT LIST
Repeat Count=2 (1-65535)
```

12. Save all edited files and press [Enter] key.

```
EDIT LIST
Save List File=1(1-7)
```

13. Operate Left/Right key and move to on. Press **[Enter]** key (The Trig lamp that indicates VFD screen status is on). Press **[Esc]** key to exit setting.

On Recall Edit

14. Press [On/Off] key to open input and press [Shift]+[.](Trigger)key.

0.00V	0.00A
0.OW	0 LIST1

 Press [CC]/[CV]/[CR]/[CW] key or any composite function key to exit List test function.

\square	Note
	NOLC

If On Recall Edit is displayed under LIST MENU or the external analog control function is switched on, neither List nor Wave file editing is accessible. In this case, change On Recall Edit to Off Recall Edit before operation.



For direct recall of existing List files and triggering of List operation, refer to steps below:

Operation steps

1. Press [Shift]+[3](List) keys. Operate Left/Right key and move to Recall. Press [Enter] key.

LIST Off Recall Edit

2. Select edited files and press [Enter] for confirmation.

RECALL LIST Recall List File=1

3. Operate Left/Right key and move to on. Press [Enter] key (The Trig lamp that indicates VFD screen status is on). Press [Esc] key to exit setting.

On Recall Edit

 Press [On/Off] key to open input and press [Shift]+[.](Trigger) key . List operation.

3.19 Terminal Function of Rear Panel

Terminals on this series load rear panel comprise external trigger terminal, external analog control terminal, voltage fault indication terminal, external On/ Off control terminal and current monitoring terminal. Terminal schematic (as shown below):



Pin	Pin function
CAN_H , CAN_L	CANH and CANL terminal for CAN communication. (- Incomplete support)
TRIG	Positive input signal terminal for external trigger.



Pin	Pin function				
ON	Positive input terminal for external On/Off control.				
VF	Positive output terminal for voltage fault indication.				
GND	Negative terminal for TRIG, ON and VF.				
Analog	Analog input/output signal terminals, used as analog signal for parallel-connection. Analog1: input GND; Analog2: input differential –; Analog3: input differential +; Analog4: output GND; Analog5: output differential –; Analog6: output differential +;				
Ext_PRG–, Ext_ PRG+ (reuse the Analog input/output signal terminals)	Ext_PRG–: connect terminals Analog1 and Analog2 as a reuse terminal. Ext_PRG+: terminal Analog3.				

3.19.1 External Trigger Function

When rear board triggering mode is selected, firstly, set the trigger source as External and the triggering signal is input from the rear board TRIG terminal.

When external trigger is selected, the positive and negative TRIG terminals will generate trigger signal and the low pulse is valid. Input corresponding to one trigger can be used for triggering dynamic test, LIST test and auto test.

The user can make the setting in the system menu as the following procedures.

- 1. Press [Shift] + [8](System) keys to enter system menu.
- 2. Press Left/Right key to move to the Trigger and press [Enter].
- 3. Press Left/Right key to move to the External and press [Enter].
- 4. Press **[Esc]** to exit the menu.

3.19.2 External On/Off Control

The load input switches can be controlled by the external TTL electrical level. During external input control, the **[On/Off]** key will become invalid and the load input switches can only be controlled by the external TTL electrical level. The load input will be switched on in case of low level external input; and the load input will be switched off in case of high level external input.



3.19.3 Voltage Fault Indication

When load is under overvoltage protection , VF pin voltage fault indication terminal outputs high level.

3.19.4 External Analog Function

Parallel-Connection Analog Function

Analog input/output signal terminals are on the rear panel, used as analog signal for parallel-connection. Please refer to Parallel Function for detailed description.

External Analog Control Function

Loading current of the electronic load can be controlled by Ext_PRG (±) analog quantity terminals on rear board. Connect 0 to 10V adjustable voltage at the Ext_PRGG terminal to analog input from 0 to full range so as to adjust input current of load (10V corresponds to current of load at full range).

The setting method as follows:

- 1. Press [Shift]+[9](Config) to enter configuration menu(Config Menu).
- 2. Operate Left/Right key and select Ext-Program. Press [Enter] key.
- 3. Select ON and start external analog control function.
- Press [Esc] to exit the menu and the screen displays Rear.
 Connect the terminals as follow.



3.19.5 Current Monitoring (I Monitor)

The 0 to 10V analog quantity output signal of current monitoring output terminal represents input current to which the terminal belongs from 0 to full range. An external voltmeter or oscilloscope can be connected to display input current change.



3.20 Auto Test Function

This series electronic load has a very strong automatic test function. The automatic test function is useful for simulating various tests and allows the user to edit up to 10 groups of testing files. It helps engineers to test out all kinds of data of the tested power supply at different loading status. Automatic test function can edit multiple product tests, such as CC, no-load, short-circuit, CV, so it can finish all test by one time. It makes tests convenient and fast, and ensures high efficiency and testing accuracy.

Edit test files

1. Press [Shift]+[6](Prog) keys.

```
PROGRAM
Run Recall Edit
```

2. Operate Left/Right key and move to Edit. Press **[Enter]** key to enter editing test files.

```
EDIT PROGRAM
Active Sequence=0987654321
```

3. Press numeric key to select test step and press **[Enter]** key. Active Sequence= 09876543YY (indicating that 1/2 step has been selected).

```
EDIT PROGRAM
Active Sequence=09876543YY
```

4. Select whether pause is necessary for these two steps. If step 2 is to be paused, press **[2]** key. If not, directly press **[Enter]** key.

```
EDIT PROGRAM
Pause Sequence=
```

5. Select whether short-circuit test is necessary for these two steps. If step 1 is to be tested, press **[1]** key. If not, directly press **[Enter]** key.

```
EDIT PROGRAM
Short Sequence=[1111112Y
```

6. Set loading time of step 1. If 2S is required, directly press **[2]** key on the board. Press **[Enter]** key.

```
EDIT PROGRAM
SEQ 01 On Time=2.0S
```

7. Set unloading time of step 1. If 2S is required, directly press [2] key. Press [Enter] key.

```
EDIT PROGRAM
SEQ 01 Off Time=2.0S
```

8. Set test delay time of step 1. If 1S is required, directly press **[1]** key. Press **[Enter]** key. Tpf is delay time before measurement.

```
EDIT PROGRAM
```

SEQ 01 P/F Delay Time=1.0S

9. Set loading time of step 2. If 2S is required, directly press **[2]** key. Press **[Enter]** key.



EDIT PROGRAM

SEQ 02 On Time=2.0S

10. Set unloading time of step 2. If 2S is required, directly press [2] key. Press [Enter] key.

```
EDIT PROGRAM
SEQ 02 Off Time=2.0S
```

11. Set test delay time of step 2. If 1S is required, directly press **[1]** key. Press **[Enter]** key. Tpf is delay time before measurement.

```
EDIT PROGRAM
SEQ 02 P/F Delay Time=1.0S
```



12. Set conditions for stop test. Complete means to stop after all tests are completed and Failure means to stop in case of test error. Press [Enter] key.

PROGRAM

Complete-Stop Failure-Stop

13. Determine whether to link to next group of test file. If it is to link to second group, press **[2]** key. 0 means not to link to other test files. Press **[Enter]** key.

PROGRAM

Chain Program File=0(0-10)

14. Save the programmed files in EEPROM. A total of 10 groups of files can be saved. If it is to save edited files in group 2, press [2] key. Press [Enter] key. PROGRAM

Save Program File=2 (1-10)

15. Press [Esc] key to exit editing menu.

∭Note

In the following editing procedures, "Y indicates selected status. To cancel selected status, press numeric key of corresponding step again. The above steps only set entire framework of auto tests. Additional setting is required for specific parameters in each step. This design will facilitate modification of parameters in a single step.



Edit Auto Test Step Parameter

After setting of entire structure of auto test, settings at each step should be independently saved. Take CC and CV mode as an example to describe how to edit auto test step parameters as below. The step editing methods of CR and CW modes are similar.

It is assumed that step 1 edits CC mode as follows: current: 2A, maximum voltage value: 10V, and minimum voltage value: 2V.

 Press the [CC] key to set the current value as 2A. Press the [Shift] + [CV] (-Setup) keys to enter the parameter setting page.

```
Constant Current
Range=240.00A
```

2. Set the maximum working current value, and enter the [Enter] key.

```
Constant Current
Range =200.00A
```

3. Set the maximum voltage value, and enter the [Enter] key.

```
Constant Current
High=10.0V
```

4. Set the minimum voltage value, and enter the [Enter] key.

Constant Current Low=2.0V

5. Select the high or low rate, and enter the [Enter] key.

Constant Current High-Rate Low-Rate

6. Set the current rising slope, and enter the **[Enter]** key.

```
Constant Current
Rise up=2.0000A/mS
```

7. Set the current falling slope, and enter the [Enter] key.

```
Constant Current
Fall down=2.0000A/mS
```

After the parameter settings are complete, the page is shown as follows.

V00.0	0.00A
0.0W	CC=2.00A

8. Press [Shift]+[4](Save) keys for saving. Press [11] to save as the first step of the Program 2.

0.00V 0.00A 0.00W Save:11

It is assumed that step 2 edits CV mode as follows: voltage: 3V, maximum current value: 5A, and minimum current value: 0A



1. Press the **[CV]** key to set the voltage value as 3V. Press the **[Shift]+[CV]** (-Setup) keys to enter the parameter setting page.

```
Constant Voltage
Range=1200.0V
```

2. Set the maximum working voltage value, and enter the [Enter] key.

```
Constant Voltage
Range=1000.0V
```

3. Set the maximum current value, and enter the [Enter] key.

```
Constant Voltage
High=5.00A
```

4. Set the minimum current value, and enter the [Enter] key.

```
Constant Voltage
Low=0.00A
```

5. Set limited current value under CV mode and press [Enter] key.

```
Constant Voltage
I-Limit=240.00A
```

6. Set high and low rate and press [Enter] key.

Constant Voltage High-Rate Low-Rate

After the parameter settings are complete, the page is shown as follows.

0.0V 0.00A 0.0W CV=3.0V

7. Press [Shift]+[4](Save) keys for saving. Press [12] to save as the second step of the Program 2.

V00.0	0.00A
W00.0	Save:12



Note

Settings at each step should be independently saved. Saving positions of step parameters are related to save group and step number of auto test files. If the auto test file is saved in group 1, the saving position of step parameter is consistent with the step number; if the auto test file is saved in group 2, the saving position is 1+ step number, for example, steps 1, 2 and 3 are saved in 11, 12 and 13 respectively; if the auto test file is saved in group 3, the saving position is 2+ step number, for example, steps 1, 2 and 3 are saved in 21, 22 and 23 respectively, and so on. Refer to the following table for saving position

Program 1 Sequence	1	2	3	4	5	6	7	8	9	10
Save Group	1	2	3	4	5	6	7	8	9	10
Program 2 Sequence	1	2	3	4	5	6	7	8	9	10
Save Group	11	12	13	14	15	16	17	18	19	20
:	:	:	••	•••	•••	•••		:	:	:
	:	:	•••	•••	•••	•••		:	:	:
Program 10 Sequence	1	2	3	4	5	6	7	8	9	10
Save Group	91	92	93	94	95	96	97	98	99	100

Correspondence Table of Auto test files and step parameter saving.

Recall test file for running

To recall edited test files from EEPROM quickly after re-energizing instrument, refer to the method below.

1. Press **[Shift] + [6]**(Prog) keys.

PROGRAM Run Recall Edit

2. Operate Left/Right key, select Recall and press [Enter] key.

RECALL PROGRAM Recall Program File=2

3. Operate Left/Right key, select Run and press [Enter] key.

```
PROGRAM
Run Recall Edit
```

4. Display auto test file 2.

```
0.00V 0.00A
PRG02 STOP
```

5. Press [Shift]+[.] (Trigger) key. Operate auto test file 2.

0.00V 0.00A PRG02-01 On Pass

 Press [Shift]+[0](Pause) key to pause auto test. Press Down key for next step.



3.21 Parallel Function

The maximum power of this series electronic loads is 60 KW. The user can connect electronic loads in parallel to provide a greater current and power capability. The electronic Load is capable of connecting up to nine units in parallel, reaching at most 384 KW.

3 sets of 4U loads in parallel

The operation steps of parallel function are described below taking 3 instruments (1 Master and 2 Slave) in parallel as an example. The System Bus is used as connection between master and slaves; the Analog is used as analog signal connection for parallel.

CAUTION

• Before connecting the system bus, the parallel mode must be single.



1. Connect the instruments according to the following diagram.

a. Use standard network cables to connect System Bus terminals.



- b. Use three-prong shield wires to connect Analog terminals.
- c. Connect DUT. Refer to 1.5 Connecting the DUT for detailed wiring method. To ensure the safety of the test, use a separate red and black test line to connect the input terminals of each instrument to the terminals of the object to be tested.
- 2. After connection, configure one electric load as a master unit and other electronic loads as slave units.
 - a. Press the composite key [Shift]+[8](System) to enter the System Menu.
 - b. Press the Right key to select "Parallel" and press **[Enter]** for parallel setting.
 - Single: Single mode.
 - Slave: Salve mode.
 - Master: Master mode. If Master mode is selected, you need to set the number of Salves for the Master.
 - Total: total number of instruments in parallel. For example, Total = 3.
- 3. After making the master-slave setting, to ensure normal operation, you need to restart the electronic loads.

2 sets of 8U loads in parallel

The operation steps of parallel function are described below taking 2 instruments (1 Master and 1Slave) in parallel as an example. The System Bus is used as connection between master and slaves; the Analog is used as analog signal connection for parallel.

CAUTION

• Before connecting the system bus, the parallel mode must be single.





1. Connect the instruments according to the following diagram.

- a. Use standard network cables to connect System Bus terminals.
- b. Use three-prong shield wires to connect Analog terminals.
- c. Connect DUT. Refer to 1.5 Connecting the DUT for detailed wiring method. To ensure the safety of the test, use a separate red and black test line to connect the input terminals of each instrument to the terminals of the object to be tested.
- 2. After connection, configure one 8U load as a master unit and another 8U load as slave units.
 - a. Press the composite key [Shift]+[8](System) to enter the System Menu.
 - b. Press the Right key to select "Parallel" and press **[Enter]** for parallel setting.



- Single: Single mode.
- Slave: Salve mode.
- Master: Master mode. If Master mode is selected, you need to set the number of Salves for the Master.
- Total: total number of instruments in parallel. For example, Total = 2.
- 3. After making the master-slave setting, to ensure normal operation, you need to restart the electronic loads.

Revert to single mode

To change Parallel Mode to Single Mode, follow the steps below:

- 1. Power off 3 instruments respectively.
- 2. Remove System Bus, Analog cables and parallel wires among three electronic loads.
- 3. Power on 3 instruments respectively.
- 4. Switch three instruments into single mode respectively.
 - a. Press the composite key [Shift]+[8](System) to enter the System Menu.
 - b. Press the Left/Right key to select "Parallel" and press [Enter] key.
 - c. Press the Left/Right key to select "Single" and press [Enter] key.
- 5. After setting, to ensure normal operation, you need to Initialize the electronic loads.
 - a. Press the composite key **[Shift]+[8]**(System) to enter system menu setting screen.
 - b. Operate Left/Right key and move to the Initialize and press [Enter] key.
 - c. Select "YES" and Press [Enter] to restore to factory setting values.



This chapter will introduce the main technical parameters of this load, such as rated voltage/current/power and so on. Besides, we will introduce the working environment and storage temperature.

- Main specifications
- Additional features



- To prevent damaging heat build-up and ensure specified performance, make sure there is adequate ventilation and air flow around the instrument to ensure proper cooling. Do not cover the ventilation holes on the top, sides, or bottom of the instrument.
- To ensure that the IT8400 series load meets the specified specifications and performance, please ensure that the inlet air temperature of the instrument is within the range of 0 to 25°C.

4.1 Main specifications

4.1.1 IT8406-600-150

Мо	del	IT8406-600-150				
	Input voltage	0~600V				
Rated value (0 ~ 40 °C)	Input current	3A	15A		150A	
	Input power	1.8KW		61	<w< td=""></w<>	
	Min. operat- ing voltage 0.45V@3A 0		0.5	25V@15A	5.25V@150A	
Constant	Range	0~60V	0~60V		0~600V	
voltage	Resolution	1mV		10mV		
mode	Accuracy	±(0.05%+0.05%F	S) ±(0.05		5%+0.05%FS)	
	Range	0~3A	0~15A		0~150A	
Constant current	Resolution	0.1mA		0.5mA	5mA	
mode Accuracy ±(0.05%+0.1%FS)		±(0.05%+0.05% FS)		±(0.05%+0.05%FS)		
Constant re-	Range	0.035Ω~10Ω	1		0Ω~7.5ΚΩ	
sistance mode *1	Resolution	16bit				



Мо	del	IT8406-600-150						
	Accuracy	0.01%+0.08S *2			0.0	1%+0.0008S		
Constant	Range		6KW					
power Mode	Resolution	0.1W						
*3	Accuracy			0.2	%+0.2%FS			
Dynamic Mode								
CC Mode								
	T1&T2		20uS~3	3600S /	Res:1 us/10m	s/100ms		
	Accuracy			5u	S±100ppm			
Dynamic Mode *4	Ascending/ descending slope	0.0001~0.1	A/uS	0.000)5~0.75A/uS	0.005~10 A/uS		
	Min. rise time *5	≒30uS			≒20uS	≒15uS		
Measuring range								
	Range	0~6	50V			0~600V		
Read-back voltage	Resolution	1mV		10mV				
	Accuracy	±(0.025%+	0.025%	FS)	±(0.02	025%+0.025%FS)		
	Range	0~3A			0~15A	0~150A		
Read-back	Resolution	0.1mA			0.5mA	5mA		
current	Accuracy	±(0.05%+0.1	%FS)	±(0.0)5%+0.05% FS)	±(0.05%+0.05%FS)		
	Range				6KW			
Read-back power *2	Resolution				0.1W			
	Accuracy			±(0.2	2%+0.2%FS)			
		Prote	ection ra	ange				
Overpower protection	1.89	ЖW			≒6.05K	W		
Overcurrent protection	=3.1	.15A =15.75A =157.5A				≒157.5A		
Overvoltage protection	≒630V							
Overtemper- ature protection	≒85°C							
		Sp	ecificati	on				
Short circuit	Current (CC)	≒3.15A		÷	=15.75A	≒157.5A		



Мо	del	IT8406-600-150				
	Voltage (CV)	=0V				
	Resistance (CR)	≒150mΩ ≒35mΩ				
Input termi- nal impedance		≒1MΩ				
Height			4U			
Weight		40 Kg				
	Voltage	100~240Vac				
AC Input	Frequency	50/60Hz				
	Power	250VA max				

*1. The voltage/current input is no less than 10%FS (FS indicates the full scope).

*2. The scope of read-back resistance is (1/(1/R+(1/R)*0.01%+0.08),1/(1/R-(1/R)*0.01%-0.08)).

*3. The voltage/current input is no less than 10%FS.

*4.The load current value is no less than 4% of FS_CCH.

*5.The load current value is no less than 10% of FS_CCH.

4.1.2 IT8412-600-300

Мо	del	IT8412-600-300				
	Input voltage	0~600V				
Rated value (0 ∼ 40 °C)	Input current	6A		30A	300A	
	Input power	3.6KW 12K		Ŵ		
	Min. operat- ing voltage	0.45V@6A 0.5		25V@30A	5.25V@300A	
Constant	Range	0.1~60V		0.1~600V		
voltage	voltage Resolution 1mV			10mV		
mode	Accuracy	±(0.05%+0.05%FS)		±(0.05	5%+0.05%FS)	
Constant	Range	0~6A	0~30A		0~300A	
mode	Resolution	0.2mA	1mA		10mA	



Мо	del	IT8412-600-300							
	Accuracy	±(0.05%+0.1%FS) ±(0.05%		%+0.05	%FS)	±(0.05%+0.05%FS)			
Constant re	Range	0.0175Ω~10Ω		10Ω~7.5ΚΩ					
sistance	Resolution		16bit						
mode *1	Accuracy	0.01%+0	0.08S *	2		0.01	%+0.0008S		
Constant	Range		12KW						
power Mode	Resolution		0.2W						
*3	Accuracy	0.2%+0.2%FS							
		Dyn	amic N	lode					
			(CC Mod	е				
	T1&T2		20uS~:	3600S /F	Res:1 us	s/10ms/	/100ms		
	Accuracy			5u\$	S±100pp	om			
Dynamic Mode *4	Ascending/ descending slope	0.0002~0.15	A/uS	0.0	01~1A/เ	JS	0.01~15 A/uS		
	Min. rise time *5	≒40uS			≒30uS		≒20uS		
		Meas	suring r	ange					
	Range	0~6	50V				0~600V		
Read-back voltage	Resolution	1n	nV	10mV			10mV		
5	Accuracy	±(0.025%+	0.025%	FS)	:	±(0.025%+0.025%FS)			
	Range	0~6A			0~30A		0~300A		
Read-back current	Resolution	0.2mA			1mA		10mA		
	Accuracy	±(0.05%+0.19	%FS)	±(0.05	.05%+0.05%FS)		±(0.05%+0.05%FS)		
	Range				12KW		-		
Read-back power *2	Resolution				0.2W				
	Accuracy			±(0.2	%+0.2%	‰FS)			
		Prote	ection r	ange					
Overpower protection	3.78	78KW ≒12.1KW							
Overcurrent protection	≒6	.3A	≒31.5A		≒315A				
Overvoltage protection		≒630V							
Overtemper- ature protection		≒85°C							



Мо	del	IT8412-600-300				
	Specification					
	Current (CC)	≒6.3A	≒6.3A ≒31.5A ≒3			
Short circuit	Voltage (CV)	≒0V				
	Resistance (CR)	≒75mΩ ≒17.5mΩ				
Input termi- nal impedance			≒500KΩ			
Height			8U			
	Voltage	100~240Vac				
AC Input	Frequency		50/60Hz			
	Power		500VA max			

*1. The voltage/current input is no less than 10%FS (FS indicates the full scope).

*2. The scope of read-back resistance is (1/(1/R+(1/R)*0.01%+0.08), 1/(1/R-(1/R)*0.01%-0.08)).

*3. The voltage/current input is no less than 10%FS.

*4.The load current value is no less than 4% of FS_CCH.

*5.The load current value is no less than 10% of FS_CCH.

4.1.3 IT8418-600-450

Мо	del	IT8418-600-450					
	Input voltage		0~600V				
Rated value (Input current	9A	45A 450		450A		
$0 \sim 40^{-5}$ C)	Input power	5.4KW 18KW			KW		
	Min. operat- ing voltage	0.45V@9A	0.525V@45A		5.25V@450A		
Constant	Range	0.1~60V		0.1~600V			
voltage	Resolution	1mV		10mV			
mode	Accuracy	±(0.05%+0.05%F	S)	S) ±(0.05%+0.05%FS)			



Мо	del	IT8418-600-450					
	Range	0~9A			0~45A	0~450A	
Constant	Resolution	0.3mA			1mA	10mA	
Guirent mode	Accuracy	±(0.05%+0.1%	FS)	±(0.05	5%+0.05%FS)	±(0.05%+0.05%FS)	
Constant ro	Range	0.012Ω~	10Ω		10	IΩ~7.5KΩ	
sistance	Resolution				16bit		
mode *1	Accuracy	0.01%+0.0)8S *2)	0.01	%+0.0008S	
Constant	Range				18KW		
power Mode	Resolution				0.3W		
*3	Accuracy			0.2	%+0.2%FS		
		Dynam	nic Mo	ode			
			С	C Mod	е		
	T1&T2	20)uS~3	600S /F	Res:1 us/10ms/	/100ms	
	Accuracy			5u\$	S±100ppm		
Dynamic Mode *4	Ascending/ descending slope	0.0002~0.225A/uS		0.001~1.5A/uS		0.01~22.5 A/uS	
	Min. rise time *5	≒40uS	≒40uS		≒30uS	≒20uS	
		Measur	Measuring range				
	Range	0~60\	V			0~600V	
Read-back voltage	Resolution	1mV	1	10mV		10mV	
	Accuracy	±(0.025%+0.0)25%I	FS) ±(0.025		5%+0.025%FS)	
	Range	0~9A			0~45A	0~450A	
Read-back	Resolution	0.3mA			1mA	10mA	
ouriont	Accuracy	±(0.05%+0.1%	FS)	±(0.05	5%+0.05%FS)	±(0.05%+0.05%FS)	
	Range				18KW		
Read-back power *2	Resolution				0.3W		
P	Accuracy			±(0.2	%+0.2%FS)		
		Protect	tion ra	nge			
Overpower protection	5.67	'KW			≒18.15KV	N	
Overcurrent protection	≒9.4	45A	Ħ	:47.25A		≒472.5A	
Overvoltage protection				≒630V			



Model		IT8418-600-450					
Overtemper- ature protection		≒85°C					
	Specification						
	Current (CC)	≒9.45A	≒9.45A ≒47.25A ≒472				
Short circuit	Voltage (CV)	≒0V					
	Resistance (CR)	≒50mΩ ≒12mΩ					
Input termi- nal impedance		=	=333KΩ				
Height			15U				
	Voltage	100~240Vac					
AC Input	Frequency		50/60Hz				
	Power		750VA max				

*1. The voltage/current input is no less than 10%FS (FS indicates the full scope).

*2. The scope of read-back resistance is (1/(1/R+(1/R)*0.01%+0.08), 1/(1/R-(1/R)*0.01%-0.08)).

*3. The voltage/current input is no less than 10%FS.

*4.The load current value is no less than 4% of FS_CCH.

*5.The load current value is no less than 10% of FS_CCH.

4.1.4 IT8424-600-600

Мо	Model IT84		IT84	424-600-600			
	Input voltage		0~600V				
Rated value	Input current	12A	60A 6		600A		
(0 ~ 40 °C)	Input power	7.2KW 24KW			<w< td=""></w<>		
	Min. operat- ing voltage	0.45V@12A 0.525V@60A 5.25V@			5.25V@600A		
Constant voltage mode	Range	0.1~60V		0.1~600V			



Model IT8424-600-600							
	Resolution	1n	าV			10mV	
	Accuracy	±(0.05%+0	0.05%F	S)	±(0.05%		%+0.05%FS)
Constant	Range	0~12A			0~60A		0~600A
current	Resolution	0.4mA			2mA		20mA
mode	Accuracy	±(0.05%+0.1	%FS)	±(0.05	5%+0.05	%FS)	±(0.05%+0.05%FS)
Constant re	Range	0.0090	2~10Ω			10	Ω~7.5ΚΩ
sistance	Resolution				16bit		
mode *1	Accuracy	0.01%+(0.08S *2	2		0.01	%+0.0008S
Constant	Range				24KW		
power Mode	Resolution				0.4W		
*3	Accuracy			0.29	%+0.2%	FS	
		Dyn	amic M	ode			
			C	C Mode	е		
	T1&T2		20uS~3	3600S /I	Res:1 us	s/10ms/	/100ms
	Accuracy	5uS±100ppm					
Dynamic Mode *4	Ascending/ descending slope	0.0004~0.3/	A/uS 0.002 [,]		0.002~2A/uS		0.02~30 A/uS
	Min. rise time *5	≒40uS			≒30uS		≒20uS
		Meas	suring ra	ange			
	Range	0~6	60V		0~600V		
Read-back voltage	Resolution	1n	٦V				10mV
. energe	Accuracy	±(0.025%+0	0.025%	FS)	Ŧ	±(0.025	%+0.025%FS)
	Range	0~12A			0~60A		0~600A
Read-back	Resolution	0.4mA			2mA		20mA
ourion	Accuracy	±(0.05%+0.1	%FS)	±(0.05	5%+0.05	%FS)	±(0.05%+0.05%FS)
	Range				18KW		
Read-back power *2	Resolution				0.4W		
	Accuracy ±(0.2%+0.2%FS)						
		Prote	ection ra	ange			
Overpower protection	7.56	КW			≒2	24.2KW	I
Overcurrent protection	≒12	6A		≒63A			≒630A



Мо	del	IT8424-600-600					
Overvoltage protection			≒630V				
Overtemper- ature protection			≒85°C				
		Specificat	ion				
	Current (CC)	≒12.6A	≒630A				
Short circuit	Voltage (CV)	≒0V					
	Resistance (CR)	≒37.5mΩ ≒9mΩ					
Input termi- nal impedance			=250KΩ				
Height			27U				
	Voltage	100~240Vac					
AC Input	Frequency		50/60Hz				
	Power		1000VA max				

*1. The voltage/current input is no less than 10%FS (FS indicates the full scope).

*2. The scope of read-back resistance is (1/(1/R+(1/R)*0.01%+0.08), 1/(1/R-(1/R)*0.01%-0.08)).

*3. The voltage/current input is no less than 10%FS.

*4.The load current value is no less than 4% of FS_CCH.

*5.The load current value is no less than 10% of FS_CCH.

4.1.5 IT8430-600-750

Мо	del	IT8430-600-750					
	Input voltage		0~600V				
Rated value	Input current	15A	75A	750A			
(0~40 C)	Input power	9KW	KW 30KW				
	Min. operat- ing voltage	0.45V@15A	0.525V@75A	5.25V@750A			



Мо	del	IT8430-600-750				
Constant	Range	0~6	50V			0~600V
voltage	Resolution	1n	nV		10mV	
mode	Accuracy	±(0.05%+	0.05%F	S)	±(0.05	%+0.05%FS)
Constant	Range	0~15A			0~75A	0~750A
current	Resolution	0.5mA			2.5mA	25mA
mode	Accuracy	±(0.05%+0.1	%FS)	±(0.05	5%+0.05%FS)	±(0.05%+0.05%FS)
Constant re	Range	0.0070	Ω~10Ω		10	Ω~7.5ΚΩ
sistance	Resolution				16bit	
mode *1	Accuracy	0.01%+(0.08S *2	2	0.01	%+0.0008S
Constant	Range				18KW	
power Mode	Resolution				0.5W	
*3	Accuracy			0.2	%+0.2%FS	
		Dyn	namic M	ode		
			C	C Mod	е	
	T1&T2	20uS~3600S /Res:1 us/10ms/100ms				
	Accuracy			5uS	S±100ppm	
Dynamic Mode *4	Ascending/ descending slope	0.0005~0.375A/uS 0.00		0.0025~2.5A/uS 0.025~37.		
	Min. rise time *5	≒40uS			≒30uS	≒20uS
		Meas	suring ra	ange		
	Range	0~6	50V			0~600V
Read-back voltage	Resolution	1n	nV			10mV
5	Accuracy	±(0.025%+	0.025%	FS)	±(0.025	%+0.025%FS)
	Range	0~15A			0~75A	0~750A
Read-back current	Resolution	0.5mA			2.5mA	25mA
ourient	Accuracy	±(0.05%+0.1	%FS)	±(0.05	5%+0.05%FS)	±(0.05%+0.05%FS)
	Range				18KW	
Read-back power *2	Resolution				0.5W	
	Accuracy			±(0.2	%+0.2%FS)	
		Prote	ection ra	ange		
Overpower protection	9.45	5KW			≒30.25K\	N



Мо	Model IT8430-600-750									
Overcurrent protection	≒15	.75A	ŧ	78.75A		≒787.5A				
Overvoltage protection			≒630V							
Overtemper- ature protection		≒85°C								
	Specification									
	Current (CC)	≒15.75A		≒78.75A		≒78.75A		≒78.75A		≒787.5A
Short circuit	Voltage (CV)		≒0V							
	Resistance (CR)	≒30mΩ	2	≒7mΩ						
Input termi- nal impedance			=	=200KΩ						
Height				27U						
	Voltage	100~240Vac								
AC Input	Frequency			50/60Hz						
	Power			1250VA m	ax					

*1. The voltage/current input is no less than 10%FS (FS indicates the full scope).

*2. The scope of read-back resistance is (1/(1/R+(1/R)*0.01%+0.08),1/(1/R-(1/R)*0.01%-0.08)).

*3. The voltage/current input is no less than 10%FS.

*4.The load current value is no less than 4% of FS_CCH.

*5.The load current value is no less than 10% of FS_CCH.

4.1.6 IT8436-600-900

Model		IT8436-600-900					
	Input voltage	0~600V					
Rated value (0 ∼ 40 °C)	Input current	18A	18A 90A 900A				
· · · · ·	Input power	10.8KW	36KW				



Мо	del	IT8436-600-900				
	Min. operat- ing voltage	0.45V@18A	0.8	525V@90A	5.25V@900A	
Constant	Range	0.1~60V		0	.1~600V	
voltage	Resolution	1mV			10mV	
mode	Accuracy	±(0.05%+0.05%F	S)	±(0.05	%+0.05%FS)	
Constant	Range	0~18A		0~90A	0~900A	
current	Resolution	0.6mA		3mA	30mA	
mode	Accuracy	±(0.05%+0.1%FS)	±(0.0	5%+0.05%FS)	±(0.05%+0.05%FS)	
Constant re-	Range	0.006Ω~10Ω		10	Ω~7.5KΩ	
sistance	Resolution			16bit		
mode *1	Accuracy	0.01%+0.08S *2	2	0.01	%+0.0008S	
Constant	Range			36KW		
power Mode	Resolution			0.6W		
*3	Accuracy		0.2	%+0.2%FS		
Dynamic Mode						
		C	C Mod	е		
	T1&T2	20uS~3600S /Res:1 us/10ms/100ms				
	Accuracy	5uS±100ppm				
Dynamic Mode *4	Ascending/ descending slope	0.0006~0.45A/uS	0.0	003~3A/uS	0.03~45A/uS	
	Min. rise time *5	≒40uS		≒30uS	≒20uS	
		Measuring ra	ange			
	Range	0~60V			0~600V	
Read-back voltage	Resolution	1mV			10mV	
0	Accuracy	±(0.025%+0.025%	FS)	±(0.025	%+0.025%FS)	
	Range	0~18A		0~90A	0~900A	
Read-back current	Resolution	0.6mA		3mA	30mA	
	Accuracy	±(0.05%+0.1%FS)	±(0.0	5%+0.05%FS)	±(0.05%+0.05%FS)	
	Range		-	18KW		
Read-back power *2	Resolution			0.6W		
	Accuracy		±(0.2	2%+0.2%FS)		
		Protection ra	ange			



Мо	odel IT8436-600-900					
Overpower protection	11.34	4KW		≒36.3KW		
Overcurrent protection	≒18	.9A		≒94.5A		≒945A
Overvoltage protection				≒630V		
Overtemper- ature protection				≒85°C		
	Specification					
	Current (CC)	≒18.9A	≒18.9A ≒94.5A			≒945A
Short circuit	Voltage (CV)			≒0V		
	Resistance (CR)	≒25mΩ	2		≒6ı	mΩ
Input termi- nal impedance			≒1	66.67ΚΩ		
Height				27U		
	Voltage	100~240Vac				
AC Input	Frequency		50/60Hz			
	Power			1500VA m	nax	

*1. The voltage/current input is no less than 10%FS (FS indicates the full scope).

*2. The scope of read-back resistance is (1/(1/R+(1/R)*0.01%+0.08), 1/(1/R-(1/R)*0.01%-0.08)).

*3. The voltage/current input is no less than 10%FS.

*4.The load current value is no less than 4% of FS_CCH.

*5.The load current value is no less than 10% of FS_CCH.

4.1.7 IT8442-600-1050

Model			IT8442-600-1050				
	Input voltage		0~600V				
Rated value (0 ~ 40 °C)	Input current	21A	21A 105A 1050A				
· · · · ·	Input power	12.6KW	421	KW			



Model IT8442-600-105						
	Min. operat- ing voltage	0.45V@21A	0.5	25V@105A	5.25V@450A	
Constant	Range	0.1~60V		0	.1~600V	
voltage	Resolution	1mV		10mV		
mode	Accuracy	±(0.05%+0.05%F	S)	±(0.05	%+0.05%FS)	
Constant	Range	0~21A		0~105A	0~1050A	
current	Resolution	0.7mA		3.5mA	35mA	
mode	Accuracy	±(0.05%+0.1%FS)	±(0.05	5%+0.05%FS)	±(0.05%+0.05%FS)	
Constant re-	Range	0.005Ω~10Ω		10	Ω~7.5ΚΩ	
sistance	Resolution			16bit		
mode *1	Accuracy	0.01%+0.08S *2	2	0.01	%+0.0008S	
Constant	Range			18KW		
power Mode	Resolution			0.7W		
*3	Accuracy	0.2%+0.2%FS				
Dynamic Mode						
			CC Mod	e		
	T1&T2	20uS~3600S /Res:1 us/10ms/100ms				
	Accuracy	5uS±100ppm				
Dynamic Mode *4	Ascending/ descending slope	0.0007~0.525A/uS	0.0	035~3A/uS	0.035~45 A/uS	
	Min. rise time *5	≒40uS		≒30uS	≒20uS	
		Measuring r	ange			
	Range	0~60V			0~600V	
Read-back voltage	Resolution	1mV			10mV	
	Accuracy	±(0.025%+0.025%	FS)	±(0.025	%+0.025%FS)	
	Range	0~21A		0~105A	0~1050A	
Read-back current	Resolution	0.7mA		3.5mA	35mA	
	Accuracy	±(0.05%+0.1%FS)	±(0.05	5%+0.05%FS)	±(0.05%+0.05%FS)	
	Range			42KW		
Read-back power *2	Resolution			0.7W		
P	Accuracy		±(0.2	2%+0.2%FS)		
	Protection range					



Мо	odel IT8442-600-1050					
Overpower protection	13.23	3KW	3KW ≒42.35KW			
Overcurrent protection	=22.	05A		110.25A		≒1102.5A
Overvoltage protection				≒630V		
Overtemper- ature protection				≒85°C		
	Specification					
	Current (CC)	≒22.05A	≒22.05A ≒110.25A ≒1102.5A			
Short circuit	Voltage (CV)			≒0V		
	Resistance (CR)	≒22mΩ	2		≒5r	nΩ
Input termi- nal impedance			H	142.8ΚΩ		
Height		37U				
	Voltage	100~240Vac				
AC Input	Frequency			50/60H	Z	
	Power			1750VA n	nax	

*1. The voltage/current input is no less than 10%FS (FS indicates the full scope).

*2. The scope of read-back resistance is (1/(1/R+(1/R)*0.01%+0.08), 1/(1/R-(1/R)*0.01%-0.08)).

*3. The voltage/current input is no less than 10%FS.

*4.The load current value is no less than 4% of FS_CCH.

*5.The load current value is no less than 10% of FS_CCH.

4.1.8 IT8448-600-1200

Model			IT8448-600-1200				
	Input voltage		0~600V				
Rated value (0 ~ 40 °C)	Input current	24A	24A 120A 1200A				
· · · ·	Input power	14.4KW	481	ŚŴ			



Мо	del		IT84	48-600-1200		
	Min. operat- ing voltage	0.45V@24A	0.52	25V@120A	5.25V@1200A	
Constant	Range	0.1~60V		0	.1~600V	
voltage	Resolution	1mV		10mV		
mode	Accuracy	±(0.05%+0.05%F	S)	±(0.05	%+0.05%FS)	
Constant	Range	0~24A		0~120A	0~1200A	
current	Resolution	0.8mA		4mA	40mA	
mode	Accuracy	±(0.05%+0.1%FS)	±(0.05	5%+0.05%FS)	±(0.05%+0.05%FS)	
Constant re-	Range	0.0Ω~10Ω		10	Ω~7.5ΚΩ	
sistance	Resolution			16bit		
mode *1	Accuracy	0.01%+0.08S *2	2	0.01	%+0.0008S	
Constant	Range			18KW		
power Mode	Resolution			0.8W		
*3	Accuracy	0.2%+0.2%FS				
Dynamic Mode						
		(CC Mod	е		
	T1&T2	20uS~3600S /Res:1 us/10ms/100ms				
	Accuracy	5uS±100ppm				
Dynamic Mode *4	Ascending/ descending slope	0.0008~0.6A/uS	0.004~3A/uS		0.04~45A/uS	
	Min. rise time *5	≒40uS		≒30uS	≒20uS	
		Measuring r	ange			
	Range	0~60V			0~600V	
Read-back voltage	Resolution	1mV			10mV	
5	Accuracy	±(0.025%+0.025%	FS)	±(0.025	%+0.025%FS)	
	Range	0~24A		0~120A	0~1200A	
Read-back current	Resolution	0.8mA		4mA	40mA	
	Accuracy	±(0.05%+0.1%FS)	±(0.05%+0.05%FS) ±(0.05%+0.05%		±(0.05%+0.05%FS)	
	Range		-	48KW		
Read-back power *2	Resolution			0.8W		
	Accuracy		±(0.2	2%+0.2%FS)		
		Protection ra	ange			



Мо	Iodel IT8448-600-1200					
Overpower protection	15.12	2KW	2KW ≒48.4KW			
Overcurrent protection	≒25	.2A		≒126A		≒1260A
Overvoltage protection				≒630V		
Overtemper- ature protection				≒85°C		
	Specification					
	Current (CC)	≒25.2A	≒25.2A ≒126A ≒1260A			
Short circuit	Voltage (CV)			≒0V		
	Resistance (CR)	≒18.75m	Ω		≒5r	nΩ
Input termi- nal impedance				≒125KΩ		
Height				37U		
	Voltage	100~240Vac				
AC Input	Frequency					
	Power			2000VA m	ax	

*1. The voltage/current input is no less than 10%FS (FS indicates the full scope).

*2. The scope of read-back resistance is (1/(1/R+(1/R)*0.01%+0.08), 1/(1/R-(1/R)*0.01%-0.08)).

*3. The voltage/current input is no less than 10%FS.

*4.The load current value is no less than 4% of FS_CCH.

*5.The load current value is no less than 10% of FS_CCH.

4.1.9 IT8454-600-1350

Model		IT8454-600-1350			
Rated value $(0 \sim 40 ^{\circ}\text{C})$	Input voltage		0~600V		
(0 40 0)	Input current	27A	135A	1350A	



Мо	del	IT8454-600-1350					
	Input power	16.2KW		54k	ŚŴ		
	Min. operat- ing voltage	0.45V@27A	0.5	25V@135A	5.25V@1350A		
Constant	Range	0.1~60V		0	0.1~600V		
voltage	Resolution	1mV		10mV			
mode	Accuracy	±(0.05%+0.05%F	S)	±(0.05	%+0.05%FS)		
	Range	0~27A		0~135A	0~1350A		
Constant current	Resolution	0.9mA		4.5mA	45mA		
mode	Accuracy	±(0.05%+0.1%FS)	±(0.05	5%+0.05%FS)	±(0.05%+0.05% FS)		
Constant re	Range	0.004Ω~10Ω		10	Ω~7.5ΚΩ		
sistance	Resolution			16bit			
mode *1	Accuracy	0.01%+0.08S */	2	0.01	%+0.0008S		
Constant	Range						
power Mode	power Mode Resolution 0.9W				0.9W		
*3	Accuracy	0.2%+0.2%FS					
		Dynamic M	ode				
		(CC Mod	е			
	T1&T2	20uS~3	3600S /	Res:1 us/10ms/	us/10ms/100ms		
	Accuracy	5uS±100ppm					
Dynamic Mode *4	Ascending/ descending slope	0.0009~0.675A/uS 0.0045~3A/uS		0.045~45A/uS			
	Min. rise time *5	≒40uS		≒30uS	≒20uS		
	<u>.</u>	Measuring ra	ange				
	Range	0~60V		(0~600V		
Read-back voltage	Resolution	1mV			10mV		
	Accuracy	±(0.025%+0.025%	FS)	±(0.025	%+0.025%FS)		
	Range	0~27A		0~135A	0~1350A		
Read-back	Resolution	0.9mA		4.5mA	45mA		
current	Accuracy	±(0.05%+0.1%FS)	±(0.05	5%+0.05%FS)	±(0.05%+0.05% FS)		
Read-back	Range		-	18KW			
power *2	Resolution			0.9W			



Мо	del	IT8454-600-1350				
	Accuracy		±(0.2%+0.2%FS)			
	Protection range					
Overpower protection	17.0	1KW		= !	54.45K\	N
Overcurrent protection	≒28	.23A	:	=47.25A		≒472.5A
Overvoltage protection				≒630V		
Overtemper- ature protection				≒85°C		
Specification						
	Current (CC)	≒9.45A	≒9.45A ≒141.75A ≒1417.5A			
Short circuit	Voltage (CV)			≒0V		
	Resistance (CR)	≒16.66m	Ω		≒4r	mΩ
Input termi- nal impedance			≒1	11.11ΚΩ		
Height		37U				
	Voltage			100~240V	ac	
AC Input	Frequency			50/60Hz	2	
	Power			2250VA m	ax	

*1. The voltage/current input is no less than 10%FS (FS indicates the full scope).

*2. The scope of read-back resistance is (1/(1/R+(1/R)*0.01%+0.08),1/(1/R-(1/R)*0.01%-0.08)).

*3. The voltage/current input is no less than 10%FS.

*4.The load current value is no less than 4% of FS_CCH.

*5.The load current value is no less than 10% of FS_CCH.



4.1.10 IT8406-1200-75

Мо	del	IT8406-1200-75					
	Input voltage	0~1200V					
Rated value	Input current	1.5A		7.5A	75A		
(0 ~ 40 °C)	Input power	1.8KW		6KW			
	Min. operat- ing voltage	1.31V@1.5A	1.	.5V@7.5A	15V@75A		
Constant	Range	0.1~120V		0.	1~1200V		
voltage	Resolution	10mV			100mV		
mode	Accuracy	±(0.05%+0.05%F	S)	±(0.05	%+0.05%FS)		
Constant	Range	1.5A		7.5A	75A		
current	Resolution	40uA		0.2mA	2mA		
mode	Accuracy	0.05%+0.1%FS	0.05	%+0.05%FS	0.05%+0.05%FS		
Constant re- sistance mode	Range	0.2Ω~10Ω		10Ω~7.5ΚΩ			
*1	Resolution		16bit				
	Accuracy	0.01%+0.08S *2 0.01%+0.00085			%+0.0008S		
Constant	Range			6KW			
power Mode	Resolution			0.1W			
^3	Accuracy		0.2	%+0.2%FS			
		Dynamic Mo	ode				
		С	C Mod	e			
	T1&T2	20uS~3	600S /	Res:1 us/10ms/	100ms		
Demonsio	Accuracy		5u\$	S±100ppm			
Dynamic Mode *4	Ascending/ descending slope	0.00004~0.05A/uS	0.00	002~0.3A/uS	0.002~5A/uS		
	Min. rise time *5	≒30uS	≒25uS		≒15uS		
		Measuring ra	inge				
	Range	0~120V		0	~1200V		
Read-back voltage	Resolution	10mV			100mV		
5	Accuracy	±(0.025%+0.025%I	FS)	±(0.025	%+0.025%FS)		
Read-back current	Range	1.5A		7.5A	75A		



Мо	del	IT8406-1200-75					
	Resolution	40uA			0.2mA		2mA
	Accuracy	0.05%+0.1	%FS	0.05	%+0.05	%FS	0.05%+0.05%FS
	Range				6KW		
Read-back power *2	Resolution				0.1W		
F	Accuracy			±(0.2	2%+0.2%	6FS)	
		Prote	ection ra	inge			
Overpower protection	≒1.8	9KW	÷	6.05KV	V		≒6.05KW
Overcurrent protection	≒1.5	575A	=	7.875	Ą		≒78.75A
Overvoltage protection			:	=1250V	/		
Overtemper- ature protection		≒85°C					
		Sp	ecificatio	on			
	Current (CC)	≒1.575 <i>/</i>	4		≒7.875A	A	≒78.75A
Short circuit	Voltage (CV)	≒()V				≒0V
	Resistance (CR)	≒875mΩ	C			≒200	ĴmΩ
Input termi- nal impedance			5	=1.6MΩ	2		
Height		4U					
Weight		40 Kg					
	Voltage			10	0~240V	ac	
AC Input	Frequency			ł	50/60Hz		
	Power			25	50VA ma	ax	

*1. The voltage/current input is no less than 10%FS (FS indicates the full scope).

*2. The scope of read-back resistance is (1/(1/R+(1/R)*0.01%+0.08),1/(1/R-(1/R)*0.01%-0.08)).

*3. The voltage/current input is no less than 10%FS.

*4.The load current value is no less than 4% of FS_CCH.



*5.The load current value is no less than 10% of FS_CCH.

4.1.11 IT8412-1200-150

Model		IT8412-1200-150				
Rated value (0 ~ 40 °C)	Input voltage	0~1200V				
	Input current	3A	15A		150A	
	Input power	3.6KW	12KW			
	Min. operat- ing voltage	1.31V@3A	1.5V@15A		15V@150A	
Constant voltage mode	Range	0.1~120V	0		.1~1200V	
	Resolution	10mV			100mV	
	Accuracy	±(0.05%+0.05%F	S)	±(0.05%+0.05%FS)		
Constant current mode	Range	3A	15A		150A	
	Resolution	80uA	0.4mA		4mA	
	Accuracy	0.05%+0.1%FS	0.05	%+0.05%FS	0.05%+0.05%FS	
Constant re- sistance mode *1	Range	0.1Ω~10Ω	10		Ω~7.5ΚΩ	
	Resolution		16bit			
	Accuracy	0.01%+0.08S *2	2	0.01%+0.0008S		
Constant power Mode *3	Range	12KW				
	Resolution	0.2W				
	Accuracy	0.2%+0.2%FS				
Dynamic Mode						
Dynamic Mode *4	CC Mode					
	T1&T2	20uS~3600S /Res:1 us/10ms/100ms				
	Accuracy	5uS±100ppm				
	Ascending/ descending slope	0.00008~0.075A/uS	0.0004~0.4A/uS		0.004~7.5A/uS	
	Min. rise time *5	≒40uS		≒35uS	≒20uS	
Measuring range						
Read-back voltage	Range	0~120V		0~1200V		
	Resolution	10mV		100mV		
	Accuracy	±(0.025%+0.025%FS)		±(0.025%+0.025%FS)		


Мо	del	IT8412-1200-150					
	Range	3A			15A		150A
Read-back	Resolution	80uA			0.4mA		4mA
ouron	Accuracy	0.05%+0.1	%FS	0.05	%+0.05%	%FS	0.05%+0.05%FS
	Range			•	12KW		
Read-back power *2	Resolution				0.2W		
	Accuracy			±(0.2	%+0.2%	FS)	
		Prot	ection ra	ange			
Overpower protection	≒3.7	8KW ≒12.1KW					V
Overcurrent protection	=3.	15A	:	=15.75A	Ą		≒157.5A
Overvoltage protection		≒1250V					
Overtemper- ature protection		≒85°C					
		Sp	ecificati	on			
	Current (CC)	≒3.15A	N .	:	≒15.75A		≒157.5A
Short circuit	Voltage (CV)	≒(V				≒0V
	Resistance (CR)	≒437.5m	nΩ			≒10	0mΩ
Input termi- nal impedance		≒800KΩ					
Height	8U						
Weight				80 Kg			
	Voltage			10	0~240Va	ас	
AC Input	Frequency			Ę	50/60Hz		
	Power			50	0VA ma	X	

*1. The voltage/current input is no less than 10%FS (FS indicates the full scope).

*2. The scope of read-back resistance is (1/(1/R+(1/R)*0.01%+0.08), 1/(1/R-(1/R)*0.01%-0.08)).

*3. The voltage/current input is no less than 10%FS.



*4.The load current value is no less than 4% of FS_CCH.

*5.The load current value is no less than 10% of FS_CCH.

4.1.12 IT8418-1200-225

Мо	del	IT8418-1200-225					
	Input voltage		C	~1200V			
Rated value	Input current	4.5A		22.5A	225A		
(0~40 °C)	Input power	5.4KW		18	<w< td=""></w<>		
	Min. operat- ing voltage	1.31V@4.5A	1.5	5V@22.5A	15V@225A		
Constant	Range	0~120V		()~1200V		
voltage	Resolution	10mV			100mV		
mode	Accuracy	±(0.05%+0.05%F	S)	±(0.05	%+0.05%FS)		
Constant	Range	4.5A		22.5A	225A		
current	Resolution	0.00012A		0.6mA	6mA		
mode	Accuracy	0.05%+0.1%FS	0.05	%+0.05%FS	0.05%+0.05%FS		
Constant re	Range	0.067Ω~10Ω 10Ω~7.5ΚΩ					
sistance	Resolution		16bit				
mode *1	Accuracy	0.01%+0.08S *2	2	0.01	%+0.0008S		
Constant	Range			18KW			
power Mode	Resolution	0.3W					
^3	Accuracy	0.2%+0.2%FS					
		Dynamic M	ode				
		C	C Mod	e			
	T1&T2	20uS~3	8600S /I	Res:1 us/10ms/	/100ms		
	Accuracy		5u\$	S±100ppm			
Dynamic Mode *4	Ascending/ descending slope	0.00012~0.1125A/ uS	0.00	06~0.6A/uS	0.006~11.25A/uS		
	Min. rise time *5	≒40uS		≒35uS	≒20uS		
		Measuring ra	ange				
Read-back	Range	0~120V		()~1200V		
voltage	Resolution	10mV		100mV			



Мо	del		IT8418-1200-225				
	Accuracy	±(0.025%+	0.025%	FS)	±(0.025%+0.025%FS)		
	Range	4.5A			22.5A		225A
Read-back	Resolution	0.00012	A		0.6mA		6mA
ourone	Accuracy	0.05%+0.19	%FS	0.05	%+0.05 ⁹	%FS	0.05%+0.05%FS
	Range		18KW				
Read-back power *2	Resolution				0.3W		
	Accuracy			±(0.2	%+0.2%	FS)	
		Prote	ection ra	ange			
Overpower protection	≒5.6	7KW			≒1	8.15K\	N
Overcurrent protection	≒4.7	′25A ≒23.625A		A		≒236.25A	
Overvoltage protection		≒1250V					
Overtemper- ature protection		≒85°C					
		Sp	ecificati	on			
	Current (CC)	≒4.725A	Ą	H	=23.625A		≒236.25A
Short circuit	Voltage (CV)	≒()V				≒0V
	Resistance (CR)	≒291.66n	nΩ	≒66.66mΩ			
Input termi- nal impedance	≒533KΩ						
Height				15U			
	Voltage			10	0~240Va	ac	
AC Input	Frequency			Ę	50/60Hz		
	Power			75	i0VA ma	IX	

*1. The voltage/current input is no less than 10%FS (FS indicates the full scope).

*2. The scope of read-back resistance is (1/(1/R+(1/R)*0.01%+0.08), 1/(1/R-(1/R)*0.01%-0.08)).

*3. The voltage/current input is no less than 10%FS.



*4.The load current value is no less than 4% of FS_CCH.

*5.The load current value is no less than 10% of FS_CCH.

4.1.13 IT8424-1200-300

Мо	del	IT8424-1200-300				
	Input voltage		C)~1200V		
Rated value	Input current	6A		30A	300A	
(0 ~ 40 °C)	Input power	7.2KW		24	KW	
	Min. operat- ing voltage	1.31V@6A	1.	5V@30A	15V@300A	
Constant	Range	0~120V			0~1200V	
voltage	Resolution	10mV			100mV	
mode	Accuracy	±(0.05%+0.05%F	S)	±(0.05	5%+0.05%FS)	
Constant	Range	6A		30A	300A	
current	Resolution	160uA		0.8mA	8mA	
mode	Accuracy	0.05%+0.1%FS	0.05	%+0.05%FS	0.05%+0.05%FS	
Constant re	Range	0.05Ω~10Ω	0.05Ω~10Ω 1			
sistance	Resolution			16bit		
mode *1	Accuracy	0.01%+0.08S *2	2	0.01	1%+0.0008S	
Constant	Range	24KW				
power Mode	Resolution	0.4W				
^3	Accuracy	0.2%+0.2%FS				
		Dynamic M	ode			
		C	C Mod	e		
	T1&T2	20uS~3	3600S /	Res:1 us/10ms	/100ms	
	Accuracy		5u	S±100ppm		
Dynamic Mode *4	Ascending/ descending slope	0.00016~0.15A/uS	0.000)8~0.85A/uS	0.008~15A/uS	
	Min. rise time *5	≒40uS		≒35uS	≒20uS	
		Measuring ra	ange			
Read-back	Range	0~120V			0~1200V	
voltage	Resolution	10mV		100mV		



Мо	del	IT8424-1200-300					
	Accuracy	±(0.025%+	0.025%	FS)	±(0.025%+0.025%FS)		
	Range	6A			30A	300A	
Read-back current	Resolution	160uA			0.8mA	8mA	
ouron	Accuracy	0.05%+0.19	%FS	0.05	%+0.05%FS	0.05%+0.05%FS	
	Range		24KW				
Read-back power *2	Resolution				0.4W		
	Accuracy			±(0.2	%+0.2%FS)		
Protection range							
Overpower protection	≒7.5	6KW			≒24.2K\	N	
Overcurrent protection	≒6	.3A	.3A ≒31.5A			≒315A	
Overvoltage protection				=1250V	,		
Overtemper- ature protection		≒85°C					
		Sp	ecificati	on			
	Current (CC)	≒6.3A			≒31.5A	≒315A	
Short circuit	Voltage (CV)	≒()V			≒0V	
	Resistance (CR)	≒218mΩ	2	≒50mΩ			
Input termi- nal impedance		≒400KΩ					
Height				27U			
	Voltage			10	0~240Vac		
AC Input	Frequency			Ę	50/60Hz		
	Power			10	00VA max		

*1. The voltage/current input is no less than 10%FS (FS indicates the full scope).

*2. The scope of read-back resistance is (1/(1/R+(1/R)*0.01%+0.08), 1/(1/R-(1/R)*0.01%-0.08)).

*3. The voltage/current input is no less than 10%FS.



*4.The load current value is no less than 4% of FS_CCH.

*5.The load current value is no less than 10% of FS_CCH.

4.1.14 IT8430-1200-375

Мо	del	IT8430-1200-375				
	Input voltage		(0~1200V		
Reted value	Input current	7.5A		37.5A	375A	
$(0 \sim 40 \ ^{\circ}\text{C})$	Input power	9KW		30KW		
	Min. operat- ing voltage	1.31V@7.5A	1.5	5V@37.5A	15V@375A	
Constant	Range	0~120V		(0~1200V	
voltage	Resolution	10mV			100mV	
mode	Accuracy	±(0.05%+0.05%F	S)	±(0.05	5%+0.05%FS)	
Constant	Range	7.5A		37.5A	375A	
current	Resolution	200uA		1mA	10mA	
mode	Accuracy	0.05%+0.1%FS	0.05	%+0.05%FS	0.05%+0.05%FS	
Constant re	Range	0.04Ω~10Ω		1(10Ω~7.5ΚΩ	
sistance	Resolution			16bit		
mode *1	Accuracy	0.01%+0.08S *2		0.01	%+0.0008S	
Constant	Range			30KW		
power Mode	Resolution	0.5W				
*3	Accuracy		0.2	%+0.2%FS		
		Dynamic Mo	ode			
		С	C Mod	e		
	T1&T2	20uS~3	3600S /	Res:1 us/10ms	/100ms	
	Accuracy		5u	S±100ppm		
Dynamic Mode *4	Ascending/ descending slope	0.0002~0.18A/uS	0.0	001~1A/uS	0.01~18.75A/uS	
	Min. rise time *5	≒40uS		≒35uS	≒20uS	
		Measuring ra	ange			
	Range	0~120V		(0~1200V	
Read-back voltage	Resolution	10mV			100mV	
J	Accuracy	±(0.025%+0.025%	FS)	±(0.025	5%+0.025%FS)	



Мо	del			IT8430-1200)-375	
	Range	7.5A		37.5A		375A
Read-back	Resolution	200uA		1mA		10mA
ourion	Accuracy	0.05%+0.19	%FS	0.05%+0.05	%FS	0.05%+0.05%FS
	Range			30KW		
Read-back power *2	Resolution	0.5W				
	Accuracy			±(0.2%+0.29	%FS)	
		Prote	ection ra	inge		
Overpower protection	≒9.4	5KW		Ę	30.25K	W
Overcurrent protection	≒7.8	75A	Ħ	39.375A		≒393.75A
Overvoltage protection		=1250V				
Overtemper- ature protection				≒85°C		
		Sp	ecificati	on		
	Current (CC)	≒7.875A	4	=39.375	A	≒393.75A
Short circuit	Voltage (CV)	≒()V			≒0V
	Resistance (CR)	≒175mΩ	2	≒40mΩ		
Input termi- nal impedance			=	320KΩ		
Height				27U		
	Voltage			100~240∖	′ac	
AC Input	Frequency			50/60Hz	Z	
	Power			250VA m	ax	

*1. The voltage/current input is no less than 10%FS (FS indicates the full scope).

*2. The scope of read-back resistance is (1/(1/R+(1/R)*0.01%+0.08),1/(1/R-(1/R)*0.01%-0.08)).

*3. The voltage/current input is no less than 10%FS.

*4.The load current value is no less than 4% of FS_CCH.

*5.The load current value is no less than 10% of FS_CCH.



4.1.15 IT8436-1200-450

Мо	Model IT8436-1200-450					
	Input voltage		(0~1200V		
Rated value	Input current	nput current 9A 45A			450A	
(0 ~ 40 °C)	Input power	10.8KW		36KW		
	Min. operat- ing voltage	1.31V@9A	1	.5V@45A	15V@450A	
Constant	Range	0.1~120V		0.	1~1200V	
voltage	Resolution	10mV			100mV	
mode	Accuracy	±(0.05%+0.05%F	S)	±(0.05	%+0.05%FS)	
Constant	Range	9A		45A	450A	
current	Resolution	240uA		1.2mA	12mA	
mode	Accuracy	0.05%+0.1%FS	0.05	%+0.05%FS	0.05%+0.05%FS	
Constant re-	Range	0.035Ω~10Ω		10	Ω~7.5KΩ	
sistance	Resolution		16bit			
mode *1	Accuracy	0.01%+0.08S *2	2 0.01%+0.0008S			
Range 36k			36KW			
power Mode	Resolution	0.6W				
*3	Accuracy		0.2	%+0.2%FS		
		Dynamic M	ode			
		C	C Mod	е		
	T1&T2	20uS~3	3600S /	Res:1 us/10ms	ns/100ms	
	Accuracy		5u	S±100ppm		
Dynamic Mode *4	Ascending/ descending slope	0.00024~0.225A/uS	0.00)12~1.2A/uS	0.012~22.5A/uS	
	Min. rise time	≒40uS		≒35uS	≒20uS	
	*5					
		Measuring ra	ange			
Dood book	Range	0~120V		C	~1200V	
voltage	Resolution	10mV			100mV	
	Accuracy	±(0.025%+0.025%	FS)	±(0.025	%+0.025%FS)	
Read-back current	Range	9A		45A	450A	



Мо	del	IT8436-1200-450					
	Resolution	240uA		1.2n	۱A	12mA	
	Accuracy	0.05%+0.1	%FS	0.05%+0.	05%FS	0.05%+0.05%FS	
	Range			36K	W	-	
Read-back power *2	Resolution			0.6	V		
•	Accuracy			±(0.2%+0	.2%FS)		
		Protection range					
Overpower protection	≒11.3	34KW			≒36.3KV	V	
Overcurrent protection	≒9.4	45A	:	=47.25A		≒472.5A	
Overvoltage protection		≒1250V					
Overtemper- ature protection		≒85°C					
		Sp	ecificati	on			
	Current (CC)	≒9.45A	۱.	≒47.2	25A	≒472.5A	
Short circuit	Voltage (CV)	≒(VC			=0∨	
	Resistance (CR)	≒145mΩ	2		≒33.3	≒33.33mΩ	
Input termi- nal impedance			=2	266.66ΚΩ			
Height				27U			
	Voltage			100~24	0Vac		
AC Input	Frequency			50/60	Hz		
	Power			1500VA	max		

*1. The voltage/current input is no less than 10%FS (FS indicates the full scope).

*2. The scope of read-back resistance is (1/(1/R+(1/R)*0.01%+0.08),1/(1/R-(1/R)*0.01%-0.08)).

*3. The voltage/current input is no less than 10%FS.

*4.The load current value is no less than 4% of FS_CCH.



*5.The load current value is no less than 10% of FS_CCH.

4.1.16 IT8442-1200-525

Мо	del	IT8442-1200-525				
	Input voltage		()~1200V		
Rated value	Input current	10.5A		52.5A	525A	
(0 ~ 40 °C)	Input power	12.6KW		42	KW	
	Min. operat- ing voltage	1.31V@10.5A	1.	5V@52.5A	15V@525A	
Constant	Range	0.1~120V		0.	1~1200V	
voltage	Resolution	10mV			100mV	
mode	Accuracy	±(0.05%+0.05%F	S)	±(0.05	i%+0.05%FS)	
Constant	Range	10.5A		52.5A	525A	
current	Resolution	280uA		1.4mA	14mA	
mode	Accuracy	0.05%+0.1%FS	0.05	%+0.05%FS	0.05%+0.05%FS	
Constant ro	Range	0.03Ω~10Ω		10)Ω~7.5ΚΩ	
sistance	Resolution			16bit		
mode *1	Accuracy	0.01%+0.08S *2	2	0.01	%+0.0008S	
Constant	Range	42KW				
power Mode	Resolution	0.7W				
*3	Accuracy		0.2	%+0.2%FS		
		Dynamic M	ode			
		C	C Mod	е		
	T1&T2	20uS~3	3600S /	Res:1 us/10ms/	/100ms	
	Accuracy		5u	S±100ppm		
Dynamic Mode *4	Ascending/ descending slope	0.00028~0.26A/uS	0.00)14~1.5A/uS	0.014~26.25A/uS	
	Min. rise time *5	≒40uS		≒35uS	≒20uS	
		Measuring ra	ange			
	Range	0~120V		()~1200V	
Read-back voltage	Resolution	10mV			100mV	
5	Accuracy	±(0.025%+0.025%	FS)	±(0.025%+0.025%FS)		



Мо	del			IT8442-1200)-525		
	Range	10.5A		52.5A		525A	
Read-back current	Resolution	280uA		1.4mA		14mA	
	Accuracy	0.05%+0.19	%FS	0.05%+0.05	%FS	0.05%+0.05%FS	
	Range			47KW			
Read-back power *2	Resolution	0.7W					
•	Accuracy		±(0.2%+0.2%FS)				
	Protection range						
Overpower protection	=13.2	23KW		Ę	42.35K	W	
Overcurrent protection	≒11.(025A ≒55.125A				≒551.25A	
Overvoltage protection		≒1250V					
Overtemper- ature protection		≒85°C					
		Sp	ecificati	on			
	Current (CC)	≒11.025	A	≒55.125	A	≒551.25A	
Short circuit	Voltage (CV)	≒()V			≒0V	
	Resistance (CR)	≒125mΩ	2	≒28.6mΩ			
Input termi- nal impedance			:	=228KΩ			
Height				37U			
	Voltage			100~240\	/ac		
AC Input	Frequency			50/60Hz	Z		
	Power			1750VA m	nax		

*1. The voltage/current input is no less than 10%FS (FS indicates the full scope).

*2. The scope of read-back resistance is (1/(1/R+(1/R)*0.01%+0.08), 1/(1/R-(1/R)*0.01%-0.08)).

*3. The voltage/current input is no less than 10%FS.

*4.The load current value is no less than 4% of FS_CCH.



*5.The load current value is no less than 10% of FS_CCH.

4.1.17 IT8454-1200-675

Model IT8454-1200-675						
	Input voltage		0	~1200V		
Pated value	Input current	13.5A		67.5A	675A	
$(0 \sim 40 \degree C)$	Input power	16.2KW		54KW		
	Min. operat- ing voltage	1.31V@13.5A 1.5		5V@67.5A	15V@675A	
Constant	Range	0~120V			0~1200V	
voltage	Resolution	10mV			100mV	
mode	Accuracy	±(0.05%+0.05%F	S)	±(0.0	5%+0.05%FS)	
Constant	Range	13.5A		67.5A	675A	
current	Resolution	360uA		1.8mA	18mA	
mode	Accuracy	0.05%+0.1%FS	0.05	%+0.05%FS	0.05%+0.05%FS	
Constant re	Range	0.025Ω~10Ω		10Ω~7.5ΚΩ		
sistance	Resolution			16bit		
mode *1	mode *1 Accuracy 0.01%+0.08S *2		0.01	%+0.0008S		
Constant	Range			54KW		
power Mode	Resolution	0.9W				
*3	Accuracy		0.29	%+0.2%FS	3	
		Dynamic Mo	ode			
		С	C Mode	Э		
	T1&T2	20uS~3	600S /F	Res:1 us/10ms	/100ms	
	Accuracy		5u\$	S±100ppm		
Dynamic Mode *4	Ascending/ descending slope	0.00036~0.33A/uS	0.00	18~1.9A/uS	0.018~33.75A/uS	
	Min. rise time *5	≒40uS		≒35uS	≒20uS	
		Measuring ra	ange			
	Range	0~120V			0~1200V	
Read-back voltage	Resolution	10mV			100mV	
	Accuracy	±(0.025%+0.025%	FS)	±(0.025	5%+0.025%FS)	



Мо	del	IT8454-1200-675					
	Range	13.5A		67.5A		675A	
Read-back	Resolution	360uA		1.8mA		18mA	
ouron	Accuracy	0.05%+0.1%FS		0.05%+0.05%FS		0.05%+0.05%FS	
	Range		54KW				
Read-back power *2	Resolution	0.9W					
	Accuracy			±(0.2%+0.2%	%FS)		
Protection range							
Overpower protection	≒17.0	1KW		<u>ب</u>	54.45K	W	
Overcurrent protection	≒14. <i>′</i>	≒14.175A		70.875A		≒708.75A	
Overvoltage protection	≒1250V						
Overtemper- ature protection	≒85°C						
Specification							
	Current (CC)	≒14.175A		≒70.875	A	≒708.75A	
Short circuit	Voltage (CV)	≒(VC	≒0V			
Chortonoult	Resistance (CR)	≒97.22m	Ω	≒22.22mΩ			
Input termi- nal impedance	=177.77ΚΩ						
Height	37U						
	Voltage	tage 100~240Vac					
AC Input	Frequency			50/60Hz	Z		
	Power			nax			

*1. The voltage/current input is no less than 10%FS (FS indicates the full scope).

*2. The scope of read-back resistance is (1/(1/R+(1/R)*0.01%+0.08),1/(1/R-(1/R)*0.01%-0.08)).

*3. The voltage/current input is no less than 10%FS.

*4.The load current value is no less than 4% of FS_CCH.

*5.The load current value is no less than 10% of FS_CCH.



4.2 Additional features

Memory capacity: 100 groups.

Recommended calibration frequency: 1 time/year.

Cooling method: fan.



5 References of Load Communication Interfaces

- RS-232 interface
 USP interface
- ♦ USB interface
- GPIB interface
 LAN interface

This series electronic load is provided with four communication interfaces to communicate with a computer for selection, including RS–232, USB, GPIB and LAN. The customer can choose any one according to his demands.

5.1 RS-232 interface

Cable connection load with both ends of COM interface (DB9) and computer. Composite key **[Shift] + 8**(System) on front board can be used to enter system menu for activation.

In RS-232 interface, all SCPI commands can be used for programming. If RS-232 interface is selected, in accordance with internal connection of data terminal equipment (DTE) and data communication equipment (DCE) as defined in EIA RS-232, the load is connected to another DTE (e.g., PC COM interface) with direct-connected Modem cable.

∐Note

RS-232 setting in procedure should be consistent with that in system menu of front board. Press composite key **[Shift] + 8**(System) to change (if necessary). Send a ^C or ^X character string to the load to pause data transmission. It will clear any uncompleted operation and waive any uncompleted output.

RS-232 data format

RS-232 data comprises start bit, odd and even parity check bit, stop bit and 8bit data bit. Start bit and stop bit are not editable. However, next odd or even item can be selected by front board **[Shift] + 8**(System). The odd and even items are saved in NVM.

Baud rate

Through front board **[Shift] + 8**(System), the user may select one Baud rate saved in NVM: 4800 /9600 /19200 /38400 /57600 /115200



RS-232 Connection

Use RS-232 cable with DB-9 interface because the RS-232 serial port can be connected controller (e.g. PC) serial port. Do not use modulating cable of air-conditioner. Refer to Table 2-2 for plug pin.

If your computer is provided with a RS-232 interface with DB-25 plug, a cable and a adapter with DB-25 plug (one end) and DB-9 plug (the other end) are required (not the modulating cable of the air-conditioner).

RS232 Pins of Plug	Pin number	Description
54321	1	No conjunction
	2	TXD, data transmission
0 8 7 6	3	RXD, data receiving
9070	4	No conjunction
	5	GND, grounding
	6	No conjunction
	7	CTS, clear to send
	8	RTS, request to send
	9	No conjunction

RS-232 troubleshooting

In case of connection failure of RS-232, perform following check:

- Check if the computer and load are provided with same Baud rate, parity check bit, data bit and flow control. The power shall be configured with one start bit (fixed) and one stop bit (fixed).
- Just as described in the RS-232 connector, correct interface cable or adapter shall be adopted. Note: even if the cable is equipped with right plug, internal wiring may be incorrect.
- The interface cable must be connected to the correct serial port (COM1, COM2, etc.) of the computer.

Setting of communication

Before communication operation, be sure to match load and PC parameters (as follows).



Baud rate: 9600 (4800/9600/19200/38400/57600/15200). You may enter system menu through the board to set communication Baud rate.

Data bit: 8 bits

Stop bit: 1 bit

Check: none

Start Bit	8 Data Bits	Parity=None	Stop Bit
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5.2 USB interface

Connect the load and the computer using a cable with two USB interfaces (each end). All functions of the load can be programmed via USB.

The functions of load USB488 interface are as follows:

- The interface is 488.2 USB488 Interface.
- The interface receives requests of REN_CONTROL, GO_TO_LOCAL and LOCAL_LOCKOUT.
- The interface receives the command MsgID=TRIGGER USBTMC and conveys the TRIGGER command to the functional layer.

The functions of load USB488 device are as follows:

- Capable to read all common SCPI commands.
- SR1 enabled.
- RL1 enabled.
- DT1 enabled.

5.3 GPIB interface

Firstly, connect load GPIB interface and computer GPIB card through IEEE488 bus and ensure sufficient contact. Tighten them with screws. Set address. Load address range: 0 to 31. Press **[Shift] + 8**(System) to enter system menu functions. Press Left/Right key to find Communication. Select GPIB and set address. Input address and press **[Enter]** for confirmation. The load works by setting GPIB address on front board. GPIB address is saved in NVM.



5.4 LAN interface

Press **[Shift] + 8**(System) button to enter the system set. Please select "LAN" in the Communication from System and then configure Gateway, IP, Mask and Socket Port in the LAN option.

Connect the LAN interface of load to the computer with a reticle (crossed). The gateway address should be consistent with that of the PC, and the IP address should be at the same network segment with the PC's IP address.



A Appendix

- Specifications of Red and Black Test Cables
- ◆ Fuse Replacement

A.1 Specifications of Red and Black Test Cables

ITECH provides you with optional red and black test cables, which are sold individually and you can select for test. For specifications of ITECH test cables and maximum current values, refer to the table below.

Model	Specifica- tion	Length	Description
IT-E30110-AB	10A	1m	A pair of red and black test ca- bles with an alligator clip at one end and a banana plug at the other end
IT-E30110-BB	10A	1m	A pair of red and black test ca- bles with banana plugs at both ends
IT-E30110-BY	10A	1m	A pair of red and black test ca- bles with a banana plug at one end and a Y-terminal at the other end
IT-E30312-YY	30A	1.2m	A pair of red and black test ca- bles with Y-terminals at both ends
IT-E30320-YY	30A	2m	A pair of red and black test ca- bles with Y-terminals at both ends
IT-E30615-OO	60A	1.5m	A pair of red and black test ca- bles with round terminals at both ends
IT-E31220-OO	120A	2m	A pair of red and black test ca- bles with round terminals at both ends



Model	Specifica- tion	Length	Description
IT-E32410-OO	240A	1m	A pair of red and black test ca- bles with round terminals at both ends
IT-E32420-OO	240A	2m	A pair of red and black test ca- bles with round terminals at both ends
IT-E33620-OO	360A	2m	A pair of red and black test ca- bles with round terminals at both ends

For maximum current of AWG copper wire, refer to table below.

AWG	8	10	12	14	16	18	20	22	24	26	28
The Maxi- mum Current Value (A)	60	40	30	20	13	10	7	5	3.5	2.5	1.7

Note

- AWG (American Wire Gage), it means X wire (marked on the wire). The table above lists current capacity of single wire at working temperature of 30°C. For reference only.
- Along with temperature, you must also consider voltage drop when selecting wire sizes.

Although the instrument will compensate for the voltage in the wires, it is recommended to minimize the voltage drop as much as possible to prevent excessive power consumption from the instrument and poor dynamic response to load changes. Larger diameter wire sizes will help minimize wire voltage drops. Twisting or bundling wires will help reduce transient voltage drops.

A.2 Fuse Replacement

Different models of our company product are supplied with different fuse assembly. The way to replace the fuse changes accordingly. The common ways are as follows. Please choose the corresponding way of disassembly and replacement based on the fuse assembly of the actual instrument.



Note

If there are no fuse assembly on the instrument rear panel, it means that you can't replace the fuse by yourself. Please contact the ITECH engineer on the condition of the same malfunction.



The type of the fuse	The way to replace
Lind Hand	 Use a screwdriver to push and turn the fuse box anti-clockwise. When turned to 90 degrees, release the screwdriver. Refer to the picture below.
	(
	The fuse box will bounce up, then you can see the fuse in it. Take out the blown fuse.
	 Please replace with a fuse of the same specification. Refer to the technical specifi- cation of the corresponding instrument.
	4. When install, put into the fuse box as the picture below. Then use a screwdriver to push and turn the fuse box to 90 degrees clockwise. Refer to the picture below.
	ysnd
	The power cord jack of the instrument includes the fuse. Please refer to the rear panel intro- duction of the corresponding instrument for the detailed position. The replacement steps for this type of the fuse are as follows.
	1. First pull out the power cord, and then take out the fuse block from the power cord jack with a small screwdriver, as shown below.
	2. Have a visual inspection of the fuse to see whether it is burnt out; if yes, replace it with another fuse of the same specification. Re- fer to the corresponding technical specifi- cations for fuse rating.



The type of the fuse	The way to replace
	 After replacement, mount the fuse block to the original position, as illustrated below.
	 Push and turn the fuse box anti-clockwise by hand. When turned to 90 degrees, re- lease the screwdriver. The fuse box will bounce up, then you can see the fuse in it. Take out the blown fuse. Please replace with a fuse of the same specification. Refer to the technical specifi- cation of the corresponding instrument. When install, put into the fuse box firstly. Then Push and turn the fuse box to 90 de- grees clockwise.



Connect with us

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

